Essex Highways

Colchester Local Plan Review: Regulation 19 Transport Evidence

18 August 2026

RINGWAY JACOBS
integrated expertise

Essex County Council

Document control sheet

Regulation 19 Transport Evidence

Project	Colchester Local Plan Review		
Client	Essex County Council and Colchester City Council		
Project no.	B3553RH5	**Project manager**	SB, NM
Document ref.	Col-LP-TE	**Prepared by**	MW
Revision no.	Consultation draft	**Date**	18 August 2026
Document status	Consultation draft		

Document history

Revision	Date	Author	Check	Review	Approved
Working draft	03/08/2026	MW, PB, KC	TP	CS,MW	MW
Consultation draft	18/08/2026	MW, PB, KC	TP	CS,MW	MW

Distribution

Revision	Issued on	Issued to	Organisation
Working draft	03/08/2026	AL, IT, SP, SS, RF	ECC, CCC
Consultation draft	18/08/2026	AL, IT, SP, SS, RF	ECC, CCC

Contact

Jacobs UK Ltd

2nd Floor, Cottons Centre
Cottons Lane
London SE1 2QG
United Kingdom

T: +44 (0)203 980 2000
E: martin.whittles@jacobs.com
W: www.jacobs.com

Disclaimer

Essex Highways

Contents

Appendices

List of tables

List of figures

Abbreviations and acronyms

Term	Description
BaU	Business as usual
BRT	Bus rapid transit
BSIP	Bus Service Improvement Plan
CCC	Colchester City Council
CTM	Colchester Transport Model
DfT	Department for Transport
DPD	Development Plan Document
DRT	Demand responsive transport
ECC	Essex County Council
HGV	Heavy goods vehicle
HQPT	High Quality Public Transport
IADP	Infrastructure Audit and Delivery Plan
LCWIP	Local Cycling and Walking Infrastructure Plan
LGV	Light goods vehicle
LTP	Local Transport Plan
LTP4	Local Transport Plan
MSOA	Middle-layer Super Output Area
NEMo	North Essex Model
NH	National Highways
NPPF	National Planning Policy Framework
NTEM	National Trip End Model
NTS	National Travel Survey
P&C	Park and choose
P&R	Park and ride

Term	Description
RTI	Real time information
RTS	Rapid transit system
SRN	Strategic Road Network
ST	Sustainable transport
TAG	Transport Analysis Guidance
TCBGC	Tendring Colchester Borders Garden Community
TDC	Tendring District Council
TEMPro	Trip End Model Programme
TfGM	Transport for Greater Manchester
TfL	Transport for London
UTC	Urban traffic control
v/c	Volume divided by capacity
VDM	Variable demand modelling
WYCA	West Yorkshire Combined Authority

Executive summary

Overview
This report assesses the transportation impact of proposed new local plan growth described in Colchester City Council's (CCC) submission draft of the Regulation 19 Plan to 2043. Grounded in planning guidance, the assessment identifies integrated transport improvements required to mitigate severe impacts and support the plan's vision for sustainable, well-connected, inclusive, vibrant and diverse places.

The assessment extends the transportation evidence collated in the *Colchester Local Plan Review: Further Transport Evidence* report [13], which established the need for an integrated transport approach in which land use planning, place-making, active travel, public transport and highways schemes each contribute to the end goals. In this new evidence report, the strategy is developed further by providing additional information on integrated schemes on western approaches (through A12 J25-27), northern approaches (through A12 J28-29), eastern approaches (using the A133), city centre routes, and to villages in outer areas.

Chapter 1: Framework for assessment
Chapter 1 of the report explains how the assessment methodology is framed in the National Planning Policy Framework (NPPF) [16], which encourages a vision-led approach in which transport and land use plans should seek to meet tomorrow's vision and not that of yesteryear. Accordingly, the chapter describes how the regional, county and local visions align and guide the integrated and sustainable approach to mitigating the impacts of growth. This uses growth as an opportunity to shape the future transport network for the benefit of all with improved connectivity and choice of travel modes.

While there is a presumption in favour of growth in sustainable, well connected locations such as near stations with frequent rail services, there is a requirement to mitigate severe impacts and avoid highway safety problems. Hence, Chapter 1 explains the sequential method used to predict and resolve problems which involves: setting up a 2043 reference case of committed and expected growth; comparing a 2043 assessment case of local plan growth without mitigation against the reference case; using the findings to identify and test a 2043 assessment case of local plan growth with mitigation to demonstrate the transport impact of how growth can be managed.

Chapter 2: Transport challenges of growth
Chapter 2 introduces the North Essex Model (NEMo), which is a strategic highway and public transport model, that has been used as the principal tool to assess the cumulative impacts of growth. NEMo is run with variable demand modelling (VDM) which allows trip makers to respond to traffic conditions by changing mode or destination. At A12 J25-26, A12 J29 and A133 Clingoe Hill the strategic modelling has been complemented by VISSIM microsimulation modelling, which provides a finer grain of traffic assessment. The chapter also introduces a movement index to help identify when the impact of growth might have unacceptable consequences on movement affecting general traffic, buses and active travel.

Reference case growth reflects housing and employment growth that would be certain or more than likely to come forward without the new local plan. It is estimated in Colchester this could amount to over 9,000 homes and over 5,000 jobs, including its share of the Tendring Colchester Borders Garden Community (TCBGC). Since the

neighbouring authorities of Braintree and Tendring are also updating local plans, it was considered appropriate to include residential and employment growth as set out in their Regulation 18 preferred options' plans, given their Regulation 19 growth was not available at the time of testing. Whilst allocations in these plans are hypothetical, the scale of growth is aligned to government targets with the quantum of growth not likely to change significantly, so, on balance, they were considered apposite to include in the reference case. It also allows for a robust cumulative test of the impacts of growth.

Using the movement index, Chapter 2 shows that committed reference case growth could have unacceptable impacts on key parts of the highway network by 2043 including safety problems at A12 J29 with queueing traffic extending onto the A120 mainline; and extreme congestion on A133 Clingoe Hill, A12 J29, the western approach from A12 J26-27 and the central route from Balkerne Hill to North Station, which affect the movement of all modes including access to rail stations. The cause and responsibility for mitigating these problems lie across reference case developments in Colchester, Tendring and Braintree. While the Further Transport Evidence report identified and introduced mitigation on Clingoe Hill at Greenstead roundabout and at A12 J29 such mitigation is hypothetical despite being identified as required in Tendring Colchester Borders Garden Community's (TCBGC) Development Plan Document (DPD) [6]. Consequently, this current assessment does not mitigate the unacceptable highway impacts at these locations in the reference case. Instead, it seeks to show how the cumulative impact of both reference case and new local plan growth can be mitigated so the end point is known. Then, as developments come forward, the end point schemes can be delivered incrementally with scheme increments apportioned fairly between those developments contributing to the need for mitigations with regard to planning rules set out in *The Community Infrastructure Levy Regulations 2010* [25].

Chapter 2 then describes how CCC's new local plan could add a further 15,000 homes and 16,000 jobs on top of reference case growth (that is, approximately 24,000 more homes and 21,000 more jobs in total by 2043). The movement index shows that unacceptable impacts remain on A133 Clingoe Hill, A12 J29, the western approach from A12 J26-27 and on the central route to North Station; but unacceptable conditions have extended to A12 J25, lower Ipswich and Harwich Roads, and the northern approach from A12 J28. Impact in outlying areas is not considered problematic in villages with growth, but this should not be interpreted as implying growth can occur without transport mitigations in these locations, which are also required to improve connectivity. It is relevant to note that the identification of unacceptable transport problems using the movement index is comparing the new local plan growth scenario with the reference case scenario.

Chapter 3: Integrated transport solutions

Having identified the scale and location of the challenges, Chapter 3 introduces an integrated and vision-based approach to mitigation. As mentioned above, the mitigations would need to be delivered incrementally as reference case and new local plan growth come forward. The first group of measures explain how the unacceptable movement problems on the highway network can be addressed in a manner that keeps general traffic moving safely and prioritises public transport and active travel, and supports place-making by addressing severance. Key schemes are:

- upgrades to urban traffic control technologies to co-ordinate traffic movements by all modes across the city

- A12 J29 signalisation and widening of the A120 off-slip
- Greenstead roundabout and Wivenhoe Park corner junction co-ordinated with rapid transit system (RTS) priority and crossings
- A12 J25 signalisation and a remodelled junction at the Station Road roundabout including footbridge widening across the A12 and new RTS priority
- A12 J26 signalisation of the approaches through Tollgate and London Road roundabouts also supporting RTS priority and crossings
- A12 J27 signalisation
- partial signalisation of St Andrews Avenue junctions with Ipswich and Harwich Roads

These highway and traffic management schemes support the introduction of a second group of measures for public transport improvements. Key mitigations include a western extension of the RTS, which provides a fast, direct and convenient connection between Marks Tey local plan allocations to the city centre. In addition, the priority of the committed RTS scheme to TCBGC is maintained by introducing a dedicated westbound RTS lane on the A133 Clingoe Hill from Wivenhoe Park Corner to Knowledge Gateway, where it joins a recently constructed RTS lane to Greenstead roundabout. Local bus services are also extended and increased in frequency to serve new local plan allocations.

Furthermore, the reach of people to public transport is enhanced through a network of mobility hubs – improving access to public transport and interchange between high quality public transport services and other modes – and a new bus station introduced in the city centre. A park and choose (P&C) site in the west is also proposed which would be served by RTS West. Rail upgrades also have a significant role in supporting sustainable development but long term, strategic investment is required to increase train frequencies on the Great Eastern mainline connecting Colchester to London and Norwich, and the branch lines to Sudbury, Clacton and Walton & Frinton. Hence, rail mitigations are not directly included since they were considered impractical for site promoters and developers to deliver in the plan period to 2043. However, rail enhancements, when delivered, will sustain opportunities for long term growth beyond 2043. Taking this into consideration, the highway authority Essex County Council (ECC), CCC and rail operators should continue to engage throughout the local plan period and beyond to realise rail potential.

The highway and public transport mitigations support and co-ordinate with a third group of measures for active travel and place making. Walking and cycling mitigations focus on connecting allocations to nearby destinations including stations and mobility hubs. The routes need to run through allocations and support place-making on and off allocations. It is recognised that use of active travel infrastructure and public transport networks will be enhanced by place-making on allocations, travel planning and parking standards.

Chapter 4: Transport assessment of growth with mitigation
Chapter 4 then presents findings from NEMo and VISSIM models in which local plan growth is assessed with the integrated vision-based mitigation. It is first assumed that travel choice is based on today's behaviour referred to as business as usual (BaU). NEMo is used with VDM to assess the combined impact of the key highway and public transport changes using this BaU trip demand assumption. Through the movement

index, it is shown that unacceptable congestion problems are partially mitigated whilst maintaining priority for public transport. Severe queuing and blocking back of traffic improve at some of the problem locations, which indicate movement by all modes will be more reliable overall. Supplementary information predicting changes in journey times and queue lengths through A12 J25-26, A12 J29 and A133 Clingoe Hill from VISSIM microsimulation models is also summarised. However, on balance, the evidence from NEMo and VISSIM indicates that the cumulative reference case and new local plan growth can only be acceptably mitigated if there were also changes in travel behaviour with greater uptake of walking, cycling and public transport than assumed in a BaU situation.

Hence NEMo is re-run with an assumption of a greater shift away from car travel due to more uptake of walking, cycling and public transport than assumed with BaU demand. This scenario with reduced car demand is referred to as the sustainable transport (ST) scenario. The evidence for such a shift was collated in the *Further Transport Evidence* report and the method to reduce car demand carefully considers the geography and distance of trips. Applying such a reduction is also consistent with planning policies which seek to monitor and manage car trips at large sites and decrease the distance of trips through land use planning choices – which make it more likely that car trip demand would decrease. When NEMo is run with ST – which also includes the highway and public transport network mitigations which are necessary to deliver improved active travel and public transport connectivity – the movement index shows that acceptable performance of the highway network can be achieved. That is, the cumulative transport impact of reference case and local plan growth can be acceptably managed using the mitigation strategy.

Chapter 5: Long range forecast beyond the plan period
It is recognised that growth of some allocations might extend beyond 2043 with continued expansion at the committed site of TCBGC (circa 7,500 homes), the local plan area of growth around Marks Tey station (circa 6000 homes – indicative figure for testing), Hare Green and Horseley Cross garden villages in Tendring (circa 10,000 homes). Consequently, Chapter 5 describes findings from a long-range NEMo forecast to 2058. This forecast compares a 2058 scenario with significant growth in Colchester's western and eastern borders with a 2058 reference scenario containing lower level of growth.

The 2058 scenarios do not include additional mitigation. The 2058 reference case shows that the mitigation approach to 2043 is robust to further low levels of growth, which also serves as a useful sensitivity test. However, significant and concentrated growth to the west at Marks Tey shows that conditions on the A12 mainline deteriorate; and additional mitigations would be required on the A133 and A120 routes to accommodate high growth at the eastern locations. Achieving higher levels of active and public transport, which could be achieved through rail frequency improvements and expansion of high quality public transport and cycle networks, will assist with the scale of highway capacity increases that might be required. On balance the 2058 scenarios provide confidence that the integrated transport and vision-based mitigation strategy provides a strong foundation to enable growth beyond 2043. Though growth beyond 2043 would require significant strategic highway and rail infrastructure improvements. The long-range assessment demonstrates that growth beyond 2043 could generate a need for additional strategic transport infrastructure, particularly on the A12 corridor serving the Marks Tey growth area. As a result, the evidence supports the local plan's approach of safeguarding a route corridor for potential future A12 widening, ensuring

that longer-term growth aspirations can be accommodated if required.

Chapter 5 also considers how growth to and beyond 2043, accompanied by appropriate public transport and active travel mitigations, would change the connectivity of the council area as measured by the Department for Transport's (DfT) Connectivity Tool. The change in score indicates that the planned approach, with growth areas accompanied by high quality public transport and cycling and walking infrastructure would support a reduction in car trip rates since people have a wider choice of viable travel choices in well connected areas instead of driving. This indicates that the combination of growth and mitigations to 2043 might drive the behavioural change needed to facilitate growth beyond 2043 in a manner that improves connectivity and choice.

Chapter 6: Conclusion
Chapter 6 concludes the report by summarising the key finding that the impact of growth to 2043 can be managed through integrated and vision-based mitigation in which key highway schemes support reliable journey times and create the space for further improvements to public transport and active travel networks in Colchester.

The conclusion also explains how there will be a need to co-ordinate and fairly apportion the cost of measures between:

- strategic infrastructure bodies such as Network Rail and National Highways (NH) for rail enhancements and a portion of Strategic Road Network (SRN) improvements
- committed sites including TCBGC to contribute to a share of the mitigations needed to address unacceptable reference case problems particularly at A12 J29 and along the A133 corridor
- local plan growth in Tendring which also would need to contribute to reference case problems
- new local plan sites in Colchester which focus on A12 J25-27 improvements, dynamic traffic management technologies RTS West and local bus and active travel connectivity

1 Framework for assessment

Introduction and summary

Colchester's proposed new local plan identifies allocations that can provide approximately 15,000 more homes and 16,000 more jobs by 2043. This is addition to 9,000 homes, including its share of Tendring Colchester Borders Garden Community (TCBGC), and an estimated 5,000 jobs from its adopted local plan commitments. The purpose of this transport evidence report is to assess the impact of this growth on the transportation network and identify appropriate mitigation.

This chapter explains that the approach to assessment and mitigation is grounded in the National Planning Policy Framework (NPPF), which encourages a vision-led approach to transport planning. The chapter describes the vision for Colchester and how it is aligned with regional and county objectives. This vision sees growth as an opportunity to shape the future by improving connectivity and choice of travel modes.

1.1 Purpose of transport evidence

1.1.1 Purpose

The purpose of this report is to assess the transportation impact of Colchester City Council's (CCC) Regulation 19 Local Plan to 2043, and develop and test an appropriate vision-based mitigation strategy. The study extends the *Further Transport Evidence* report [13] which supported the evidence base for the Regulation 18 Preferred Options Local Plan [3].

The Regulation 18 phase focussed on identifying an integrated and sustainable transport strategy to align with a vision, and network-wide assessment of impacts. Meanwhile, the Regulation 19 transport evidence seeks to provide greater confidence that the strategy is plausible through providing more details of measures. That is:

- Regulation 18 is setting the strategy, which identifies how the transport authorities can respond to growth (the 'how')
- Regulation 19 is setting the tactics, which confirms what is required to implement the strategy (the 'what') – which is the focus of this report on transport evidence

Figure 1.1 shows how the process of transport assessment commences with a vision, reflecting planning guidance summarised in Section 1.3. The integrated and sustainable transport vision referred to in the figure reflects the vision introduced in Section 1.4 and the sustainability of locations for site allocation has been considered in the earlier transport evidence report [14].

The figure then shows that transport assessment at the Regulation 19 stage needs to consider how people and goods can move acceptably around the network by all modes (e.g. private vehicles, deliveries, rail, bus, cycling, wheeling and walking). Strategic and microsimulation transport models provide indicators that help assess if people and goods are predicted to move acceptably through the highway network.

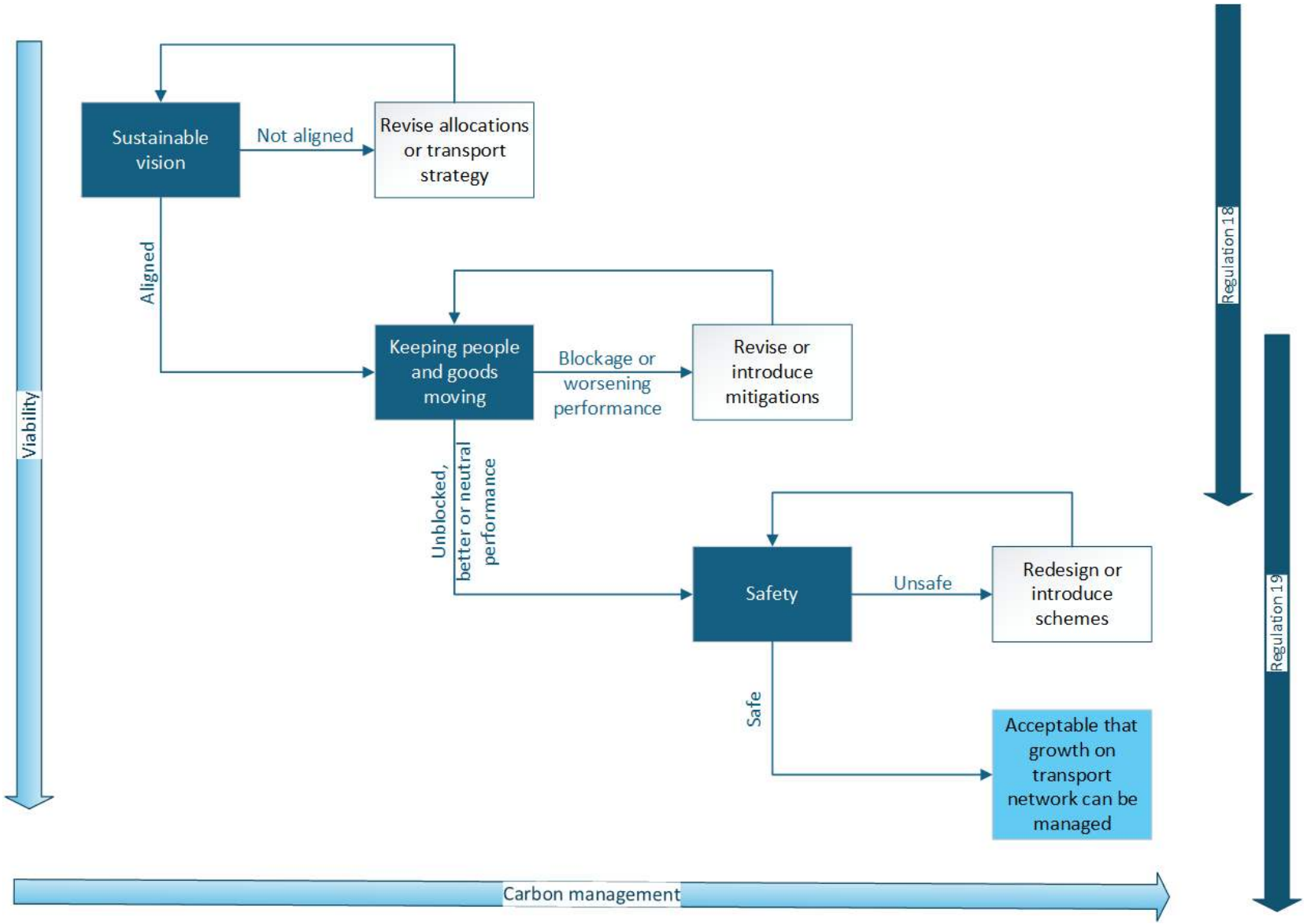

Figure 1.1: Criteria to inform assessment of acceptability of growth from the perspective of transport

To some extent safety is a requirement considered throughout, however, it is only after details on movements, mode shift and mitigation measures are derived that a judgement can be made on residual safety issues. Hence, safety is a final check, which might prevent or necessitate changes to elements of the Local Plan and its mitigation approach. In this report, safety concerns have informed the requirement for mitigation measures to accompany growth, such as at A12 J29.

Throughout the steps shown in Figure 1.1 it is also important to consider viability since the vision, mitigations and schemes need to be affordable and deliverable. Furthermore, it is recommended that carbon implications and the approach to carbon management is developed from the outset. By doing so, opportunities for whole life carbon reductions can be incorporated into decision making.

1.2 Structure

The Regulation 19 transport assessment first seeks to understand the significant transportation and movement problems that arise from a reference case of committed growth in Colchester, which includes TCBGC, and expected growth in surrounding districts including the neighbouring planning authorities of Braintree and Tendring. In Colchester, reference case growth is estimated at 9,000 homes and 5,000 jobs – which would occur without the proposed new local plan.

The assessment then seeks to identify the impact of proposed new local plan growth on top of the reference case which would add 15,000 homes and 16,000 jobs, leading to 24,000 more homes and 21,000 more jobs by 2043 across both the reference and assessment cases. This could increase demand for car trips in the Colchester area by over 20% if people's travel choice remained as today. This growth leads to unacceptable transport problems without appropriate mitigation which is yet to be fully identified.

The report next seeks to provide confidence that feasible, deliverable and affordable transport mitigations can be found that are able to alleviate the cumulative impact of reference and new local plan growth in a manner consistent with a vision and national and local transport policies. This vision seeks to avoid severe impact and support increased connectivity by widening the choice of viable transport options for trips beyond cars. It is recognised that mitigation will need to be phased to align with reference and new local plan developments as they come forward, since the need for some of the mitigation is caused by reference case growth.

The report then seeks to demonstrate that the transport impact of local plan growth with vision-based mitigation is manageable, with people able to move reliably through the network on all modes. Consideration is also given to the implications of growth beyond the plan period.

It has been assumed that neither the J19-25 A12 (Chelmsford to A120) widening scheme nor the proposed A120 Braintree to A12 scheme come forward by 2043 over the life of the new plan, which is a factor influencing the size of housing allocations around Marks Tey. It is assumed that committed infrastructure such as the A1331 link road would be fully completed by 2043 along with the rapid transit system (RTS) connecting to TCBGC.

Figure 1.2 sets out the process that has been followed to develop the further transport evidence. To the sides of the diagram are chapter and appendix references to help

the reader navigate to relevant sections of interest in the report. As far as possible, technical explanations and analysis have been placed in appendices rather than the main body of the report.

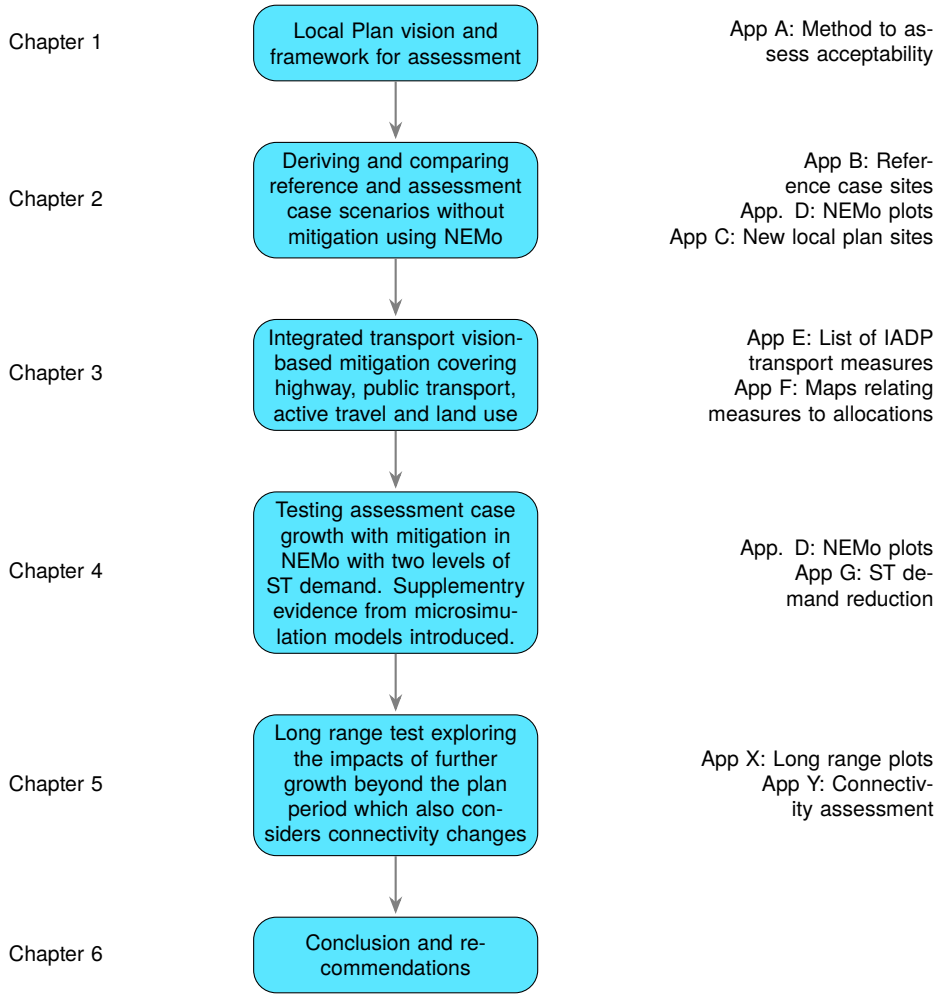

Figure 1.2: Overview of approach to further transport evidence

1.3 Planning guidelines and regulations

1.3.1 National Planning Policy Framework

1.3.1.1 December 2024 NPPF

The NPPF [16] mandates how transport issues arising from growth should be approached and assessed. The NPPF has a presumption in favour of sustainable growth which is summarised as meeting the "needs of the present without compromising the ability of future generations to meet their own needs" (para.7). To guide sustainable development, it also introduces three interdependent overarching economic, social and environmental objectives (para.8).

It states that strategic policies should, as a minimum, provide for objectively assessed needs for housing and other uses unless the "adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in this Framework taken as a whole" (para.11). Hence potentially adverse transport impacts need to be weighed against the benefits of growth.

The NPPF explains that "transport issues should be considered from the earliest stages of plan-making and development proposals, using a vision-led approach to identify transport solutions that deliver well-designed, sustainable and popular places" (para. 109). Furthermore, it states that "development should only be prevented or refused on highways grounds if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network, following mitigation, would be severe, taking into account all reasonable future scenarios" (para.116).

Connecting NPPF paragraphs (8), (11) and (116), above, implies that severe impact should be defined with respect to demonstrable impact on the overarching objectives. It would be expected that growth leads to increases in delay on the highway network; but a mitigation approach should be guided by desired policy outcomes not the alleviation of delay *per se*.

In a growing city area such as Colchester, the intention of the NPPF is especially pertinent. Transport issues of growth cannot be mitigated through highway capacity improvements alone, which would work against environmental and social objectives; rather growth should be approached as an enabler of more sustainable modes of travel and better integration between land uses and the transport system, which balances progress across all the overarching objectives.

1.3.1.2 Draft NPPF

The government is expected to update the NPPF in 2026 following a consultation on a new draft [17].

The new draft is expected to further embed the vision-led approach to transport to move away from "a 'predict and provide' approach to transport planning that can create unattractive environments dominated by cars." [ibid., p.15] The draft is also expected to introduce a permanent presumption in favour of suitably located development, such as building homes around stations. Footnote 26 of the consultation draft list criteria for well-connected stations defined as having four trains per hour.

In assessing potential impacts, the new draft advise that all reasonable future scenarios should be considered, taking into account impacts at different times of the day, potential cumulative impacts, multimodal trip generation and the promotion of sustainable modes of travel, and realising the transport vision for the development itself.

It reiterates that all development proposals should be capable of proceeding without having a severe adverse impact on the transport network (in terms of capacity and congestion, including cumulative impacts), or an unacceptable impact on highway safety, taking into account any mitigation measures proposed as well as any wider network improvements. [ibid., p.71]

Consequently, the new draft NPPF is not expected to alter the approach to assessment, which can be summarised as 'vision and validate'.

1.3.2 Section 122

The approach to assessment and mitigation also needs to consider planning regulations. The Planning Act 2008 and the Community Infrastructure Levy (CIL) Regulations 2010 provide the legal tests on the use of S106 planning obligations. [25]

Regulation 122(2) of the Community Infrastructure Levy Regulations 2010 states that a planning obligation may only constitute a reason for granting planning permission for

the development if the obligation is:

- necessary to make the development acceptable in planning terms;
- directly related to the development; and
- fairly and reasonably related in scale and kind to the development.

Hence in considering the assessment of growth, the methodology needs to consider if the problems are related to the developments, but also what connections might be required to align to planning policies. For example, growth might not cause severe impact on the network, but it would be reasonable to require connections by public transport and active travel to be made.

1.4 Policy context

1.4.1 Transport East

The vision of the Transport East *Transport Strategy 2023-2050* [23], published in February 2023, is centred around establishing a thriving eastern region with safe and efficient networks advancing a future of inclusive and sustainable growth for decades to come. The strategy sets out how the vision will be experienced by people and businesses in different parts of the Transport East region. For larger urban areas this looks like:

- high quality, accessible, fast and efficient urban public transport networks, e.g., buses, supported by dedicated infrastructure
- comprehensive, safe, high quality, inclusive urban walking and cycling networks
- seamless interchanges to sustainable modes for last mile trips into and out of urban areas (e.g., Park and Ride / Park and Pedal)
- sustainable development concentrated around existing and new public transport hubs

1.4.2 National Highways

Planning for the future [18] provides a guide to working with National Highways (NH) on planning matters. It states that one of the key assessment considerations for NH is the principles of sustainable development. The guide state that "where developments are located, how they are designed and how well delivery and public transport services are integrated has a huge impact on people's mode of travel for short journeys" [para. 29].

This supports a vision-led approach in which mitigation measures aim to improve sustainable transport connections and generate a mode shift from private car reliance to walking, cycling and public transport use. The guidance further solidifies this connection by stating that NH "will therefore expect those responsible for preparing local and neighbourhood plans to only promote development at locations that are or can be made sustainable and where opportunities to maximise walking, wheeling, cycling, public transport and shared travel have been identified" [ibid.]

1.4.3 Network Rail

The Transport East and NH strategies are supported by Network Rail, whose long term strategy recognised the need to increase capacity on the Great Eastern Mainline *Great Eastern Main Line Strategic Advice*. Such improvements support growth, noting the draft NPPF aspiration mentioned above to introduce a permanent assumption in favour of growth close to rail station with frequent services.

Transport East is currently working collaboratively with Network Rail to prioritise capacity improvements as set out in *Shorter-Term Rail Opportunities in the Transport East Region* [21, p.77]. It is also developing a strategic case for branchline line improvements between Colchester and Clacton and Walton & Frinton [22].

It should be recognised that the frequency of passenger trains in the East region is constrained by the need to balance passenger movement with rail freight [19]. Nevertheless, the strategies and priorities of national and regional transport bodies support an integrated and vision-led approach assessing and mitigating the impact of growth.

1.4.4 Local Transport Plan

The vision-based approach to transport recommended in the NPPF is continued through to the county's draft Local Transport Plan (LTP4) which identifies desired outcomes for which transport is a means to an end. The draft LTP4 articulates a vision "for a safe transport system that supports economic growth and prosperity, provides access to our homes, services, education, work and leisure and enables more sustainable choices and journeys to be made" [11].

LTP4 embeds integration of planning and transport to ensure people and places are at the heart of all decisions to secure new development at the most appropriate and sustainable locations. Furthermore, it supports connectivity and journey reliability for all modes of transport, which would provide choice of travel alternatives.

The draft transport plan explains that will be achieved by

- balancing better the location-specific needs of cars, buses, goods vehicles, and other motorised traffic, with the needs of cyclists, pedestrians, residents, shoppers, and local businesses, in both urban, suburban and rural locations (a place and movement approach)
- providing attractive local spaces, easy access to local and wider services and facilities
- requiring developers to consider the impact of travel and transport – both positive and negative on the health and wellbeing of residents and communities

1.4.5 Colchester City Council['s] Local Plan

Reg 18 LP 2026-2043 articulates an ambition and vision for the new local plan, which is aligned with using growth as an opportunity to shape the future transport network to improve connectivity and choice of travel mode, which will support healthy local environment.

> "Growth in Colchester is inevitable and brings with it change and opportunity. The Local Plan will embrace growth opportunities to meet the environmental, social and economic needs of the changing population and future generations. In doing so it will improve the quality of life for our communities, create a better environment and contribute to healthy lifestyles, by maximising the opportunities provided through well connected green networks. The Plan will also preserve and enhance Colchester's identity defined by its special diverse natural environment, green networks and waterways, prestigious heritage, varied arts and culture, and welcoming inclusive, vibrant and healthy communities."[3, p.9]

Achieving this vision is more likely since it is aligned with national, regional and county

approaches to integrated land use and transport planning. CCC has also adopted supporting plans including the *Colchester City Centre Masterplan* and *Active Travel Supplementary Planning Document*. This means that the transport system is already being shaped to enable as many people as possible to "walk, cycle or use public transport to travel into the city centre through re-connecting neighbourhoods to the city centre with attractive and easy walking and cycling routes; and improving public transport, particularly bus provision and including the new Rapid Transit System, and improving the interchanges between different modes of transport [2, p.30].

Meanwhile active travel is being improved through:

- the provision of good quality infrastructure in new developments to create an active sustainable development from the outset
- improvements to existing infrastructure to upgrade unconnected cycle routes to create a coherent network that is accessible by all and attractive to prospective users
- cycle and wheel parking that is convenient, covered, safe and secure
- other sustainable travel measures, promotion and community projects to overcome the challenges and barriers faced by many residents and their perceptions of active travel [1]

Consequently, to be consistent with vision and polices, the approach to transport assessment of growth should consider how to:

- help people move around developments sustainably
- link new developments to existing public transport lines
- enhance public transport options (rail, bus and bus rapid transit (BRT))
- enhance networks of cycling and walking routes
- ensure that the movement needs of those for whom sustainable transport options are not available are also met

1.5 Conclusion

This chapter has set the scene for the transport analysis of the impact of new local plan growth. It has considered the vision and objectives at national, regional and local levels to provide a framework to guide the assessment of transport issues and mitigation measures in line with NPPF guidance.

The following chapter (Transport Challenges of Growth) introduces the transport model North Essex Model (NEMo), and explains how household and jobs growth is used to derive growth in trips to input into the model. NEMo outputs are then summarised to understand the unmitigated transport impact of this growth.

2 Transport challenges of growth

Introduction and summary

This chapter introduces the North Essex Model that is the principle tool used to carry out the assessment of the impact of growth on the performance of the highway network. It is complemented in some locations by VISSIM microsimulation models which provide a finer grain of assessment.

The chapter also introduces a movement index which helps to objectively compare a reference case scenario to new local plan scenarios without and with vision-based and integrated transport mitigations. The index uses a scale of 1-15 to quantify network impacts utilising key performance criteria, and allow for direct scenario comparison.

In this chapter the movement index is used to identify unacceptable movement problems in the reference case, which worsen with proposed new local plan growth. This represents an unacceptable operating position with only committed transport schemes in operation. The challenge of growth informs the selection of mitigation measures described in Chapter 3.

2.1 Transport models

2.1.1 North Essex Model (NEMo)

NEMo is a strategic highway and public transport model with a base year of 2023. The model has been independently reviewed by NH to verify that it is suitable to use to assess the impact of local plans across North Essex. Forecast year assessments involve changing the network in the base model along with trip demand to reflect scenarios to be tested.

The NEMo base year model has been developed by expanding and updating the Colchester Transport Model (CTM), which has a base year of 2019. The detailed area of modelling in the CTM was expanded to include parts of Braintree and Tendring to align with options being considered in their local plan reviews. Updates were made to the highway and public transport networks to reflect 2023 conditions; and car, light goods vehicles (LGV), heavy goods vehicles (HGV), bus and rail demand was adjusted to reflect better 2023 travel patterns. The resulting NEMo was then validated against 2023 flow and journey time data to confirm it represents travel conditions.

CTM, and hence NEMo, has been built following Department for Transport (DfT) Transport Analysis Guidance (TAG) and best modelling practice (including [8], [9] and [10]), and the update process has followed DfT guidance on present day updates, in which models are refreshed rather than reconstructed entirely.

NEMo includes a variable demand modelling (VDM), also developed in line with DfT guidance [7], which allows trip makers to change destination and switch between car and public transport modes. The VDM considers trip purposes over a 24-hour period and predicts from where trips will be produced, to where they will be attracted and which mode will be used. It then produces origin and destination car, bus and rail matrices for the AM and PM peak hours and average interpeak hours.

The trips in the car matrix are subdivided into commuting, business and other trips

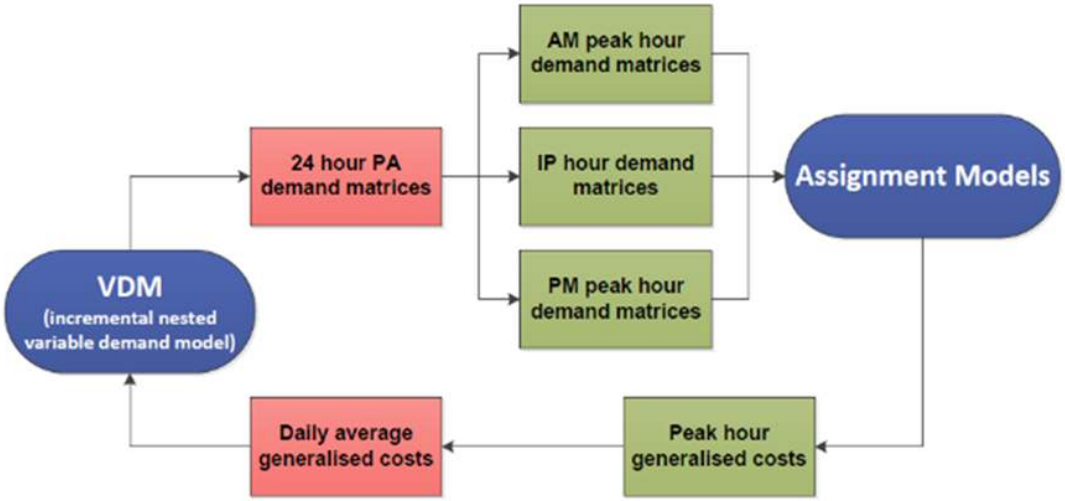

Figure 2.1: Relationship between demand and assignment models

and assigned onto the highway network alongside estimates of LGVs and HGVs using VISUM software. Buses, which travel on the highway network, are also included but follow designated routes. Meanwhile the bus and rail trips are assigned onto the public transport network using EMME software. Some public transport trips use both bus and rail to complete a journey.

Since destination and mode choice is affected by congestion levels, the VDM and assignment models iterate with each other until they reach convergence – which means that the level of congestion in the highway assignment model does not lead to a change in destination or mode choice. For information, the highway assignment model forecasts delay as more trips are added to the network. The public transport assignment model allows buses to fall behind scheduled timetables as a result of congestion on the highway network, but rail services are assumed always to run to schedule.

NEMo represents a typical mid-week day in a month without major holidays; hence is skewed towards days with heavier traffic flow. Choosing such conditions tends to maximise normal traffic flow through all parts of the transport network and follows modelling best practice [24]. The highway assignment model shows traffic conditions in the AM peak hour 07.30-08.30 and the PM peak hour 16.30-17.30, since these are, overall, the busiest hours in 2023 across North Essex in the respective peaks. The highway model can also show traffic conditions for an average interpeak hour between 10.00-16.00. The public transport model shows public transport trips for average peak hours in the AM (07.00-10.00), interpeak (10.00-16.00) and PM (16.00-19.00) periods.

NEMo is used to assess forecast 2043 scenarios shown in Table 2.1. As set out in the table, this involves making assumptions for trip demand changes and highway and public transport network changes between the base and future year.

1. Scenario 1 – Reference case growth without new local plan mitigation (though it does include committed mitigation).
2. Scenario 2 – Assessment case without mitigation, in which proposed new local plan growth is added on top of reference case growth and no mitigation is added to that included in the reference case. A business as usual (BaU) trip demand is assumed.

3. Scenario 3 – Assessment case with mitigation, in which key highway and public transport mitigations are added to Scenario 2. Trip demand is based on the BaU assumption used in Scenario 2.
4. Scenario 4 – Assessment case with mitigation and reduced car demand to reflect sustainable transport (ST) mitigation not accounted for in Scenario 3. This scenario replaces BaU trip demand with ST trip demand.

Table 2.1: NEMo scenarios

Assumptions		Scenario 1	Scenario 2	Scenario 3	Scenario 4
Summary	Year	2043	2043	2043	2043
	Description	Reference case with only committed mitigation	Assessment case without mitigation and with BaU demand	Assessment case with mitigation and BaU demand	Assessment case with mitigation and ST demand
	VDM	✓	✓	✓	
Demand	Reference case growth	✓	✓	✓	✓
	New local plan growth		✓	✓	✓
	Reduced car demand reflecting ST mitigation				✓
Key committed mitgation for reference case growth	A1331 link road	✓	✓	✓	✓
	RTS Central to TCBGC	✓	✓	✓	✓
	P&C East	✓	✓	✓	✓
Key further mitgation needed for reference case growth	A12 J29 scheme			✓	✓
	Greenstead and Clingoe Hill package			✓	✓
	RTS East to proposed Tendring garden villages				✓

Continued on next page

Table 2.1: NEMo scenarios *(continued)*

Assumptions		Scenario 1	Scenario 2	Scenario 3	Scenario 4
Key mitgation needed for new local plan growth	Dynamic traffic management			✓	✓
	A12 J25-27 package			✓	✓
	RTS West to Marks Tey			✓	✓
	Local bus connnections to major sites				✓
	P&C West				✓
	Local bus general improvements				✓
	Improvements to and at interchanges, and mobility hubs				✓
	Active travel connections to major sites				✓
	Travel planning to support ST				✓

2.1.2 Microsimulation models

NEMo is complemented by VISSIM microsimulation models, which help assess traffic performance on complex parts of the road network and identify and test appropriate highway mitigations, including how public transport priority and active travel crossings can be incorporated. VISSIM models have been developed and used for complementary assessment of

- A12 J25-26 which includes the A120 route through J25 and along London Road through to Tollgate
- A12 J29 which includes the A120 merge with the A12 and the routes to Severalls business park and Ipswich Road
- A133 Clingoe Hill which extends from the new A1331 roundabout through Greenstead roundabout and along key arms including Colne Causeway and St Andrew's Avenue

Further information on the VISSIM models is provided in Section 4.4 and Appendix H, as their main purpose has been to help derive solutions to complex highway problems arising from growth. The VISSIM models provide a level of analysis beyond many Regulation 19 local plan transport assessments and would usually be used at a much later stage of scheme development. Using the models help increase confidence that solutions can be found to keep people and goods moving. However, the ideas for mitigations would still need to go through typical scheme development stages of optioneering, design and consultation, so are subject to change.

2.2 Movement index

This section outlines the approach to assessing movement performance of scenarios tested in NEMo. The approach is based on assessing if the impact of a scenario when compared to another scenario can be considered acceptable in terms of impact on the transport network. Appendix A provides further technical information underlying the approach.

This approach involves identifying the areas of the Colchester highway network of interest. These were identified by considering the location of existing problems and the impact of both reference case and assessment case growth, accounting for where mitigation measures are likely to be needed to improve network operating conditions. The areas of the network of interest are summarised in Table 2.2 and shown in Figure 2.2.

Table 2.2: Areas of interest on the highway network

Sector	Location
Central	N station rdbt, Station Wy, A134 Westway, Balkerne Hill
	Ipswich Road, East Street, East Hill & Harwich Road
East	Greenstead Roundabout, Colne Causeway & Clingoe Hill
	Colchester Road to Wivenhoe
West	Lexden Road, Cymbeline Way, Colne Bank Rbt, London Rd, A12 J27, A12 J26
	A12 J25 / A120 (western)
North	Northern Approach Road, Via Urbis Romane, Mill Road & A12 J28
	A12 J29 / A120 (eastern)
Outer	Tiptree
	Aldham
	A12 J20-25

Focusing on the areas of interest shown in Table 2.2 provides an appropriate barometer to assess and cover traffic impact across Colchester. However, our analysis also involves inspecting model outputs and plots to check if there are significant changes in other areas beyond the selected areas of interest.

The approach then involves calculating a movement index on a scale of 1-15 for each of the areas of interest for the scenarios to be compared. A scale of 15 has been chosen in order that differences between areas of interest and scenarios can be perceived. The movement index combines indicators typically used in modelling assessment: queues, speed and capacity. It has an advantage of conciseness over using individual indicators and plots. The index provides an immediate overview of the key performance criteria to keep people and goods moving and helps to identify locations with problems. In addition, the more severe problem movements within each area of interest can be identified, which help focus in on detailed issues. The movement scale can be seen in Table 2.3.

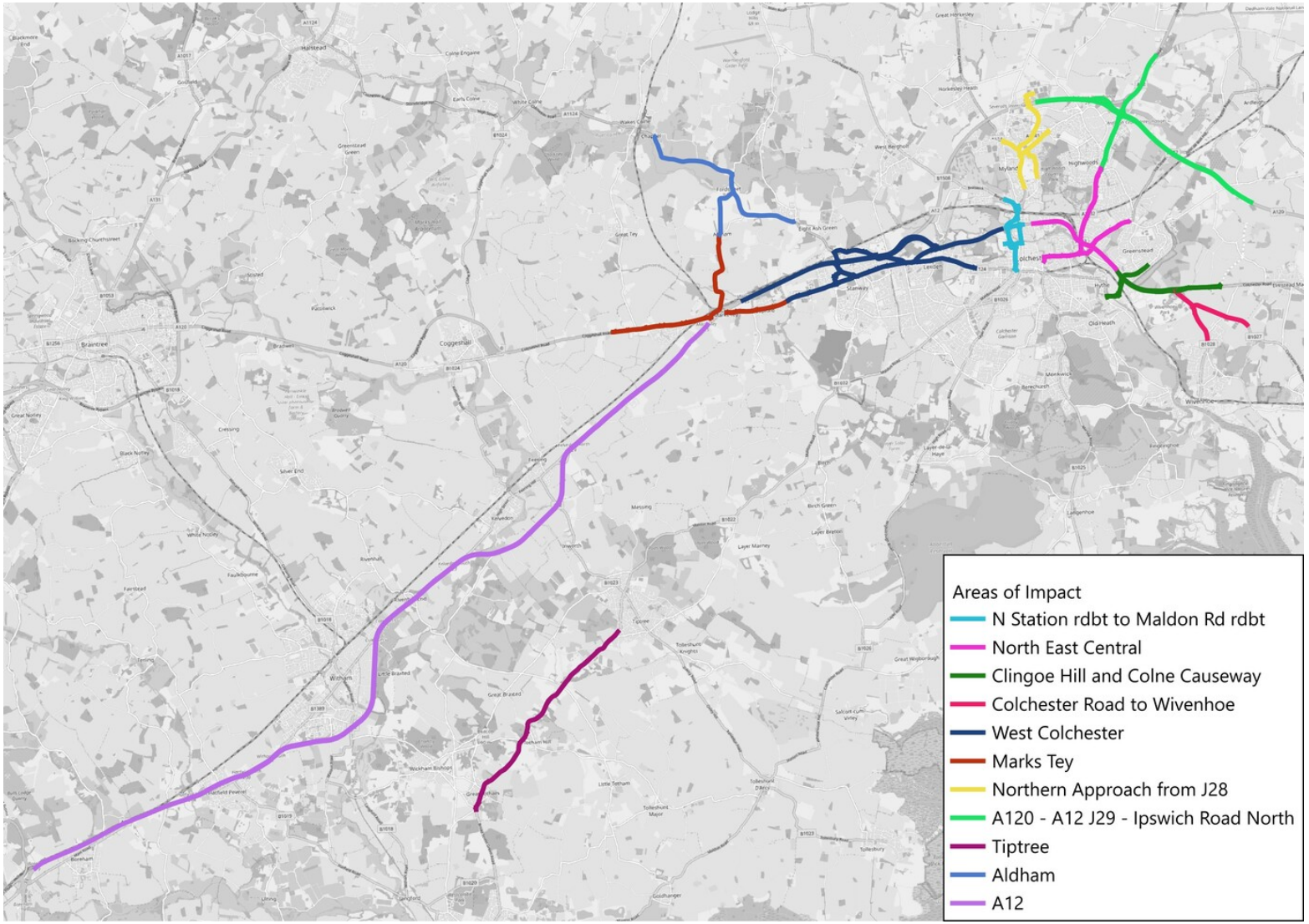

Figure 2.2: Corridor areas of network interest

In addition, an overall score for each scenario tested has been calculated. The overall score is a weighted average of the movement scores of the areas of interest by demand. Thus areas with higher demand contribute more to the overall score than those with lower demand. The overall score is shown in the final row of the assessment tables.

Depending on the change between the scenarios being compared, the change in the movement indices also help identify the level of concern to inform acceptability:

- passable ✓
- caution **!**
- unsatisfactory ✗

Table 2.3: Movement scale

Description	Movement scale
More or less free flow	1
	2
	3
Travelling slower	4
	5
	6
Moderate congestion	7
	8
	9
Substantial congestion	10
	11
	12
Extreme congestion	13
	14
	15

2.3 Reference case forecast

2.3.1 Reference case growth

Without Colchester's preferred site allocations, some level of growth would reasonably be expected to occur in the council area and in surrounding areas. This growth has been referred to as reference case growth. In Colchester reference case growth to 2043 has been assumed to include:

- housing sites that have been identified by CCC as near certain or more than likely to come forward, including those sites in CCC's adopted local plan (2017-2033)[4] (see Appendix B)
- general growth in employment calculated using job growth forecasts from the National Trip End Model (NTEM), since employment growth can reasonably be expected to accompany housing growth

- residential and employment growth at TCBGC to 2043

It is worth noting that TCBGC growth has been informed by latest developer assumptions, in which employment to 2043 is concentrated in the Colchester model zones and housing in the Tendring model zones. Hence the representation of trips in the transport model does not reflect how CCC and Tendring District Council (TDC) report on housing delivery plans to the government, in which growth at TCBGC is shared between CCC and TDC. However, this results in no difference in the accuracy of assigning TCBGC trips to the transport network. The location of committed sites in the Colchester council area are shown in Figure 2.3.

Since Colchester will be particularly affected by growth in the neighbouring North Essex authorities of Braintree and Tendring, planned development in these locations has also been identified. For both authorities, housing and employment growth use their Regulation 18 preferred options published in January 2026. The TDC preferred option is referred to as Option 1 in its report, which includes a garden village in the Horsely Cross and Frating area.

Consideration was given to using lower levels of growth in Braintree and Tendring aligned to NTEM (Version 8) or only including certain and near certain developments in those authorities — since their 2043 local plans are still hypothetical. However, if a lower level of growth were used, the impact of Colchester's new local plan growth alongside expected Braintree and Tending 2043 local plan growth would not have been identified. Given there is limited time to produce the Regulation 19 transport evidence, it was considered more efficient, therefore, to include expected 2043 local plan growth in Braintree and Tendring in the Colchester reference case.

In taking this approach, it should be noted that mitigation measures associated with Braintree and Tendring 2043 local plan growth have only partially been identified at the Regulation 18 stage. Therefore, the Colchester reference case could show worse traffic performance than if full mitigations were known, which would accompany Braintree and Tendring growth. As part of the Braintree and Tendring local plan reviews, however, work is proceeding on identifying any such mitigations.

Growth in districts beyond North Essex is assumed to be at 2043 levels predicted by the core scenario of NTEM. The growth applied in Colchester reference case for each of the North Essex planning authorities is shown in Table 2.4 below. These numbers have been adjusted to share TCBGC residential growth equally between Colchester and Tendring. It should be noted that these growth assumptions are based on the most up-to-date assumptions available at the time of writing.

Having established the growth in homes and jobs, the DfT's NTEM was used to calculate trip generation from growth using its database tool called Trip End Model Programme (TEMPro). NTEM was used since it provides outputs in 24-hour production-attraction format, which is required as an input for VDM, for both car and public transport. Furthermore,NTEM considers characteristics of Middle-layer Super Output Areas (MSOA) in which people in urban MSOAs would have different travel behaviour to rural MSOAs. Meanwhile TEMPro also has a useful feature called alternative planning assumptions in which bespoke housing and employment growth assumptions can be added. The alternative planning assumptions mechanism, therefore, allows us to use the NTEM core scenario prediction of growth outside the North Essex authorities and to match North Essex housing and jobs growth to our desired reference case.

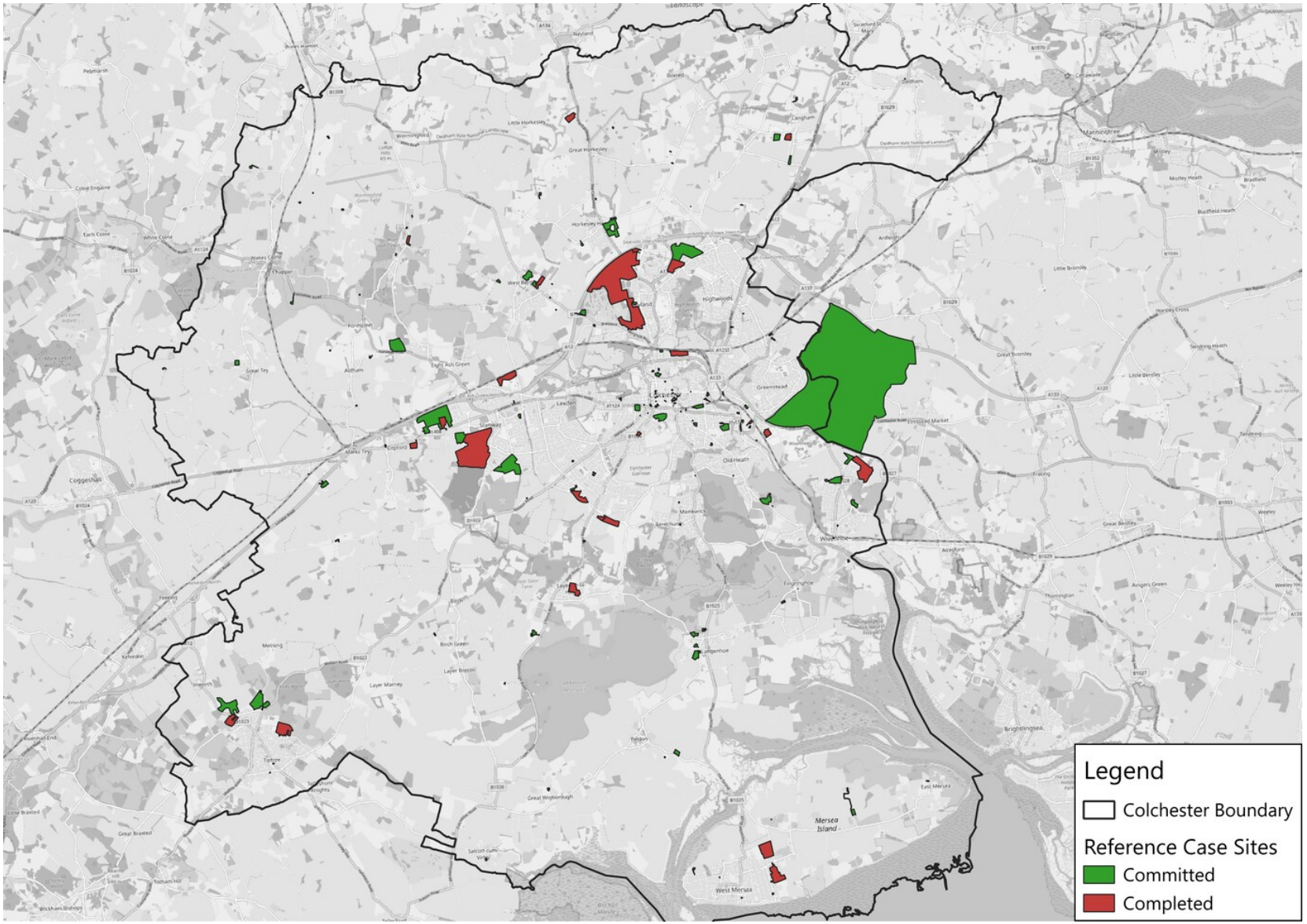

Figure 2.3: Completed and committed sites in the reference case

Table 2.4: Reference case growth assumptions across North Essex

Council area	Category	2023 base	2043 NTEM 8 forecast growth	2043 reference case forecast growth	% change from 2023 base to 2043 NTEM forecast	% change from 2023 base to 2043 reference case
Colchester	Households	81 086	12 388	9125	15 %	11 %
	Jobs	97 188	5258	5258	5 %	5 %
Braintree	Households	65 039	5146	21 517	8 %	33 %
	Jobs	66 221	3326	10 000	5 %	15 %
Tendring	Households	66 906	9531	15 808	14 %	24 %
	Jobs	51 341	2727	9748	5 %	19 %

Since NTEM provides trip growth assumptions at the MSOA level, further refinements are made to allocate a greater share of growth to the specific model zones within each MSOA where developments are actually located. For MSOAs in Colchester, Tendring and Braintree that include developments, the following steps were undertaken:

Step 1: Baseline Growth Without Development Assumptions - A TEMPro growth factor was applied to the base year trip ends, assuming no growth in dwellings or jobs. This was achieved by modifying the default 2043 household and job figures in TEMPro to match the 2023 values. This adjustment isolates the background growth captured by TEMPro, excluding any development-related growth.

Step 2: Incorporating Committed Developments - Alternative planning assumptions were then applied to the default 2043 household and job figures in TEMPro to reflect the committed developments included in the reference case. The adjusted 2043 figures were extracted, and the development-related trip ends were calculated as the difference between this output and the trip ends extracted from TEMPro from Step 1. These development trip ends were then added to the adjusted trip ends from Step 1 (i.e. base year trip ends multiplied with the adjusted growth factor from Step 1).

Step 3: Spatial Allocation Within MSOAs - Where an MSOA spans multiple model zones (e.g. zones 1, 2, and 3), but development is known to occur only in a specific zone (e.g. zone 1), all development-related growth was allocated to that zone. No growth was assigned to the other zones within the same MSOA.

Step 4: Additional Growth at TCBGC Zones - Additional trip growth was incorporated for the TCBGC zones, consistent with assumptions used in its planning application.

For all other areas of the model, default TEMPro growth factors (2023-2043) were applied to base year demand for all model zones in MSOAs without developments.

2.3.2 Committed schemes

As well as identifying growth in trips ends, the reference case highway model reflects changes in the highway network — that is, highway schemes that are reasonably expected to come forward because funding and decisions are in place. The highway

schemes included in the reference case model are listed in Table 2.5 and shown in Figure 2.4 below. Meanwhile. the public transport model includes the RTS service connecting TCBGC to destinations in Colchester.

The following points should be noted with regards to the reference case forecast network.

- Following the cancellation of the A12 J19-25 widening, this scheme has not been included in the Reference Case network.
- Although it is expected that TCBGC would promote or part fund solutions to mitigate its impact at A12 Junction 29 and Greenstead roundabout, details regarding the possible mitigation measures related to TCBGC. Therefore, improvement schemes at these two junctions have not been included in the reference case forecast network.

Table 2.5: Committed highway schemes

Category of scheme	Scheme name
Committed schemes	A120/A133 Link Road (fully built)
	RTS Section A (dedicated RTS and cycle lane between Bruff Close and Mill Road)
	RTS Section C (westbound RTS lane between Knowledge Gateway and Greenstead roundabout)
	Colne Bank roundabout Improvements including signalisation
	Axial Way changes
	Speed limit of 30 mph on Northern Approach + signals (part of RTS Section A)
	Headgate / Crouch St / St John's St / Head Street junction signals
	St Botolph's Circus
	P&C East
	LCWIP1 (Head Street cycle lane, 1 lane northbound from Crouch Street / St John's Street)
	LCWIP4 (East Hill)
Highway mitigation expected to accompany Braintree local plan growth	Millenium Way Slips
	Halstead Bypass

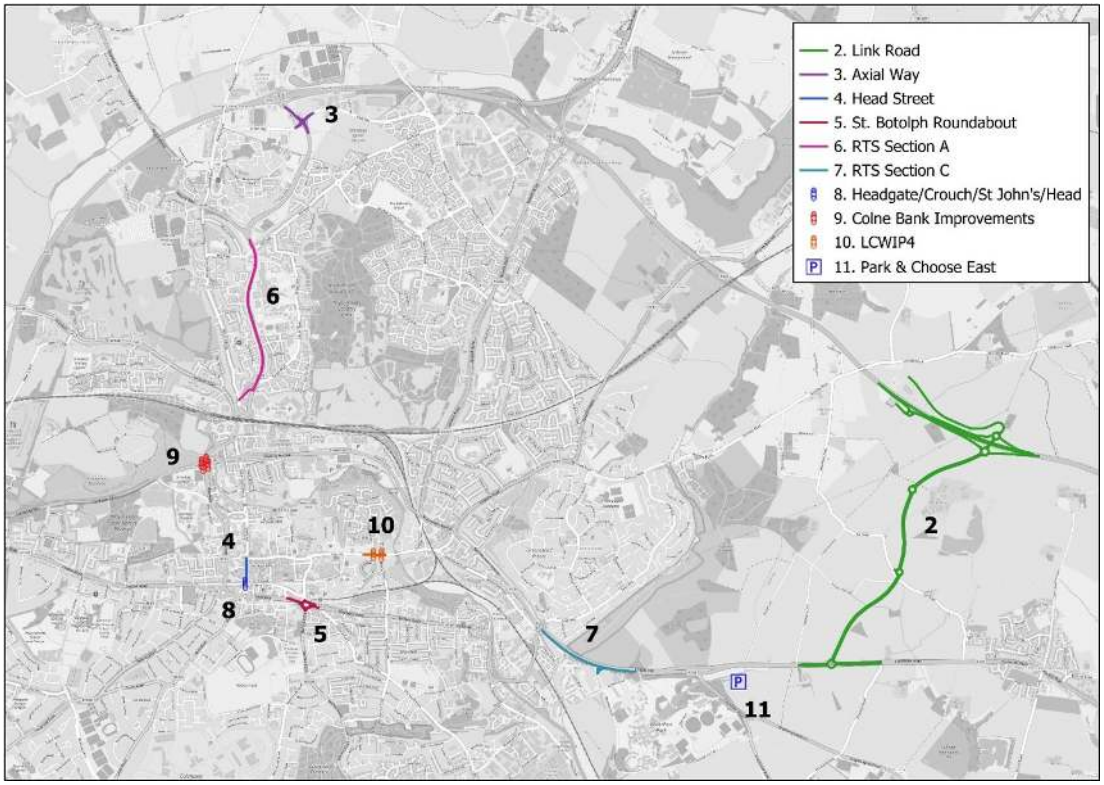

Figure 2.4: Committed highway schemes

To ensure that development-related trips are accurately represented within the transport model, additional zone connectors have also been incorporated. These connectors provide appropriate access points, allowing trips to enter and exit the model network at locations that reflect realistic travel behaviour and network usage. By aligning the connectors with representative junctions and corridors, the modelling process captures the likely distribution of traffic flows more effectively, thereby improving the robustness of the assessment and ensuring that the impacts of the development are evaluated in a credible and transparent manner.

2.3.3 Reference case performance

Table 2.7 shows the movement index scores for the reference case, which can be compared to the 2023 base model (and looking ahead to the new local plan scenario without mitigation). The high shows that committed reference case growth cause significant impacts on key parts of the highway network by 2043 including noticeable worsening between the 2023 base and 2043 reference case along A133 Clingoe Hill, Colchester Road to Wivenhoe, A12 J26/27 through to Colne Bank and A12 J29. Performance in the central area is poor but a slight improvement is predicted on the route between Balkerne Hill and North Station.

The change between the reference and base can also be seen in the speed ratio difference and relative queue difference plots shown in Figures 2.5, 2.6, 2.7 and 2.7, which illustrate that the problems described in the previous paragraph arise from blocking back which decreases speed. In some parts of the network, speed can increase due to traffic being gridlocked in other locations.

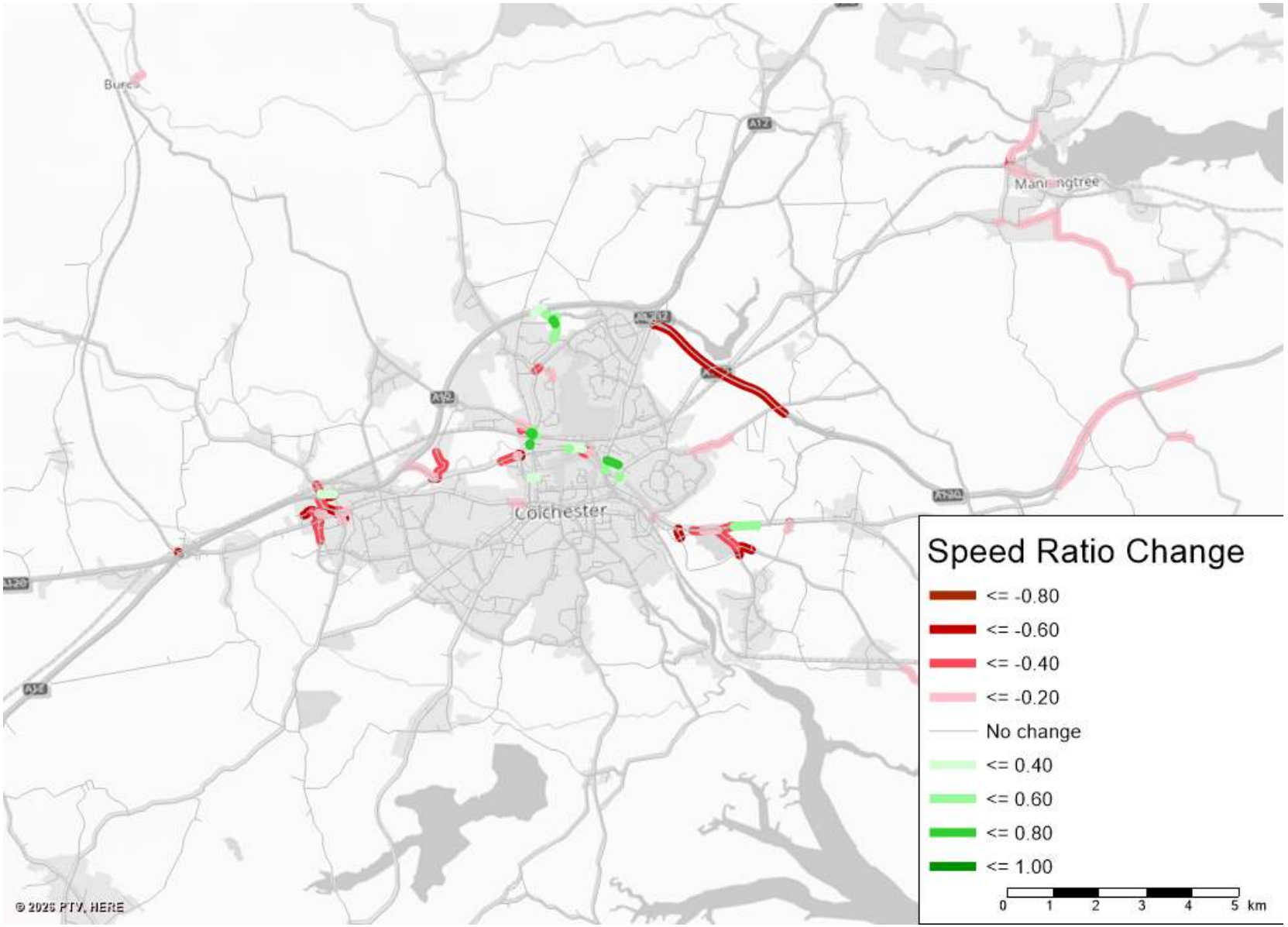

Figure 2.5: AM speed ratio difference – 2043 Scenario 1 v 2023 Base

Figure 2.6: PM speed ratio difference – 2043 Scenario 1 v 2023 Base

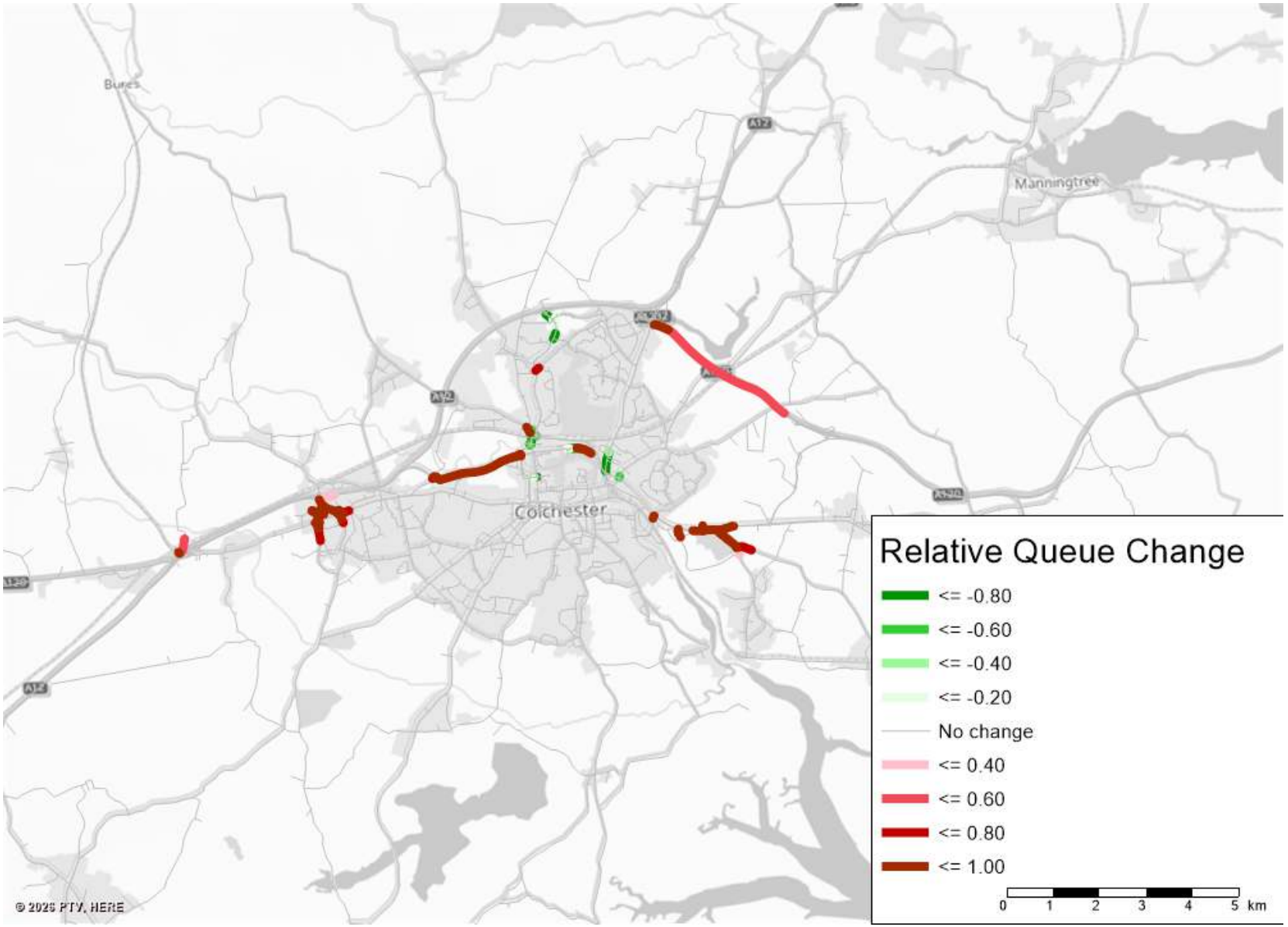

Figure 2.7: AM relative queue difference – 2043 Scenario 1 v 2023 Base

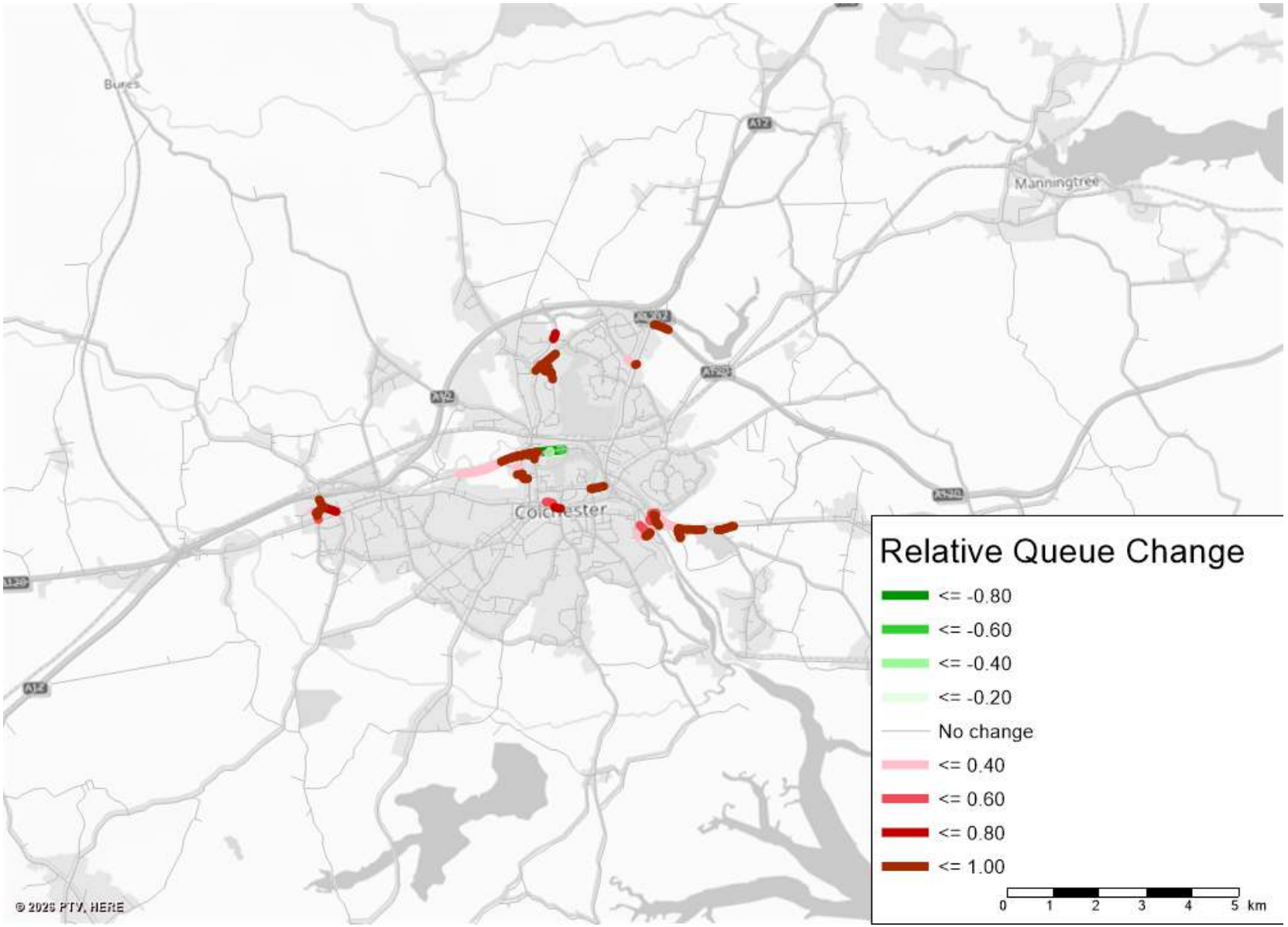

Figure 2.8: PM relative queue difference – 2043 Scenario 1 v 2023 Base

For information:

- speed ratio is ratio between speed in the modelled hour and the free flow speed
- relative queue indicates blocking back problems where queues build up over the modelled peak hour

Appendix D provides flow difference plots and the absolute speed ratio and relative queue plots for the reference case. It should be noted that blocking back problems at A12 J29 shown in Figures I.19 and D.21 indicate the strong possibility of safety problems with queueing traffic on the A120 off-slip extending back onto the A120 mainline.

2.4 Assessment case forecast without mitigation

2.4.1 Assessment case growth

The proposed new local plan allocations will grow households and jobs in Colchester beyond the reference case estimate. Growth elsewhere remains at reference case levels.

The location of new local plan residential and employment site allocations for households and jobs growth in Colchester is depicted in Figure 2.9. Appendix C provides further details on the allocations. In addition, CCC includes an assumption for windfall growth of 2,640 dwellings. Although the allowance is not located in specific locations, it was proportionally spread across models zones with committed and allocation sites (where the amount of windfall growth is proportionate to the total amount of growth in each zone.) Table 2.6 shows a summary of total growth expected with the new local plan.

To calculate the trip generation of local plan allocation the process described in Subsection 2.3.1 was followed. Households and jobs were assigned to MSOAs and input into TEMPro as alternative assumptions to generate the number of trips in a production-attraction format required for VDM. The trip demand was then assigned to model zones based on the proportion of the developments falling within the model zone. Finally, the growth was added to the reference case trip ends. Since the assessment case is run with VDM, the VDM process handles the distribution of trips.

Table 2.6: Assessment case new local plan growth assumptions

Council area	Category	2023 base	2043 reference case forecast growth	2043 new local plan growth	2043 total growth (reference and local plan growth)	% change from 2023 base to 2043 reference case	% change from 2023 base to 2043 new local plan
Colchester	Households	81 086	9125	12 934	22 059	11 %	27 %
	Jobs	97 188	5258	16 011	21 269	5 %	22 %
Braintree	Households	65 039	21 517	–	21 517	33 %	33 %
	Jobs	66 221	10 000	–	10 000	15 %	15 %
Tendring	Households	66 906	15 808	–	15 808	24 %	24 %
	Jobs	51 341	9748	–	9748	19 %	19 %

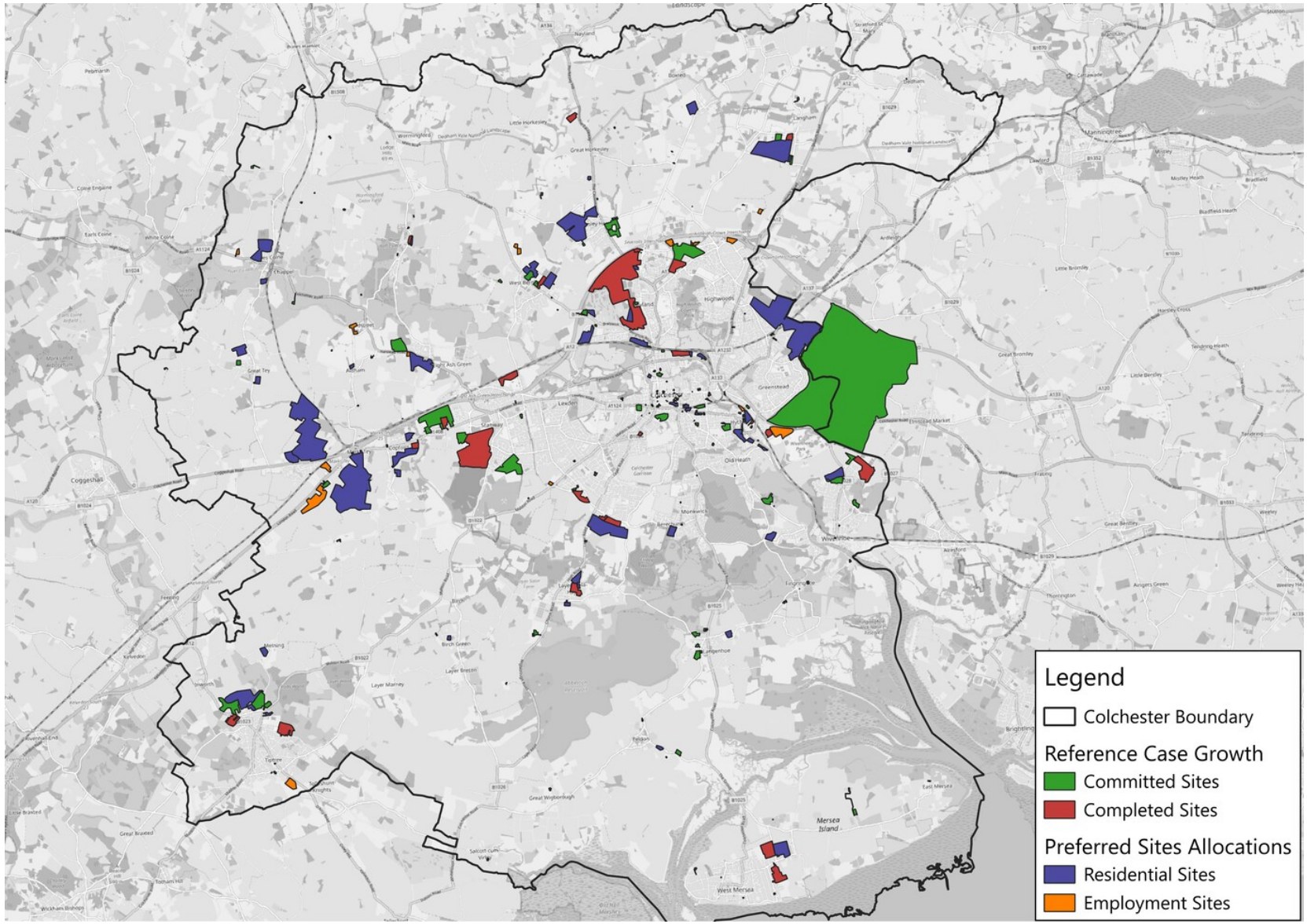

Figure 2.9: New local plan allocations in the assessment case

2.4.2 Assessment case network

The reference case forecast model network is used as the base to create the assessment case forecast network. To ensure that local plan allocation site-related trips are accurately represented within the transport model, additional zone connectors have been incorporated as described in 2.3.2.

2.4.3 Assessment case performance without mitigation

Table 2.7 provide the movement scores, in which Scenario 2 (new local plan growth without mitigation) can be compared to Scenario 1 (reference case) and the base performance. It shows a significant worsening at A12 J25 and more severe problems in the centre of the city.

Table 2.8 uses the change in score to provide an assessment on the acceptability of the change from the perspective of a highway authority. In this table Scenario 1 is compared to the base – for the whicd the AM period indicates unacceptable performance in the city centre route to North Station, along Clingoe Hill including along Colchester Road, the route from A12 J26 to Colne Bank roundabout and A12 J29. A12 J25 and North Approach Road are also coming under stress indicated by the explanation mark. Acceptability of performance compared to now is not considered unsatisfactory in the PM peak as the AM peak. Though problems are unacceptable in the city centre route through East Hill and along Northern Approach Road.

Table 2.8 also shows the acceptability of Scenario 2 – which is assessed by comparing the change from Scenario 1 (the reference case). This show severe impact in centre and eastern, northern and western approaches. The severe impact of proposed new local plan growth is due to extreme congestion on parts of the road network arising from reference case growth. Thus would be a requirement for commmitted growth in Colchester and growth in Tendring and Braintree to contribute to mitigation.

Table 2.7: Movement index scores for base, reference and assessment scenarios without mitigation

Sector	Location	AM Peak Impact			PM Peak Impact		
		2023 Base	2043 S1 RC	2043 S2 BAU	2023 Base	2043 S1 RC	2043 S2 BAU
Central	N Station rdbt, Station Way, A134 Westway and Balkerne Hill	14	13	14	8	12	14
	Ipswich Road, East Street, East Hill and Harwich Road	11	11	12	11	10	11
East	Greenstead Roundabout, Colne Causeway and Clingoe Hill	9	15	15	11	15	15
	Colchester Road to Wivenhoe	7	15	15	7	8	8

Continued on next page

Table 2.7: Movement index scores for base, reference and assessment scenarios without mitigation *(continued)*

Sector	Location	AM Peak Impact			PM Peak Impact		
		2023 Base	2043 S1 RC	2043 S2 BAU	2023 Base	2043 S1 RC	2043 S2 BAU
West	A12 J26/J27 to London Rd , Lexden Road, Cymbeline Way and Colne Bank Rbt, London Rd	6	12	12	5	9	10
	A12 J25 / A120 (western)	5	6	11	5	5	6
North	Northern Approach Road, Via Urbis Romane, Mill Road & A12 J28	9	9	10	8	12	15
	A12 J29 / A120 (eastern)	7	12	12	7	9	10
Outer	Tiptree	3	4	4	3	3	4
	Aldham	3	3	3	3	3	3
	A12 J20-25	6	8	8	5	7	7
Overall assessement combining all areas		8	11	11	7	9	10

Key to movement scale and acceptability of change

More or less free flow			Travelling slower			Moderate congestion			Substantial congestion		
1	2	3	4	5	6	7	8	9	10	11	12
Extreme congestion			Acceptability of change								
13	14	15	Passable ✓			Caution !			Unsatisfactory ✗		

Table 2.8: Movement index acceptability for base, reference and assessment scenarios without mitigation

Sector	Location	AM Peak Impact			PM Peak Impact		
		2023 Base	2043 S1 RC	2043 S2 BAU	2023 Base	2043 S1 RC	2043 S2 BAU
Central	N Station rdbt, Station Way, A134 Westway and Balkerne Hill	14	✗	✗	8	✗	✗
	Ipswich Road, East Street, East Hill and Harwich Road	11	✓	✗	11	✓	✗

Continued on next page

Table 2.8: Movement index acceptability for base, reference and assessment scenarios without mitigation *(continued)*

Sector	Location	AM Peak Impact			PM Peak Impact		
		2023 Base	2043 S1 RC	2043 S2 BAU	2023 Base	2043 S1 RC	2043 S2 BAU
East	Greenstead Roundabout, Colne Causeway and Clingoe Hill	9	✗	✗	11	✗	✗
	Colchester Road to Wivenhoe	7	✗	✗	7	!	!
West	A12 J26/J27 to London Rd , Lexden Road, Cymbeline Way and Colne Bank Rbt, London Rd	6	✗	✗	5	✗	!
	A12 J25 / A120 (western)	5	!	✗	5	✓	!
North	Northern Approach Road, Via Urbis Romane, Mill Road & A12 J28	9	!	✗	8	✗	✗
	A12 J29 / A120 (eastern)	7	✗	!	7	✗	!
Outer	Tiptree	3	✓	✓	3	✓	✓
	Aldham	3	✓	✓	3	✓	✓
	A12 J20-25	6	!	✓	5	!	✓
Overall assessement combining all areas		8	11	11	7	9	10

Key to movement scale and acceptability of change

More or less free flow			Travelling slower			Moderate congestion			Substantial congestion		
1	2	3	4	5	6	7	8	9	10	11	12
Extreme congestion			Acceptability of change								
13	14	15	Passable ✓			Caution !			Unsatisfactory ✗		

The impact of new local plan growth on top of reference case growth can be seen in the speed ratio and relative queue difference plots shown in Figures 2.10, 2.11, 2.12 and 2.12. Meanwhile Appendix D provides flow difference plots and the absolute speed ratio and relative queue plots for Scenario 2.

Figure 2.10: AM speed ratio difference – 2043 Scenario 2 v 2043 Scenario 1

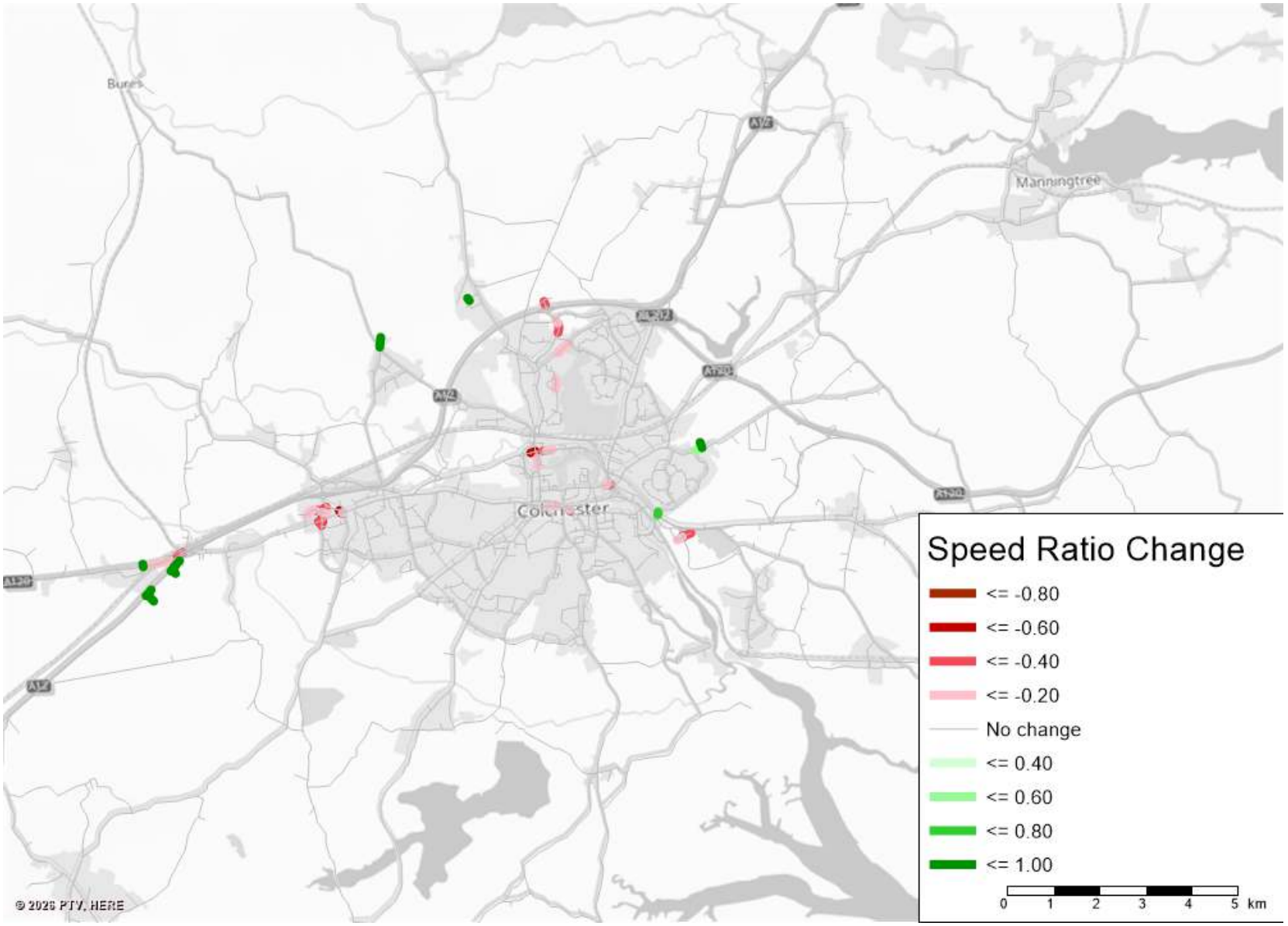

Figure 2.11: PM speed ratio difference – 2043 Scenario 2 v 2024 Scenario 1

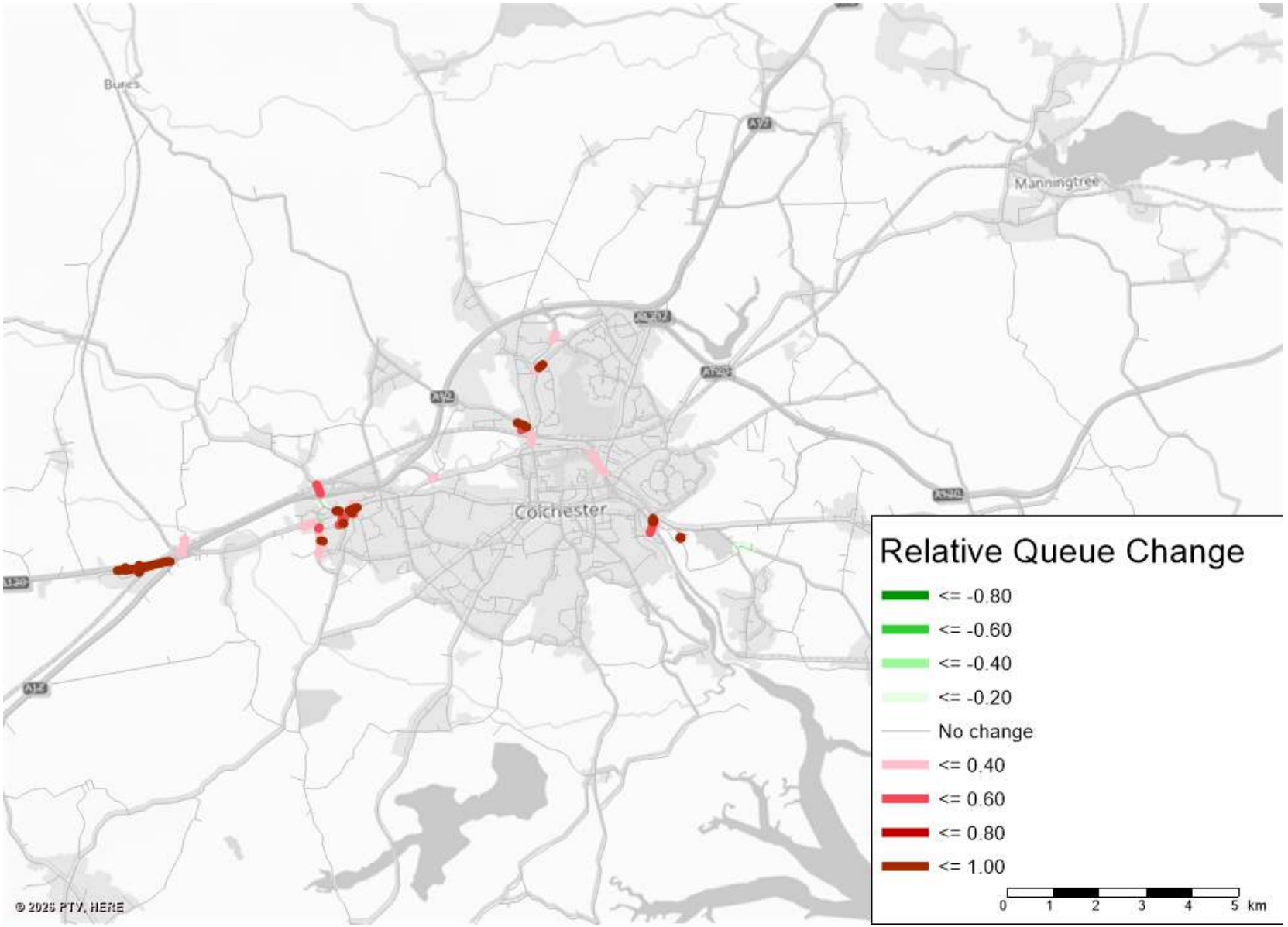

Figure 2.12: AM relative queue difference – 2043 Scenario 2 v 2043 Scenario 1

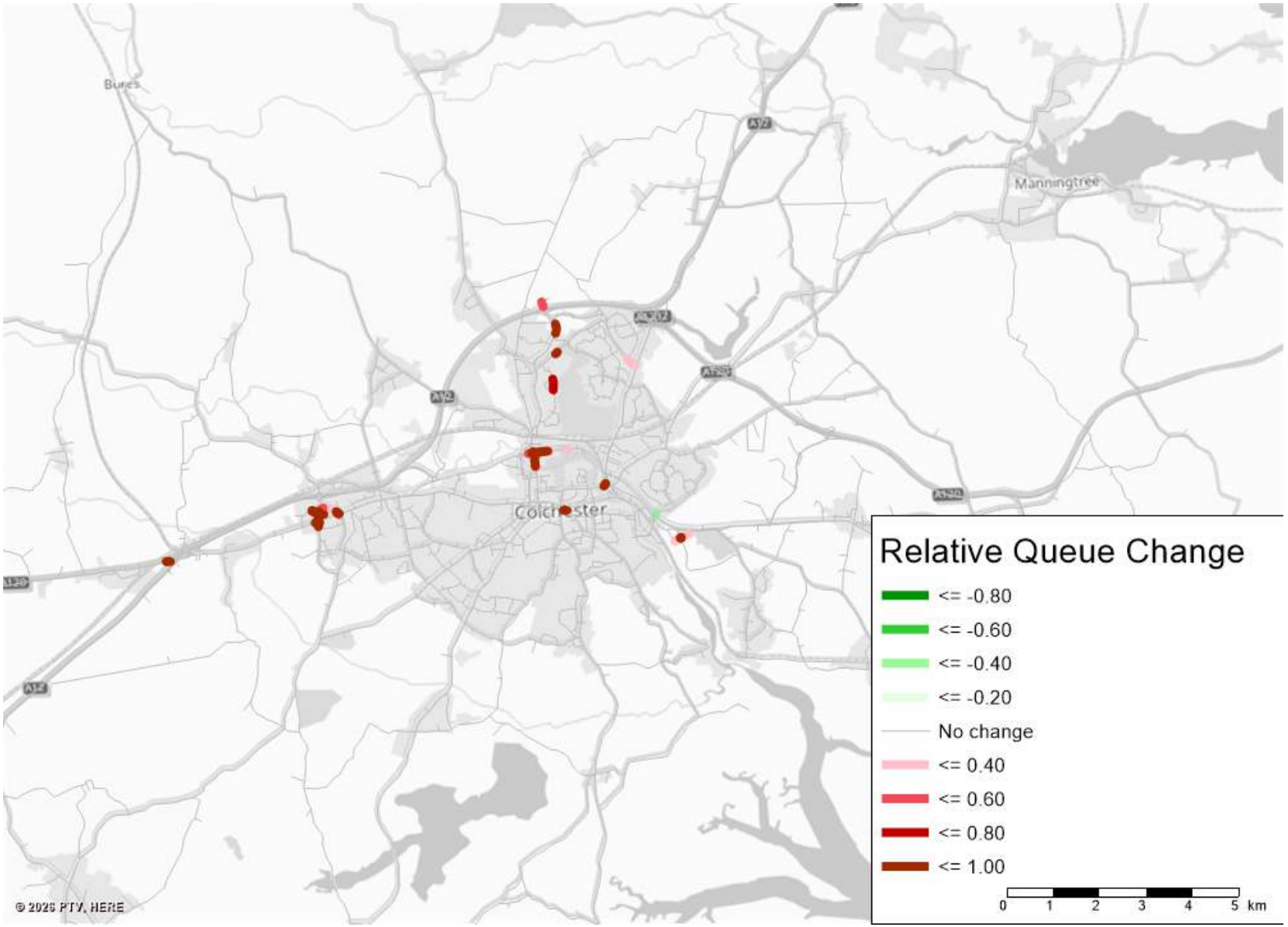

Figure 2.13: PM relative queue difference – 2043 Scenario 2 v 2043 Scenario 1

2.5 Conclusion

This chapter has introduced the transport model NEMo and explained how reference case and assessment case without mitigation scenarios were derived. This explained the assumptions for housing and employment growth in the scenarios, how trip quantities were generated and the modelled network.

Substantial and extreme congestion was observed in the reference case, indicating the requirement for committed growth and expected local plan growth in Braintree and Tendring to contribute to mitigations.

When proposed new plan growth was added, network performance problems worsened, which are considered unacceptable from the perspective of a highway authority. Problems are predicted in the city centre and along key eastern, northern and western approaches.

The next chapter proceeds to consider vision-led mitigation to address the cumulative impact of reference case and new local plan growth.

3 Integrated transport solutions

Introduction and summary

The previous chapter explained that proposed new local plan growth worsens conditions on a network which already has unsafe, severe and unacceptable movement problems. The scale of transport problems would be impacting on the economy of Colchester and the sub-region if not addressed

This chapter develops an integrated and vision-based mitigation stategy to solve problems arising from cumulative committed developments, local plan growth in bordering authorities and Colchester's new local plan. The responsibility to fund and deliver the end point mitigations would need to be fairly and reasonably apportioned across reference case and new local plan developments.

Highway related mitigations include major schemes to address gridlock problems on the main routes into Colchester at A12 J25/26, A12 J29 and A133 Clingoe Hill and balance the movement needs of all modes. In addition, investment in dynamic traffic management technology is recommended to harness the potential of artificial intelligence along with junction improvements to support connections to developments by all modes.

The mitigation package also enhances the high-quality public transport network and walking and cycling routes to provide viable choices of travel mode. The role of placemaking and land use planning is also recommended to reduce distances between activities.

Chapter 4shows the impact of the measures whilst Chapter 5 stress tests the mitigations further into the future and explains how they enhance connectivity as measured by the DfT's Connectivity Tool.

3.1 Mitigation strategy

3.1.1 Overview of vision-led and integrated package of measures

Chapter 2 established the imperative for the transport system to evolve in order to accommodate growth. The mitigation strategy is grounded in a vision for an integrated transport system in which there is choice to travel by different modes. This recognises that not everyone has access to a car at all times in their life; that different modes can suit different trip purposes better than others; and that in busy, economic centres it is infeasible, unattractive and counter-productive to be car dominated.

The delivery of an integrated transport system implies achieving a better balance between modes, which will keep people and goods moving, and support a clean and pleasant local street environment. This will help businesses thrive, good jobs be created and customers, visitors and tourists reach attractions whether in the city centre, business parks, countryside parks or village centres.

To create a better integrated transport system able to accommodate growth satisfactorily, in line with the NPPF requirement to balance economic, environmental and social objectives (which the severe and road safety problems would disrupt) there is a need.

to improve connectivity by bus, cycling and walking in particular. Together with rail, these modes form sustainable transport options (sometimes abbreviated to ST in this report.) In Colchester 20% of trips in the urban area undertaken by car are less than 2km; whilst approximately 50% are between 2-5km long. In non-urban areas of Colchester 25% of car trips are less than 5km long. Thus, there is a large pool of car trips for which improved sustainable transport is a realistic alternative which would significantly contribute to alleviation of the congestion impact of growth.

However, supporting ST connectivity alone would not be sufficient to keep people and goods moving. An integrated transport system also needs to consider the strategic road and rail connections; local road distributors; and how safer and more attractive bus, cycling and pedestrian priority routes can be weaved into the often congested road network.

Figure 3.1 explains the logic for how an integrated transport approach helps achieve the outcomes desired. The logic map shows how the categories of measures work together to both address desired outcomes and alleviate the types of transport problems that could arise from preferred site allocations. The logic map also considers the range of providers which will need to work together to deliver interventions through new or existing programmes. Since travel planning cuts across groups of measures, it has been excluded from the logic map.

The integrated transport measures in this chapter have been divided into three groups: highway measures, public transport measures and active travel and place making measures. However, there is a strong overlap between measures since highway measures facilitate priority for buses, cycling and walking, place-making and, at time, access to rail stations. Similarly, public transport measures consider interchanges between modes such as found at park and choose (P&C) bus and rail stations and mobility hubs.

Figure 3.2 presents the proposed integrated transport measures alongside their proximity to development allocations. Appendix E lists all the proposed highway, public transport and active travel measures. Whilst Appendix F provides detailed maps by movement corridor.

3.1.2 Background changes and trends

Colchester is experiencing continued population, housing and employment growth even without new local plan growth as shown in subsection 2.3.1. As the city expands through local development, urban extensions and planned garden communities, travel demand is expected to increase, placing additional pressure on an already constrained transport network.

Historically, growth in travel demand has been accommodated primarily through private car use. However, this approach is becoming increasingly difficult to sustain. Congestion and journey time reliability remain key challenges on parts of the network, while further growth in car-based travel would place additional pressure on network capacity, accessibility and economic productivity. Recognising these challenges, Essex County Council's (ECC) draft Local Transport Plan (LTP) identifies a need to reduce reliance on private vehicles and establish a transport network that prioritises active, safe and sustainable travel, delivering health, environmental and economic benefits.

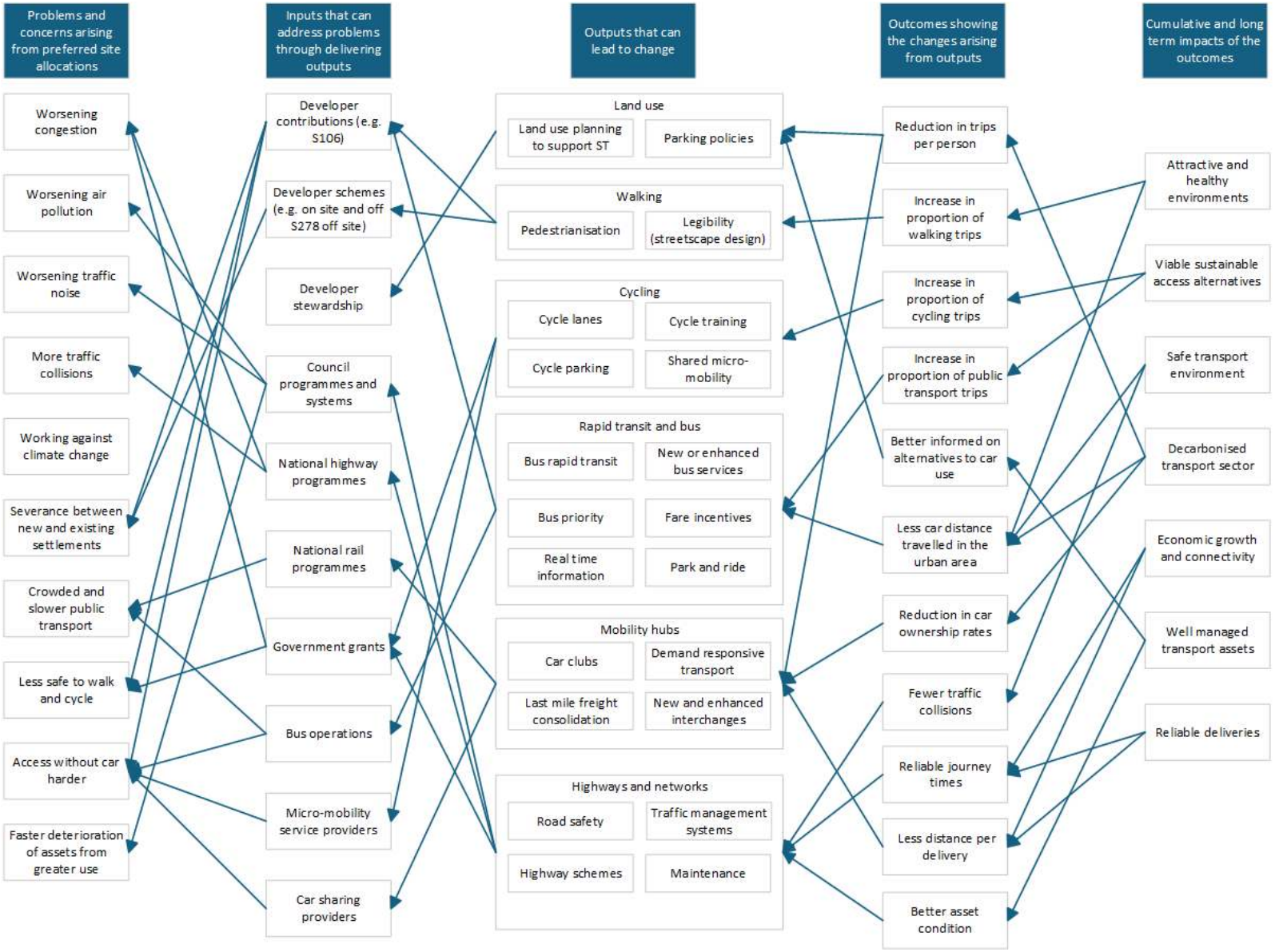

Figure 3.1: Logic map showing approach to address problems and achieve vision

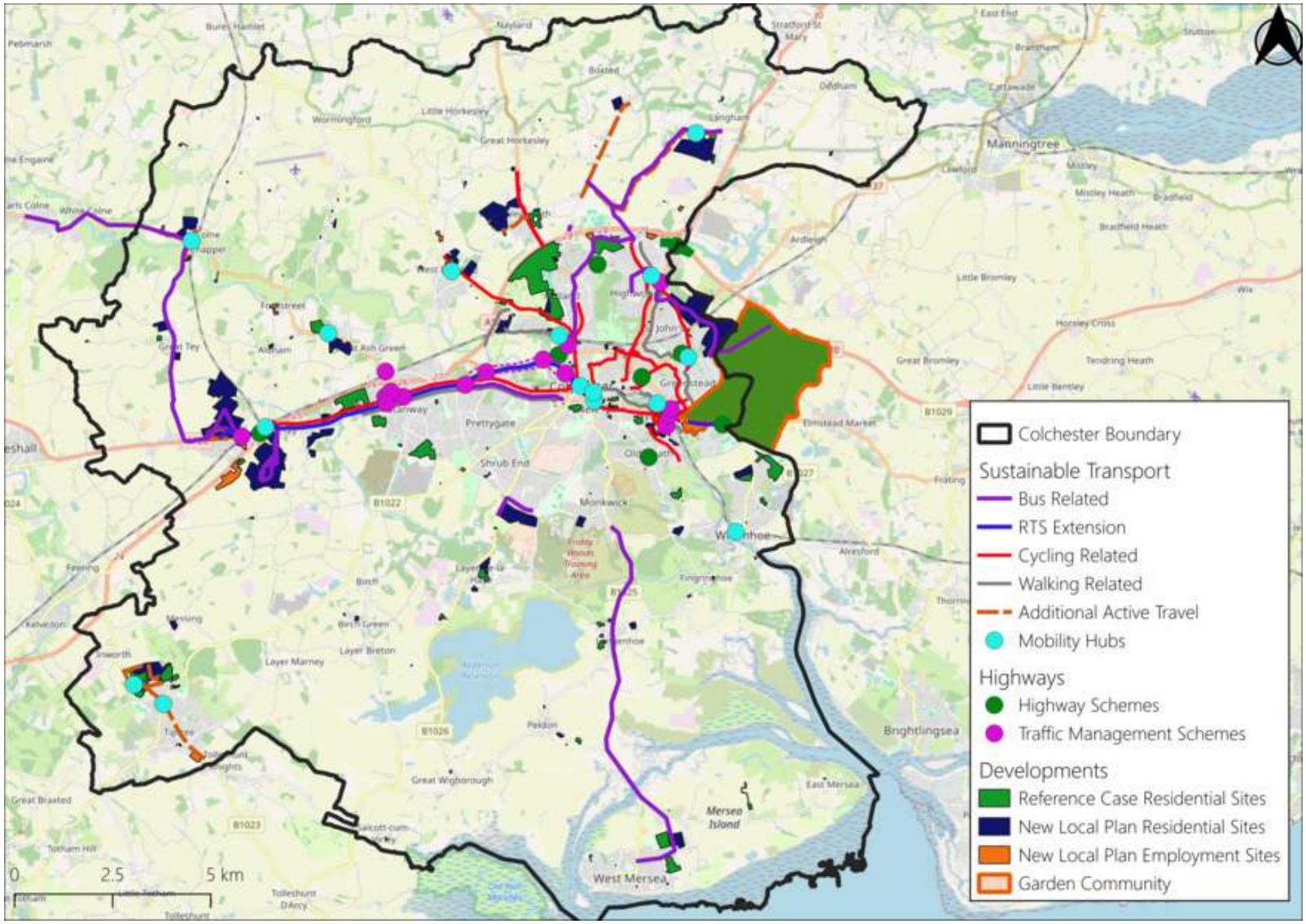

Figure 3.2: Interaction of proposed measures and allocations

This shift in transport planning priorities is reflected across several recent strategies and policy documents prepared for Colchester. The *Colchester City Centre Masterplan* [2] identifies congestion, air quality and limited accessibility by sustainable modes as key barriers to the future success of the city centre. In response, the masterplan promotes a more people-focused environment, where improved walking, cycling and public transport connections support regeneration, economic growth and the overall quality of place.

Alongside growth pressures, travel patterns and user expectations are evolving. Increased levels of hybrid and flexible working have changed commuting behaviours and reduced reliance on traditional peak-hour travel patterns. At the same time, there is growing awareness of the health, environmental and economic benefits associated with walking, cycling and public transport. As a result, users increasingly expect transport networks to provide convenient, connected and flexible travel options.

These trends are reflected in the *Active Travel Supplementary Planning Document* [1], which promotes the creation of well-connected places that prioritise walking, cycling and public transport over private car use. The document recognises that supporting a long-term shift towards sustainable travel requires both high-quality infrastructure and the creation of environments that make active travel an attractive and convenient choice.

Similarly, the Colchester's Local Cycling and Walking Infrastructure Plan (LCWIP) seeks to improve connectivity between key destinations across the city by delivering a coherent network of walking and cycling routes. This responds to evidence that a significant proportion of journeys within Colchester are relatively short and could be undertaken by active modes where suitable infrastructure is available.

Technology is also influencing how transport networks are planned and used. Improvements in digital journey planning, intelligent transport systems, shared mobility services and vehicle electrification are creating opportunities to provide more flexible and integrated travel options. Reflecting these changes, the *Mobility Hubs and Integrated Transport Halts* [12] promotes mobility hubs as locations where public transport, active travel and shared mobility services are brought together, supporting seamless multi-modal journeys and reducing reliance on private vehicle ownership.

A similar evolution can be seen in parking policy. The *Colchester Positive Parking Strategy* [5] continues to recognise the importance of parking in supporting residents, visitors and businesses, whilst positioning parking management within wider objectives relating to environment, sustainable travel, well-being and social inclusion. This reflects an increasing focus on managing travel demand and influencing travel behaviour, rather than simply providing additional parking capacity.

Collectively, these strategies demonstrate a clear and consistent shift in the direction of transport planning within Colchester. While supporting future growth remains a key objective, there is increasing emphasis on creating an integrated transport network that offers attractive alternatives to private car use, supports healthier lifestyles, improves accessibility and contributes to broader environmental, social and economic outcomes.

Crucially, as cities develop and connectivity by ST modes enhances, there will be change in travel behaviour and a rebalancing between the modes.

3.1.3 Fair and reasonable apportionment

The identification of transport mitigation measures within this evidence base has been informed by the scale and distribution of planned growth, forecast travel demand and the operational requirements of the future transport network. While some measures are directly related to individual development locations, many interventions provide benefits across a wider geographical area, supporting movement between communities, key destinations and transport corridors. As a result, the delivery and funding of transport infrastructure will require a coordinated approach that reflects the cumulative impacts of growth across the local plan area.

A key principle of the transport evidence is that development should contribute fairly and proportionately towards the infrastructure required to mitigate its transport impacts. Contributions should reflect the scale of development proposed, the level of travel demand generated and the extent to which individual developments benefit from the infrastructure being delivered. This approach will ensure that the costs associated with transport improvements are distributed equitably across developments and that no single site is required to fund infrastructure that delivers substantial benefits beyond its direct impacts.

It is important to distinguish between strategic transport mitigation and site-specific accommodation works. All development proposals will be required to provide appropriate access arrangements to the public highway, together with any associated junction improvements, pedestrian and cycle connections, frontage works and other measures necessary to make the development acceptable in transport terms. These works are considered site-specific requirements and are a direct responsibility of developers. Consequently, allowances for site access and associated accommodation works have not been included within the strategic mitigation package identified in this evidence base.

In addition, developers of large sites would be required to prepare, implement and monitor travel plans for residents, employees and other site users, as appropriate to the nature and scale of development. The costs associated with Travel Plans are site-specific obligations and have not been included within the strategic mitigation costs or the apportionment of funding contributions set out within this study.

Where mitigation is required solely to support a specific development, including site access arrangements, local junction improvements, frontage works, internal circulation measures and travel plan obligations, infrastructure and associated measures should be delivered directly by that development and funded by the developer. However, where interventions form part of a wider strategic movement corridor, support multiple development locations or address the cumulative impacts of growth, a proportionate cost-apportionment should be applied. This will enable contributions from multiple developments to be combined towards the delivery of larger strategic schemes appropriate to the relationship with development impacts.

The delivery of transport infrastructure over the local plan period is anticipated to require a blend of funding sources. Developer contributions secured through the planning process will represent an important mechanism for delivery; however, opportunities should also be pursued to secure funding from national, regional and local sources. A coordinated funding strategy will maximise opportunities to bring forward infrastructure in a timely manner whilst reducing reliance on any single funding source.

The timing of infrastructure delivery should also be accounted for, given some strategic interventions are intended not only to mitigate planned growth to 2043, but also to establish foundations for longer-term development beyond the plan period. This is particularly relevant for strategic highway improvements, rapid transit infrastructure and the wider comprehensive LCWIP network, where schemes may need to be delivered in phases over an extended period.

In such cases, it may not be appropriate for development planned to 2043 to fund the entirety of the scheme where a substantial proportion of future benefits will be realised through growth occurring beyond the plan period. Local plan developments should contribute towards the proportion of infrastructure required to accommodate growth forecasts to 2043, with future development, external funding opportunities and subsequent plan-making processes contributing towards later phases where appropriate. This ensures that infrastructure can be planned and safeguarded on a long-term basis while maintaining a fair relationship between development impacts and funding obligations.

Opportunities should be explored to secure contributions from outstanding non-consented developments, including developments currently progressing through the planning application process where planning permission has not yet been granted and planning obligations have not been finalised. Contributions should be sought only where mechanisms exist to secure or revise infrastructure contributions, or where developments would derive measurable benefits from the strategic transport interventions identified within this transport evidence. This would recognise the cumulative nature of growth impacts and broaden the funding base available to support delivery of strategic transport infrastructure.

3.1.4 Infrastructure Audit and Delivery Plan and viability

Transport infrastructure requirements identified through this evidence base should be considered as part of the wider local plan infrastructure planning, funding and delivery discussions. Whilst this document does not constitute an Infrastructure Audit and Delivery Plan (IADP) or viability assessment, the development of the evidence base and associated mitigation strategy has been undertaken with due regard to these parallel workstreams, including the need to support an appropriate balance between infrastructure provision, housing delivery and sustainable growth objectives.

The transport interventions identified within this evidence base are considered necessary to support planned growth over the local plan period to 2043 and to mitigate the impacts arising from forecast increases in travel demand. Collectively, they demonstrate the scale and nature of the infrastructure required to accommodate growth whilst supporting the delivery of a proportionate and integrated transport network across Colchester.

All proposed interventions have been informed by the transport evidence and modelling undertaken as part of this study, with their contribution to network performance, accessibility and sustainable travel objectives assessed through the appraisal process. The resulting package of measures therefore provides an evidence-led basis for future infrastructure planning, funding discussions and consideration within parallel IADP and viability assessments.

3.2 Shaping the highway network

3.2.1 Key highway schemes

The current list of proposed highway and traffic management interventions is shown in Tables E.1. It should be noted that these measures do not include local access arrangements to the local plan development sites as, in most cases, these details are not known. Nevertheless, allowances for access arrangements, proportionate to the sizes and locations of site allocations, have been provided to the IADP and viability work streams.

The highway mitigations involve changes to the highway layout or the control of traffic through the highway. The highway schemes are integrated with the public transport, active travel and place-making so not only serve the needs of general traffic. The schemes address severe traffic problems and also unlock the capacity on the network to provide public transport priority, and active travel routes and crossings. The key highway schemes are:

- upgrades to urban traffic control technologies to co-ordinate traffic movements by all modes across the city
- A12 J29 signalisation and widening of the A120 off -slip
- Greenstead roundabout and Wivenhoe Park corner junction co-ordinated with RTS priority and crossings
- A12 J25 signalisation and a remodelled junction at the Station Road roundabout including footbridge widening across the A12 and new RTS priority
- A12 J26 signalisation of the approaches through Tollgate and London Road roundabouts also supporting RTS priority and crossings
- A12 J27 signalisation
- partial signalisation of St Andrews Avenue junctions with Ipswich and Harwich Roads

3.2.2 Dynamic traffic management

New homes, jobs, town centre regeneration and local plan allocations will all place more pressure on an already busy highway network. In many locations, it will not be practical or affordable to keep responding to growth by building more road capacity. The better opportunity is to enhance the intelligence of the existing network to optimise traffic flows, reduce congestion and prioritise certain modes.

The dynamic traffic management mitigation seeks to upgrade traffic management urban traffic control systems to support the delivery of integrated transport. By improving how traffic signals, sensors, operational systems and wider datasets are integrated, this will support more reliable movement of people and goods, enable housing and economic growth, improve access to sustainable transport choices and contribute to improved health, environmental and decarbonisation outcomes.

Next generation traffic management innovations provide ECC a way to do this; they use better data, sensors, traffic signal systems, communication networks (5G), real-time modelling, artificial intelligence and digital tools to understand and predict what is happening on the network to optimise traffic signal phasing. It supports proactive versus reactive network management, with future systems being able to use wider

data sources to manage the local network and other wider network data to predict and manage flows in real-time.

The outcome will be improved traffic flows, journey time reliability and reduced congestion on the network. This matters because traffic management is an enabler for many things - growth, public transport reliability, active travel, air quality, town centre vitality, development viability and ultimately review value for money.

Leading authorities are starting to treat traffic management technology as strategic infrastructure, not a back-office system. It is becoming part of how places support growth, improve journey time reliability and make better use of public money. Alongside this the commercial models to fund the digital and physical infrastructure are also evolving.

Essex already operates traffic management systems using SCOOT, MOVA and bus priority, alongside other technologies such as Vivacity sensors and environmental monitoring. Therefore, the approach is to extend this capability to integrate existing systems and data more effectively, maximise their current value and identify where targeted investment could unlock further benefits.

In 2021, York became the first UK city to deploy real-time traffic modelling within its traffic management operations. In 2024, the city implemented a real-world pilot to automatically simulate alternative signal plans within the real-time model, and to send recommendations to be implemented via the urban traffic control (UTC)). This resulted in traffic delay reductions of up to 8% in the peaks.

Tees Valley has developed a digital regional traffic simulation using live roadside data: in-road sensors and GPS-tracked buses to simulate and predict traffic conditions. Its six-month pilot reported reduction in delays where the system was deployed, and improvements in bus journey times.

The vision for the system in Essex is shown in Figure 3.3. The investment in the system would require ongoing revenue support as opposed to a one-off single investment. Therefore, in many respects, it is a more affordable option than large infrastructure projects as developers could pay contributions only after housing has been completed.

Such innovation would be expected to support the local technology sector and link to areas of computing excellence at the University of Essex. It would also naturally coordinate with NH traffic management systems used on the Strategic Road Network (SRN).

Figure 3.3: Dynamic traffic management vision

3.2.3 Northern corridor

On the northern corridor, A12 J29 and the Mill Road approach to Urbis Romanae have been identified as the key locations where traffic is blocked back, which in the case of J29 also leads to safety problems as traffic queues back on to the westbound A120.

Appropriate mitigation at A12 J29 would likely be achieved by:

- extended signalisation (since not all arms are currently signalised)
- widening of A120 to Ipswich Road offslip to three lanes
- widening of slip approach to Newcomen Way to two lanes
- widening of the A120 eastbound onslip to two lanes

External contributions from NH should be explored and developer contributions from developments across Tendring and Colchester council areas should also be considered. Since there are four components to the suggested scheme, it is feasibly that it could be delivered in increments with funded provided from separate sources at different times – aligning to the requirement of fair and reasonable funding apportionment explained in subsection 3.1.3.

Modelling as established that Mill Road has limited capacity with a volume divided by capacity (v/c) ratio has higher than 85% and sensitivity to demand growth and network changes further afield. A traffic management package is recommended along Mill Road corridor to help manage congestion and facilitate access to nearby destinations including the city's hospital. The package will likely require physical work and will need to support active travel and public transport priorities.

3.2.4 Western corridor

The model shows that the impact of preferred allocations is of greater concern on the approaches to and off A12 junctions: J25, J26 and J27. Such issues could, if they worsen, lead to safety issues exiting the A12, long queues and low speeds. This also impacts on buses and the ability to walk and cycle. Hence these problems undermine movement and connectivity at the proposed new local plan Marks Tey allocations.

An integrated, highway-led, transport scheme is recommended around A12 J25, illustrated in Figure 3.4, with the following possible components:

- conversion of the Marks Tey roundabout to a signalised cross-road junction to improve delays
- signalisation of the Prince of Wales roundabout
- provision of bus and RTS priority between Marks Tey and Prince of Wales junctions in both directions using existing highway space (no widening required)
- active travel route enhancements supporting LCWIP (Route 3) access.
- remove on-street parking on Station Rd and replace with cycle track and widened footpath
- A12 pedestrian footpath widening to enable use by cyclists

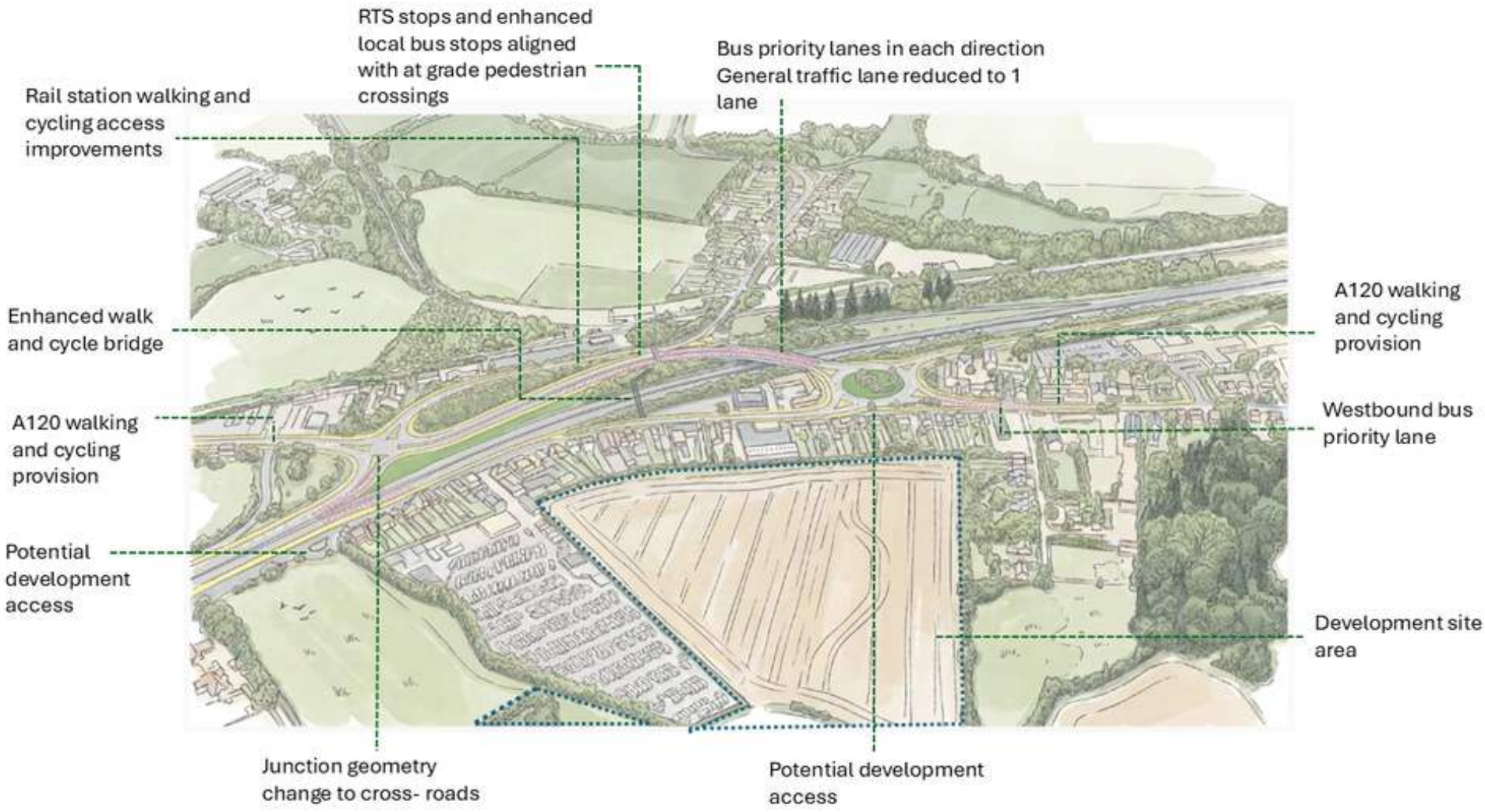

Figure 3.4: Marks Tey integrated transport mitigation ideas

Meanwhile at A12 J26-27 and Stanway, a package of measures to help manage queuing on Essex Yeomanry Way, expected as a result of the Tollgate development, is suggested:

- Tollgate roundabout signalisation and bus priority lanes
- London Road/Western Approach junction geometry change from roundabout to crossroads with bus priority lanes
- Essex Yeomanry Way J27 and Western Approach roundabout signalisation to manage traffic movements

The eastern package of measures also addresses significant queues along Cymbeline Way through use of signal technologies (supported by the dynamic traffic management mitigation).

3.2.5 Eastern corridor

The main eastern approach into Colchester is along Clingoe Hill through Greenstead roundabout. Congestion and delays are already frequent and there are limited ST options with minimal walking and cycling infrastructure, and most corridor trips depend on car use.

Traffic grows substantially along the eastern corridor due, mainly, to TCBGC and Tendring local plan allocations. To support this growth and enable the multi-modal transport capability, the corridor will also need to accommodate RTS, which will provide direct access into TCBGC and a P&C East site, offering a high-frequency and reliable public transport option aligned with the garden community's sustainable transport vision.

To mitigate the impacts of growth along the A133 corridor and to ensure strong connectivity between key destinations north and south of the route, a comprehensive package of transport scheme options have been identified. The suggested changes required at Greenstead roundabout, which are illustrated in Figure 3.5 include:

- peninsularisation of the south west side of the roundabout to prioritise key movements and reduce extreme congestion (or another arrangement to achieve the same end)
- full signalisation
- RTS and local bus priority measures including between Clingoe Hill and St Andrews Avnenue and between Colne Causeway and Greenstead Road
- complementary measures at the Colne Causeway / Elmstead Road roundabout to help co-ordinate movements and facilitate safe crossings from the University

In addition, the Clingoe Hill package needs to consider the severe queuing predicted at Wivenhoe Park Corner, where Colchester Road meets Clingoe Hill. Accordingly, the mitigation approach includes allowance for Wivenhoe Park Corner junction re-design to a conventional roundabout geometry with RTS priority lanes to access P&C East. The redesign would include pedestrian crossings and bus stop improvements and include complementary measures to improve the Colchester Road / Brightlingsea Road junction.

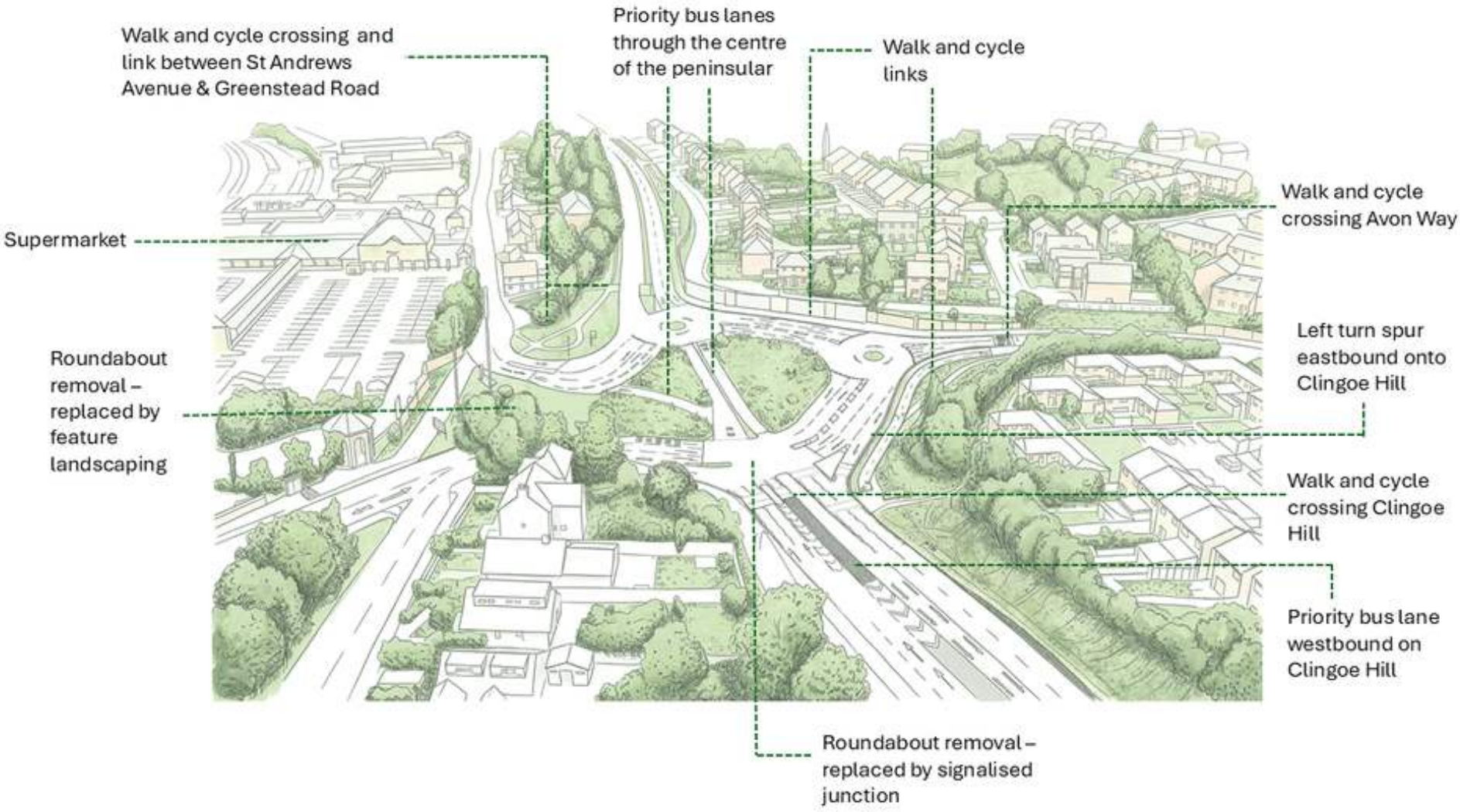

Figure 3.5: Greenstead roundabout integrated transport mitigation ideas

The Wivenhoe Park corner package would also enable extension of dedicated RTS lanes, which are described in Section 3.3. A dedicated westbound RTS lane will be needed to support RTS journey time reliability exiting Wivenhoe Park corner approaching the current bus priority provision at Knowledge Gateway. Feasibility work is required to understand whether this provision will sit within the central reservation or nearside lane along the A133.

3.2.6 City centre

Close to and in the city centre, the most practical approach to mitigation is draw on the technology upgrades proposed for the UTC system. At some location this will require introduction of additional signals.

For example, to address problems at lower Ipswich Road and lower Harwich Road locations, partial signalisation, signal co-ordination is proposed to better balance movements of all modes through and around these junctions. Changes need to be co-ordinated with movements through Greenstead roundabout from the east and also movements through Colne Bank and along Cowdray Avenue from the west.

Similarly, a traffic management solution is proposed on the route running through Balkerne Hill to North Station. This solution only works if there are improvements to public transport, and active travel infrastructure to reduce the demand for car trips in the city centre.

3.2.7 Outer areas

While the main focus is on the urban area, the forecast 2043 model plots have been inspected to identify issues in outer areas. However, since some outer areas are not in the area of detailed modelling, issues can sometimes be understated in the strategic model. Therefore interpretation of issues needs to be complemented by local intelligence, and where available, studies involving junction models.

This wider review has noted the need for improvements to the priority junction between B1022 Maldon Road / Warren Lane Junction near Heckfordbridge, south west of Colchester – which involves creating a roundabout to address road safety and delay.

The IADP anticipates there could be traffic issues that require addressing at Langham, Aldham and Tiptree. However, the NEMo analysis suggests that movement is acceptable in terms of the NPPF. Hence the focus it to use public transport and active travel schemes, which are required for connectivity, to also address junctions where a rebalancing between modes is required.

3.3 High quality public transport

High Quality Public Transport (HQPT) will play a fundamental role in accommodating future growth in Colchester, providing an attractive alternative to private car travel and supporting the creation of sustainable, well-connected communities. The concept of HQPT extends beyond the provision of conventional bus services and is characterised by a combination of six principles which help create a public transport offer that can compete effectively with the convenience of the private car:

- fast - competitive journey times through priority and direct routing
- reliable - protected from congestion and supported by traffic signal priority
- frequent - turn-up-and-go services throughout the day

- integrated - seamless interchange with rail, active travel, mobility hubs and park and choose
- accessible - inclusive infrastructure and services for all users
- scalable - capable of increased capacity and service enhancements as demand grows

Figure 3.7 shows the aim for a rapid transit network in Colchester which combines rail and rubber-tyred RTS routes, which connects with P&C facilities. These routes are integrated with the local bus, cycling and walking networks. The list of public transport related mitigation and connectivity measures for the IADP is provided in Table E.2.

3.3.1 Rail

Colchester is well connected by rail, with direct access to the Great Eastern Main Line via Colchester North and Marks Tey stations. Both stations benefit from regular and frequent services to London, Ipswich and wider destinations along the route. Colchester Town, Wivenhoe and Chappel & Wakes Colne stations are located on branch lines with less frequent services but provide important connectivity across the council area and to neighbouring districts.

Proposed mitigations focus on improved station accessibility and the integration of transport modes to enhance access to the rail network and support sustainable travel choices.

For all stations within Colchester's council area, mobility hubs are proposed in accordance with the *Mobility Hubs and Integrated Transport Halts* [12]. The scale and typology of each hub will reflect station characteristics, including service frequency, passenger demand, surrounding land uses and wider transport connectivity. Stations located within Colchester's urban area and Marks Tey are likely to require Typology 1 or 2 hubs, which are the highest grade of hubs, whilst Chappel & Wakes Colne and Wivenhoe Stations are likely to be more appropriately served by Typology 2 or 3 hubs, which are lower grade provisions tailored specifically to communities.

The proposed mobility hubs will provide a coordinated package of measures to improve integration between rail services and onward travel options, in accordance with the *Mobility Hubs and Integrated Transport Halts*. By creating accessible and attractive station environments, the hubs will strengthen multimodal connectivity, support sustainable travel choices and reduce dependence on private car access across the council area.

Marks Tey Station is proposed to receive the most significant package of accessibility and interchange improvements to support both local plan development and longer-term growth beyond the plan period. Most notably, lift and stair upgrades are proposed to improve step-free access between platforms and enhance accessibility for all users. In the short term, these improvements would be complemented by enhanced secure cycle parking and improved pedestrian access to the station.

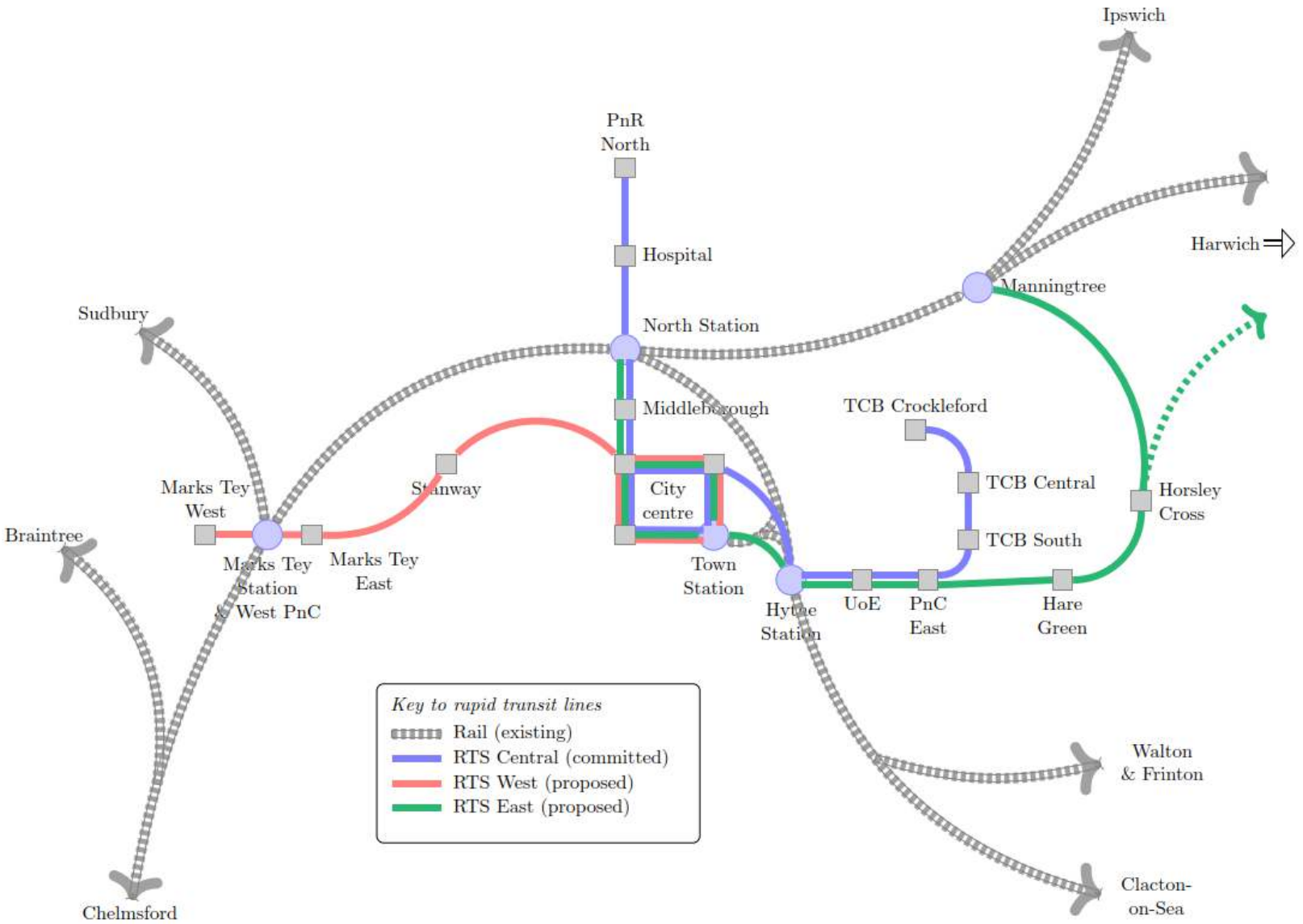

Figure 3.6: Proposed rapid transit network

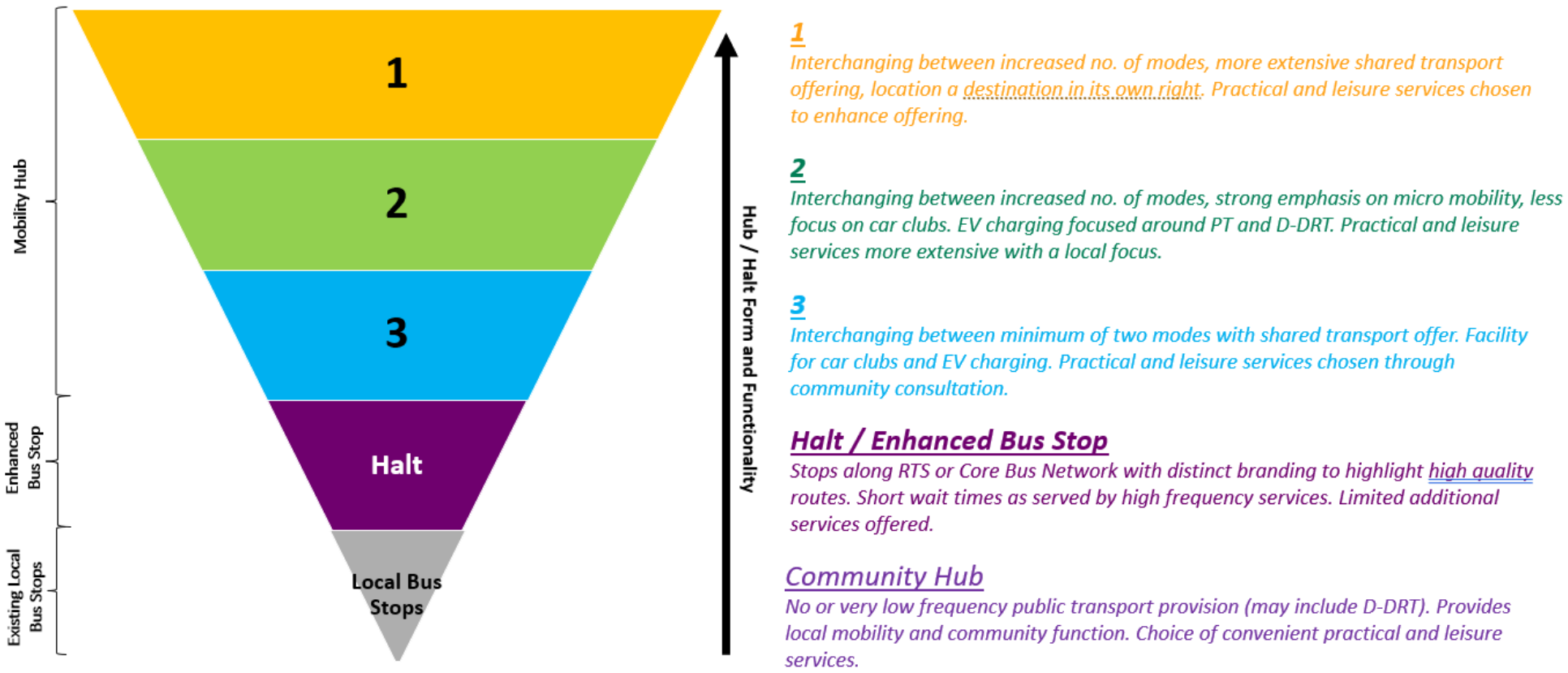

Figure 3.7: Types of mobility hubs

Over the plan period, these measures would form part of a wider mobility hub centred on the station forecourt. This would include widened pedestrian routes, improved cycling infrastructure along Station Road, enhanced bus stops and RTS facilities, and improved connectivity between the station entrance, bus services and surrounding development areas. Opportunities for shared mobility services and supporting local facilities would also be incorporated to provide a seamless and integrated transport offer, enabling sustainable access to existing and proposed development across the Marks Tey area.

At Colchester North and Colchester Town Stations, mobility hub interventions would focus on strengthening links with local bus services, walking and cycling networks and the city centre, whilst at Wivenhoe and Chappel & Wakes Colne Stations measures would be proportionate to levels of demand, focusing on improved accessibility, cycle provision, wayfinding and local transport integration. Together, these interventions will support the role of the rail network as a key component of the Borough's sustainable transport strategy and enable increased rail mode share throughout the local plan period.

It is recommended that North Essex planning authorities continue to build the case for Network Rail to invest in frequency and rail capacity improvements through Transport East. Such improvement would likely fall beyond the plan period but are considered critical to supporting growth post-2043. Table 3.1 summarise the key schemes required which have been informed by Transport East studies [21] [22]. Not shown in the table is also the need for capacity enhancements at Liverpool Street and Stratford stations since these support national and regional growth beyond Colchester.

Table 3.1: Rail plans

Line	Journey	Current service	Longer term aspiration	Rail journey time	Road journey time	Key schemes needed to unlock longer term aspiration
Great Eastern Mainline	London – Colchester	2tph (fast) + 3tph (stopping)	3tph (fast) + 3tph (stopping)	47 mins (fast), 1hr (stopping)	1hr 30	• Remodelling of Bow Junction west of Stratford • Remodelling of Haughley Junction north of Chelmsford
	Colchester - Norwich	2tph (fast)	3tph (fast)	1hr	1hr 30	
Branch lines	Sudbury – Marks Tey	1tph (off-peak)	2tph	20 mins	30 mins	• Passing loop • Possibly reconfiguation of Marks Tey station
	Colchester - Clacton-on-Sea	2tph in peak/ 1tph off-peak	2tph	30 mins	35 mins	• Increasing frequency to 2tph considered feasible • Possibly reconfiguation of Marks Tey station
	Colchester -Walton-on-the-Naze	1tph	2tph	55 mins	40 mins	

3.3.2 Rapid transit system

3.3.2.1 RTS Central

Along with rail, RTS provides the foundation for the delivery of the HQPTvision across Colchester. Recently delivered schemes have already created dedicated infrastructure along the Northern Approach Road between Bruff Close and Mill Road, and Clingoe Hill between Greenstead roundabout and the university's Knowledge Gateway entrance. The first RTSservices would be expected to commence operation in 2028 connecting the first homes at TCBGC to destinations in the city centre.

As TCBGC grows and Tendring local plan development comes forward, additional RTS priority will be required. Hence a dedicated westbound RTS lane is proposed between Wivenhoe Park corner and Knowledge Gateway, where it would join the recently delivered dedicated lane. The dedicated glsrts is enabled by the major highway schemes at Greenstead roundabout and Wivenhoe Park corner described subsection 3.2.5. In addition, it is recommended that land is safeguarded for an eastbound dedicated RTS lane between Greenstead roundabout and Wivenhoe Park corner.

3.3.2.2 RTS West

The integrated transport plan to mitigate transport impacts on the west of Colchester recommends introducing an additional RTS line to establish a HQPT corridor linking the western growth areas of Colchester with the city centre and wider public transport network. RTS would serve Marks Tey and the significant residential and employment growth planned in this location, and Stanway.

The RTS West corridor would build upon the core principles of RTS, providing reliable journey times, priority where required, frequent services, high-quality passenger facilities and seamless interchange with rail services, active travel networks and future mobility hubs. In doing so, it would support both existing and emerging communities, improving access to employment, education, healthcare and leisure destinations across the wider Colchester area.

Delivering RTS West alongside the early phases of development at Marks Tey presents a significant opportunity to establish sustainable travel patterns from the outset. The provision of an attractive and competitive public transport offer from first occupation can help embed lower-car travel behaviours, reducing long-term reliance on private vehicles and supporting choice of mode.

As a substantial proportion of growth within the Marks Tey area is anticipated beyond the current Local Plan period, RTS West should be planned as a scalable and future-proof transport corridor. Initial infrastructure delivered during the plan period would accommodate early phases of development and committed growth, while safeguarding the ability for future enhancements in service frequency, vehicle capacity and network coverage as demand increases. This phased approach ensures that the corridor can evolve alongside development whilst maintaining the characteristics expected of a strategic rapid transit network.

The highway interventions identified within subsection 3.2.4 have been developed to accommodate future RTS and bus priority measures and thereby support the expansion of the rapid transit network to the west of Colchester. In addition to addressing future highway demand, these schemes incorporate the infrastructure necessary to facilitate a continuous HQPT corridor along London Road and Cymbeline Way, helping to secure reliable and attractive public transport connectivity between Marks Tey,

Stanway and Colchester city centre.

3.3.2.3 RTS East

Although not part of Colchester's IADP, a RTS service is being planned to connect to proposed garden village developments at Hare Green and Horsley Cross in Tendring. This eastern RTS route is shown in Figure 3.7 and will be part of the strategy to mitigate the traffic impact of growth and improve sustainable connections. RTS East would be supported by the proposed highway infrastructure and dedicated running lanes along the A133.

3.3.3 Local buses

The local bus network forms a key component of the approach to improve the integration of transport in Colchester in order to mitigate the transport impact of growth and support sustainable travel choices. Local buses provide connectivity between residential areas, employment locations, educational facilities, healthcare services, the city centre and strategic transport hubs. Alongside walking, cycling and rail, local bus services support travel to a wide range of day-to-day destinations and provide an important alternative to private car travel. As Colchester continues to grow over the Local Plan period, a reliable, accessible and attractive bus network will be required to support sustainable travel patterns, improve accessibility and contribute to wider objectives relating to congestion reduction, social inclusion and decarbonisation.

To support these objectives, provision should be made for enhancements to the local bus network, including increased service frequencies, network extensions and the introduction of new services where justified by future travel demand. Establishing high-quality public transport provision from the early phases of growth will be important in encouraging sustainable travel behaviour and reducing car dependency. In many locations, achieving an attractive level of service is likely to require revenue funding support during the period in which passenger demand develops and services mature towards long-term viability.

The scale and distribution of planned growth across the local plan area is likely to require a combination of enhancements to existing services and the introduction of new routes to improve access to key destinations across the wider Colchester urban area. The precise form of these interventions will continue to evolve as development proposals progress and service requirements are refined in partnership with local authorities and bus operators. Given the cross-boundary nature of several strategic travel movements, coordination with neighbouring authorities will also be required to ensure that future bus services provide effective connectivity across the wider functional area. To secure the delivery of these improvements, contributions towards bus service support will be required to fund service enhancements and network development during the early years of operation.

A new city centre bus interchange is also proposed as a key element of the future public transport network. While the location and detailed design of the interchange remain subject to ongoing consultation and further development, the provision of a modern, accessible and operationally efficient facility will be important in supporting the long-term role of bus travel within Colchester. The interchange would provide the capacity and infrastructure necessary to accommodate enhanced service frequencies, additional routes and future fleet requirements, whilst improving passenger facilities, accessibility and operational reliability. By creating a high-quality focal point for local

bus services and strengthening integration with walking, cycling and rail networks, the interchange would support a more attractive and efficient public transport system capable of meeting the city's future needs.

3.4 Active travel and place making

Active travel forms a fundamental component of Colchester's integrated transport system and will play an increasingly important role in supporting sustainable growth across the local plan period. Walking, wheeling and cycling provide direct access to local destinations whilst also enabling seamless first and last mile connections to bus services, rail stations, community facilities, employment locations and the city centre. As a result, active travel infrastructure is critical to maximising the effectiveness of the wider transport network and providing genuine travel choice for residents, workers and visitors.

Colchester has the opportunity to improve network connectivity, accessibility, safety and route quality to support a greater proportion of journeys being made by active modes. In line with national, regional and local transport objectives, Colchester seeks to create a coherent and connected network that enables more trips to be undertaken by foot, by wheel or by cycle, providing choice for users whilst supporting wider health, wellbeing, place-making and environmental objectives.

Active travel infrastructure will enhance connectivity between existing communities, planned growth areas, transport interchanges and key destinations across Colchester. Together these measures will support the development of attractive, accessible and inclusive streets and places, whilst strengthening integration with the wider public transport network.

A full list of active travel and placemaking mitigation measures is provided in Table E.3

3.4.1 Integration with land use planning and place making

Integrating active travel infrastructure with land use planning and placemaking is fundamental to delivering sustainable growth across Colchester. The provision of high-quality walking, wheeling and cycling infrastructure alongside future development will provide residents, employees and visitors with attractive alternatives to private car travel from the outset, helping to establish sustainable travel patterns and supporting greater use of active modes for both local and strategic journeys.

This approach builds upon a strong existing policy and evidence base for active travel across Colchester and Essex. The identification of active travel mitigation measures has been informed by ECC's plans for well-designed neighbourhoods. These principles promote the creation of places where day-to-day needs can be accessed conveniently by walking, wheeling and cycling, reducing dependence on private vehicle travel and supporting more sustainable patterns of movement. They seek to ensure that streets, public spaces and movement corridors are designed around people, creating connected communities that prioritise accessibility, place quality and modal choice.

The focus of the proposed mitigation measures is to provide direct, attractive and continuous connections between existing communities, planned growth locations and the wider active travel network. In particular, measures have been designed to support access to key destinations, public transport interchanges, employment areas, education facilities and local centres. The Colchester LCWIP, discussed further in subsection 3.4.2, provides the strategic framework for many of these interventions and

identifies the longer-term active travel corridors into which new infrastructure should connect. There should be an obligation for all developments to provide a connection to the strategic LCWIP network or to a safe cycling network, where and LCWIP route is not provided.

Future development and detailed design of active travel infrastructure should be guided by Healthy Streets principles [15], creating streets and public spaces that are safe, attractive, inclusive and accessible for all users. By prioritising the movement of people and providing high-quality public realm, these principles support increased levels of walking, wheeling and cycling whilst delivering wider benefits relating to health, wellbeing, social interaction, environmental quality and placemaking.

A key focus area for active travel investment is the Marks Tey corridor, where significant planned growth coincides with existing barriers to movement for non-motorised users. The A12 and A120 currently create substantial severance, particularly in relation to access to Marks Tey railway station and movement between communities located on either side of the strategic road network. To address these constraints, the proposed mitigation package includes replacement or enhancement of the existing pedestrian and cycle bridge to modern design standards, improvements to crossing facilities at Junction 25 of the A12, enhanced walking and cycling provision along Station Road, and the delivery of new active travel links connecting neighbouring communities with existing and proposed routes. Collectively, these measures will improve access to the railway station, strengthen local connectivity and support the delivery of the strategic LCWIP corridor between Marks Tey and Colchester City Centre.

By integrating active travel infrastructure with the location and design of future growth, opportunities can be created to establish connected and accessible neighbourhoods where a greater proportion of daily journeys can be undertaken by sustainable modes. This will help to manage future travel demand, support the efficient operation of the wider transport network and contribute to broader objectives relating to public health, carbon reduction and place quality. Active travel infrastructure should therefore be viewed not only as a transport intervention, but as a fundamental component of successful placemaking and the creation of sustainable communities across Colchester.

3.4.2 Connecting development to LCWIP and safe routes

The Colchester LCWIP provides the strategic framework for the long-term development of walking and cycling infrastructure across the city. The LCWIP identifies a comprehensive network of routes and interventions designed to improve connectivity, accessibility and safety for active travel, supporting both local journeys and longer strategic movements between key destinations. It establishes a prioritised programme of investment that will, over time, deliver a coherent and connected active travel network across the Colchester urban area.

Since the adoption of the LCWIP, a number of schemes have been delivered, are currently being developed, or are progressing through funding and design stages. The continued phased implementation of the LCWIP network will be essential to realising its long-term vision and supporting sustainable travel patterns as Colchester grows over the local plan period.

To support planned growth, a number of LCWIP corridors and associated active travel schemes have been identified for delivery through full or partial developer contributions where they provide strategic connectivity to allocated development sites. Integ-

rating development with the LCWIP network from the outset will help ensure that walking, wheeling and cycling are viable and attractive travel options, supporting mode share aspirations and providing direct access to employment, education, transport interchanges, local centres and other key destinations across the wider Colchester area.

Figures 3.8 and 3.9 illustrate the strategic walking and cycling networks identified within the LCWIP and their relationship to planned growth locations and proposed mitigation measures.

In addition to the strategic LCWIP corridors, a series of complementary active travel connections have been identified to provide safe, direct and attractive access between development areas and the wider active travel network. These links will help address existing gaps in connectivity, reduce barriers to active travel and support seamless journeys between neighbourhoods and key destinations. Collectively, this approach will enhance the attractiveness and practicality of active travel for a broad range of trip purposes and journey lengths.

Figure 3.10 identifies the proposed development connections to the strategic network, with particular emphasis on the cycling network, reflecting the wider catchment and journey distances that can be effectively served by cycling infrastructure.

3.4.3 Proportionate contributions to LCWIP

The delivery of the Colchester LCWIP network will require investment from a range of sources over the local plan period. Many LCWIP schemes form part of strategic active travel corridors serving multiple development locations, existing communities and key destinations. As a result, the benefits of these routes extend beyond individual sites and support the cumulative impacts of growth.

Development should therefore contribute fairly and proportionately towards LCWIP infrastructure, reflecting the scale of development, the level of active travel demand generated, and the extent to which a development benefits from the infrastructure delivered. This will ensure costs are evenly distributed equitably across developments, contributions pooled and coordinated to support phased delivery of the proposed network.

Opportunities should be explored to secure contributions from existing committed developments where mechanisms remain available and a clear relationship can be demonstrated between the development and the benefits of the LCWIP. This will broaden the funding base and reflect the cumulative nature of growth impacts.

This approach will support the delivery of the proposed LCWIP network while providing flexibility to respond to future funding opportunities to further strengthen the proposed and wider network as development phases emerge.

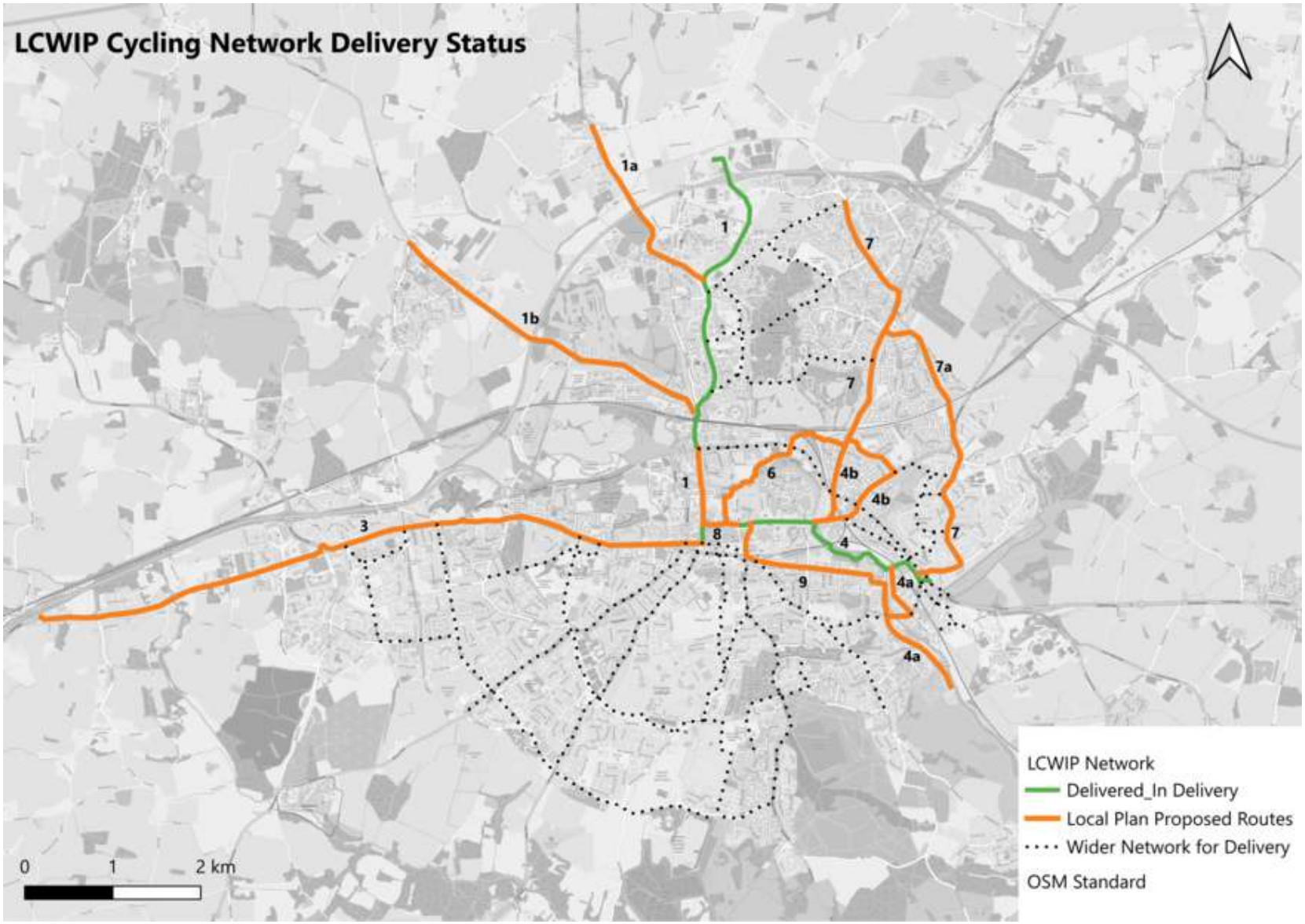

Figure 3.8: Delivered and proposed LCWIP cycling network

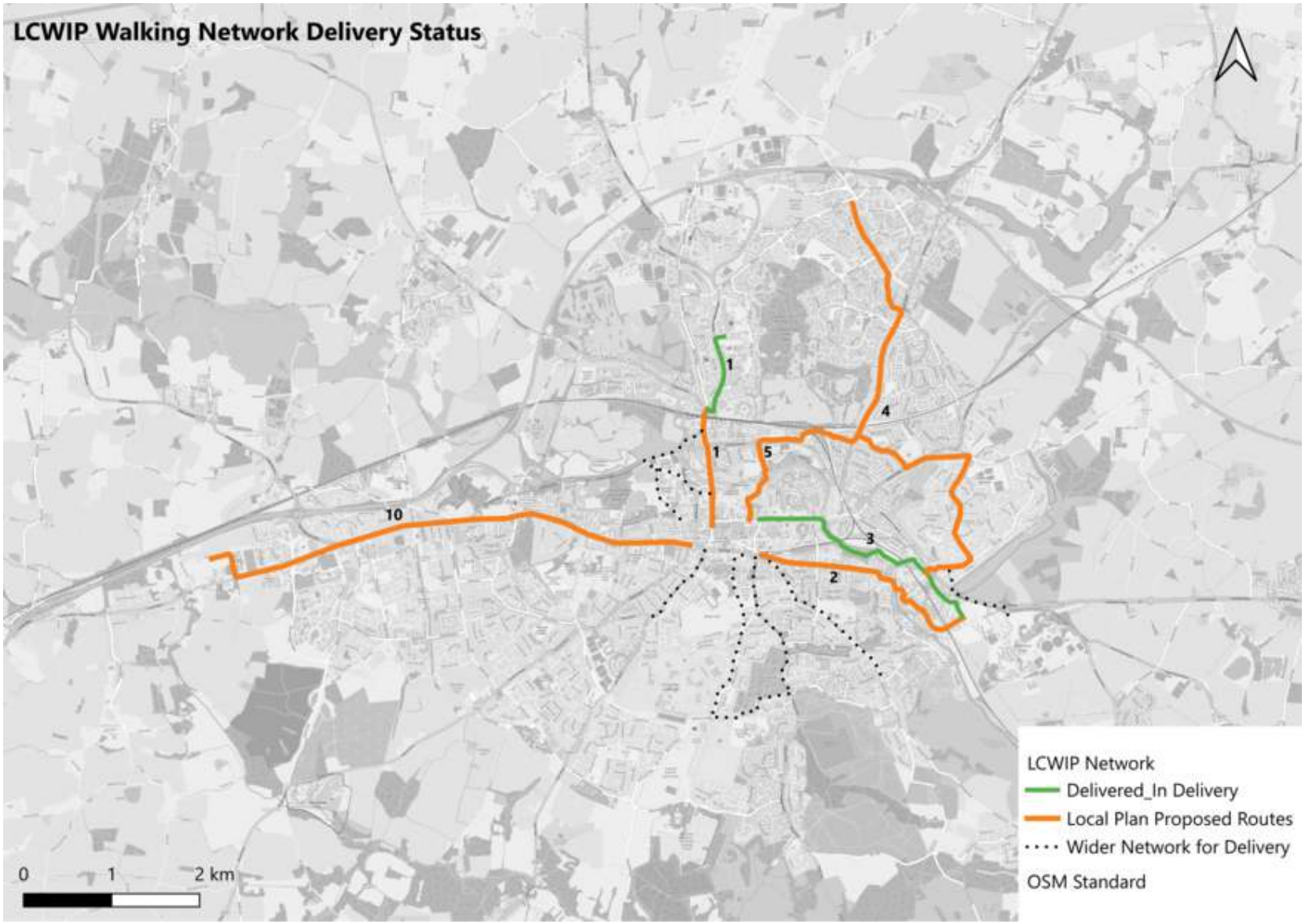

Figure 3.9: Delivered and proposed LCWIP walking network

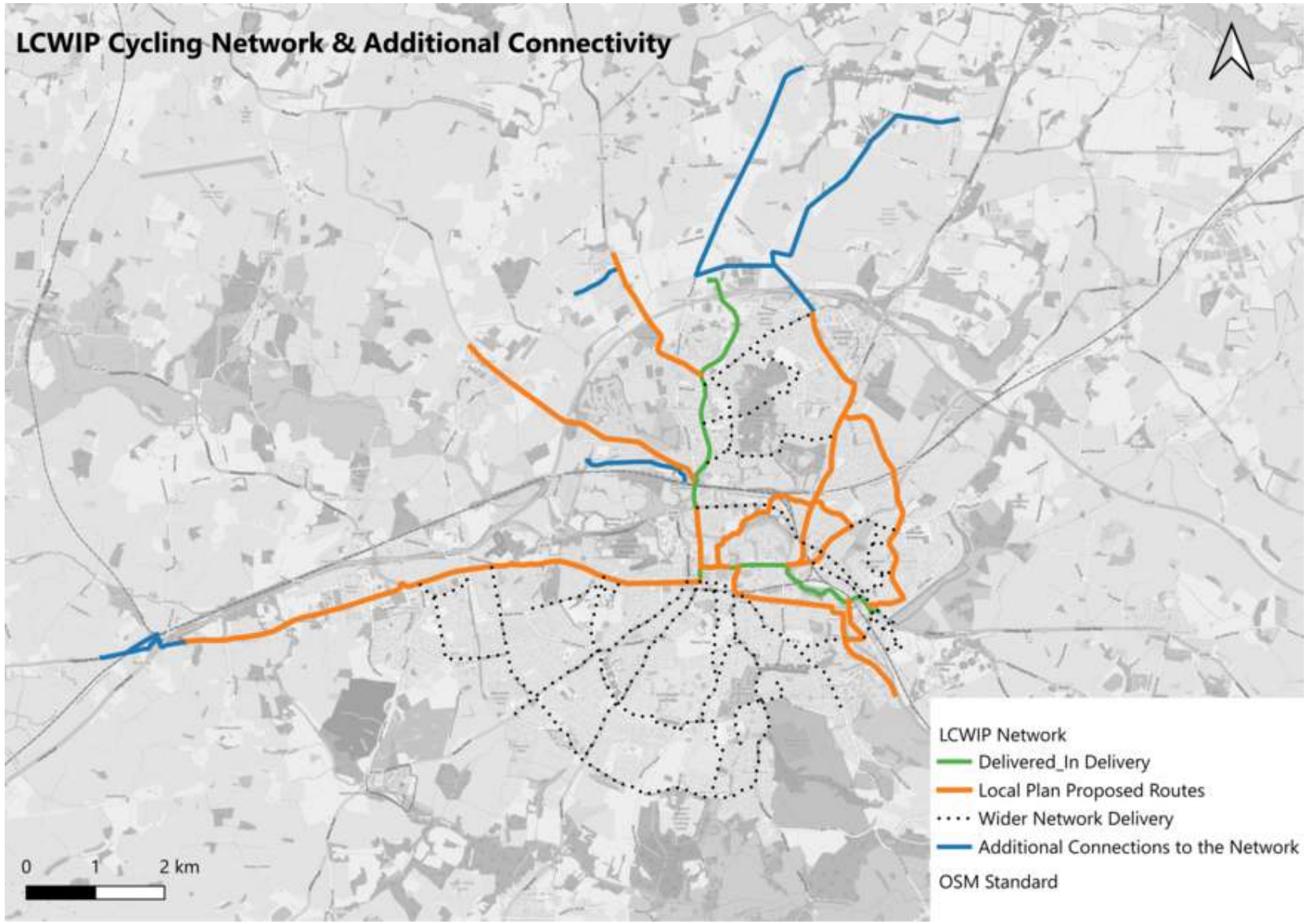

Figure 3.10: Connection between new local plan sites and the LCWIP network

3.5 Conclusion

This chapter has set out a comprehensive and vision-led transport mitigation strategy to support the preferred site allocations and planned growth across Colchester to 2043. Building upon the transport challenges identified in the baseline assessment in Chapter 2, the strategy has been developed to ensure that growth is accommodated in a manner that supports the wider objectives of the emerging local plan, the draft LTP, and broader national and regional ambitions for growth, liveability, and place-making.

The evidence presented demonstrates that addressing the transport impacts of growth cannot be achieved through highway infrastructure alone. Instead, a coordinated package of interventions is required that integrates land use planning, active travel, high-quality public transport, mobility hubs, travel planning, highway improvements and advanced traffic management. Together, these measures are intended to influence travel behaviour, improve access to sustainable modes, enhance network efficiency and provide genuine travel choice for residents, businesses and visitors.

Whilst a range of highway and traffic management interventions have been identified to support highway capacity where necessary, the overall approach seeks to maximise the contribution of sustainable transport measures before considering the extent of further highway intervention required. In this respect, the mitigation strategy reflects a shift from a traditional capacity-led approach towards one focused on moving people and goods more efficiently, supporting sustainable travel choices and making best use of existing infrastructure. Highway schemes are seen as an opportunity to unlock capacity for sustainable transport provision.

The chapter has identified a substantial opportunity to widen transport choices, particularly for shorter journeys where walking, wheeling, cycling and public transport can provide realistic alternatives. The proposed measures build upon existing strategies, programmes and committed schemes, whilst also establishing a framework for future investment that can evolve alongside development and technological change. Particular emphasis has been placed on strengthening connections between new and existing communities, improving access to key destinations and transport interchanges, and creating a transport network that supports healthier, more accessible and more attractive places.

Recognising the cumulative nature of growth impacts, the chapter has also established principles for fair and proportionate infrastructure delivery, funding and cost apportionment. This acknowledges that many proposed interventions provide strategic benefits across the wider council area and will require coordinated delivery through a combination of developer contributions, public sector funding and future investment opportunities.

The following chapter presents findings of tests the mitigation measures in the transport models.

4 Transport assessment of growth with mitigation

Introduction and summary

Chapter 2 identified significant tranport challenges related to reference case and proposed new local plan growth; and Chapter 3 explained the logic for packages of integrated transport schemes to keep people and goods moving, widen mode choice and, thereby, support growth.

This chapter tests the measures in NEMo and microsimulation VISSIM models, and finds that the transport impact of growth can be acceptably managed if the integrated transport schemes are delivered.

The chapter use NEMo to test the key highway and public transport schemes using a BaU assumption of trip demand, in which transport behaviour is similar to now. NEMo is then run taking into account a switch to greater levels of sustainable travel to reflect the impact of measures not directly used in the model.

The next chapter explores how robust the integrated transport measures will be to support growth beyond 2043 and the extent to which they provide the foundations for a tranport system aligned to the long term vision for for sustainable, well-connected, inclusive, vibrant and diverse places.

The chapter notes that in order to fund the integrated transport schemes through the planning system that incremental delivery will be required with contributions from committed sites in Colchester, local plan sites in Braintree and Tendring, and from proposed new local plan sites, which is further explained in Chapter 6.

4.1 Key findings of assessment of growth with mitigation

Two mitigation scenarios have been tested within the NEMo model to understand the scale of mitigation required to support Local Plan assessment growth.

Scenario 3 uses the BaU trip demand from Scenario 2 – which includes reference case and proposed new local plan growth – and changes the highway and public transport network by adding:

- A12 J29 scheme
- A133 corridor package including Greenstead roundabout and Wivenhoe Park corner changes, partial signalisation at St Andrews Avenue roundabout with Ipswich and Harwich Roads, and extension of RTS and local bus priorities
- RTS East serving Tendring growth areas
- A12 J25 scheme – Station Road/A120 Coggeshall Road junction and Prince of Wales roundabout changes
- A12 J26 scheme – B1408 London Road / Stanway Western Bypass and Tollgate roundabout changes
- A12 J27 – Spring Lane roundabout signalisation

- Mill Road / Urbis Romanae signal changes as a proxy for a large traffic management scheme
- RTS West – Marks Tey to Colchester
- signal optimisation (reflecting timings informed by VISSIM microsimulation models and, in part, the proposed dynamic traffic management improvements (though the full advantages of this system have not been reflected in the model)

Meanwhile, Scenario 4 applies modest reductions to the BaU car trip demand to reflect the impact of ST measures not able to be reflected in NEMo. While Scenario 3 is run with VDM, Scenario 4 is run as a fixed assignment model to control the amount of car trips. The scale of the reduction in car trips is grounded in the evidence collated for the *Further Transport Evidence* report [13] and explained in Appendix G.

The ST demand in Scenario 4 takes into account the reduction in car trips coming from schemes that are not accounted for in the Scenario 3 model and includes:

- enhanced bus services
- mobility hubs and improved rail access
- P&C North, East and West
- comprehensive active travel infrastructure
- travel planning and behavioural change measures

As explained in Section 2.2 the movement performance of the scenarios in NEMo involve calculating an index score, which combines indicators for queueing, speed and capacity, for areas of interest where the greatest impact is expected. Tables 4.1 and 4.2 provide the movement index scores and interpretation of acceptability for movement for Scenarios 1-4. As a reminder, the movement performance is shown on the coloured scale 1-15, whilst concern over the level of change is denoted as passable ✓, caution **!** or unsatisfactory ✗.

The modelling evidence indicates that Scenario 3 satisfactorily addresses the cumulative impact of reference case and assessment case BaU demand, though some areas of caution remain. Consideration of overall satisfactory performance also recognises that further enhancement of the outline concepts are likely as schemes are developed through optioneering and consultation stages. Performance can be improved further with modest modal shift – which is attainable for short journeys in the urban area and through P&C. This slight improvement using ST demand can be seen in the changes between Scenario 3 and 4 in the central area and along Clingoe Hill. While the modelling evidence does not include a reliance on the high levels of ST demand, the ST interventions are considered a critical part of delivery of a comprehensive, integrated transport strategy, improving connectivity and choice of mode.

Therefore the transport modelling shows that an integrated, vision-led strategy combining infrastructure investment and sustainable travel interventions can successfully accommodate planned growth to 2043 and address the severe transport impacts arising from unmitigated growth. Achieving this outcome will require coordinated delivery, appropriate cost apportionment between growth locations, and sustained mode shift away from private car dependence.

Table 4.1: Movement index scores for Scenarios 1-4

Sector	Location	AM Peak Impact				PM Peak Impact			
		2043 S1 RC	2043 S2 BAU	2043 S3 BAU Mit	2043 S4 BAU Mit ST	2043 S1 RC	2043 S2 BAU	2043 S3 BAU Mit	2043 S4 BAU Mit ST
Central	N Station rdbt, Station Way, A134 Westway and Balkerne Hill	13	14	9	8	12	14	9	8
	Ipswich Road, East Street, East Hill and Harwich Road	11	12	10	9	10	11	10	10
East	Greenstead Roundabout, Colne Causeway and Clingoe Hill	15	15	14	12	15	15	11	10
	Colchester Road to Wivenhoe	15	15	8	9	8	8	8	8
West	A12 J26/J27 to London Rd , Lexden Road, Cymbeline Way and Colne Bank Rbt, London Rd	12	12	9	9	9	10	8	8
	A12 J25 / A120 (western)	6	11	8	8	5	6	6	6
North	Northern Approach Road, Via Urbis Romane, Mill Road & A12 J28	9	10	9	9	12	15	10	10
	A12 J29 / A120 (eastern)	12	12	8	8	9	10	8	8
Outer	Tiptree	4	4	4	4	3	4	4	4
	Aldham	3	3	3	3	3	3	3	3
	A12 J20-25	8	8	8	8	7	7	7	7
Overall assessement combining all areas		11	11	9	9	9	10	8	8

More or less free flow			Travelling slower			Moderate congestion			Substantial congestion			Extreme congestion			Acceptability of change		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Passable ✓	Caution !	Unsatisfactory ✗

Table 4.2: Movement index acceptability for Scenarios 1-4

Sector	Location	AM Peak Impact				PM Peak Impact			
		2043 S1 RC	2043 S2 BAU	2043 S3 BAU Mit	2043 S4 BAU Mit ST	2043 S1 RC	2043 S2 BAU	2043 S3 BAU Mit	2043 S4 BAU Mit ST
Central	N Station rdbt, Station Way, A134 Westway and Balkerne Hill	13	✗	✓	✓	12	✗	✓	✓
	Ipswich Road, East Street, East Hill and Harwich Road	11	✗	✓	✓	10	✗	!	!
East	Greenstead Roundabout, Colne Causeway and Clingoe Hill	15	✗	✓	✓	15	✗	✓	✓
	Colchester Road to Wivenhoe	15	✗	✓	✓	8	!	!	!
West	A12 J26/J27 to London Rd , Lexden Road, Cymbeline Way and Colne Bank Rbt, London Rd	12	✗	✓	✓	9	!	✓	✓
	A12 J25 / A120 (western)	6	✗	!	!	5	!	!	!
North	Northern Approach Road, Via Urbis Romane, Mill Road & A12 J28	9	✗	!	!	12	✗	✓	✓
	A12 J29 / A120 (eastern)	12	!	✓	✓	9	!	✓	✓
Outer	Tiptree	4	✓	✓	✓	3	✓	✓	✓
	Aldham	3	✓	✓	✓	3	✓	✓	✓
	A12 J20-25	8	✓	✓	✓	7	✓	✓	✓
Overall assessement combining all areas		11	11	9	9	9	10	8	8

More or less free flow			Travelling slower			Moderate congestion			Substantial congestion			Extreme congestion			Acceptability of change		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Passable ✓	Caution !	Unsatisfactory ✗

4.2 Assessment case forecast with mitigation and BaU demand

4.2.1 Balancing speed and blocking back in each area of interest

To help understand why the impact is becoming more satisfactory in Scenario 3 with key highway and public transport mitigation, it is also useful to consider changes in speed and blocking back indicators, which are used in the movement index, for each of the areas of interest.

In the transport model, a blocking back indicator called relative queue is used to identify parts of the network where the desired amount of modelled traffic is not able to pass through in the modelled time period, which causes queues to form. Relative queue is shown as percentages and ranges between 0 (no queue) to 100% (where the entire path link is blocked by the end of the modelled hour). This indicator only appears on the worst performing parts of the modelled network.

The overall assessment has been based on applying the movement index, which combines three indicators, queues, speed and capacity, over a selection of areas of interest which would likely be affected by growth at preferred site allocations. This approach has been taken since it helps identify the cumulative impact of growth as well as providing an objective and concise assessment framework. Relevantly, the approach also aligns with the NPPF, which states that "development should only be prevented or refused on highways grounds, if there would be an unacceptable impact on highway safety, or the residual cumulative impacts on the road network, following mitigation, would be severe, taking into account all reasonable future scenarios" [16, para.106].

Each area of interest comprises several paths, which are routes or corridors through an area. For example, one path may go straight ahead at a junction whereas another path may turn left or right. The movement index combines information on speed and blocking back for each path. (The index also includes another indicator of capacity, though this is not considered in this subsection).

Within the movement index, each path comprises a number of links. For each of these links information on speed (as a ratio of free flow speed) and relative queue is extracted from the model. The movement index then combines the information to provide a score for each area of interest, which is then represented on the coloured 1-15 movement scale. In combining the information, weighted averages are used in order that paths with greater demand influence the movement index score more than paths with less demand.

An increase in car trips likely leads to a decrease in speed but people and goods could still be able to move around the network acceptably if there is sufficient capacity. An increase in blocking back, however, indicates a build up of severe queues on sections of the network where there is insufficient capacity. Where this happens there is likely to be greater variability in journey time and people and goods would not be moving acceptably through the network.

Figures 4.1 and 4.2 show how the speed ratio changes between Scenarios 3 and 2 (with and without mitigation) in the AM and PM peaks, respectively. The green indicates that traffic is travelling closer to its free flow speed, whereas red shows an increase of speed in that area. Figures 4.3 and 4.4 show the change in relative queue in the AM and PM peaks highlighting the reductions of queues in green and increases in red. Flow difference plots between Scenarios 3 and 2 along with plots showing the absolute values for speed ratio and relative queue indicators for the AM and PM peaks are provided in Appendix D

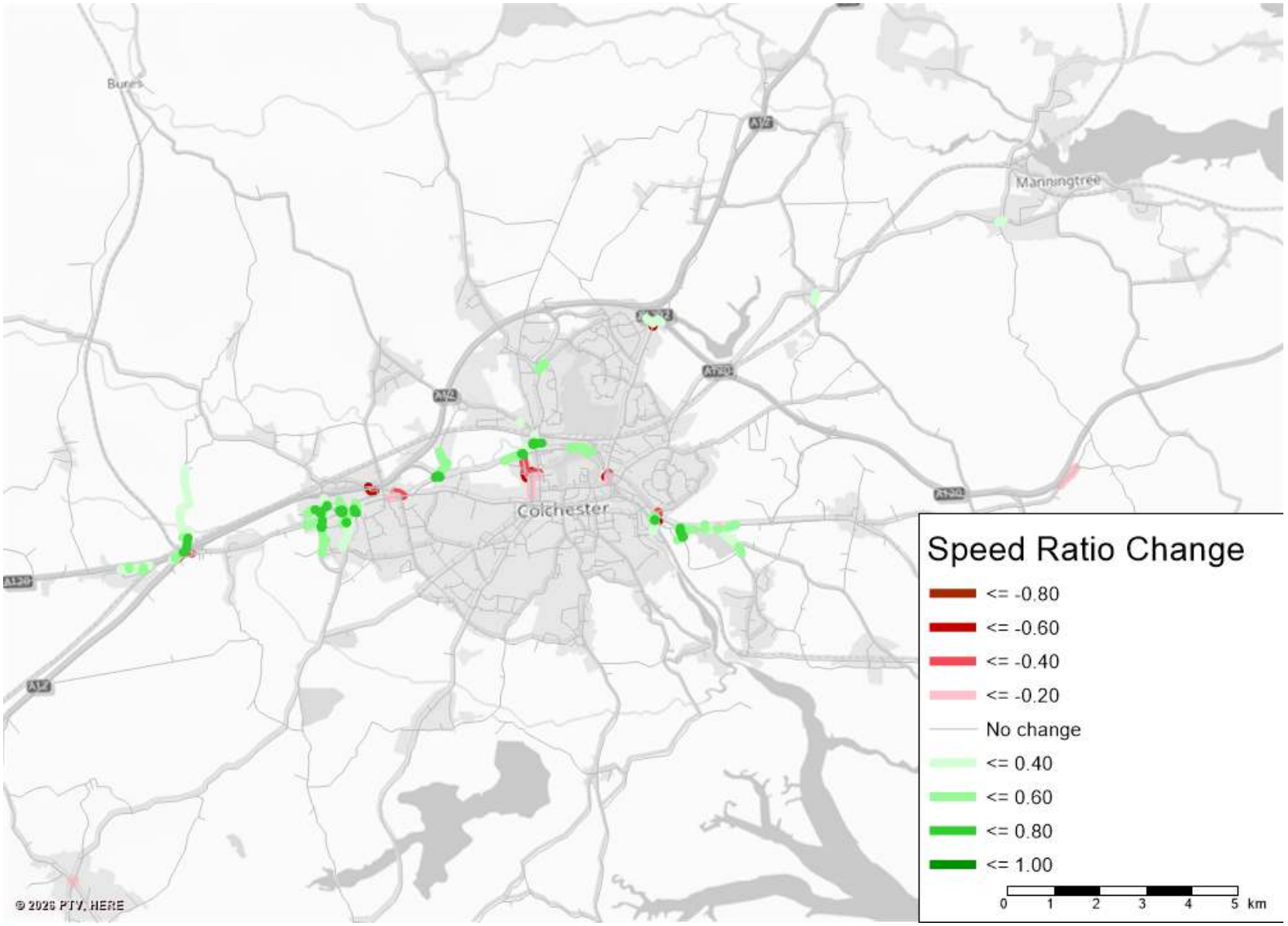

Figure 4.1: AM Difference in traffic speed between Scenario 3 and Scenario 2

Figure 4.2: PM Difference in traffic speed between Scenario 3 and Scenario 2

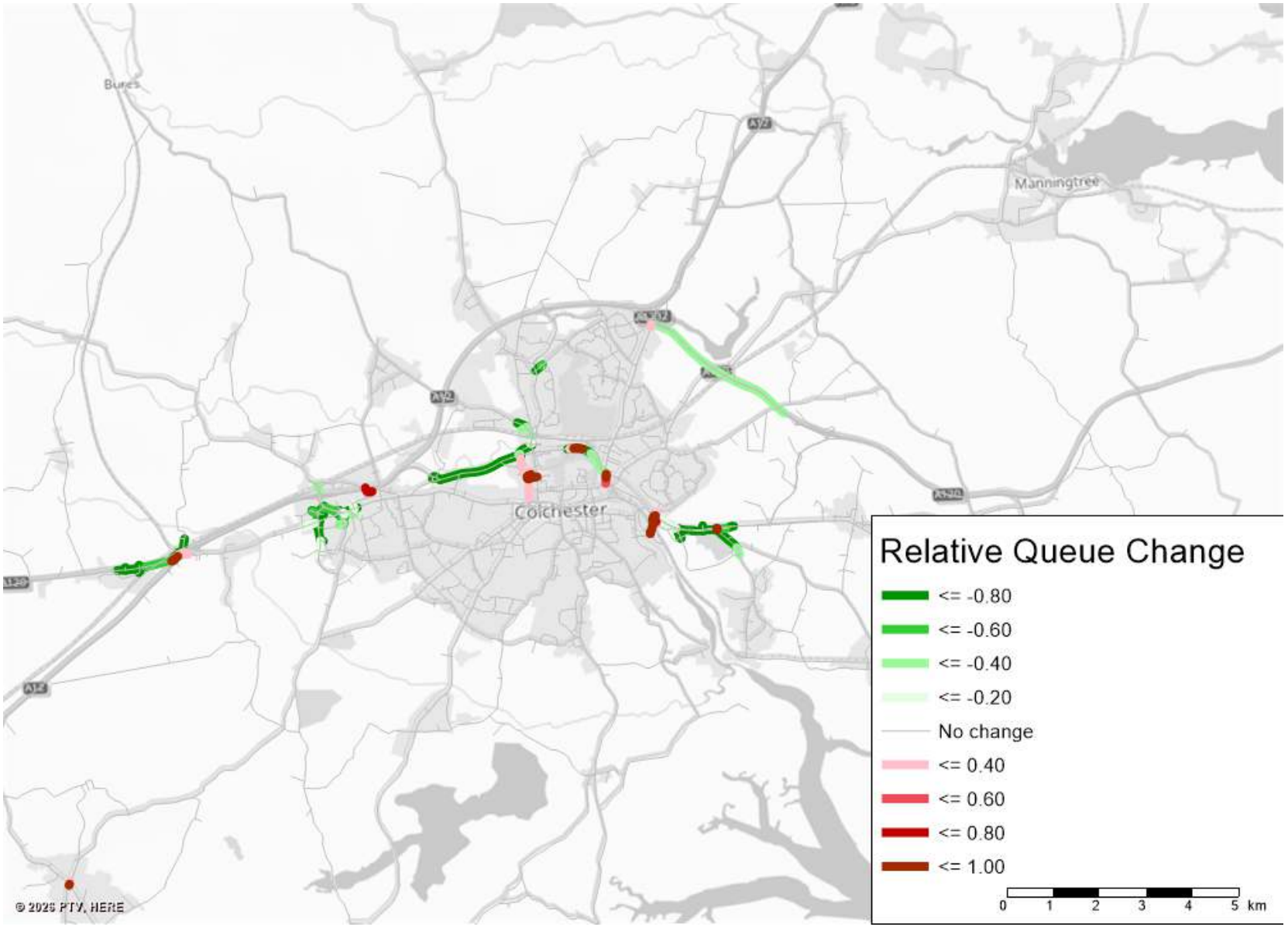

Figure 4.3: AM Difference in blocking back (relative queues) between Scenario 3 and Scenario 2

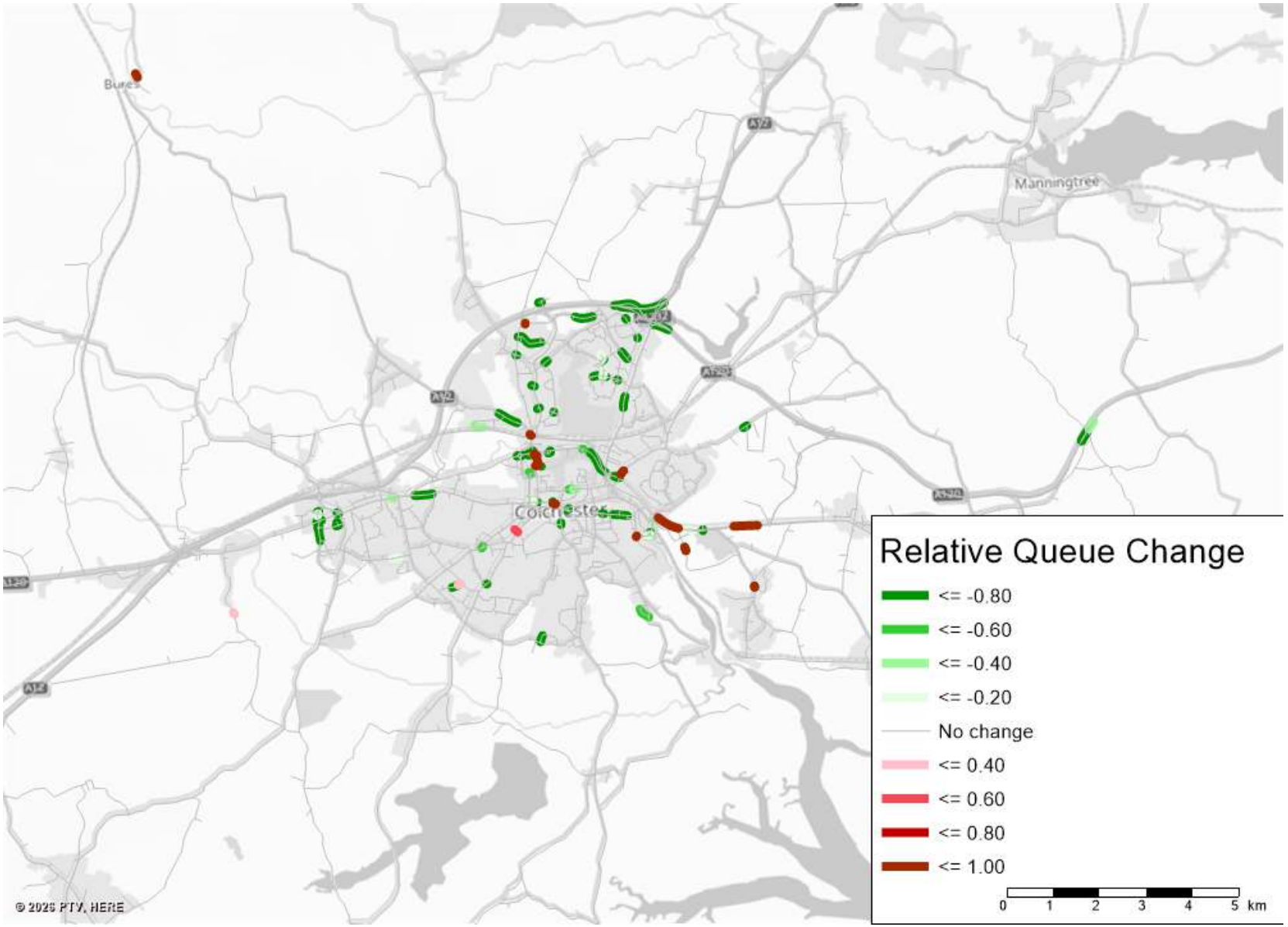

Figure 4.4: PM Difference in blocking back (relative queues) between Scenario 3 and Scenario 2

4.2.2 Findings from Scenario 3

Overall, Scenario 3 in NEMo demonstrates that the introduction of targeted highway and rapid transit mitigation delivers significant improvements in network operation when compared with the unmitigated local plan scenario. The package reduces some of the most severe queueing and blocking back issues, improves journey time reliability and increases the resilience of key strategic corridors. The results indicate that a number of severe transport problems identified in the earlier assessment can be substantially managed through infrastructure intervention.

Key findings:

- noticeable improvements in network performance compared with the BaU scenario
- significant reductions in severe queueing and blocking back across several strategic corridors
- improved operation of the wider highway network and better movement of people, freight and public transport throughout Colchester
- reduced severity of some of the worst transport impacts associated with cumulative growth
- enhanced support for rapid transit and public transport reliability through corridor improvements and junction interventions.

Whilst the mitigation package improves overall performance, it does not fully resolve all capacity constraints. Some locations continue to experience congestion and operational challenges, reflecting the scale of cumulative growth being accommodated. The modelling indicates that issues remain on the A133 corridor around Greenstead, at A12 Junction 26 and at A12 Junction 29, although the severity of impacts is generally reduced compared with the BaU and unmitigated Local Plan scenarios.

The assessment therefore demonstrates that highway and rapid transit interventions are effective in managing many of the severe impacts of growth and improving overall network performance. However, residual congestion remains at several key locations, confirming that infrastructure delivery alone is insufficient to fully mitigate cumulative growth. Further improvements through sustainable transport measures and mode shift are required to achieve an acceptable overall transport outcome.

4.3 Assessment case forecast with mitigation and sustainable transport demand

In Scenario 4, the highway and public transport network changes are retained, however, the amount of car trips is reduced slightly to reflect increased uptake of walking, cycling and public transport. The modelling demonstrates that acceptable management of growth can be achieved across much of the transport network. The movement index shows that the cumulative impacts of committed growth and Local Plan growth can be substantially reduced through the delivery of the integrated transport strategy comprising highway improvements, rapid transit, enhanced bus services, active travel infrastructure, mobility hubs, travel planning and dynamic traffic management.

The assessment demonstrates that infrastructure investment and sustainable transport measures work together to improve overall network performance. Compared with the unmitigated Local Plan scenario, the modelling indicates a significant reduction in queueing, blocking back and journey time variability across much of the network.

Figure 4.5: AM Difference in traffic speed between Scenario 4 and Scenario 3

Figure 4.6: PM Difference in traffic speed between Scenario 4 and Scenario 3

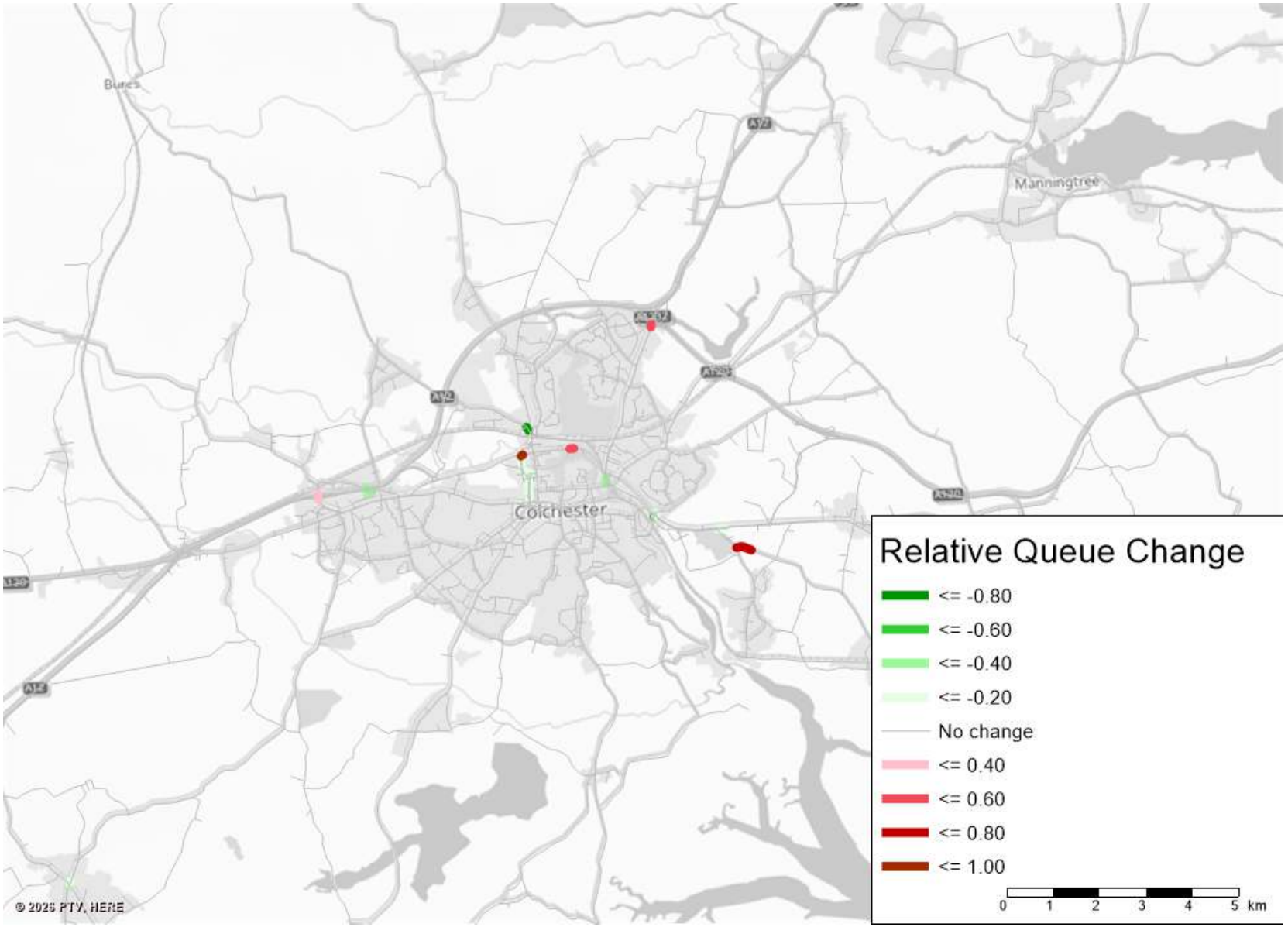

Figure 4.7: AM Difference in blocking back (relative queues) between Scenario 4 and Scenario 3

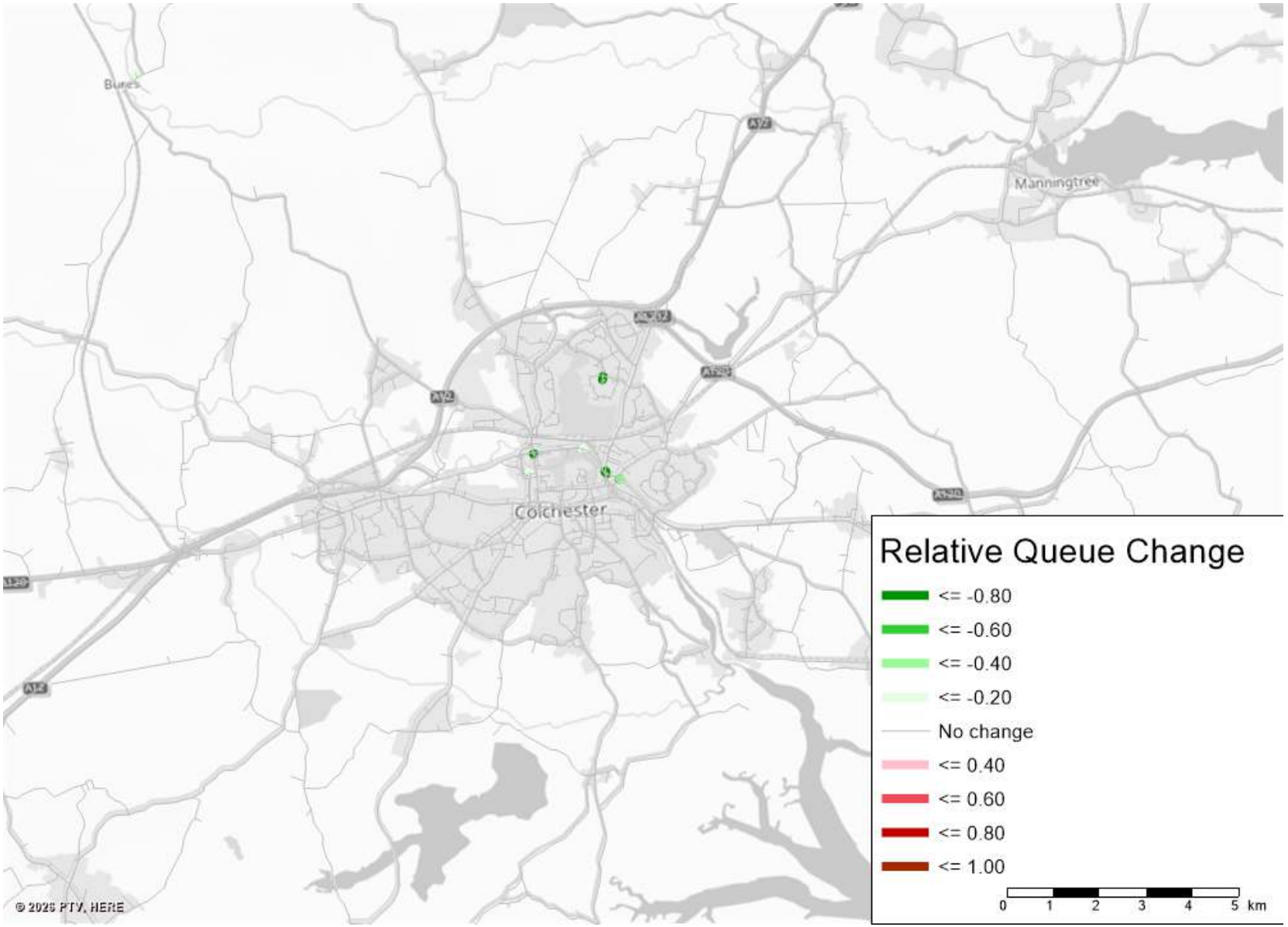

Figure 4.8: PM Difference in blocking back (relative queues) between Scenario 4 and Scenario 3

The objective of the transport strategy is not to eliminate congestion entirely, but to manage growth in a way that improves access to key destinations and supports greater use of sustainable travel modes.

The modelling does not suggest that all transport issues are fully resolved. Whilst the integrated mitigation package significantly improves overall network performance, some locations continue to experience operational pressure. A12 Junction 26 still shows queues along Essex Yeomanry Way and Western Approach. Congestion also remains evident on Greenstead roundabout, while residual delays persist at A12 Junction 29. However, the severity and extent of these impacts are substantially reduced compared with both the Business as Usual and unmitigated Local Plan scenarios, demonstrating that the integrated transport strategy can manage the cumulative effects of growth to a generally acceptable level.

The modelling therefore demonstrates that whilst some problem locations remain, the cumulative impacts of growth can be brought to a generally manageable and acceptable level through the integrated transport strategy. The objective is not to create free-flow traffic conditions across the network, but to ensure that people, goods and services can move efficiently whilst supporting a significant shift towards more sustainable travel behaviour.

Figures 4.5 and 4.6 show how the speed ratio changes between Scenarios 4 and 3 (with and without mitigation) in the AM and PM peaks, respectively; whilst Figures 4.7 and 4.8 show the change in relative queue in the AM and PM peaks.

Flow difference plots between Scenarios 4 and 3 along with plots showing the absolute values for speed ratio and relative queue indicators for the AM and PM peaks are provided in Appendix D

4.4 Supplementary evidence from microsimulation models

4.4.1 Role of microsimulation modelling

VISSIM microsimulation models have been developed for the A12 J25-26 corridor, A12 J29, and the Greenstead roundabout and Clingoe Hill area to provide a more detailed assessment of operational performance and support the development of appropriate mitigation strategies at these key locations. Each of the microsimulation assessments have considered performance with:

- 2043 reference case demand
- 2043 proposed new local plan BaU demand without mitigation
- 2043 proposed new local plan BaU demand with mitigation

Traffic demand inputs were derived from NEMo, ensuring consistency with growth assumptions. The strategic model outputs were translated into microsimulation demand matrices, enabling a more granular representation of vehicle interactions, route choice behaviour, queue formation, lane utilisation and junction operation within each study area.

This section summarises the key findings from the microsimulation modelling, including the identification of operational issues and the effectiveness of tested mitigation measures. The findings informed the network changes and signal timings that were applied in NEMo Scenario 4 – new local plan growth with mitigation.

4.4.2 A12 J25 and J26

A VISSIM model covering the A12 and A120 between J25 and J26 was developed as shown in the AM and PM peak hour heat maps in Figures 4.9 and 4.10. The heat maps indicate the relative delay with green indicating good movement and red to dark red worsening congestion. Both the AM and PM 2023 base models show congestion building up around J25 and J26 similar to the movement assessment in NEMo. On occasion these problems can worsen further and maximum queues can extend beyond the average conditions shown in the heat maps.

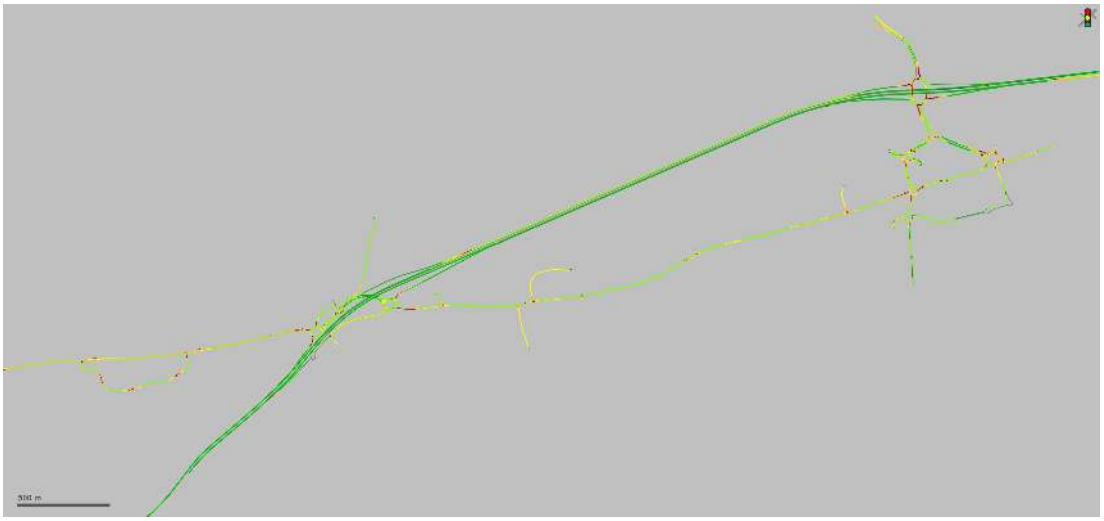

Figure 4.9: J25-26 AM peak 2023 VISSIM base heatmap

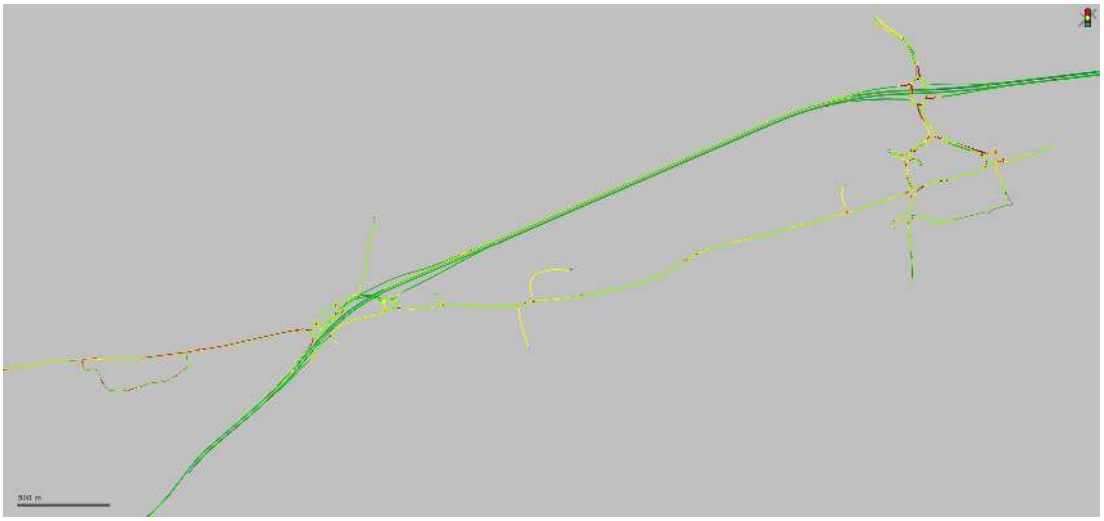

Figure 4.10: A12 J25-26 PM peak 2023 VISSIM base heatmap

The reference case performance is shown in Figures 4.11 and 4.12.These show a significant worsening of delay in the AM peak on the eastbound A120 approach to the Station Road roundabout at A12 J25 along with worsening on the A120 westbound approach to the Prince of Wales roundabout at J25. Furthermore, there is an increase of queuing on the eastbound J25 off-slip in the AM peak and slowing of traffic on the A12 mainline, which indicates that this section of the network is coming under further stress. Relative delay around A12 J26 seems appears similar in the AM reference case

model as the base model. In the PM reference case model, A12 J25 exhibits similar relative delay to the 2023 base, however, there is a worsening at A12 J26.

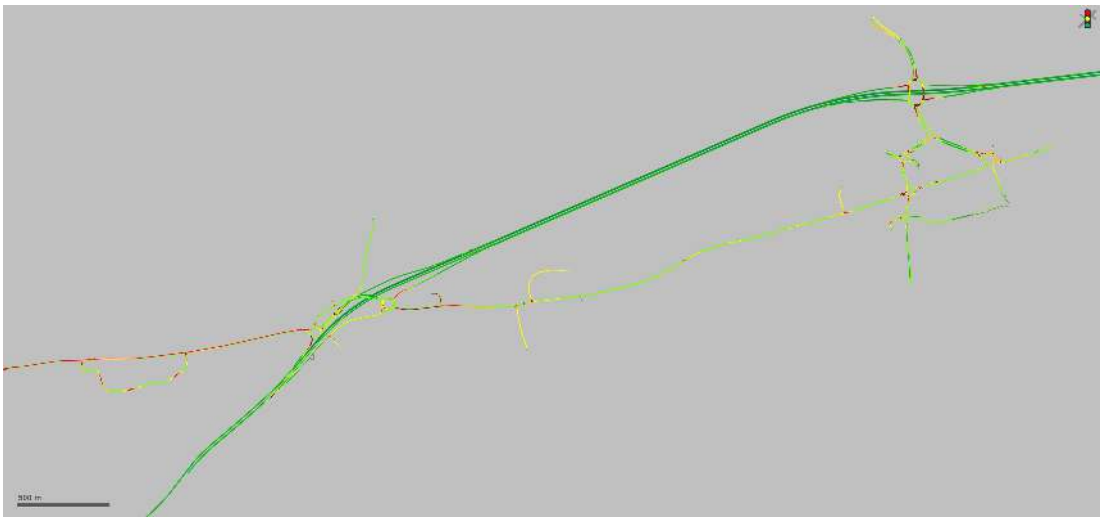

Figure 4.11: A12 J25-26 AM peak 2043 VISSIM reference case heatmap

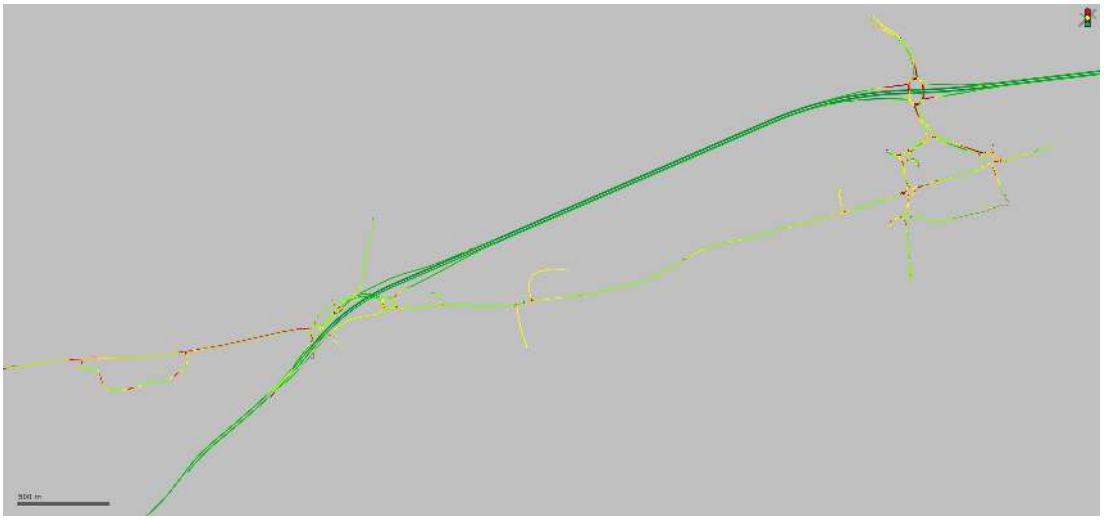

Figure 4.12: A12 J25-26 PM peak 2043 VISSIM reference case heatmap

The impact of proposed new local plan BaU traffic demand is shown in Figures 4.13 and 4.14 for the AM and PM peak hours, respectively. When proposed new local plan BaU traffic demand is added onto reference case demand, the congestion problems worsen with extreme delays along the A120 eastbound approach to J25 in the AM and PM peaks, and queues on the eastbound A12 J25 off-slip impacting on mainline A12 flows, creating a safety problem.

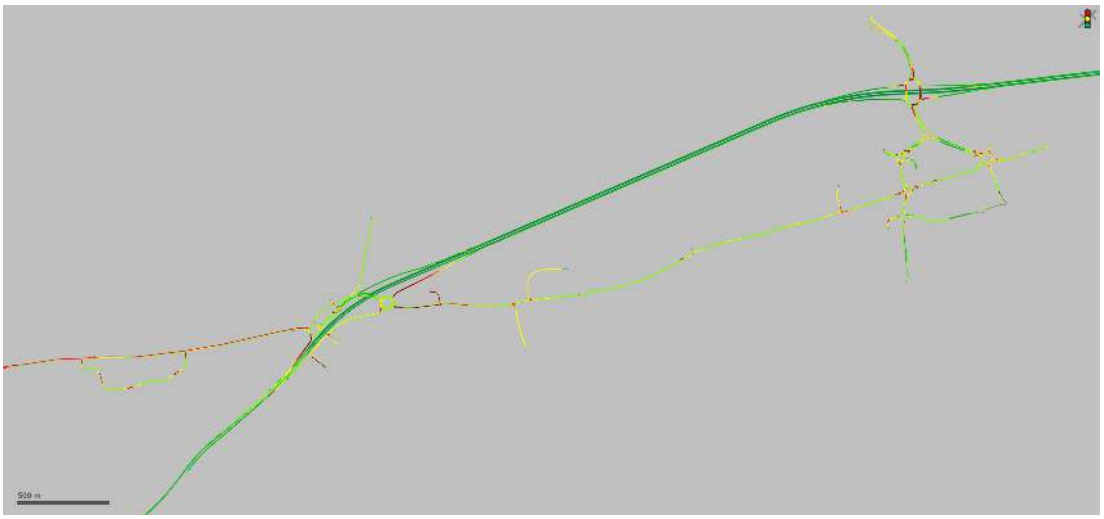

Figure 4.13: A12 J25-26 AM peak 2043 VISSIM new local plan without mitigation heatmap

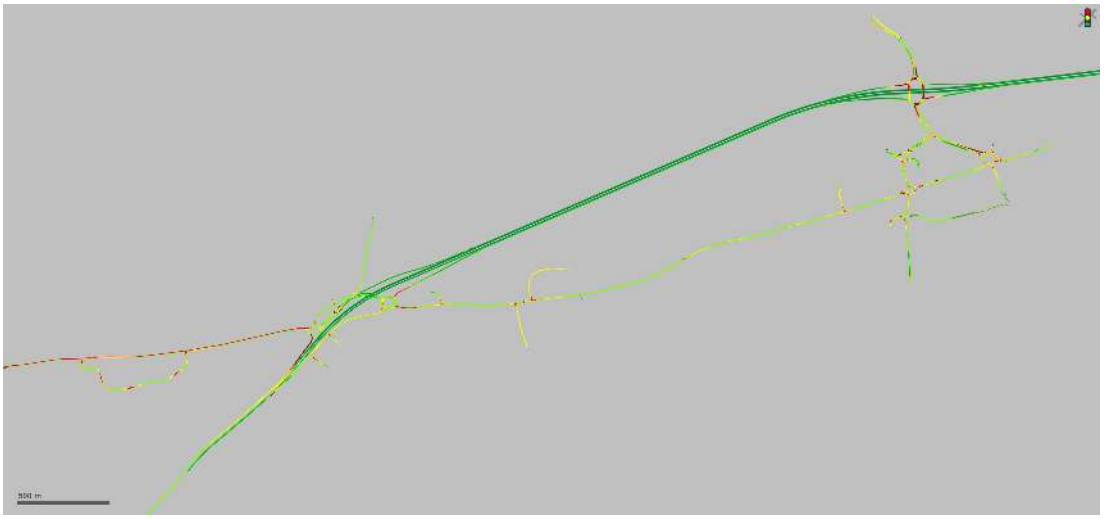

Figure 4.14: A12 J25-26 PM peak 2043 VISSIM new local plan without mitigation heatmap

Having identified the network problems arising from growth, the VISSIM model was used to identify possible solutions to traffic problems which support RTS, local bus and active travel movements through the area. The possible solutions are described in subsection 3.2.4 and include:

- conversion of the Marks Tey roundabout to a signalised cross-road junction to improve delays
- signalisation of the Prince of Wales roundabout
- Tollgate roundabout signalisation and bus priority lanes
- London Road/Western Approach junction geometry change from roundabout to crossroads with bus priority lanes
- Essex Yeomanry Way J27 and Western Approach roundabout signalisation to manage traffic movements
- provision of bus and RTS priority through both junctions

The impact of the measures are shown in Figures 4.15 and 4.16 for the AM and PM peak hours, respectively. For general traffic, the proposals result in very similar network delay and speeds in the AM peak hour and a marginal improvement in the PM peak. However, the road safety problems have been mitigated and there is significant delay saving for buses in both peaks, which reflects the bus priority measures.

Appendix Section H.1 provides tables of performance statistics from VISSIM.It shows that latent demand is lower in both peaks, which suggests the proposals do overall increase network capacity. Looking at queues, the two Marks Tey roundabouts have decreased queue lengths in both peaks, however queue lengths for the Tollgate area junctions have increased.

For travel times, seven out of the ten routes in the AM and five out of ten routes in the PM show an improvement. The A120 eastbound route from Coggeshall Road to London Road shows the largest improvement due to reduced queuing on the eastbound approach at the Marks Tey (West) junction. Improvement on some routes, however, have been at the expense of others with the introduction of signals necessariy increasing some travel times. However, overall, this is creating a network helping to keep all people and goods moving – avoiding excessive delay on any single route or by any one mode.

The A12 J25-26 VISSIM tests provide confidence that a solution to mitigate the impacts of growth and provide ST connections can be found. It should be noted that any final scheme could be different following detailed optioneering and consultation.

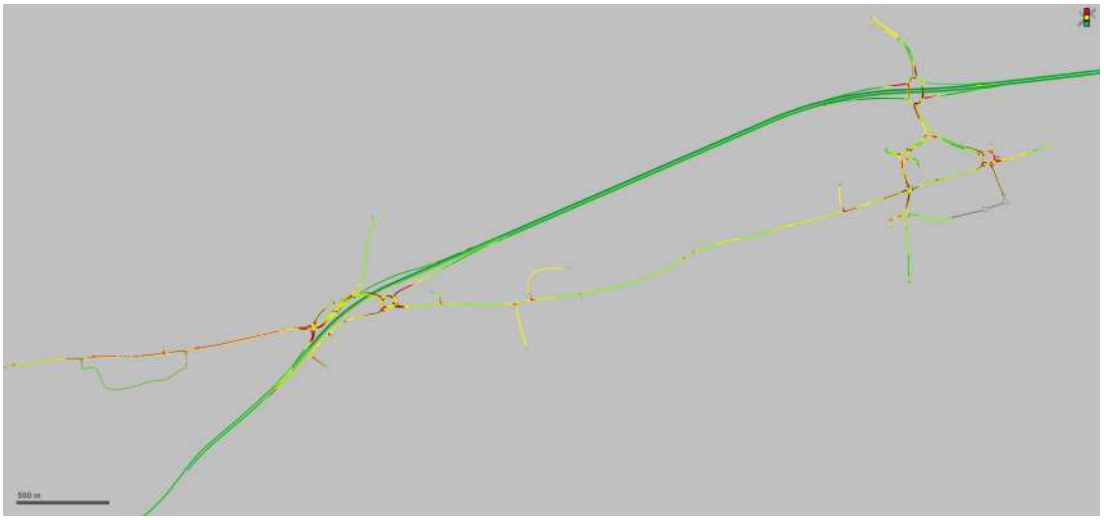

Figure 4.15: A12 J25-26 AM peak 2043 VISSIM new local plan with mitigation heatmap

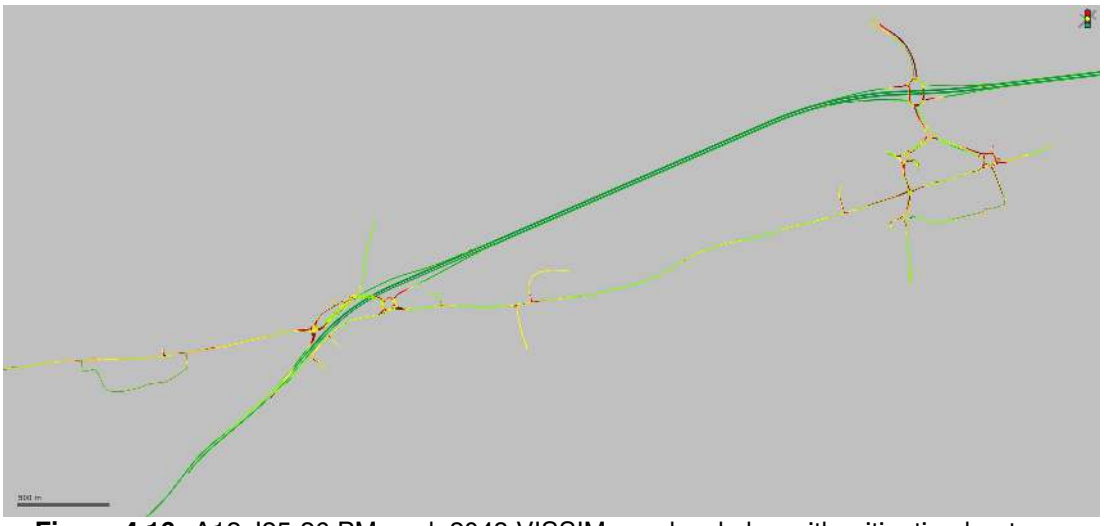

Figure 4.16: A12 J25-26 PM peak 2043 VISSIM new local plan with mitigation heatmap

4.4.3 A12 J29

A VISSIM model covering A12 Junction 29 was developed, with the model extent shown in the AM and PM peak hour heat maps in Figures 4.17 and 4.18. The model includes the junction where the A12, A120 and Ipswich Road converge, a key strategic highway node serving movements between Colchester, Tendring and Suffolk, as well as along the A12 corridor. Strategic transport modelling identified the junction as a critical network constraint, with future traffic demand expected to increase as a result of planned growth, particularly at TCBGC. The introduction of the A1331 link road will improve connectivity between the garden community and the A120 corridor, further increasing demand through the junction.

The heat maps indicate the relative delay with green indicating good movement and red to dark red worsening congestion. Both the AM and PM 2019 base models show congestion building up on the A12 and A12 off slips, consistent with patterns identified within NEMo. In the AM peak, the most significant delays are concentrated on the westbound off-slip, with sustained queues extending back towards the A120 mainline. In the PM peak, congestion remains focused on the A12 southbound and eastbound off slips. While the heat maps represent average modelled conditions, the simulation indicates that on some days and during periods of demand fluctuations, queues can extend beyond those shown, resulting in longer queue lengths with the potential to reach both the A120 westbound and A12 southbound mainlines, posing road safety risks.

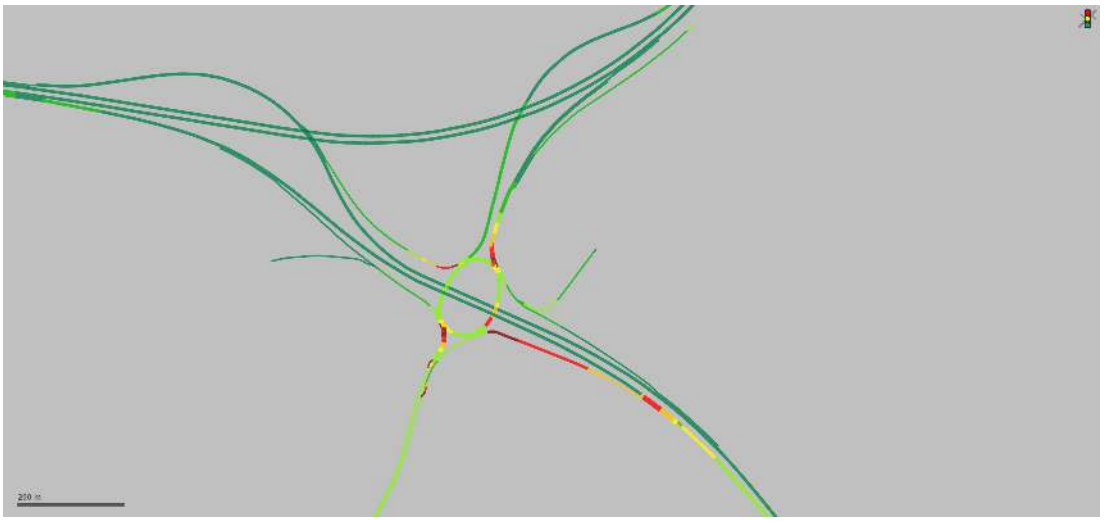

Figure 4.17: A12 J29 AM peak 2019 VISSIM base heatmap

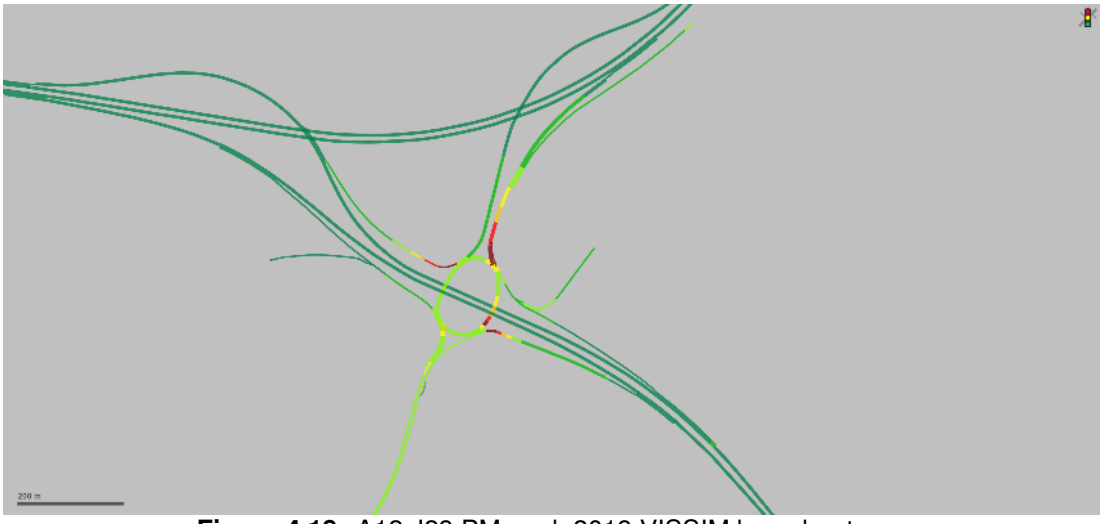

Figure 4.18: A12 J29 PM peak 2019 VISSIM base heatmap

The 2043 reference case performance is shown in Figures 4.19 and 4.20 demonstrate a deterioration in operational performance, particularly during the AM peak. The most significant increase in delay is on the A12 southbound off-slip approach to the roundabout, where there is severe congestion in both peaks. Queuing is also increased on this approach, with queues extending onto the A12 southbound mainline. The A120 westbound off-slip also maintains delay similar to the base.

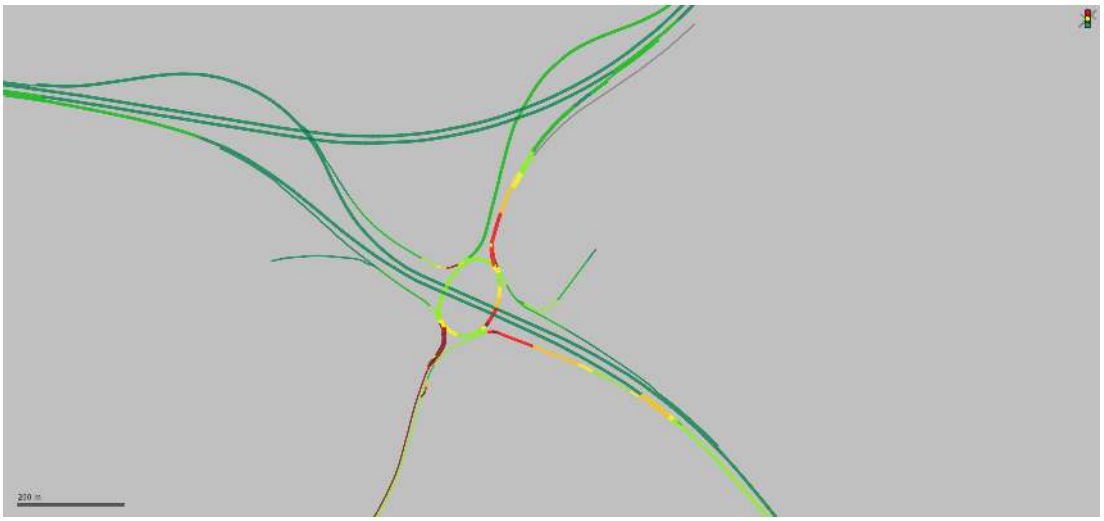

Figure 4.19: A12 J29 AM peak 2043 VISSIM reference case heatmap

Figure 4.20: A12 J29 PM peak 2043 VISSIM reference case heatmap

The impact of the new local plan BaU traffic demand in Figures 4.21 and 4.22 for the AM and PM peak hours, respectively, shows significantly worsening operational performance of the junction. The most pronounced effects are observed on the A12 southbound off-slip, where extensive queueing and severe delay are evident. In both the AM and PM peaks, queues reach back to the A12 mainline, creating potential for blocking back onto the mainline. Additional delays are observed on the A120 eastbound off-slip and Ipswich Road approach to the roundabout, demonstrating that the junction is unable to accommodate forecast demand without mitigation. The increase in queue lengths and journey time delay highlights a worsening of existing congestion and raises road safety concerns.

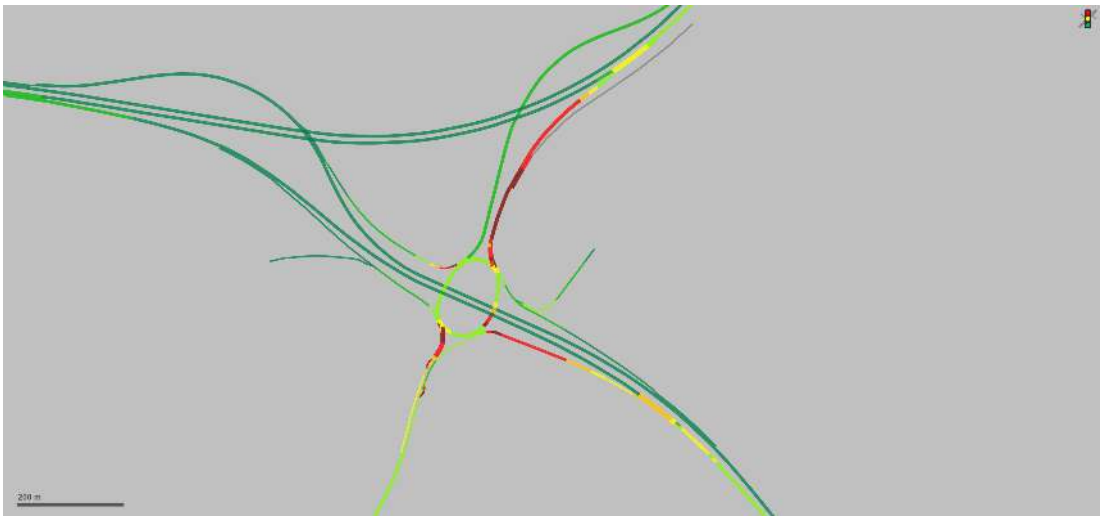

Figure 4.21: A12 J29 AM peak 2043 VISSIM new local plan without mitigation heatmap

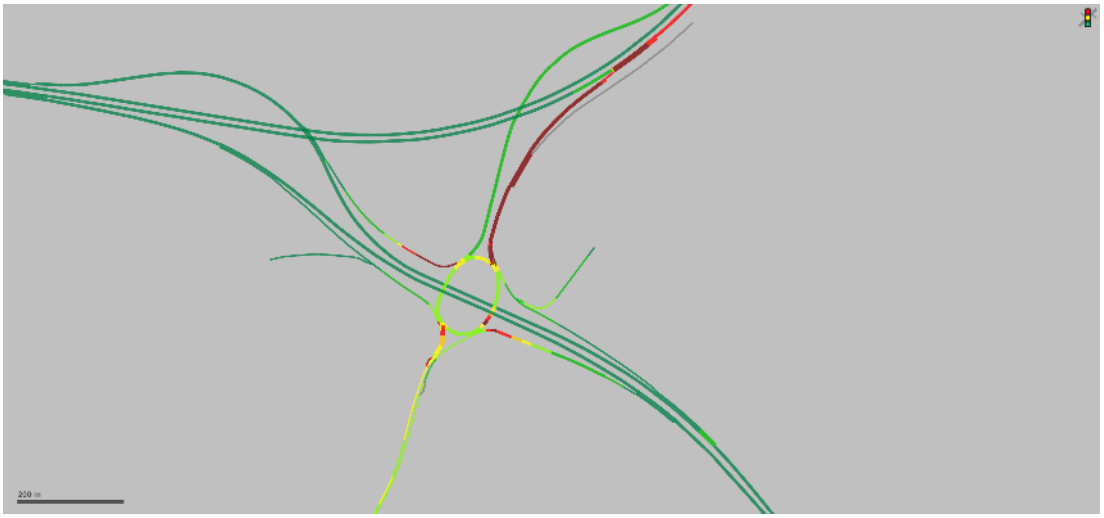

Figure 4.22: A12 J29 PM peak 2043 VISSIM new local plan without mitigation heatmap

Having identified the network problems arising from growth, the VISSIM model was used to identify possible solutions to traffic problems which support traffic movements on the SRN. The possible solutions area described in subsection 3.2.3 and include:

- extended signalisation on all arms
- widening of the A120 to Ipswich Road off-slip to three lanes
- widening of slip approach to Newcomen Way to two lanes
- widening of the A120 eastbound on-slip to two lanes

The impact of the measures is shown in Figures 4.23 and 4.24 for the AM and PM peak hours, respectively. For general traffic, the proposals result in a junction that continues to operate effectively, with the majority of links experiencing low levels of delay and good traffic movement during both peaks. Whilst some localised congestion remains on sections of the carriageway and on individual approaches, particularly on the A12 southbound off-slip, these effects are limited in extent and do not result in widespread network delay. The operation of the junction is broadly consistent in the AM and PM

peaks. Overall the proposals maintain acceptable performance for general traffic while addressing the safety concerns by reducing conflict points.

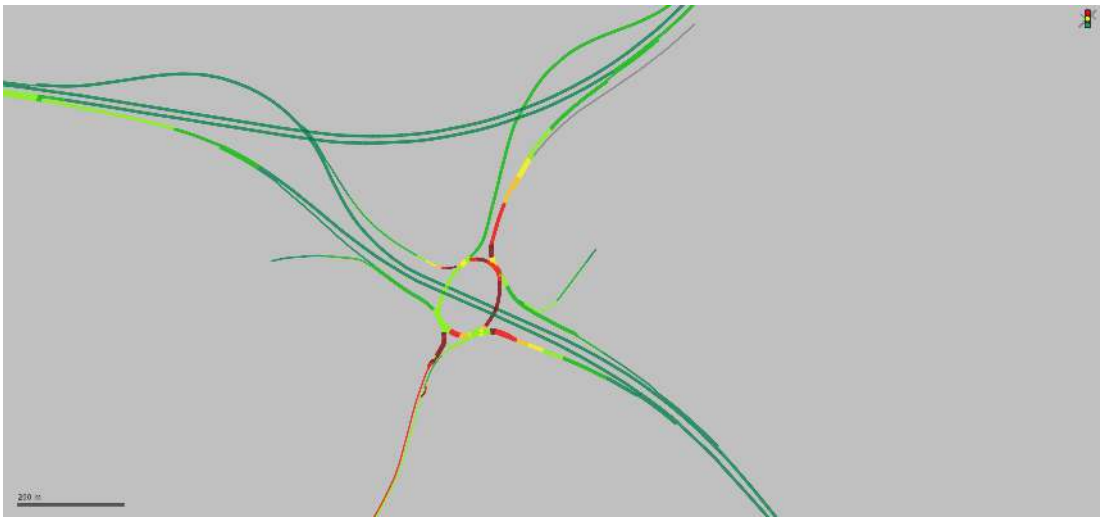

Figure 4.23: A12 J29 AM peak 2043 VISSIM new local plan with mitigation heatmap

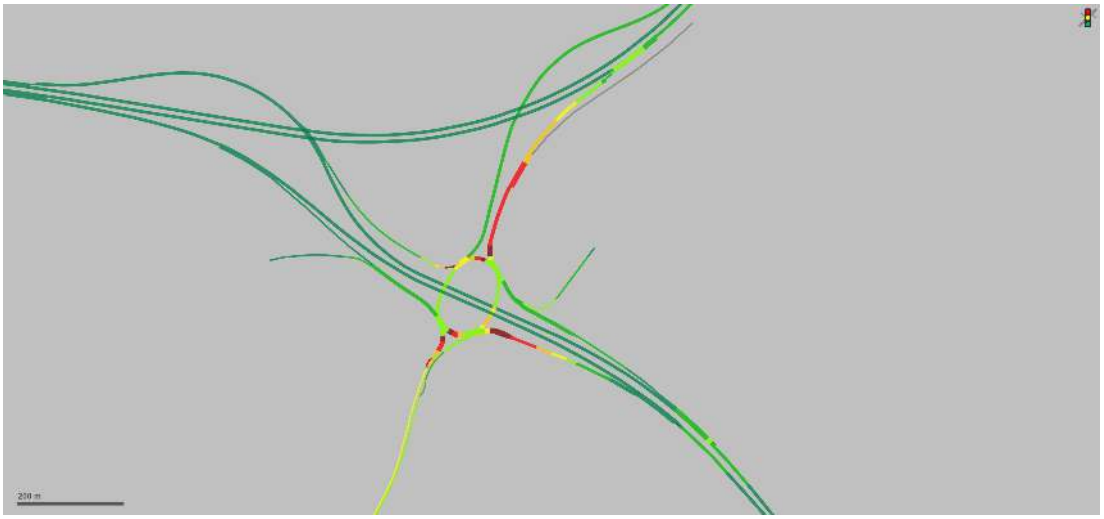

Figure 4.24: A12 J29 PM peak 2043 VISSIM new local plan with mitigation heatmap

Appendix Section H.2 provides tables of statistics from the J29 model tests. The results show that traffic conditions generally worsen between the base and reference case scenarios as background growth and committed development increase demand on the network. Journey times increase further in the unmitigated local plan scenario, particularly on movements between the A120, A12 and Ipswich Road, indicating that the junction would experience additional congestion as a result of local plan growth.

4.4.4 Greenstead roundabout and Clingoe Hill

The VISSIM model covers the A133 corridor and its connections to the A120 and A12 strategic road network, including the area surrounding TCBGC and its principal access points to Colchester. Key junctions represented within the model include Greenstead roundabout and Colne Causeway, Wivenhoe Park corner, the A1331 link road junctions with the A133 and A120, and A12 J29.

The A133 Clingoe Hill VISSIM modelling involved refining the A133 and Colne Causeway section of the model — whilst the A12 J29 VISSIM modelling described in the previous subsection focussed on the A120 and A12 section. The area of interest is shown in the AM and PM peak base model heat maps in Figures 4.25 and 4.25 show that the A133 corridor generally operates with low levels of delay during peak periods, with principal delay in the westbound approach to Greenstead roundabout, where significant queuing is seen in both peaks. The PM peak shows a slightly higher intensity of delay, with congestion extending further along the A133 approach. In contrast, delays along Colne Causeway are comparatively localised on approach to Greenstead roundabout.

Figure 4.25: A133 Clingoe Hill AM peak 2019 VISSIM base heatmap

Figure 4.26: A133 Clingoe Hill PM peak 2019 VISSIM base heatmap

The 2041 reference case performance is shown in Figures 4.27 and 4.28 demonstrates a notable deterioration in operational performance compared to the base model. In both peaks, the A133 corridor experiences substantially greater and more widespread delay, with congestion concentrated on the westbound approach to Greenstead roundabout extending along Clingoe Hill. This indicates forecast traffic demand results in a more continuous corridor of delay between Greenstead roundabout and Colne Causeway, with less spare capacity across the network.

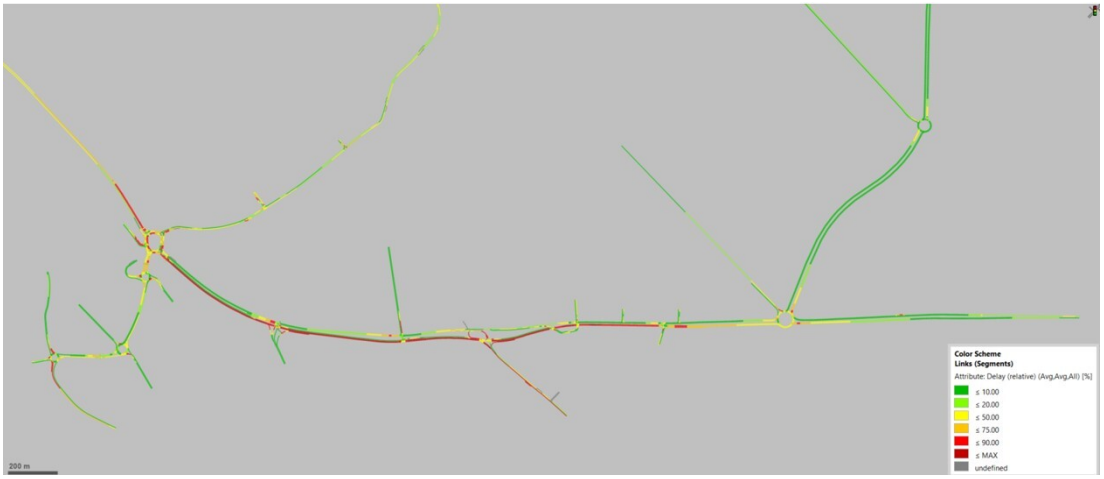

Figure 4.27: A133 Clingoe Hill AM peak 2043 VISSIM reference case heatmap

Figure 4.28: A133 Clingoe Hill PM peak 2043 VISSIM reference case heatmap

The impact of the new Local Plan BaU traffic demand is shown in Figures 4.29 and 4.30 for the AM and PM peak hours, respectively. The results indicate the most noticeable impacts are concentrated along the A133 corridor, particularly the approaches to Wivenhoe Park corner and Greenstead roundabout, where delay exceeds 75% and isolated sections exceeding 90%. The PM peak identifies more significant delay approaching Greenstead from Colne Causeway and St Andrews Avenue.

Figure 4.29: A133 Clingoe Hill AM peak 2043 VISSIM new local plan without mitigation heat-map

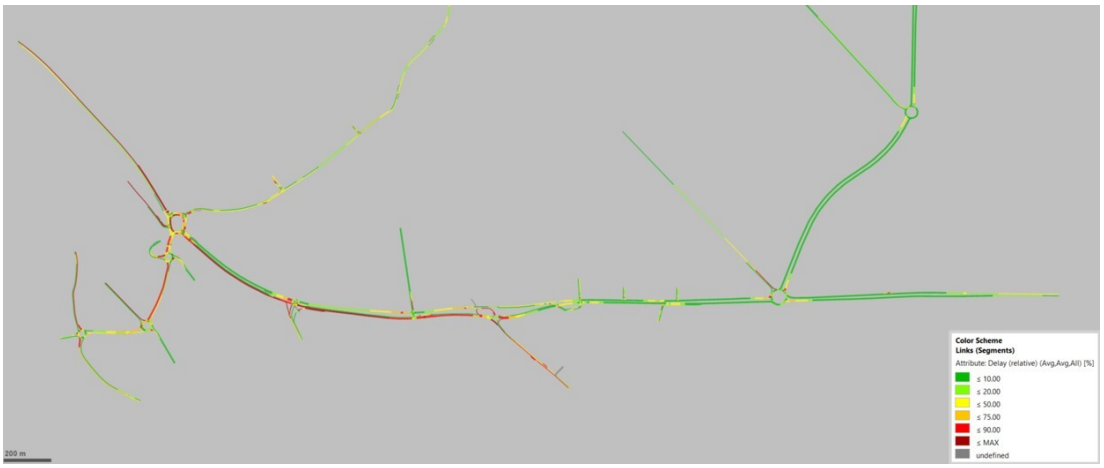

Figure 4.30: A133 Clingoe Hill PM peak 2043 VISSIM new local plan without mitigation heat-map

Having identified the network problems arising from growth, the VISSIM model was used to identify possible solutions to traffic problems which support traffic movements. The possible solutions area described in subsection 3.2.5 and include:

- Greenstead roundabout which involves peninsularisation of the southwest side of the roundabout, full signalisation, and RTS lane and local bus priority between Clingoe Hill and St Andrews Avenue and between Colne Causeway and Greenstead Road
- complementary measures at Colne Causeway/Elmstead Road roundabout
- Wivenhoe Park corner redesign to a conventional roundabout which includes RTS priority lanes to access P&C East
- dedicated westbound RTS lane between Wivenhoe Park corner and Knowledge Gateway junction

The impact of the measures is shown in Figures 4.31 and 4.32 for the AM and PM peak hours, respectively. For general traffic, the proposals result in largely localised increases in delay across the A133 corridor, with the greatest impacts on the westbound approach to Wivenhoe Park corner in both peaks. However, delays generally reduce

along the corridor towards Greenstead roundabout, where there are only minor and localised impact on some approaches and turning movements. Overall, the impacts are concentrated on the westbound section of the corridor, with impacts reducing on approach to Greenstead roundabout. This indicates that general traffic is managed through the junctions of the corridor, taking the pressure off the Greenstead junction.

Figure 4.31: A133 Clingoe Hill AM peak 2043 VISSIM new local plan with mitigation heatmap

Figure 4.32: A133 Clingoe Hill PM peak 2043 VISSIM new local plan with mitigation heatmap

Appendix Section H.3 provides tables of statistics from the model tests. These show that the with mitigation scenario delivers substantial journey time reduction for both general traffic and buses in the westbound direction of the A133, compared with the without mitigation scenario. Journey times are reduced by almost half, with minimal impact on other corridors. For buses the most significant benefit is observed on routes serving Greenstead roundabout, Boundary Road and the RTS corridor, with several movements experiencing journey time reductions of between 30% and 75%, particularly in the PM peak. This reinforces that the mitigations significantly improve operational performance along the A133 while maintaining broadly comparable conditions elsewhere on the network.

4.5 Conclusion

Chapter 4 has presented findings from NEMo and microsimulation models to test the mitigations described in Chapter 3. The transport modelling shows that an integrated, vision-led strategy combining infrastructure investment and sustainable travel interventions can successfully accommodate planned growth to 2043 and address the severe transport impacts arising from unmitigated growth. However, achieving this outcome will require coordinated delivery, appropriate cost apportionment between growth locations, and sustained mode shift away from private car dependence.

Chapter 5 explores how robust the integrated transport measures will be to support growth beyond 2043. Then Chapter 6 returns to requirements for delivery.

5 Long range forecast beyond the plan period

Introduction and summary

Chapter 5 assesses the implications of growth beyond the proposed new local plan period by considering conditions in 2058, 15 years beyond the 2043 assessment year.

It describes the methodology and performance results of the 2058 assessment. The analysis highlights the extent to which future growth further constrains the operation of the highway network and affects overall network performance.

The chapter also reflects on the effectiveness of the mitigation strategy, recognising that growth beyond 2043 is likely to be constrained by unresolved transport deficiencies and increasing demand on critical parts of the network. This reinforces the need for a longer-term approach to transport investment and infrastructure delivery.

In addition, the chapter explores the role of strategic transport interventions and connectivity improvements to and beyond 2043. It identifies key highway, public transport, walking and cycling measures required to support future growth and improve accessibility. The DfT's Connectivity Tool has been used to assess how accessibility changes under committed and proposed new local plan growth, providing an indication of the extent to which the proposed strategy supports sustainable access to employment, services and opportunities.

5.1 Growth beyond 2043

Table 5.1 provides a summary of key trip demand and highway and public transport network assumptions for two scenarios that have been developed to test the impact of growth in 2058:

- Scenario 5 – 2058 reference case, which includes committed growth at TCBGC, caps growth at 2043 levels at Marks Tey, Hare Green and Horsley Cross, and grows elsewhere by the levels predicted by NTEM. The highway and public transport network is that used in the 2043 mitigated new local plan scenario (Scenario 3). ST demand reductions as used in 2043 Scenario 4 have not been applied since Scenario 5 is run with VDM, which requires 24 hour tip demand.
- Scenario 6 – 2058 assessment case, which grows Marks Tey to 6,000 homes, and Hare Green and Horsley Cross proposed garden villages to 10,000 homes. Elsewhere the demand is as per Scenario 5. The highway and public transport network is also the same as Scenario 5.

Table 5.1: NEMo 2058 scenarios

Assumptions		Scenario 5	Scenario 6
Summary	Year	2058	2058
	Description	Reference case with 2043 mitigation	Assessment case with 2043 mitigation
	VDM	✓	✓
Demand	TCBGC at 7,500 homes	✓	✓
	Marks Tey at 6,000 homes		✓
	Hare Green and Horsley Cross at 10,000 homes		✓
	Elsewhere 2043 new local plan growth increased by NTEM	✓	✓
Key committed 2043 mitigation	A1331 link road	✓	✓
	RTS Central to TCBGC	✓	✓
	P&C East	✓	✓
Key further 2043 mitigation reference case growth	A12 J29 scheme	✓	✓
	Greenstead and Clingoe Hill package	✓	✓
	RTS East to proposed Tendring garden villages	✓	✓
Key 2043 mitigation for new local plan growth	Dynamic traffic management	✓	✓
	A12 J25-27 package	✓	✓
	RTS West to Marks Tey	✓	✓
	Local bus connnections to major sites	✓	✓
	P&C West		
	Local bus general improvements		
	Improvements to and at interchanges, and mobility hubs		
	Active travel connections to major sites		
	Travel planning to support ST		

5.1.1 2058 reference case (Scenario 5)

The growth in the 2058 reference case is determined by comparing trip demand in the 2043 new local plan assessment case against NTEM forecasts. This comparison was undertaken to determine the appropriate level of additional growth to be applied beyond the 2043 new local plan assessment case.

In the comparison there were instances where the level of growth identified through NTEM between 2043 and 2058 was lower than the growth already represented in the 2043 assessment case. In these cases, no additional growth was applied beyond the

proposed new local plan position. In these locations, the 2058 growth was therefore taken to be equivalent to the local plan 2043 growth. This approach avoids reducing the level of growth already assumed within the assessment case as a result of a lower NTEM forecast and ensures that the assessment continues to represent the new local plan growth position.

For employment growth, the NTEM forecasts indicate an overall reduction in the number of jobs between 2043 and 2058. Consequently, no additional employment growth has been applied between 2043 and 2058, and the level of employment growth represented in the 2043 local plan assessment case has been retained for the 2058 assessment.

This approach results in a 2058 reference case that represents the additional growth identified by NTEM where this exceeds the level already accounted for in the new local plan 2043 assessment case, while maintaining the 2043 local plan growth position where NTEM indicates a lower level of growth. This is considered to provide a consistent and robust basis for assessing the potential impact of longer-term growth on the highway network.

This approach has been applied to the council areas in the North Essex study area – Colchester, Tendring and Braintree. Background growth from 2043-2058 from NTEM has been assumed for the districts outside of North Essex.

Following the approach to trip generation in the 2043 reference case, TCBGC growth has been included in the trip ends as this has been informed by latest developer assumptions, where the employment growth is concentrated in Colchester model zones and housing growth in the Tendring model zones. However, TCBGC growth is at 2050 levels estimated at 7,500 homes.

In summary, growth expected to happen in the district and surrounding areas is expected as below:

- growth in the study area has been informed by the difference of houses and jobs between the 2058 NTEM growth and the local plan 2043
- background growth forecasted from NTEM) between 2043 and 2058 is assumed in the rest of districts
- for TCBGC residential and employment growth has beeb taken from developer assumptions

Table 5.2 shows the difference between NTEM 2043-2058 growth comparing to the Local plan 2043 to NTEM 2058 growth.

Table 5.2: 2058 Reference case growth assumptions across North Essex

Council area	Category	2043 assessment case	2058 NTEM forecast growth	2058 reference case forecast growth	% change from 2043 to 2058 NTEM growth	% change from 2043 assessment case to 2058 reference case
Colchester	Households	103 145	7039	6732	7 %	6 %
	Jobs	117 246	−1490	0	−1 %	0 %
Braintree	Households	86 556	4215	2475	6 %	3 %
	Jobs	76 221	−1027	1004	−1 %	1 %
Tendring	Households	84 714	6486	7809	8 %	9 %
	Jobs	61 089	−786	1186	−1 %	2 %

5.1.2 2058 Assessment Case (Scenario 6)

The 2058 assessment case grows Marks Tey to 6,000 homes, for which growth has been allocated to the sites north and south of the A12. In addition, proposed garden villages in Tendring at Hare Green and Horsley Cross are grown to 10,000 homes, across both sites.

Table 5.3 shows the additional growth beyond the reference Case growth highlighting the overall growth in the 2058 assessment Case.

Table 5.3: 2058 Assessment case growth assumptions across North Essex

Council area	Category	2043 assessment case forecast Growth	2058 reference case forecast growth	2058 assessment case forecast growth	2058 rc plus ac growth	% change from 2048 assessment case to 2058 assessment case
Colchester	Households	103 145	6732	3660	10 392	10 %
	Jobs	117 246	0			0 %
Braintree	Households	86 556	2475		2475	3 %
	Jobs	76 221	1004		1004	1 %
Tendring	Households	84 714	7809	6250	14 059	17 %
	Jobs	61 089	1186		1186	2 %

5.2 Post-2043 forecasts

The assessment of the models beyond 2043 local plan is described in this section, highlighting the assumptions developed in the model and the results using the tabular analysis and queue and speed changed between scenarios.

5.2.1 NEMo assumptions

5.2.1.1 Demand

Trip demand to use in NEMo was generated using the process described in subsection 2.3.1.

The 2058 household and jobs assumptions derived in subsection 5.1.1 were input into TEMPro using alternative planning assumptions. This generated car and public transport trip demand in a 24-hour production-attraction format, which is required for VDM. As TEMPro uses the MSOA geography, disaggregation was undertaken to calculate growth in each model zone, which tend to be smaller than MSOAs in the detailed area of the model. As no specific development sites were identified in the reference case scenario, except at TCBGC which is treated separately, the trip growth was spread around model zones proportionate to the number of trip ends in the zones. For TCBGC, the trip demand provided by the developer was used productions and attractions in the TCBGC model zones.

In the case of the 2058 assessment case scenario, growth was distributed among zones with allocated growth beyond 2043.

5.2.1.2 Highway and public transport network

The highway and public transport network used for both the 2058 reference and assessment scenarios has been taken from the mitigated network developed for the assessment of 2043 Scenarios 3 and 4. However, no further mitigation has been included. The key highway and public transport schemes in this network are described in Table 5.1.

5.2.2 Long range performance without full mitigation

To assess the performance of Scenarios 5 and 6, the movement index has been applied for consistency with analysis of Scenarios 1-4. Table 5.4 presents the movement scores for Scenarios 1 to 6 which helps identify the impact of growth to 2058.

Comparison of Scenario 5 with the 2043 mitigated scenarios indicates that the additional demand results in a deterioration in network performance. In several locations, conditions revert to levels similar to those observed in the 2043 unmitigated network. In the AM peak, severe congestion is evident on the eastern approaches, particularly on the approach to Greenstead roundabout. In the PM peak, congestion becomes most severe on the route between North Station roundabout and Maldon Road roundabout through central Colchester. Meanwhile substantial congestion has returned to the western routes through A12 25 and A12 J26 and is also seen on the A12 mainline between J20-25.

Table 5.4 also shows the performance of Scenario 6. The additional demand associated with possible growth at Marks Tey and garden villages in Tendring places further pressure on the highway network. Severe congestion observed in Scenario 5 persists along Clingoe Hill and on the central route to North Station. A12 J29 also worsens with high levels of substantial congestion in the AM. In the west, substantial congestion persists at A12 J25 and A12 J26. The A12 mainline between J20-25 deteriorates in the PM but gets better the AM. This counter intuitive result is likely due to issues such as traffic being gridlocked at other locations or extreme changes to the model's trip distribution caused by VDM. In short, the volume of demand is so high that without mitigation, the model is struggling to assign the required volume of traffic.

Table 5.4: Movement index scores for Scenarios 1-6

Sector	Location	AM Peak Impact						PM Peak Impact					
		2043 S1 RC	2043 S2 BAU	2043 S3 BAU Mit	2043 S4 ST Mit	2058 S5 RC	2058 S6 BAU	2043 S1 RC	2043 S2 BAU	2043 S3 BAU Mit	2043 S4 ST Mit	2058 S5 RC	2058 S6 BAU
Central	N Station rdbt, Station Way, A134 Westway and Balkerne Hill	13	14	9	8	10	14	12	14	9	8	15	15
	Ipswich Road, East Street, East Hill and Harwich Road	11	12	10	9	11	12	10	11	10	10	11	11
East	Greenstead Roundabout, Colne Causeway and Clingoe Hill	15	15	14	12	15	15	15	15	11	10	15	15
	Colchester Road to Wivenhoe	15	15	8	9	15	15	8	8	8	8	8	8
West	A12 J26/J27 to London Rd , Lexden Road, Cymbeline Way	12	12	9	9	11	12	9	10	8	8	9	8
	A12 J25 / A120 (western)	6	11	8	8	12	11	5	6	6	6	6	7
North	NAR, Urbis Romanae, Mill Road & A12 J28	9	10	9	9	9	10	12	15	10	10	11	11
	A12 J29 / A120 (eastern)	12	12	8	8	11	12	9	10	8	8	9	9
Outer	Tiptree	4	4	4	4	4	4	3	4	4	4	4	4
	Aldham	3	3	3	3	4	3	3	3	3	3	3	3
	A12 J20-25	8	8	8	8	10	8	7	7	7	7	8	9
Overall assessement combining all areas		11	11	9	9	11	11	9	10	8	8	10	10

More or less free flow			Travelling slower			Moderate congestion			Substantial congestion			Extreme congestion			Acceptability of change		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Passable ✓	Caution !	Unsatisfactory ✗

Overall, the results indicate that growth between 2043 and 2058 generates significant additional pressure on the highway network, reducing the effectiveness of the mitigation measures identified for earlier scenarios. Appendix I provides a set of speed ratio and relative queue plots for the AM and PM peaks for each scenario.

5.3 Reflections on the mitigation approach

The impacts of future development beyond 2043 will place existing pressures on the network, and opportunities for sustainable growth beyond the plan period will be increasingly constrained. The 2043 local plan mitigation package provides a foundation of integrated highway, public transport and active travel improvement; however, the 2043 mitigations will not be sufficient through to 2058 and will require significant additional mitigations.

The mitigation measures identified within 3 have been developed to support the level of growth forecast within the local plan period. Without delivery of the local plan mitigation package, future development would not simply place additional pressure on the network from an already higher baseline. Instead, growth beyond 2043 would be constrained by unresolved transport deficiencies, reducing the ability of the network to accommodate additional demand and limiting opportunities for sustainable regeneration and housing delivery. These measures therefore form the foundation of a long-term transport strategy that will support sustainable growth, enhance connectivity and improve quality of life across the council area. Continued investment beyond the new local plan period will be essential to ensure that transport infrastructure evolves alongside future development and continues to support economic prosperity, environmental objectives and the creation of well-connected places.

5.3.1 Requirement to progress transport mitigation in the new plan period

Development areas such as Marks Tey and TCBGC, within the Colchester council boundary, and the Hare Green and Horsley Cross villages within Tendring, all expect significant growth beyond the 2043 Local Plan period. These communities will commence development within the proposed new local plan period and so consideration is needed to understand the vision and viability of these developments and associated trip generation beyond the local plan period.

Future growth is primarily concentrated along the western (A12/B1408) and eastern (A133) corridors, creating a strong spatial relationship between future development and the strategic transport interventions identified within this study. Interventions along these corridors will provide the essential transport infrastructure upon which future allocations, regeneration opportunities and place-making initiatives will depend. They act as a catalyst for longer-term investment by improving accessibility, strengthening sustainable travel connectivity, enhancing network efficiency and increasing overall transport capacity. Without implementation of these measures, the ability of the city and borough to accommodate growth beyond the Local Plan period would be significantly limited, with increasing pressure placed on an already constrained network.

5.3.2 Need for strategic schemes and connectivity improvements

The schemes identified within this evidence base should be viewed not only as mitigation for current development proposals, but as a fundamental prerequisite for unlocking sustainable economic growth, housing delivery, and strategic development opportunities in the decades beyond this plan.

There should be a coordinated package of infrastructure improvements that collectively strengthen network resilience, increase travel choice and unlock opportunities for future growth.

Scheme improvements within the local plan period will need to be developed and embedded prior to developments opening, to allow for modal choice and behaviour changes from the outset of development occupation. This will allow the infrastructure to be utilised and culture benefits beginning to be realised prior to long-term growth initiating. This will significantly increase the attractiveness of alternative modes as future phases of developments commence, with cumulative growth in sustainable transport users.

5.3.2.1 Rail and high quality public transport

Rail and high-quality public transport connections will be fundamental to supporting future growth and reducing reliance on private car travel. As travel demand increases, it will become increasingly difficult to accommodate all journeys through highway capacity enhancements alone. Investment in rail services, stations, rapid transit corridors, bus priority measures and high-quality passenger facilities will therefore be critical in providing attractive and competitive alternatives to private vehicle use. With improved integration between rail, bus and active travel, infrastructure can facilitate seamless journeys, in turn increasing public transport mode share.

The development of the RTS west corridor connecting Marks Tey with Colchester city centre, will form a key component of the areas future sustainable transport network. During the local plan period, significant investment is anticipated in bus priority measures along London Road and the A12 J25, improving journey time reliability of local buses, and enabling the introduction of RTS services. RTS east will also be a key component in the growth of TCBGC beyond the local plan period. Future growth may justify further enhancements and extensions to each of these corridors. The safeguarding of corridors and junction capacity to accommodate these continued improvements should be considered as part of a longer-term network approach rather than standalone schemes, helping to accommodate future development while limiting pressure on the highway network.

As these communities grow, bus services will be increasingly important for connecting new settlements with surrounding towns, employment areas and key services. Strong bus connectivity will help ensure that growth areas are integrated with the wider region rather than functioning as self-contained communities, enabling both new and existing residents to access jobs, education, healthcare and leisure opportunities.

While future bus routes, frequencies and capacities will evolve through the Enhanced Partnership between ECC and operators, the infrastructure needed to support these services must be planned alongside growth. This is particularly important where barriers such as the A12, A120 and B1408 around Marks Tey, and the A133, Salary Brook and nearby railway to TCBGC constrain movement.

Targeted infrastructure, including bus priority measures, dedicated links and new crossings where required, will be necessary to enable direct, reliable and attractive bus connections, helping future services avoid highway congestion and providing a competitive alternative to private car travel.

Rail connectivity will play an important role in supporting long-term growth, specifically around Marks Tey. Support from National Rail will be required to enhance services and

access arrangements associated with Marks Tey station, together with strong connections to Colchester North and Colchester Town stations. As growth continues beyond the local plan period, further investment in rail infrastructure, service frequencies, station facilities, integrated ticketing and other demand management measures will be required to maintain accessibility and support increase travel demand.

Beyond the new local plan period, high-quality public transport infrastructure has the potential to act as a catalyst for growth by unlocking development opportunities, strengthen connectivity, increase the attractiveness and accessibility of development locations, support higher-density and mixed-use development, and enable sustainable patterns of movement. Continued investment in public transport connectivity will therefore be essential to accommodating future growth while supporting wider environmental and carbon reduction objectives.

5.3.2.2 Highway interventions and active travel

Whilst public transport will play an increasingly important role in meeting future travel demand, targeted highway interventions will remain necessary to maintain network performance, improve resilience and address existing constraints. Strategic highway improvements can help manage the cumulative impacts of growth by increasing network efficiency, reducing bottlenecks and enhancing connectivity between key destinations.

A key focus for future investment in the longer term will be the A12 corridor and its associated junctions, which perform a critical strategic function for both local and longer-distance movements. Whilst a number of improvements are anticipated within the Local Plan period, continued growth beyond this timeframe is likely to place additional pressure on key junctions. Further intervention may therefore be required to maintain operational performance, support access to emerging development areas and ensure the continued efficient movement of people and goods along this nationally significant route.

Within the Colchester urban area, a number of strategic highway junctions are also expected to experience increasing pressure as development progresses. Beyond the Local Plan period, a combination of intelligent transport systems, dynamic traffic management, signal optimisation and targeted capacity enhancements will be required where highway space and environmental constraints permit. Such measures will help improve network resilience and maximise the efficiency of existing infrastructure, reducing the need for more extensive highway widening schemes. The impact on the A12 mainline observed in Scenarios 5 and 6 indicate there could be a need to relook at widening the A12 based the cancelled A12 J19-25 scheme; furthermore the problems or accommodating growth at Mark Tey and to the west in Braintree will be assisted by widening and realigning the A120 between Braintree and the A12. This would free up the old A120 to help distibute development traffic and provide space for a sustainable transport corridor – supporting RTS, local bus and cycling.

Importantly, future highway interventions should not be considered solely in terms of vehicle capacity. A modern transport network must support the movement of people rather than simply the movement of vehicles. As such, highway schemes should be designed to incorporate active travel infrastructure wherever feasible, creating safer and more attractive environments for walking, wheeling and cycling. Beyond the Local Plan period, continued expansion of the walking and cycling network will be essential to connect existing communities with new areas of growth. Whilst the LCWIP provides an important foundation, further route development will be required to extend safe and

direct active travel connections to emerging residential, employment and education destinations. This will help increase travel choice, support healthier lifestyles and reduce reliance on private car travel for shorter journeys.

Many of the physical barriers that constrain local bus networks also constrain opportunities for direct and high quality walking and cycling routes. Future crossings and connectivity improvements should therefore be designed as multi-modal interventions wherever feasible, accommodating active travel and public transport movements alongside each other. This approach would maximise accessibility and connectivity benefits in integrating growth areas with the wider urban area, while reducing reliance on more heavily trafficked parts of the highway network.

Marks Tey represents a particularly significant long-term challenge, with development proposed on multiple sides of an existing roundabout and proposed future crossroads arrangement that is already constrained by strategic transport infrastructure. Whilst an active travel bridge is expected to be delivered during the local plan period, additional connectivity measures are likely to be required beyond this timeframe. This may include a further bridge or crossing facility capable of accommodating local bus services, walking and cycling movements, helping to overcome severance, improve accessibility and support the ongoing expansion of the garden community.

Similarly, the successful delivery of the Tendring Colchester Borders Garden Community will depend upon the provision of high-quality walking and cycling connections to neighbouring communities including Greenstead, Wivenhoe and Elmstead Market. These links are consistent with the requirements of the TCBGC Development Plan Document (DPD) [6] and will be essential in ensuring that new development functions as part of an integrated network of communities rather than as an isolated settlement. As growth continues beyond the new local plan period, further enhancement of these connections may be required to accommodate increasing demand and support sustainable travel behaviour.

Continued investment beyond the current Local Plan period will ensure that transport infrastructure evolves alongside future development, providing the connectivity and capacity necessary to accommodate long-term growth while supporting wider environmental, health and placemaking objectives.

5.4 Connectivity assessment

5.4.1 Connectivity Tool

The DfT's Connectivity Tool has been used to assess connectivity along three study corridors under both the baseline (existing) and long-term future development scenarios, including the proposed public transport mitigation measures. The tool provides a consistent methodology for assessing, measuring and visualising changes in connectivity to employment, services and other key destinations by public transport. This enables a comparative assessment of how accessibility is expected to change as a result of planned growth and transport interventions. The tool is relatively new and the assessment has been carried out in a 'beta' version of the software.

The three strategic corridors were identified for assessment based upon their radial transport function accessing the city centre, but also where significant development is expected through committed local plan and forecast growth beyond 2043.

- Marks Tey and West Colchester – captures local plan development in Marks Tey and

Copford, alongside committed development along London Road. Future expansion around Marks Tey is expected beyond the local plan period of up to 6,000 homes.

- North East Central – captures the North East Colchester development and Crockleford Heath TCBGC development area, routeing towards the city centre along Ipswich and Harwich Roads.
- J29 and Northern Approach Road extending to Langham– capturing peripheral local plan developments and committed developments around the Mill Road and A134 corridors.

The outputs have been used to demonstrate the relative level of connectivity across the corridors and to illustrate the extent to which proposed public transport enhancements improve accessibility. By presenting the results spatially, the tool helps to identify areas where connectivity is currently constrained, where future development may increase demand for travel, and where mitigation measures can support more sustainable travel patterns.

The tool principal strength lies in its ability to quantify and spatially represent changes in accessibility, enabling clear comparison over time. It is particularly useful in demonstrating the extent to which public transport interventions contribute to improved connectivity and support sustainable growth objectives. The visual outputs support the interpretation of accessibility patterns and relative benefits of interventions across the corridors, resulting in a transparent way of demonstrating the relationship between development proposals and connectivity outcomes. The assessment is not intended to be a standalone measure of transport performance but forms part of a wider evidence base supporting the local plan.

However, the results should be interpreted within the context of the tool's limitations. The assessment focuses primarily on connectivity by public transport and does not fully capture the contribution of active travel modes such as walking and cycling. As a result, accessibility benefits arising from new pedestrian or cycle infrastructure may not be reflected in the outputs. Similarly, whilst the tool provides an indication of the ability to access destinations, it does not assess network performance issues such as public transport capacity, reliability, interchange quality or journey experience. The assessment therefore represents a measure of accessibility rather than a comprehensive appraisal of transport network operation.

The tool is most effective as a strategic planning resource, providing an overview of connectivity patterns at a corridor scale rather than assessing highly localised accessibility issues. Consequently, the findings should be considered alongside the transport modelling outputs within the transport evidence base.

The Connectivity Tool provides valuable evidence for the local plan by clearly demonstrating baseline accessibility conditions, illustrating the impacts of planned growth, and evidencing the role of proposed public transport mitigation in supporting sustainable and connected communities. As such, it forms an important component of the wider evidence base, helping to demonstrate that the spatial strategy is supported by improvements in sustainable transport accessibility and that planned development can be accommodated in locations with enhanced connectivity opportunities.

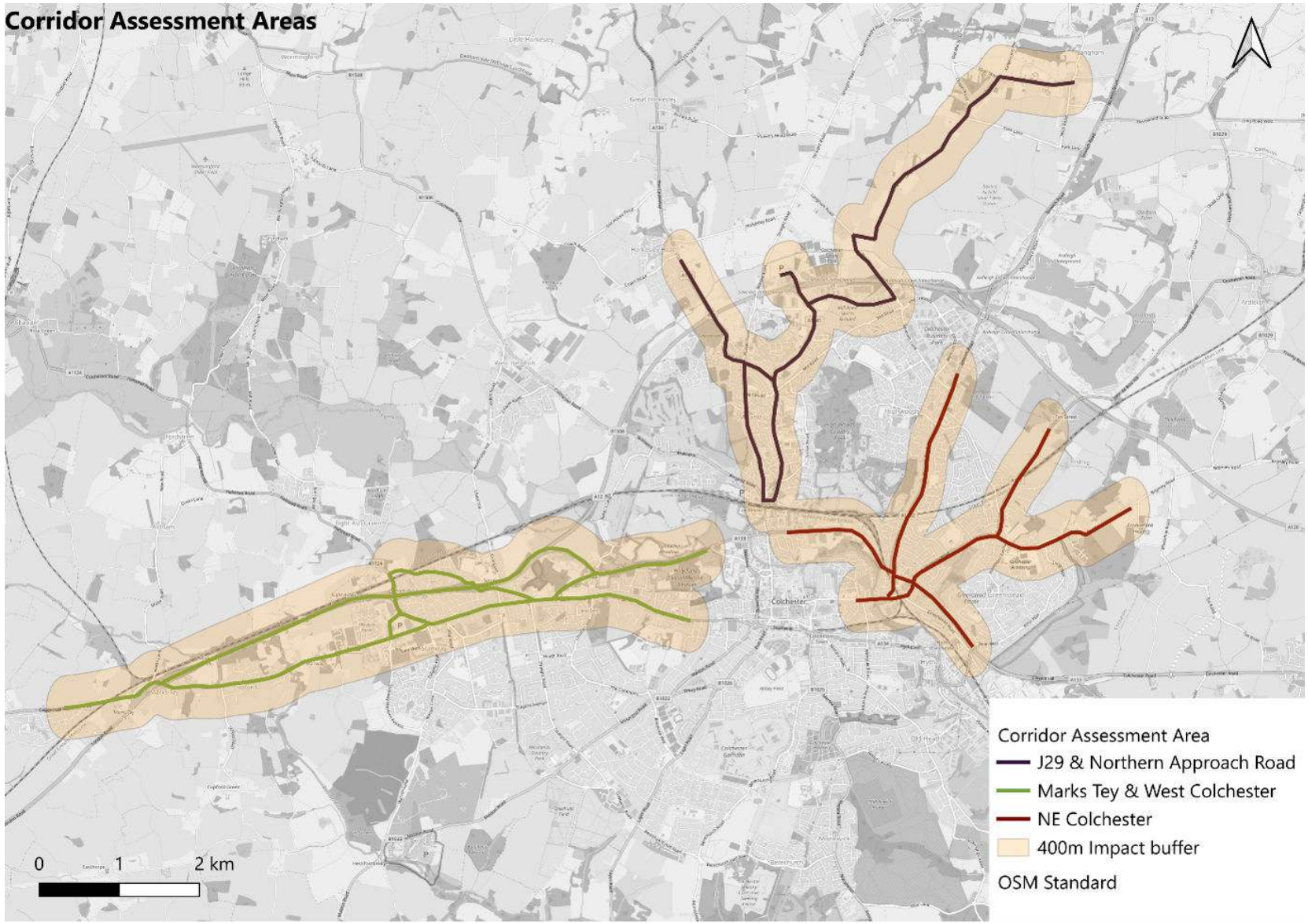

Figure 5.1: Corridor assessment areas

5.4.2 Interpreting connectivity tool outputs

5.4.2.1 Relative scoring method

The DfT Connectivity Tool generates a connectivity score for each location on a scale of 0 to 100. These scores represent the relative ability of a location to access the range of destinations included within the DfT methodology, such as employment, education, healthcare, shopping, leisure and social opportunities, using sustainable transport modes. The scores are calculated relative to all other locations across England and Wales, with higher scores indicating a greater level of connectivity and lower scores indicating comparatively lower connectivity. Importantly, the scores should be interpreted as a relative measure rather than an absolute assessment of accessibility. A score of 50 does not represent average connectivity, nor does a score of 80 indicate that 80% of destinations are accessible. Instead, the outputs provide a means of comparing locations and identifying relative differences in connectivity.

The greatest value of the outputs lies in understanding spatial patterns and changes between scenarios rather than focusing on the absolute score achieved in any individual location. The mapping outputs identify the variability in connectivity across a corridor or study area and assess how accessibility changes following development or transport interventions.

When reviewing the outputs, emphasis should be placed on the overall distribution of connectivity scores, the extent of areas experiencing improvement or decline, and the magnitude of any changes between scenarios. Improvements in connectivity scores indicate that a location has become relatively more accessible to the destinations included within the assessment, whilst reductions indicate comparatively lower accessibility. Reading these outputs alongside transport evidence, allows for a broader understanding of how transport interventions contribute to sustainable access and connectivity objectives.

5.4.2.2 Baseline summary

The baseline outputs have been assessed for connectivity to all of the key destination types into a single score. This in mind, the plots should be interpreted as an overall measure of connectivity rather than an indication of access to any individual service or destination category. Consequently, areas with higher scores are not necessarily closer to any one destination type but instead have stronger overall accessibility across the combined set of destinations included within the DfT methodology. Appendix J shows plots for connectivity to each of the six destination types.

The baseline outputs indicate that all three corridors currently benefit from moderate levels of overall connectivity, although accessibility varies spatially within each corridor. A consistent pattern is evident across the corridors, with the highest connectivity scores generally occurring closest to the city centre and principal concentrations of facilities. Connectivity progressively decreases with increasing distance from the city centre and main destination clusters, reflecting the influence of geographical proximity and the existing public transport network.

While the specific distribution of scores differs between corridors, the results demonstrate a common accessibility gradient. The North East corridor exhibits the highest and most extensive area of strong connectivity, with much of the corridor achieving scores in the region of 70%, reflecting the close relationship to the city centre and rail stations. The Marks Tey corridor also demonstrates relatively high levels of connectivity in its east, with connectivity reducing westwards. The Northern Approach Road cor-

ridor displays the greatest variation in connectivity, with high connectivity concentrated at the south of the corridor, transitioning to lower levels of connectivity north of the A12.

The pattern is consistent with the spatial distribution of key destinations and transport services across Colchester and demonstrates the important role that proximity to established centres of activity plays in shaping overall connectivity. Aligned with the transport evidence objectives, there is a clear need to support access from the peripheral locations to the city centre.

This assessment provides a strategic baseline against which the effects of future development and proposed public transport interventions can be compared, enabling an understanding of how connectivity may change across the corridors over time.

Appendix section J.1 shows the overall connectivity across the main three corridors, Marks Tey & West Colchester, J29 & Northern Approach Road, and North East Central.

5.4.2.3 Forecast summary

The forecast scenarios have considered committed, Local Plan and future growth beyond 2043. They have also incorporated public transport alterations along or within close proximity to each corridor. While exact public transport routes have not been defined within the transport evidence, for the use within this tool new routes, route alterations and frequency changes have been represented to represent potential enhanced operations to support new developments, as outlined within the transport mitigations in Chapter 3.

- three new routes — Great Tey to Marks Tey; Axial Way to Colchester; Crockleford Heath to Highwoods, Langham to park and ride (P&R) North.
- two existing routes have been altered to access the Marks Tey development areas - with frequency defined as a half hourly service
- two routes have had frequency upgrades applied — Langham to Colchester, and Horksley Heath to Colchester
- Marks Tey corridor — all baseline routes have had frequency upgrades to reflect the bus priority enhancements within the local plan mitigations

These will be subject to change in the real-world to align with planning requirements and engagement with bus operators.

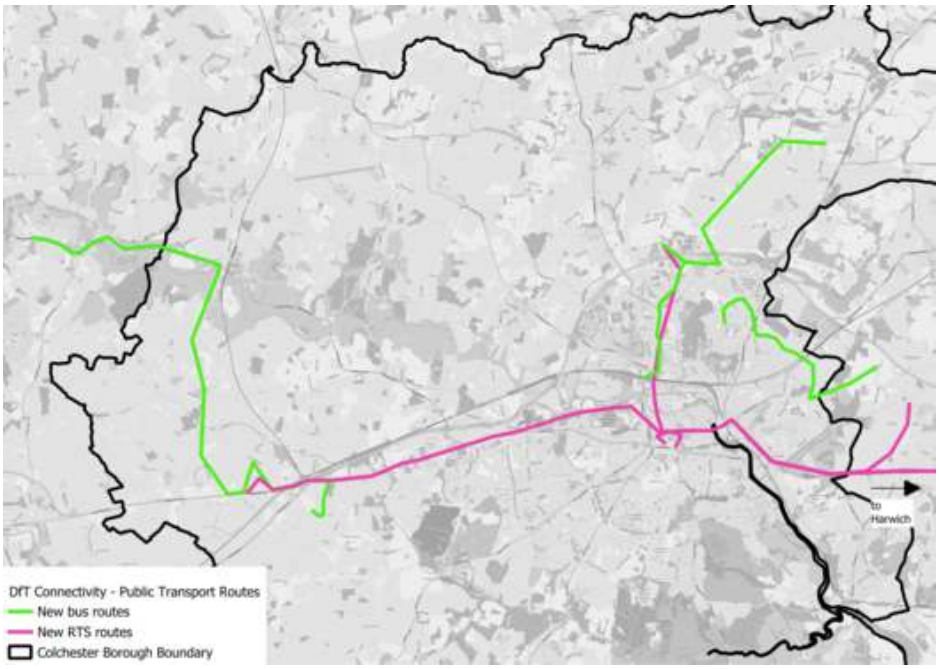

Figure 5.2: Central and Marks Tey Routes

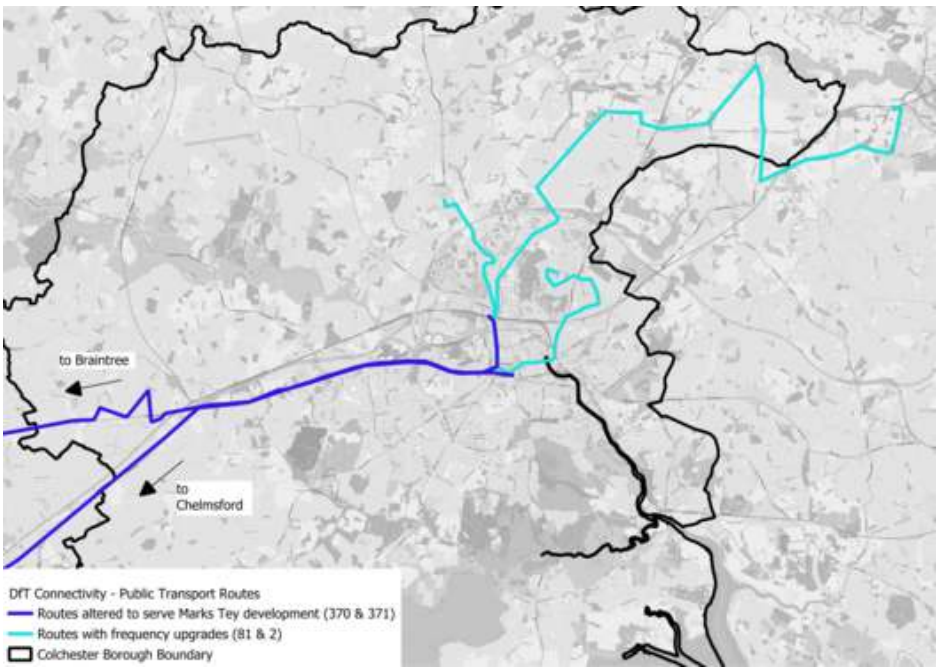

Figure 5.3: Northern Approach Routes

To determine if population weighting would impact the DfT Tool outputs, each of DfT tool outputs have been weighted by population utilising the OS Address database. From the results of this, and considering the relatively low impact of the additional transport mitigations compared to the existing variation, population weighting has been deemed unnecessary for the outputs.

The plots have been assessed with the overall connectivity score, which combines all the separate connectivities, and in addition for each individual destination type. For

each of the corridors, a single destination type has been extracted to demonstrate typical connectivity varieties.

It should be noted that in areas with a high overall connectivity, there is typically less impact from the additional provision of public transport routes.

Out of the three corridors considered, Marks Tey typically showed the lowest level of impact from the improvement of public transport routes within the area since it is already well connected, hence, impact it relatively small. This also indicates that greater public transport intervention could be required post-2043, which would be supported by rail frequency improvements.

Appendix section J.2 show the impact on the new/improved routes on leisure connectivity within the corridor. Leisure was chosen as it showed the highest impact compared to other destination types. It can be seen that the baseline connectivity is already high polarised within the corridor, with a much greater level of connectivity towards the eastern section of the corridor.

Whilst the improved public transport does show a few areas of marked improvement, typically around Lexden Gathering Grounds and Turkey Cock Lane, these were already areas of relatively high connectivity (and low population density). Towards Marks Tey itself, there is barely any improvement in connectivity – but this can also reflect limitations of the beta version of the tool.

The additional public transport within the J29 and Northern Approach Road corridor shows two clear areas of impact on education connectivity. Through comparing the underlying land use pattern of the two areas, it can be seen that just relying on connectivity as a metric can be flawed. Appendix section J.3 shows the results in the impact of connectivity for education in this corridor.

The two major areas with an increase in connectivity are in Langham, which sees a rise from being in the 30-40% decile, to the 50-60% decile, and in the area around the Jobserve Community Stadium and surrounding parks, which increases to the 90-100% decile for education connectivity. However, these two areas are fundamentally different and it may be questioned if an increase in education based connectivity is of value for a sports stadium. The increased connectivity for Langham could represent a much more valuable impact with an area on the outskirts of Colchester seeing improved connectivity to the centre. Again, caution is required with reading too much into the findings of the beta version of the Connectivity Tool.

In NE Colchester, there are three main routes extending out from Colchester City Centre, but it can be seen that only one route has generated a significant change in employment connectivity.

From an examination of the route in question, it can be seen that this is the exact result that might be expected. The route moves through a relatively highly populated residential area, before terminating in a business park. This would be an ideal configuration to improve employment connectivity. Appendix section J.4 shows the results in the impact of connectivity for employment in this corridor.

Despite, some caution in interpreting the findings from the Connectivity Tool, there is some evidence that the small subset of public transport mitigations is helping lift connectivity. Naturally, this impact is less in areas that are already well-connected.

5.5 Conclusion

This chapter has considered the transport impact to 2058 under two scenarios: a 2058 reference case with a low level of growth including TCBGC; and a 2058 assessment case with additional growth concentrated at Marks Tey and garden villages at Hare Green and Horsley Cross. The chapter has also considered how the public transport new local plan mitigations would improve connectivity using the DfT Connectivity Tool.

The 2058 reference case indicates a worsening of transport performance: while most severe in the city centre and on Clingoe Hill, substantial congestion is predicted on the A12 and A120 routes affecting key junctions. However, since the reference case scenario did not reflect ST demand but used BaU demand, there is some evidence that 2043 mitigations, if combined with trends for public transport and active travel would be robust post 2058 for low levels of growth,

The 2058 assessment case shows a further worsening of movement performance on the eastern and western approaches. While the 2043 new local plan mitigations provide the foundation for an integrated transport system, the 2058 assessment case shows there will be requirements for:

- strategic investment in the highway network including the A12 J19-25 widening and A120 Braintree to A12 widening
- strategic investment in the rail network with increased train frequencies on the Great Eastern mainline and branchlines to Sudbury, and Walton & Frinton.
- continued investment in ST including LCWIP, RTS, P&C and local buses

Whilst growth up to 2043 can be managed with a small shift to ST, growth post-2043 will depend on people choosing a wider range of modes than private car travel. The Connectivity Tool analysis shows that the 2043 new local plan mitigations provide the foundation for this change in behaviour – with significant changes in relative connectivity on key corridors.

Hence, Chapter 5 provides added confidence that the 2043 mitigations are the right approach. The concluding chapter summarises the key requirements for strategic investments and contributions from reference case and new local plan developments.

6 Conclusion

Introduction and summary

This report has assessed the cumulative transport impacts of committed growth, neighbouring authority growth and the proposed Regulation 19 Local Plan allocations to 2043. Using the North Essex Model and complementary microsimulation modelling, the assessment has examined the scale of transport challenges arising from growth and the effectiveness of a vision-led mitigation strategy designed to support sustainable development.

The findings demonstrate that transport challenges are already emerging as a result of committed growth across North Essex. Whilst the Regulation 19 Local Plan increases these pressures, the modelling confirms that growth can be managed through a coordinated package of highway improvements, public transport investment, active travel measures and behavioural change initiatives.

The conclusion summarises findings and explains requirements for reference case and proposed new local plan sites to contribute to integrated transport improvements necessary to manage growth. Strategic investment via National Highways and Network Rail is also recommended to support the plan to 2043 and secure sustainable growth beyond.

6.1 Summary of findings

The transport evidence demonstrates that the principal transport challenges arise from cumulative growth across Colchester and neighbouring authorities, rather than from Regulation 19 growth in isolation. By 2043, existing network constraints are forecast to worsen significantly, with local plan growth widening transport problems.

The reference case already represents a significant level of growth without the new local plan, comprising approximately 9,000 homes and 5,000 jobs in Colchester, together with substantial growth in Braintree and Tendring, including the cross-border development at TCBGC. The Regulation 19 Local Plan adds approximately 15,000 homes and 16,000 jobs to reference case growth, increasing total forecast growth to around 24,000 homes and 21,000 jobs by 2043.

NEMo has been used to test the following scenarios:

1. Scenario 1 – reference case growth without new local plan mitigation (though it does include committed mitigation).
2. Scenario 2 – assessment case growth without mitigation, in which proposed new local plan growth is added on top of reference case growth and no mitigation is added to that included in the reference case. BaU trip demand is assumed.
3. Scenario 3 – assessment case growth with mitigation, in which key highway and public transport mitigations are added to Scenario 2. Trip demand is based on the BaU assumption used in Scenario 2.
4. Scenario 4 – assessment case growth with mitigation and reduced car demand to reflect ST mitigation not accounted for in Scenario 3. This scenario replaces BaU

trip demand with ST trip demand.

The key integrated transport mitigations reflected in Scenarios 3 and 4 include:

- upgrades to urban traffic control technologies to co-ordinate traffic movements by all modes across the city
- A12 J29 signalisation and widening of the A120 off-slip
- Greenstead roundabout and Wivenhoe Park corner junction remodelling co-ordinated with RTS priority and crossings
- A12 J25 signalisation and a remodelled junction at the Station Road roundabout including footbridge widening across the A12 and new RTS priority
- A12 J26 signalisation of the approaches through Tollgate and London Road roundabouts also supporting RTS priority and crossings
- A12 J27 signalisation
- partial signalisation of St Andrews Avenue junctions with Ipswich and Harwich Roads
- expansion of bus-based RTS to the west and east
- introduction of P&C to the west of Colchester

A movement index has been used to objectively assess each of the scenarios. The movement index scores for the AM and PM peak periods are shown in Tables 6.1 and 6.2, respectively.

Table 6.1: AM movement index scores for 2023 base and 2043 Scenarios 1-4

Sector	Location	AM Peak Impact				
		2023 Base	2043 S1 RC	2043 S2 BAU	2043 S3 BAU Mit	2043 S4 BAU Mit ST
Central	N Station rdbt, Station Way, A134 Westway and Balkerne Hill	14	13	14	9	8
	Ipswich Road, East Street, East Hill and Harwich Road	11	11	12	10	9
East	Greenstead Roundabout, Colne Causeway and Clingoe Hill	9	15	15	14	12
	Colchester Road to Wivenhoe	7	15	15	8	9
West	A12 J26/J27 to London Rd , Lexden Road, Cymbeline Way and Colne Bank Rbt, London Rd	6	12	12	9	9
	A12 J25 / A120 (western)	5	6	11	8	8

Continued on next page

Table 6.1: AM movement index scores for 2023 base and 2043 Scenarios 1-4 *(continued)*

Sector	Location	AM Peak Impact				
		2023 Base	2043 S1 RC	2043 S2 BAU	2043 S3 BAU Mit	2043 S4 BAU Mit ST
North	Northern Approach Road, Via Urbis Romane, Mill Road & A12 J28	9	9	10	9	9
	A12 J29 / A120 (eastern)	7	12	12	8	8
Outer	Tiptree	3	4	4	4	4
	Aldham	3	3	3	3	3
	A12 J20-25	6	8	8	8	8
Overall assessement combining all areas		8	11	11	9	9

Key to movement scale and acceptability of change

More or less free flow			Travelling slower			Moderate congestion			Substantial congestion		
1	2	3	4	5	6	7	8	9	10	11	12
Extreme congestion			Acceptability of change								
13	14	15	Passable ✓			Caution !			Unsatisfactory ✗		

Scenario 1 shows unsatisfactory performance with reference case growth. Reference case growth includes both committed growth, such as TCBGC and hypothetical growth, such as proposed new local plan growth in Braintree and Tendring based on their Regulation 18 preferred options. However, reference case mitigation is not known at this point in time.

The TCBGC DPD [6] identifies requirements for TCBGC to mitigate severe impacts along A133 Clingoe Hill and introduce RTS priority, and significantly contribute to the alleviation of road safety problems at A12 J29. However, it is fair and reasonable within planning regulations [25] that developments would only mitigate its impact on top of certain or near certain development, and not hypothetical development for which a local plan would likely be adopted only after a decision on its outline planning application.

In order to appropriately and fairly identify mitigation to address reference case problems, which are focussed mainly on Clingoe Hill and at A12 J29, and to a lesser extent at A12 J26-27, it would be necessary to separately assess the impacts of committed growth, establish certainty over which developments contribute to mitigation, which might not exclusively be TCBGC, and then assess the further contribution likely required by hypothetical growth in Tendring or Braintree. Such an approach, if embarked upon, would be fraught with uncertainties.

Hence, in the time available to produce local plan evidence to adhere to government

timelines, it has been considered preferable to identify the cumulative impact of reference case and assessment case growth, and identify the endpoint mitigations. This avoids guessing the mitigation, and timing of that mitigation, that would be expected to be agreed as part of major planning applications such as for TCBGC, and predicting contributions from hypothetical developments in Braintree and Tendring, for which infrastructure delivery plans are only currently being produced.

Table 6.2: PM peak movement index scores for 2023 base and 2043 Scenarios 1-4

Sector	Location	PM Peak Impact				
		2023 Base	2043 S1 RC	2043 S2 BAU	2043 S3 BAU Mit	2043 S4 BAU Mit ST
Central	N Station rdbt, Station Way, A134 Westway and Balkerne Hill	8	12	14	9	8
	Ipswich Road, East Street, East Hill and Harwich Road	11	10	11	10	10
East	Greenstead Roundabout, Colne Causeway and Clingoe Hill	11	15	15	11	10
	Colchester Road to Wivenhoe	7	8	8	8	8
West	A12 J26/J27 to London Rd , Lexden Road, Cymbeline Way and Colne Bank Rbt, London Rd	5	9	10	8	8
	A12 J25 / A120 (western)	5	5	6	6	6
North	Northern Approach Road, Via Urbis Romane, Mill Road & A12 J28	8	12	15	10	10
	A12 J29 / A120 (eastern)	7	9	10	8	8
Outer	Tiptree	3	3	4	4	4
	Aldham	3	3	3	3	3
	A12 J20-25	5	7	7	7	7
Overall assessement combining all areas		7	9	10	8	8

Key to movement scale and acceptability of change

More or less free flow			Travelling slower			Moderate congestion			Substantial congestion		
1	2	3	4	5	6	7	8	9	10	11	12
Extreme congestion			Acceptability of change								
13	14	15	Passable ✓			Caution !			Unsatisfactory ✗		

Therefore when proposed new local plan growth is added to reference case growth in Scenario 2, it is added to a network already with unsatisfactory performance which, unsurprisingly extends movement problems. In particular, worsening around A12 J25 and the central areas are predicted. However, Scenarios 3 and 4 show that performance with mitigation is considered much improved; and performance is best with successful sustainable travel measures which provide viable choices to car travel especially for short journeys in or to the urban area.

Since the endpoint mitigations have been identified, the approach to managing growth needs to anticipate that there will be requirements for contributions from committed sites in Colchester, local plan sites in neighbouring authorities and proposed new local plan sites in Colchester. In addition, due to the impact on the SRN and the role of rail to support sustainable travel, strategic investment via National Highways and Network Rail is also recommended to support the plan to 2043 and secure sustainable growth beyond.

The following sections recommend requirements from national transport bodies, reference case developments and proposed new local plan developments; and how they should be co-ordinated to deliver to achieve the endpoint mitigations.

6.2 Strategic investment requirements

6.2.1 Highways

Transport mitigation to 2043 requires major interventions on the A12 at J25, J26, J27 and J29. Furthermore Braintree local plan growth could lead to the need for improvements and changes from J21-J24 and along the A120 at Braintree; Tendring requires some A120 improvements through to Harwich to support Freeport East and unlock garden village growth at Horsley Cross. Meanwhile A12 J19-20 will likely require improvements to accommodate growth in the Chelmsford area.

The long range forecast to 2058 indicates that widening of the A12 between J19 to J25, based on the cancelled scheme for which a development consent order was prepared, would once again be required. Realignment of the A120 route from Braintree to the A12 would also be desirable with A120 widening around Horsley Cross.

It is unlikely that government funding for such extensive improvements across the North Essex SRN would be funded in the plan period to 2043 and indeed, would likely take longer than a fifteen-year plan period to design and implement. Consequently, in plan period to 2043 it is recommended that highway authorities NH and ECC:

- confirm a 2060 infrastructure vision for the SRN – which is able to be informed by the evidence in this study and the A12 Chelmsford to A120 and A120 Braintree to A12 plans
- require developers contributing to the need for improvements to implement sections contributing to the 2060 vision and safeguard land

- seek funding through the Road Investment Strategy and Major Road Networks programmes in the plan period to 2043 to complement developer contributions where there would be efficiencies to complete sections of the vision earlier rather than wait on subsequent developer contributions – which is expected to be at A12 J25 and A12 J29 in this plan period
- prepare the business case for widening and realignment schemes for implementation after 2043 but before 2060

6.2.2 Rail

Sustainable travel will be supported by improved frequencies of services on the Great Eastern Mainline and local services to Sudbury and to Clacton and Walton & Frinton. Such improvements help to mitigate the highway impact of Colchester developments, especially at Marks Tey, and the impact of Tendring growth.

Table 3.1 lists the rail infrastructure needed to unlock frequency increases. However, these changes, while desirable, are not considered practicable mitigations – in the sense that they would alleviate specific problems, be financially viable and be deliverable in the plan period.

Post-2043, rail frequency improvements, however are considered essential to maximise sustainable travel opportunities and manage the impact of growth from potential large new developments across North Essex.

Consequently, in the plan period to 2043, it is recommended that the case for rail investment is continued to be be made by ECC through Transport East and Network Rail.

6.3 Requirements to mitigate reference case growth

Reference case growth covers:

- committed growth in Colchester
- committed and proposed new local plan growth in Braintree and Tendring
- growth from outside North Essex in line with DfT NTEM forecasts

On the eastern and northern approaches, it is found that committed growth, primarily from TCBGC, and wider Tendring growth necessitates the need for major schemes along the A133 and at A12 J29. On the western approach Braintree growth contributes to problems predicted at A12 J25-27.

Since the proposed new Colchester local plan growth will overlap with reference case growth, there is a requirement to establish fair and reasonable contributions to the endpoint schemes. For the A12, it has been recommended in Section 6.2 that NH and ECC develop a 2060 endpoint vision for the A12 to help this process. Similarly ECC should develop an endpoint vision for the A133 corridor.

Then, as developments come forward, they should be:

- establishing if there is a case for contribution to mitigations
- confirming if any revisions are needed to the endpoint scheme
- identifying contributions and that it is proportionate to the remaining changes that would be needed

At A12 J29, the endpoint scheme can be broken down into signalisation, slip road changes of different scales and realignment of the central roundabout. Hence the scheme could readily be delivered in increments following the above steps. Similarly, the A133 corridor improvements can be broken down into changes around lower Ipswich Road and lower Harwich Road, Greenstead roundabout, Wivenhoe Park corner and extension of a dedicated RTS lane. Again these can be broken down into deliverable increments fairly apportioned.

At A12 J25 the scale of the scheme required may be too large for a single development to provide sufficient funding so the infrastructure is in place ahead of when needed. Furthermore there may be efficiencies in delivering the scheme in a single phase. In this example, strategic investment could usefully assist delivery so the infrastructure is provided ahead of development.

6.4 Requirements to mitigate assessment case growth

Appendix E identifies which transport mitigations require contributions from reference case developments, applying the approach described in Section 6.3 – for which a coordinated approach to contributions would be required. Even if a mechanism for a community infrastructure levy was used, it is likely an incremental approach to delivery would still be required aligned to contributions.

Contributions from proposed new local plan developments to the reference case mitigations also needs to be considered where new local plan growth is contributing to tangible worsening. It is expected that the case for contributions on Clingoe Hill would be minimal, however, some contribution would be expected at lower Ipswich Road and lower Harwich Road, A12 J29 and significant contribution at A12 J25-27.

The majority of mitigations proposed in Appendix E, however, are associated with avoiding severe movement or road safety problems, or providing acceptable levels of connectivity. The appendix therefore provides a reasonably comprehensive starting point for developers to use to develop details of mitigations collaboratively with ECC, NH and National Rail.

6.5 Recommendations

This transport evidence report has identified the impact of Colchester's proposed new local plan growth and compared it to a reference case of growth comprising committed allocations and proposed new local plan sites in the other North Essex authorities of Braintree and Tendring. It is found that movement is unsatisfactory on parts of the network with reference case growth and noticeably worsens with the addition of new local plan growth.

Since new local plan growth will overlap with reference case growth and required mitigations at reference case sites are uncertain, the report has outlined integrated and vision-led mitigations which would address the cumulative transport impact of reference and assessment case growth and provide adequate levels of connectivity. It should be noted that at the local plan stage only outline concepts can be provided, which indicate the scale and type of interventions required. Each package of mitigation needs to be designed in detail which should involve further optioneering and consultation.

The integrated transport plan of mitigations is consistent with the county's draft LTP and national and regional plans being developed by NH, National Rail and Transport

East. The report finds that if the mitigations were provided as outlined that the transport impacts of cumulative growth from reference case and proposed new local plan development can be acceptably managed. Furthermore, the measures provide a foundation for continued growth through to 2060.

Starting with committed developments and then extending to new local plan sites, it is recommended that developers work collaboratively with the planning and transport authorities to deliver the necessary integrated transport and vision-led mitigations. While the transport plan to 2043 is not dependent on government funding, there would be efficiencies if the more complex schemes on the A12 and rail network were delivered as as part of established programmes, to which government funding complements developer funding. This would help accelerate housing delivery, reduce the amount of disruption from works and ensure infrastructure improvements are delivered ahead of development. Post 2043, strategic investment in A12 widening, A120 upgrades both west and east of Colchester, and rail frequency improvements are considered essential to support continued growth.

In order to ensure that this collaborative approach to deliver the integrated transport vision the report has also recommended requirements for reference case and proposed new local plan developments to:

- keep the endpoint schemes under review, recognising changes my be required over time
- identify proportionate contributions that can deliver meaningful increments of the endpoint schemes
- check that the remaining increment necessary to realise completion of the endpoint schemes are viable for future expected development to fund

The recommended approach is cognisant of planning regulations but also able to be adapted as conditions change. The scale of the transport challenge require the transport authorities – principally ECC – to maintain details of the endpoint schemes in order to support collaborative review and transport assessments as development come forward. Should this be done then the transport impacts of growth can be acceptably managed and the future transport system support the wider objectives for liveability, environmental quality and economic growth.

Bibliography

[1] Colchester City Council. *Active Travel Supplementary Planning Document*. Colchester, UK, Dec. 2023. URL: https://cbccrmdata.blob.core.windows.net/noteattachment/CBC-Active-Travel-SPD-Active-Travel-SPD-Active%20Travel%20SPD%20Final%20December%202023.pdf.

[2] Colchester City Council. *Colchester City Centre Masterplan*. Colchester, UK, Dec. 2023. URL: https://cbccrmdata.blob.core.windows.net/noteattachment/CBC-null-Colchester--City-Centre--Masterplan-24-We%20Made%20That_255_Colchester%20Town%20Centre%20Masterplan_Final%20Document_REV%20E.pdf.

[3] Colchester City Council. *Colchester City Council Preferred Options Local Plan. Regulation 18 Consultation*. Colchester, UK, Nov. 2025. URL: https://cbccrmdata.blob.core.windows.net/noteattachment/CBC-null-Preferred-Options-Local-Plan-Consultation-Draft-November-2025-Preferred%20Options%20Local%20Plan%20Consultation%20Draft%20November%202025.pdf.

[4] Colchester City Council. *Colchester Local Plan 2017-2033*. Colchester, UK, July 2022. URL: https://cbccrmdata.blob.core.windows.net/noteattachment/CBC-null-section-2-local-plan-update-Colchester%20Borough%20Council%20Local%20Plan%202017-2033%20Section%202%20Final.pdf.

[5] Colchester City Council. *Colchester Positive Parking Strategy*. Nov. 2020. URL: https://cbccrmdata.blob.core.windows.net/noteattachment/Colchester%20Parking%20Strategy%202020%20.pdf.

[6] Colchester City Council and Tendring District Council. *Tendring Colchester Borders Garden Community Development Plan Document*. May 2025. URL: https://legacy.tendringdc.gov.uk/sites/default/files/documents/planning/Planning_Policy/Garden_Community/Development%20Plan%20Document%20%28DPD%29.pdf.

[7] Department for Transport. *TAG Unit M2-1 Variable Demand Modelling*. London, UK, May 2024. URL: https://assets.publishing.service.gov.uk/media/666af2a3ffd07973a043d10f/tag-unit-m2.1-variable-demand-modelling.pdf.

[8] Department for Transport. *TAG Unit M2-2 Base Year Matrix Development*. London, UK, May 2020. URL: https://assets.publishing.service.gov.uk/media/5fbfbd998fa8f559e32b4d25/tag-m2-2-base-year-matrix.pdf.

[9] Department for Transport. *TAG Unit M3-1 Highway Assignment Modelling*. London, UK, May 2024. URL: https://assets.publishing.service.gov.uk/media/67ed0e54e9c76fa33048c634/tag-m3-1-highway-assignment-modelling.pdf.

[10] Department for Transport. *TAG Unit M3-2 Public Transport Assignment Modelling*. London, UK, May 2024. URL: https://assets.publishing.service.gov.uk/media/666af32effd07973a043d110/tag-unit-m3.2-public-transport-assignment-modelling.pdf.

[11] Essex County Council. *A Better Connected Essex. Essex Transport Strategy: Public Consultation(Part Two)*. July 2025. URL: https://consultations.essex.gov.uk/essex-highways/better-connected-essex/user_uploads/consultation-document---a-better-connected-essex.pdf.

[12] Essex County Council. *Mobility Hubs and Integrated Transport Halts*. Sept. 2024. URL: https://www.essexdesignguide.co.uk/media/3052/mobility-hubs-implementation-guide_sept-2024.pdf.

[13] Essex Highways. *Colchester Local Plan Review: Further Transport Evidence*. London, UK, Oct. 2025. URL: https://cbccrmdata.blob.core.windows.net/noteattachment/CBC-Evidence-base-Further-Transport-Evidence-Colchester-

Local-Plan-October-2025-Further%20Transport%20Evidence%20Colchester%20Local%20PLan%20(Preferred%20Options)%20October%202025.pdf.

[14] Essex Highways. 'Colchester Local Plan Review: Transport Evidence'. London, UK, Feb. 2025. URL: https://cbccrmdata.blob.core.windows.net/noteattachment/CBC-Evidence-base-and-supporting-documents-Transport-evidence-2025-02_Colchester-LP_v1%20(2)_compressed%20(1).pdf.

[15] Healthy Streets. *Online guidance*. 2026. URL: https://www.healthystreets.com.

[16] Ministry of Housing, Communities and Local Government. *National Planning Policy Framework*. London, UK, Dec. 2024. URL: https://assets.publishing.service.gov.uk/media/67aafe8f3b41f783cca46251/NPPF_December_2024.pdf.

[17] Ministry of Housing, Communities and Local Government. *Proposed reforms to the National Planning Policy Framework and other changes to the planning system*. London, UK, Dec. 2025. URL: https://assets.publishing.service.gov.uk/media/697b6bc6aacd0dc9777b4fd2/December_2025_NPPF_Consultation.pdf.

[18] National Highways. *Planning for the future. A guide to working with National Highways on planning matters*. Oct. 2023. URL: https://nationalhighways.co.uk/media/imvluu5w/final-cre23_0370-nh-planning-guide-2023.pdf.

[19] Network Rail. *Eastern Region Freight Strategy*. Sept. 2022. URL: https://sacuksprodnrdigital0001.blob.core.windows.net/regional-long-term-planning/Eastern%20region%20-%20planning%20documents/Eastern%20Region%20Freight%20Strategy%20-%20Summary.pdf.

[20] Network Rail. *Great Eastern Main Line Strategic Advice*. 2025. URL: https://sacuksprodnrdigital0001.blob.core.windows.net/regional-long-term-planning/Eastern%20region%20-%20planning%20documents/Great%20Eastern%20Main%20Line%20Strategic%20Advice%202025.pdf.

[21] Transport East. *Shorter-Term Rail Opportunities in the Transport East Region. Full Technical Report*. Aug. 2025. URL: https://www.transporteast.gov.uk/wp-content/uploads/Full-Report-Identification-and-Prioritisation-of-Shorter-Term-Rail-Opportunities-in-the-Transport-East-Region.pdf.

[22] Transport East. *The strategic case for rail service enhancements between Colchester and Clacton-on-Sea*. Aug. 2025. URL: https://www.transporteast.gov.uk/wp-content/uploads/Colchester-to-Clacton-Route-Short-Term-Opportunities.pdf.

[23] Transport East. *Transport Strategy 2023-2050*. 2023. URL: https://www.transporteast.gov.uk/wp-content/uploads/20230224-TE_Strategy-FINAL.pdf.

[24] Transport for London. *Traffic Modelling Guidelines. Version 4.0*. 2021. URL: https://content.tfl.gov.uk/traffic-modelling-guidelines.pdf.

[25] UK Parliament. *The Community Infrastructure Levy Regulations 2010*. 2010. URL: https://www.legislation.gov.uk/uksi/2010/948/contents.

Glossary

Term	Description
Bus rapid transit	Bus rapid transit is used to refer to high quality, rubber-tyred public transport. BRT services are typically faster than local bus services with less stops. In Colchester the rapid transit system (RTS) is a form of BRT.
Colchester Transport Model	A strategic highway and public transport model. It was expanded and updated to produce the North Essex Model
Connectivity Tool	The DfT's Connectivity Tool combines transport and land use data to generate a national measure of connectivity for any location in England and Wales. This connectivity score measures people's ability to get where they want to go. The tool is used to: • display how any location in England and Wales is connected to everyday services by walking, driving, cycling and public transport • plot new transport routes to understand how these would affect an area's connectivity
Development Plan Document	Development Plan Documents provide policies and land allocation details which complement local plans. This report refers to the TCBGC DPD.
EMME	Public transport assignment software package used in the North Essex Model
Local Transport Plan	ECC is currently consulting on its fourth Local Transport Plan call 'A Better Connected Essex'. It sets out the transport vision and priorities for Essex and the approach to delivery in order to achieve desired outcomes. See [11]
National Travel Survey	NTS is an annual survey commissioned by the UK DfT which provides information on travel behaviour. Whilst the sample is in the region of 3,000, it is able to provide statistically reliable insight at regional levels and by urban and rural geographies.
National Trip End Model	National Trip End Model is used to forecast trips
North Essex Model	The North Essex Model is a strategic highway and public transport model. The area of detailed modelling covers localities across Braintree, Colchester and Tendring council areas.
Park and choose	P&C relfect that there are a choice of modes from the site as well as P&R
Rapid transit system	Bus Rapid Transit System

Term	Description
Strategic Road Network	Major roads administered by National Highways
Transport Analysis Guidance	DfT's Transport Analysis Guidance
Trip End Model Programme	Trip End Model Programme is used to access National Trip End Model (NTEM)
Variable demand modelling	Variable demand modelling allows trips to change destination or switch between car and public transport modes. North Essex Model uses VDM to iteratively assign trips to highway and public transport networks.
VISSIM	VISSIM is the proprietary name of a traffic microsimulation model used for detailed assessment and testing of highway conditions and scheme proposals. It is often used alongside a strategic transport model which provides forecast traffic demand inputs
VISUM	Highway assignment software package used in the North Essex Model
Volume divided by capacity	Measure of the level of congestion on a link or a junction

A Method for assessing the acceptability of the transport impact of growth

Section 2.2 introduces a movement index for helping transport authorities consider the acceptability of transport impacts arising from local plan growth and supporting the identification of appropriate mitigation measures in line with the NPPF vision-led approach to transport planning and the county's LTP4. This appendix provides technical information on the transport assessment method, which has guided the findings and recommendations.

A.1 Strategic versus detailed

Traditional approaches to acceptability of local plan development often focus on using level of service (LoS), volume/capacity (V/C) and queue length indicators around junctions.

At the preferred options, plan making, Regulation 18 stage of local plan preparation there is risk that sole use of these indicators would tilt plans to highway schemes at the expense of the vision for sustainable transport; and put focus on specific problem locations while losing sight of the strategic tapestry of the transport network, and the cumulative impact of how people and goods move through the network using all modes.

At the Regulation 19 stage and in site-specific, developer-led transport assessments, LoS , V/C and queue length indicators have their role – ideally when used to test the effectiveness of mitigation measures to strike the right balance between pedestrian, cycle, bus, car and goods vehicle movements aligned with a sustainable transport vision. It is also appropriate that they are considered at key junctions such as found on the strategic road network managed by National Highways (NH).

However, at the Regulation 18 stage, a more strategic approach is recommended, aligned with the intent of the NPPF and the draft LTP4.

A.2 Assessment of keeping people and goods moving (theory and method)

The assessment of keeping people and goods moving is, arguably, the key criterium for which an objective judgement is required, to be informed by transport modelling. This section explains the theory and method.

Transport models can produce numerous indicators which are difficult to combine and interpret – it is metaphorically difficult to see the wood for the trees. In addition, strategic transport models are good at showing change between a reference case (without local plan growth and mitigations) and an assessment case (with local plan growth and with or without mitigations). However, strategic models are not as good at interpreting the level of problem in either of the cases.

We make an assumption that highway traffic indicators provide the most useful high level indicators since increases in flow, congestion and delay will likely impact all people and goods movements regardless of mode. Secondary analysis would then consider impact on each mode informed by findings from the sustainable transport criterium and the traffic forecasts.

As illustrated in Section 2.2, the assessment of movement performance commences by identifying key areas of the network where there are problems or change is expected. Each area of interest is then subdivided into paths, which are routes through an area.

For example, one path may go straight ahead at a junction whereas another path may turn left or right. For each path the following indicators are extracted from the model.

- Relative queue (*q*) which shows blocking back of traffic on that path, i.e. traffic that doesn't get through in the modelled time period, which causes queues to form. This indicator only appears on the worst performing parts of the modelled network and is shown as the percentage of a link which is blocked. Relative queue ranges between 0 (no queue) to 100% (where the entire path link is blocked by the end of the modelled hour).
- The ratio between modelled speed and free flow speed along the path (*s*). This indicator reflects delay in situations where traffic is slow moving and is calculated by dividing modelled speed by free flow speed. Traffic can be slow moving without there being a relative queue. The ratio ranges from 0+ (very slow but never 0 since some traffic must have travelled along a path even if it ends up fully blocked with traffic unable to move at the end of the modelled hour) to 1 (where there is no delay whatsoever).
- The ratio between the demand for traffic to flow along a path and the actual modelled flow that is predicted to get through a path over the modelled hour (*d*). This indicator reflects issues where demand exceeds capacity. It is calculated by dividing demand flow by actual flow. It ranges from 1 (where all traffic can get through) to, potentially, a high number in an exceptionally congested network – though in reality the indicator will range between 1 and 2.

These indicators (*q*, *s* and *d*) have then been combined into a movement index (*I*) using the following formula:

$$I = \left(\frac{(1+q)^2}{s} \right)^d$$

The index I ranges from 1 (with no queue and delay with all traffic demand passing through) to, in extreme situations, a high number. In practice it ranges from 1 to 4 for the majority of paths with some outliers ranging to 15.

There is an index score for each of the paths through each of the areas of interest. For each area of interest, a combined index score is then calculated. This is done by calculating a weighted average of the index scores of the paths through an area. The average is weighted by path length.

In order to interpret the severity of conditions represented by the index score, a seven point scale 1-15 has also been developed, shown in A.1. Since the function is non-linear the scale is also non-linear. To develop the scale, a technique borrowed from mathematical approximation theory has been used to identify the most efficient set of intervals to represent change.

Table A.1: Relationship between the movement scale and index values

Description	Movement scale	Index values
More or less free flow	1	$1.00 \leq I < 1.04$
	2	$1.04 \leq I < 1.11$
	3	$1.11 \leq I < 1.22$
Travelling slower	4	$1.22 \leq I < 1.36$
	5	$1.36 \leq I < 1.53$
	6	$1.53 \leq I < 1.73$
Moderate congestion	7	$1.73 \leq I < 1.96$
	8	$1.96 \leq I < 2.22$
	9	$2.22 \leq I < 2.50$
Substantial congestion	10	$2.50 \leq I < 2.80$
	11	$2.80 \leq I < 3.12$
	12	$3.12 \leq I < 3.45$
Extreme congestion	13	$3.45 \leq I < 3.80$
	14	$3.80 \leq I < 4.15$
	15	$I \geq 4.15$

Using the scale, the level of movement performance can be assessed in each area of interest. Also, problems on specific paths can be identified by looking at the indices on individuals paths. The question then arises that if growth is added to the network or mitigations made whether performance is acceptable or not.

To answer this question, it is assumed that there will be two scenarios (reference and assessment scenarios) to be compared against each other. Depending on the changes between scenarios and the scale of problem, the matrix shown in A.2 shows how a judgement can be reached on whether the assessment scenario can be found broadly acceptable in terms of movement performance – noting that sustainable transport and safety impacts also need to be considered.

The main report illustrates how this method is being applied in praxis in the Colchester local plan evidence project. For example, see the assessment of the different scenarios is discussed in chapters 2 and 4.

Depending on the change between the scenarios being compared, the change in the movement indices also help identify the level of concern to inform acceptability:

- passable ✓
- caution **!**
- unsatisfactory ✗

Table A.2: Acceptability matrix for initial assessment

Referenc case level of prob-lem	Assessment case level of problem														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	✓	✓	!	!	!	!	✗	✗	✗	✗	✗	✗	✗	✗	✗
2	✓	✓	✓	!	!	!	✗	✗	✗	✗	✗	✗	✗	✗	✗
3	✓	✓	✓	✓	!	!	✗	✗	✗	✗	✗	✗	✗	✗	✗
4	✓	✓	✓	✓	!	!	!	!	✗	✗	✗	✗	✗	✗	✗
5	✓	✓	✓	✓	✓	!	!	!	✗	✗	✗	✗	✗	✗	✗
6	✓	✓	✓	✓	✓	✓	!	!	!	✗	✗	✗	✗	✗	✗
7	✓	✓	✓	✓	✓	✓	✓	!	!	✗	✗	✗	✗	✗	✗
8	✓	✓	✓	✓	✓	✓	✓	✓	!	!	✗	✗	✗	✗	✗
9	✓	✓	✓	✓	✓	✓	✓	✓	!	!	✗	✗	✗	✗	✗
10	✓	✓	✓	✓	✓	✓	✓	✓	✓	!	✗	✗	✗	✗	✗
11	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	!	✗	✗	✗	✗
12	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	!	✗	✗	✗
13	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗
14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗
15	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗

A.3 Reaching a view on acceptability

Information on movements of vehicles through the highway network is a good proxy for all movement, as buses, cyclists and pedestrians can be affected by general traffic delay, however to reach a view on the acceptability of a local plan from the perspective of transport, additional interpretation is needed to assess also the impact on other modes and safety.

B Reference case sites

B.1 Completed residential sites 2023-2026

Table B.1: Commpleted residential sites 2023-2026

Planning reference	Location	Site name	Number of dwellings
191093	Berechurch	Berechurch Hall Road (Harding)	32
202025	Berechurch	Berechurch Hall Road (Persimmon)	134
221496	Berechurch	L/A 56 Berechurch Hall Road	10
180045	Castle	Cowdray Centre, Mason Road, Colchester	103
190424	Castle	29 East Bay, Colchester	11
201290	Castle	25 Southway, Colchester	15
211575	Castle	Norfolk House, 23 Southway	11
223128	Castle	Midland House, North Station Road	17
220235	Castle	Ewer House, Crouch Street	12
220779	Castle	23 Norfolk House, Colchester (Student 6 + 16)	12
223138	Castle	23 Ryegate House, St Peters Street, Colchester (Student 27)	11
240751	Castle	2 St Johns Street, Colchester	34
240650	Castle	14 Headgate, Colchester	44
191997	Lexden & Braiswick	Stable Cottage	25
100502	Mile End	Former Severals Hospital Phase 2	37
150473	Mile End	Chesterwell, (Both Outlets)	248
201208 / 221047	Mile End	South Of Cambian Fairview, Boxted Road, Colchester	26
192837	New Town & Christchurch	Garrison K2, Butt Road	33
190335 / 212182	Old Heath & Hythe	R/O Colchester Centre, Hawkins Road	206
241702 / 242394	Old Heath & Hythe	Phoenix House, Hawkins Road	24
201943	Shrub End	Elfreda House	36
190522	Shrub End	Gosbecks Phase 2	60
Various	Stanway	Lakelands	89
172049	Stanway	Chitts Hill, Stanway	19
202829	Stanway	Catchbelles, Land North Of London Road, Stanway	66
231600	Marks Tey & Layer	L/A The Folley, Layer De La Haye(Inc Res 15)	24

Continued on next page

Table B.1: Commpleted residential sites 2023-2026 *(continued)*

Planning reference	Location	Site name	Number of dwellings
231640	Marks Tey & Layer	Hall Road, Copford	50
200960 / 240313	Mersea & Pyefleet	Brierley Paddocks, West Mersea	101
213234	Mersea & Pyefleet	Dawes Lane, West Mersea	42
160906	Rural North	Horkesley Hamlet	5
221111	Rural North	Plummers Road, Fordham	17
191830	Rural North	School Road (East), Langham	15
190647	Tiptree	L/A The Gables, Kelvedon Road, Tiptree	39
210398	Tiptree	Barbrook Lane	156
231243	Wivenhoe	Broadfields, Wivenhoe	34
		Total	**1798**

B.2 Committed residential site allocations

Table B.2: Committed residential sites

Planning reference	Location	Site name	Number of dwellings
202021	Berechurch	128 The Willows, Colchester	1
232457	Berechurch	24 Prince Philip Road, Colchester	1
222734	Castle	12-13 Magdelen Street, Colchester (Student, 23 Bed Shared Facilites)	9
222839	Castle	62 Brook Street, Colchester (Almshouses)	7
231067	Castle	17-13 Long Wyre Street, Colchester	3
231896	Castle	11-13 Head Street, Colchester	4
232137	Castle	Midland House, North Station Road	5
232517	Castle	4 St Botolphs Street, Colchester	1
240333	Castle	3 Culver Street East, Colchester	3
231296	Castle	2 Culver Street East, Colchester	2
232286	Castle	82 East Hill, Colchester	1
240982	Castle	28 Eld Lane, Colchester	3
241729	Castle	1 Culver Street East, Colchester	4
232754	Castle	Land East Of Albert Street, Colchester	8
241786	Castle	96 High Street, Colchester	1
242588	Castle	12B Culver Street West	4

Continued on next page

Table B.2: Committed residential sites *(continued)*

Planning reference	Location	Site name	Number of dwellings
242039	Castle	5 Osborne Street, Colchester	1
213524	Castle	17-26 Priory Walk & 20-28 Queen Street	31
223097	Castle	Priory Walk & Long Wyre Street, Colchester	19
190424	Castle	29 East Bay, Colchester	9
210088	Castle	Former Museum Resource Centre, 14 Ryegate Road	18
232757	Castle	Childsplay, Clarendon Way	21
252147	Castle	57 North Hill, Colchester	1
241369	Castle	59 North Hill, Colchester	1
250068	Castle	14 Short Wyre Street, Colchester	1
250053	Castle	20 Trinity Street, Colchester	1
231077	Castle	Former Conservatives Club	16
250518	Castle	17-33 Long Wyre Street, Colchester	9
252660	Castle	Balkerne House, Colchester	10
250607	Castle	10 Trinity Street, Colchester	1
252064	Castle	Hudson, 19 Head Street	9
252515	Castle	43 Head Street, Colchester	5
252618	Castle	15 Queen Street	4
260136	Castle	40 Long Wyre Street, Colchester	1
TBC	Castle	Riverside, Colchester	93
240207	Greenstead	Land Rear Of 29 Greenstead Road, Colchester	2
251441	Greenstead	Ballantyne Drive, Colchester	1
220317	Greenstead	Gamet Bearings Site, Greenstead Road	65
240254	Lexden & Braiswick	Barn, Hall Road, West Bergholt	2
222860	Lexden & Braiswick	2Nd Floor, Hop House, West Bergholt	1
231172	Lexden & Braiswick	19 Bradbrook Cottages, West Bergholt	1
250273	Lexden & Braiswick	32 Colchester Road, West Bergholt	61
251001	Lexden & Braiswick	Hill House Farm,West Bergholt	1
201686 / 240651	Lexden & Braiswick	Land South Of West Bergholt Cricket Club	18
260014	Lexden & Braiswick	4 Bakers Lane, Colchester	1

Continued on next page

Table B.2: Committed residential sites *(continued)*

Planning reference	Location	Site name	Number of dwellings
231041	Lexden & Braiswick	Briarberry Farm, Turkey Cock Lane, Eight Ash Green	1
211604	Lexden & Braiswick	Aldham Hall Farm, Aldham	2
250944	Lexden & Braiswick	Frog Hall Cottage, Aldham	2
231258	Lexden & Braiswick	Ashington Lodge, Aldham	1
240725	Lexden & Braiswick	Grove Lodge, Highfield Drive	1
192828 / 192829	Lexden & Braiswick	Ecc Hospital, Lexden Road, Colchester	120
222429	Mile End	Myland Lodge, 301A Mile End Road	4
232814	Mile End	227 Bergholt Road, Colchester	5
150473	Mile End	Chesterwell, (Both Outlets)	661
220526	Mile End	L/A 67 Braiswick, Colchester	27
190665	Mile End	Parcel Hc1, Rugby Club, Mill Road, Colchester (Colchester Northern Gateway C2 Use)	300
190665	Mile End	Parcel Hc2, Mill Road	200
190665	Mile End	Mill Road, Land South Of Axial Way (Northern Gateway)	350
232807	New Town & Christchurch	56 Military Road, Colchester	1
231648	New Town & Christchurch	28 Alexandra Road, Colchester	1
190043	New Town & Christchurch	North Of Magdalen Street (Brook Street) , Colchester	119
260193	New Town & Christchurch	Former Lookers, Military Road, Colchester	28
250724	New Town & Christchurch	2 Creffield Road, Colchester	1
252592	New Town & Christchurch	184 Magdalen Street, Colchester	1
231297	New Town & Christchurch	Defence Support Group (Dsg), Flagstaff Road	203
251311	Old Heath & Hythe	22 Winsley Square, Old Heath	1
222731	Old Heath & Hythe	50 Abbots Road, Colchester	1
242076	Old Heath & Hythe	159 Rowhedge Road	1

Continued on next page

Table B.2: Committed residential sites *(continued)*

Planning reference	Location	Site name	Number of dwellings
251150	Old Heath & Hythe	Rowhedge Road, Colchester	75
152493 / 180694	Old Heath & Hythe	"Silverton Aggregates Site" Hawkins Road, Colcghester	37
211510	Old Heath & Hythe	Colne Quay, Land East Of Hythe Quay	111
212810	Old Heath & Hythe	Port Lane, Hythe Quay	100
192441	Old Heath & Hythe	Bridge House And Garage, Hythe Quay, Colchester	18
230380	Prettygate	179B Shrub End Road, Colchester	1
232792	Shrub End	Gosbecks View, Colchester	8
242355	Shrub End	L/A 110 Gosbecks Road, Colchester	1
250563	Shrub End	Kirton Wood, Colchester	1
250397	St Johns and St Annes	59A Parsons Heath, Colchester	1
240569	St Johns and St Annes	2 Delamere Road, Colchester	1
230347	St Johns and St Annes	313A Ipswich Road, Colchester	1
242451	St Johns and St Annes	Finch Way, Parsons Heath	1
240478	Stanway	Shaw Park, Maldon Road	1
240213	Stanway	239 London Road, Stanway	1
232295	Stanway	50 London Road, Stanway	1
250894	Stanway	Fmr Police Traffic Unit, New Farm Road	32
222548	Stanway	Fiveways Fruit Farm, Stanway	420
212507	Stanway	London Road, Stanway	600
213047	Stanway	Land West Of Lakelands, Stanway	225
200995	Stanway	Rosemary Almshouses, Stanway	27
231600	Marks Tey & Layer	L/A The Folley, Layer De La Haye(Inc Res 15)	46
250806	Marks Tey & Layer	Layer Hall Farm, Layer De La Haye (1)	4
240938	Marks Tey & Layer	Rows Farm, Church Road, Layer	2
232674	Marks Tey & Layer	Layer Hall Farm, Layer De La Haye (2)	5

Continued on next page

Table B.2: Committed residential sites *(continued)*

Planning reference	Location	Site name	Number of dwellings
232758	Marks Tey & Layer	Lynch Cottage, Birch	1
200615	Marks Tey & Layer	Park Farm, New Road, Messing	5
250988	Marks Tey & Layer	39 Jays Lane, Marks Tey	1
242454	Marks Tey & Layer	Old London Road, Marks Tey Travelllers Pitches	8
212490	Marks Tey & Layer	152 London Road, Copford	6
231732	Marks Tey & Layer	Little Badcocks Farm, Copford	5
232562	Marks Tey & Layer	Eastthorpe Road, Copford	1
212582	Marks Tey & Layer	Gt Wigborough Village Hall	1
211055	Marks Tey & Layer	South Barn, Green Farm, Salcott	1
222184	Mersea & Pyefleet	12 Goings Lane, West Mersea	1
242604	Mersea & Pyefleet	1 Firs Road, West Mersea	1
230876	Mersea & Pyefleet	Creek House, West Mersea	1
223027	Mersea & Pyefleet	68/70 Seaview Avenue, West Mersea	1
200960 / 240313	Mersea & Pyefleet	Brierley Paddocks, West Mersea	18
213234	Mersea & Pyefleet	Dawes Lane, West Mersea	58
240004	Mersea & Pyefleet	Ashlyn, East Mersea Road, West Mersea	1
242556	Mersea & Pyefleet	Meeting Lane, East Mersea	1
241045	Mersea & Pyefleet	Northlands Farm, East Mersea	1
210898	Mersea & Pyefleet	Pyefleet Quay, East Road, East Mersea	1
200631/2	Mersea & Pyefleet	Mersea Road, Peldon	1
250962	Mersea & Pyefleet	Mayford, Peldon	1

Continued on next page

Table B.2: Committed residential sites *(continued)*

Planning reference	Location	Site name	Number of dwellings
231735	Mersea & Pyefleet	Oxley House, Mersea Road, Abberton (1)	1
222355	Mersea & Pyefleet	Oxley House, Mersea Road, Abberton (2)	5
242188	Mersea & Pyefleet	Ashpark House, Peldon Road, Abberton	4
252183	Mersea & Pyefleet	The Gate House, Abberton	1
213531	Mersea & Pyefleet	Borleys, Peldon Road, Abberton	5
221299	Mersea & Pyefleet	The Wheelwright, Fingringhoe	1
231083	Mersea & Pyefleet	Chapel House, Fingringhoe	1
231558	Mersea & Pyefleet	Ballast Quay Road, Fingringhoe	1
231667	Mersea & Pyefleet	11 Church Green, Fingringhoe	1
223032	Mersea & Pyefleet	Prior House, Fingringhoe	1
222973	Rural North	Noakes Farm, Straight Road, Boxted	2
232089	Rural North	Jasmine, Boxted Road, Colchester	2
251108	Rural North	Walnut Tree Cottage, Straight Road	1
231117	Rural North	Langham Road, Boxted	3
230625 / 251595	Rural North	The Manor, Nayland Road, Great Horkesley	100
231338	Rural North	London Road, Great Horkesley	5
250436	Rural North	Coach Road Nursery, Great Horkesley	2
242553	Rural North	Holly Lane, Great Horkesley	1
252469	Rural North	The Crescent, Great Horkesley	1
231236	Rural North	Ivy Lodge Road, Great Horkesley	2
241853	Rural North	Laburnums, Great Horkesley	1
221510	Rural North	Wick Road/Park Lane, Langham	12
220595	Rural North	School Road (West), Langham	30
241765	Rural North	Langham Lodge, Langham	1
250320	Rural North	Nightingale Hill, Langham	7
240238	Rural North	Springfield Farm, Langham	3
191830	Rural North	School Road (East), Langham	31

Continued on next page

Table B.2: Committed residential sites *(continued)*

Planning reference	Location	Site name	Number of dwellings
240457	Rural North	Shakespear House, Dedham	1
TBC	Rural North	Fordham Rural Exception Site	10
240242	Rural North	Kenmore Lodge, Fordham	1
232639	Rural North	Top Cottage, Fordham	1
232863	Rural North	Ponders Farm, Fordham	1
242456 / 242457	Rural North	Barn 1 & 2 Chapel Farm, Fordham	2
242223 / 251746	Rural North	Burnt House Farm Barn, Wakes Colne	1
232839	Rural North	Loveneys, Wakes Colne	1
242298	Rural North	Rowneys Farm, Wakes Colne	2
222261	Rural North	Hushwing Farm, Mount Bures Road, Wakes Colne	1
241600	Rural North	Dowling Road, Mount Bures	1
242081	Rural North	Broom House Farm, Chappel	4
231153	Rural North	Greenfield Drive/New Barn Road, Great Tey	30
231342	Rural North	Baldwins Farm, Great Tey	1
190647	Tiptree	L/A The Gables, Kelvedon Road, Tiptree	91
231574	Tiptree	3 Station Road, Tiptree	1
232838	Tiptree	The Maypole, Tiptree	1
241378	Tiptree	Former Lloyds Bank, Church Road, Tiptree	6
231368	Tiptree	Elms Farm, Messing Road	200
TBC	Tiptree	Highland Nursery, Tiptree	200
231243	Wivenhoe	Broadfields, Wivenhoe	81
241152	Wivenhoe	Land Between 49 Park Road And High Street	1
242191	Wivenhoe	Grovesnor House, Wivenhoe	7
213515	Wivenhoe	Land North Of Elmstead Road, Wivenhoe	25
240409	Wivenhoe	Crocquet Gardens, Wivenhoe	25
213507	Wivenhoe	Land Rear Fire Station, Colchester Road, Wivenhoe	80
		Total	**5327**

B.3 Committed employment site allocations

In the reference case, employment growth has been estimated using National Trip End Model (NTEM).

C New local plan allocations

C.1 Residential site allocations

Table C.1: New local plan residential allocations

Policy reference	Location	Site name	Number of dwellings
PP55	Berechurch	L/A Lethe Grove, Colchester	75
PP10	Berechurch	Land South Of Berechurch Hall Road Inc Land East Of Layer Road	875
PP54	Castle	Land At Sheepen Place, Colchester	100
PP52	Castle	Guildford Road Bt Site, Colchester	25
PP50	Castle	Cowdray Avenue Bt Site, Colchester	40
PP51	Castle	Fmr Land Rover Site, Cowdray Avenue	25
PP11	Castle	Europit Garage & Surrounding Land , 177 - 192 Magdalen Street, Colchester	40
PP2	Castle	Vineyard Gate, Colchester	100
PP12	Castle	Robertson Van Hire, Magdalen Street	6
PP13	Castle	Land North Of Magdalen Street, Colchester	15
PP3	Castle	Runwald Street Car Park, Colchester	40
PP1	Castle	Brittania Car Park, Colchester	100
PP42	Lexden & Braiswick	Land At White Hart Lane, West Bergholt	185
PP43	Lexden & Braiswick	Land North Of Colchester Road, West Bergholt	185
PP7	Lexden & Braiswick	Land Off Bakers Lane, Colchester	120
251310 (PP32)	Lexden & Braiswick	Foxes Corner/Halstead Road, Eight Ash Green	250
PP32a	Lexden & Braiswick	Land South Of Halstead Road, Eight Ash Green	250
PP45	Lexden & Braiswick	New Road, Aldham	15
PP5	Mile End	Land At Chesterwell/ Golf Club	50
PP6	Mile End	Land At Colchester Station	250
PP53	Mile End	Chapmans Farm, Nayland Road	35
PP4	Mile End	Land At Braiswick	30
OA3	New Town & Christchurch	Magdalen Street Oa3, Colchester	100
PP15	Old Heath & Hythe	Land West Of Hawkins Road, Hythe	50

Continued on next page

Table C.1: New local plan residential allocations *(continued)*

Policy reference	Location	Site name	Number of dwellings
PP14	Old Heath & Hythe	Scrapyard Site And Gas Works Site Hythe Quay, Colchester	200
OA1	Old Heath & Hythe	King Edward Quay Coldoc Site And Codoc 2, Hythe, Colchester	200
OA2	Old Heath & Hythe	Land East Of Hawkins Road, Hythe	150
PP9	St Johns and St Annes	North East Colchester	2000
PP8	Stanway	Land Off Lakeland Crescent	5
PP39	Marks Tey & Layer	The Furze, Layer De La Haye	10
PP40a	Marks Tey & Layer	Maltings Green Road, Layer De La Haye	30
PP40	Marks Tey & Layer	Land West Of The Folley, Layer De La Haye	75
PP46	Marks Tey & Layer	Birch Green , Birch	15
PP48	Marks Tey & Layer	Kelvedon Road, Messing	25
PP17	Marks Tey & Layer	Land South Of Marks Tey Village	1500
PP18	Marks Tey & Layer	Land North Of A120	880
PP18	Marks Tey & Layer	Dandara Site North Of A120	120
PP29c	Marks Tey & Layer	East Of Queensberry Avenue, Copford	70
PP29a	Marks Tey & Layer	Land East Of School Road, Copford (North)	300
PP29b	Marks Tey & Layer	Land East Of School Road, Copford (South)	50
213234	Mersea & Pyefleet	Dawes Lane, West Mersea	300
PP49a	Mersea & Pyefleet	Land South Of Mersea Road, Peldon	25
PP49b	Mersea & Pyefleet	Land West Of Maltings Road, Peldon	5
213530	Mersea & Pyefleet	Land West Of Peldon Road, Abberton	50
PP25	Mersea & Pyefleet	View Park, Abberton And Langenhoe	50

Continued on next page

Table C.1: New local plan residential allocations *(continued)*

Policy reference	Location	Site name	Number of dwellings
PP47	Mersea & Pyefleet	Land At Picketts Farm, Fingringhoe	5
PP41	Rowhedge	Rowhedge Business Centre	50
PP26	Rural North	Land North Straight Road, Boxted	150
PP34	Rural North	Land North Coach Road, Great Horkesley	800
PP35	Rural North	The Old School, Great Horkesley	13
PP38	Rural North	Wick Road, Langham	10
PP37	Rural North	Land North Park Lane, Langham	850
PP30	Rural North	Land South Of Long Road, Dedham	15
PP33	Rural North	Plummers Road, Fordham	25
PP28	Rural North	Land West Of Station Road Wakes Colne	200
PP27	Rural North	Swan Grove, Chappel	35
PP36	Rural North	Earls Colne Road, Great Tey	150
PP36a	Rural North	Land East Of Brook Road, Great Tey	50
PP20	Tiptree	Land At Bonnie Blue Oak	30
PP22	Tiptree	Former Telephone Exchange, Tiptree	5
PP22B	Tiptree	New Park Cottage, Maypole Road, Tiptree	25
PP19	Tiptree	Land North Of Oak Road, Tiptree	650
PP21	Tiptree	Highlands, Tiptree	10
PP24	Wivenhoe	Land North West Of The Fire Station	200
		TOTAL	**12 294**

C.2 Employment site allocations

Note that the employment allocations at preferred site allocations have been derived from information provided by Colchester City Council (CCC). The estimated floor area leads to the creation of about 11,000 jobs in order that one job is created for each home built, which is the intention of the local plan. This calculation was required, in order that trip demand could be estimated, to input into the transport model North Essex Model (NEMo). The total floor area is consistent with the total floor area in the preferred allocations. However, the allocation of this floor space between employment land use classes and individual sites (apart from those sites which are carried forward from the adopted local plan) has needed to be assumed. While the assumptions are reasonable, land use class and floor area are expected to differ in reality.

Table C.2: New local plan employment allocations

Policy reference	Policy site	Location	Land use class	Estimated net internal floor area (m^2)	Estimated number of jobs
OA4	Northern Gateway	(North) Colchester	A1/A3	5750	319
OA4	Northern Gateway	(North) Colchester	D1	5750	160
OA4	Northern Gateway	(North) Colchester	D2	5750	77
PEP1	Colchester Business Park	(North) Colchester	B1a/b	6000	500
PEP1	Colchester Business Park	(North) Colchester	B2	6000	167
PEP1	Colchester Business Park	(North) Colchester	B8	6000	86
PEP2	Knowledge Gateway	(East) Colchester	B1a/b	45 000	3750
PEP4	Land North of Maldon Road	(West) Colchester	B2	5250	146
PEP5	Land South of A12	Marks Tey	B1a/b	40 000	3333
PEP5	Land South of A12	Marks Tey	B2	40 000	1111
PEP5	Land South of A12	Marks Tey	B8	40 000	571
PEP6	Anderson Site	Marks Tey	B1a/b	8000	667
PEP6	Anderson Site	Marks Tey	B2	8000	222
PEP6	Anderson Site	Marks Tey	B8	8000	114
PEP7	Highlands Nursery	Tiptree	B1a/b	2750	229
PEP7	Highlands Nursery	Tiptree	B2	2750	76
PEP7	Highlands Nursery	Tiptree	B8	2750	39
PEP8	Land South of Factory Hill	Tiptree	B1a/b	11 750	979
PEP8	Land South of Factory Hill	Tiptree	B2	11 750	326
PEP8	Land South of Factory Hill	Tiptree	B8	11 750	168
PEP9	Bullbanks Farm	Eight Ash Green	B1a/b	2000	167
PEP9	Bullbanks Farm	Eight Ash Green	B2	2000	56
PEP9	Bullbanks Farm	Eight Ash Green	B8	2000	29
PEP10	Land at Lodge Lane	Langham	B1a/b	2500	208
PEP10	Land at Lodge Lane	Langham	B2	2500	69
PEP10	Land at Lodge Lane	Langham	B8	2500	36
PEP11	Land at Pattens Yard	West Bergholt	B1a/b	5000	417
PEP11	Land at Pattens Yard	West Bergholt	B2	5000	139
PEP11	Land at Pattens Yard	West Bergholt	B8	5000	71
PEP12	Land at Wakes Hall Business Centre	Wakes Colne	B1a/b	2250	188

Continued on next page

Table C.2: New local plan employment allocations *(continued)*

Policy reference	Policy site	Location	Land use class	Estimated net internal floor area (m^2)	Estimated number of jobs
PEP12	Land at Wakes Hall Business Centre	Wakes Colne	B2	2250	63
PEP12	Land at Wakes Hall Business Centre	Wakes Colne	B8	2250	32
PEP13	Coal Yard Site	(East) Colchester	B1a/b	2250	188
PEP13	Coal Yard Site	(East) Colchester	B2	2250	63
PEP13	Coal Yard Site	(East) Colchester	B8	2250	32
PEP14	Land South of Flakt Wood	(North) Colchester	B1a/b	2750	229
PEP14	Land South of Flakt Wood	(North) Colchester	B2	2750	76
PEP14	Land South of Flakt Wood	(North) Colchester	B8	2750	39
PEP15	Mill Race Nursery	Aldham	B1a/b	3667	306
PEP15	Mill Race Nursery	Aldham	A1/A3	3667	204
PEP15	Mill Race Nursery	Aldham	A1/A3	3667	204
PEP16	Land South of Tower Business Park	Tiptree	B1a/b	1250	104
PEP16	Land South of Tower Business Park	Tiptree	B2	1250	35
PEP16	Land South of Tower Business Park	Tiptree	B8	1250	18
			TOTALS	**338 000**	**16 011**

D Strategic model plots

Introduction

This appendix brings together flow difference, relative queue and speed plots from the 2043 NEMo reference and assessment case AM and PM models. They have been grouped by plot type and time period to facilitate comparison between scenarios. The key assumptions in the scenarios are summarised in Table 2.1:

- Scenario 1 – 2043 reference case demand with only committed mitigation
- Scenario 2 – 2043 assessment case without mitigation and with business as usual (BaU) demand
- Scenario 3 – 2043 assessment case with mitigation and BaU demand
- Scenario 4 – 2043 assessment case with mitigation and sustainable transport (ST) demand.

D.1 AM flow, speed queue plots

D.1.1 Summary of impact in the AM

Table D.1: AM movement index scores for 2023 base and 2043 Scenarios 1-4

Sector	Location	AM Peak Impact				
		2023 Base	2043 S1 RC	2043 S2 BAU	2043 S3 BAU Mit	2043 S4 BAU Mit ST
Central	N Station rdbt, Station Way, A134 Westway and Balkerne Hill	14	13	14	9	8
	Ipswich Road, East Street, East Hill and Harwich Road	11	11	12	10	9
East	Greenstead Roundabout, Colne Causeway and Clingoe Hill	9	15	15	14	12
	Colchester Road to Wivenhoe	7	15	15	8	9
West	A12 J26/J27 to London Rd , Lexden Road, Cymbeline Way and Colne Bank Rbt, London Rd	6	12	12	9	9
	A12 J25 / A120 (western)	5	6	11	8	8
North	Northern Approach Road, Via Urbis Romane, Mill Road & A12 J28	9	9	10	9	9
	A12 J29 / A120 (eastern)	7	12	12	8	8
Outer	Tiptree	3	4	4	4	4
	Aldham	3	3	3	3	3
	A12 J20-25	6	8	8	8	8
Overall assessement combining all areas		8	11	11	9	9

Key to movement scale and acceptability of change

More or less free flow			Travelling slower			Moderate congestion			Substantial congestion		
1	2	3	4	5	6	7	8	9	10	11	12
Extreme congestion			Acceptability of change								
13	14	15	Passable ✓			Caution !			Unsatisfactory ✗		

D.1.2 AM flow difference plots

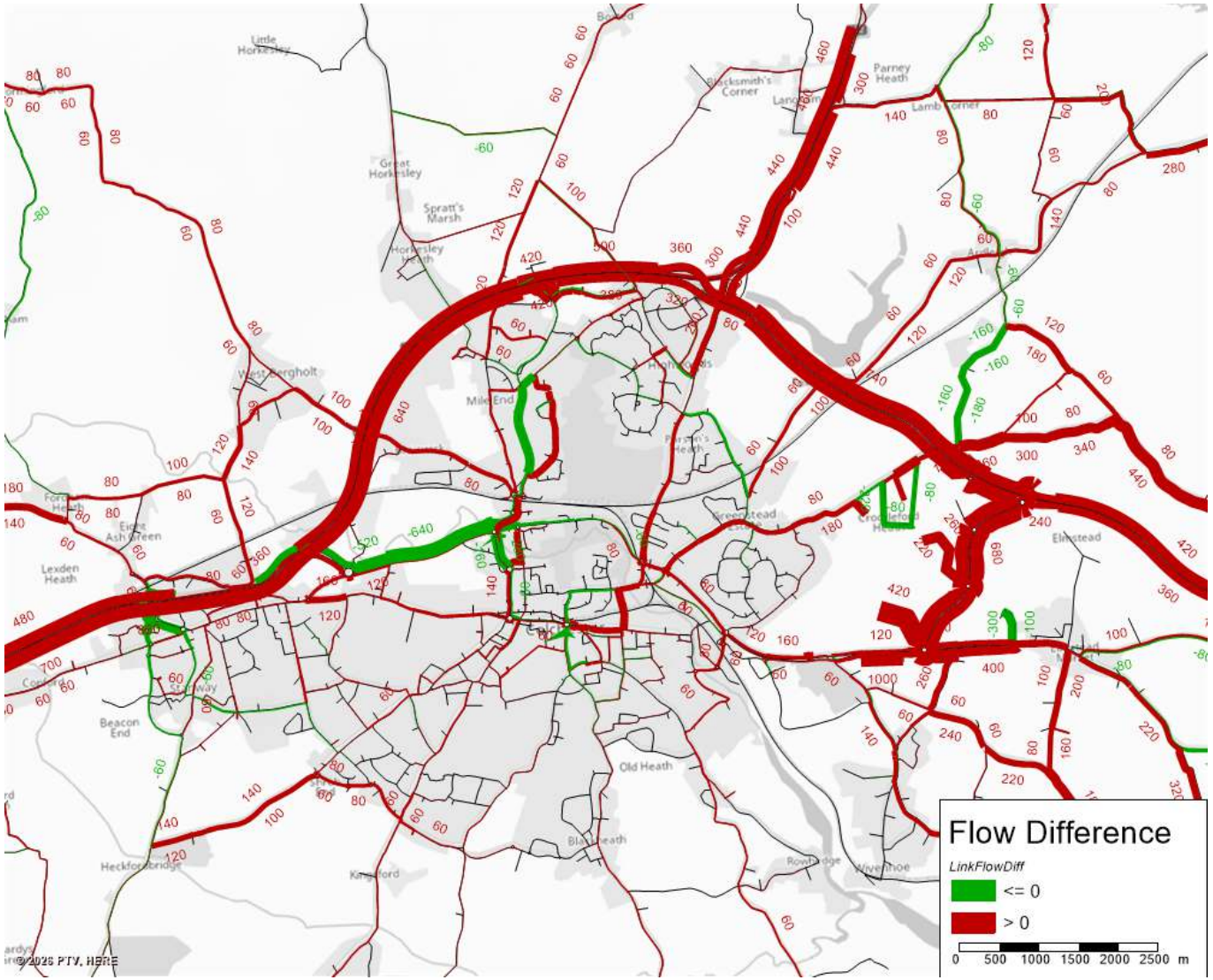

Figure D.1: AM flow difference – Scenario 1 2043 reference v 2023 base

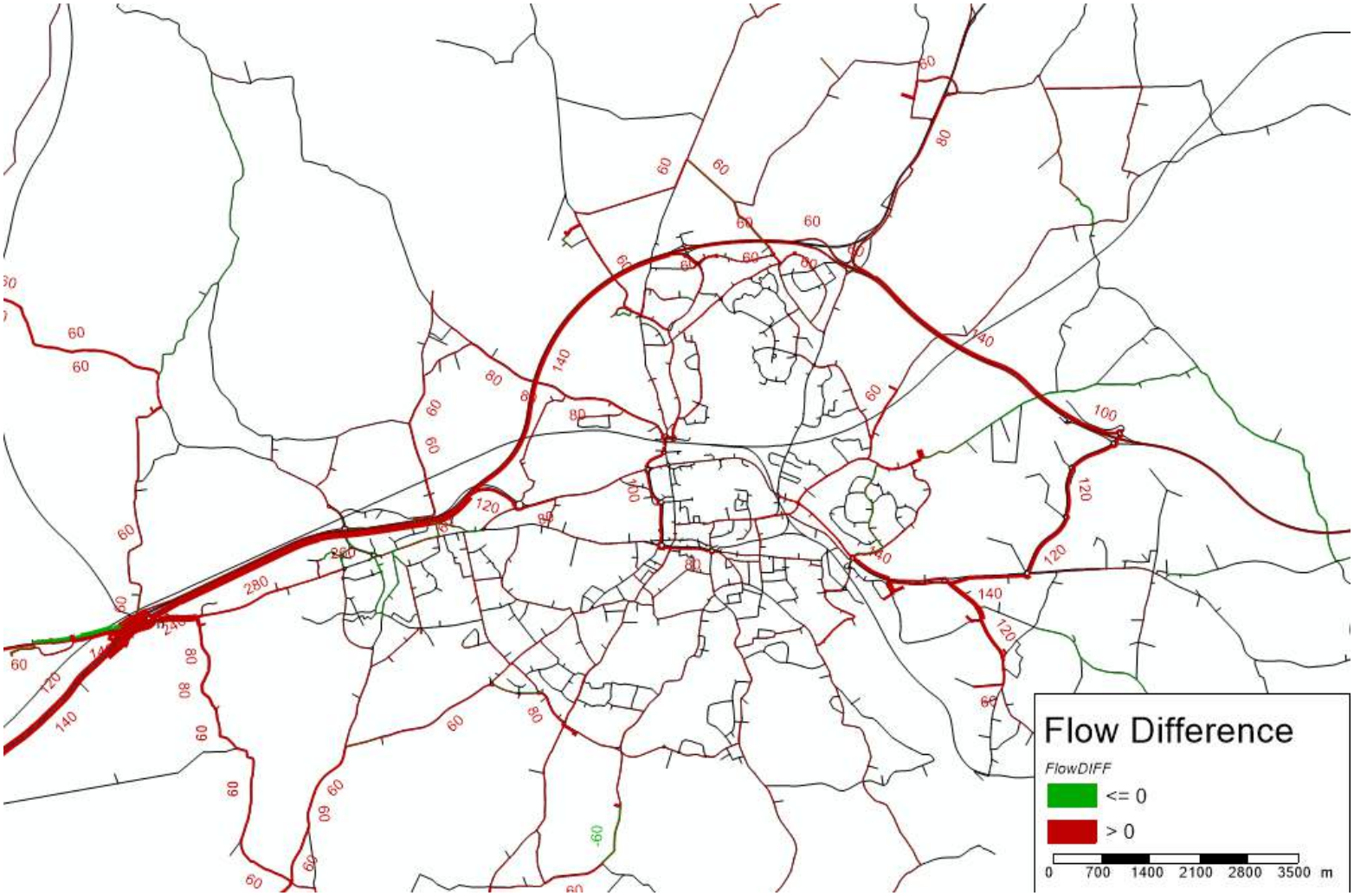

Figure D.2: AM flow difference – Scenario 2 2043 unmitigated assessment v Scenario 1 2043 reference

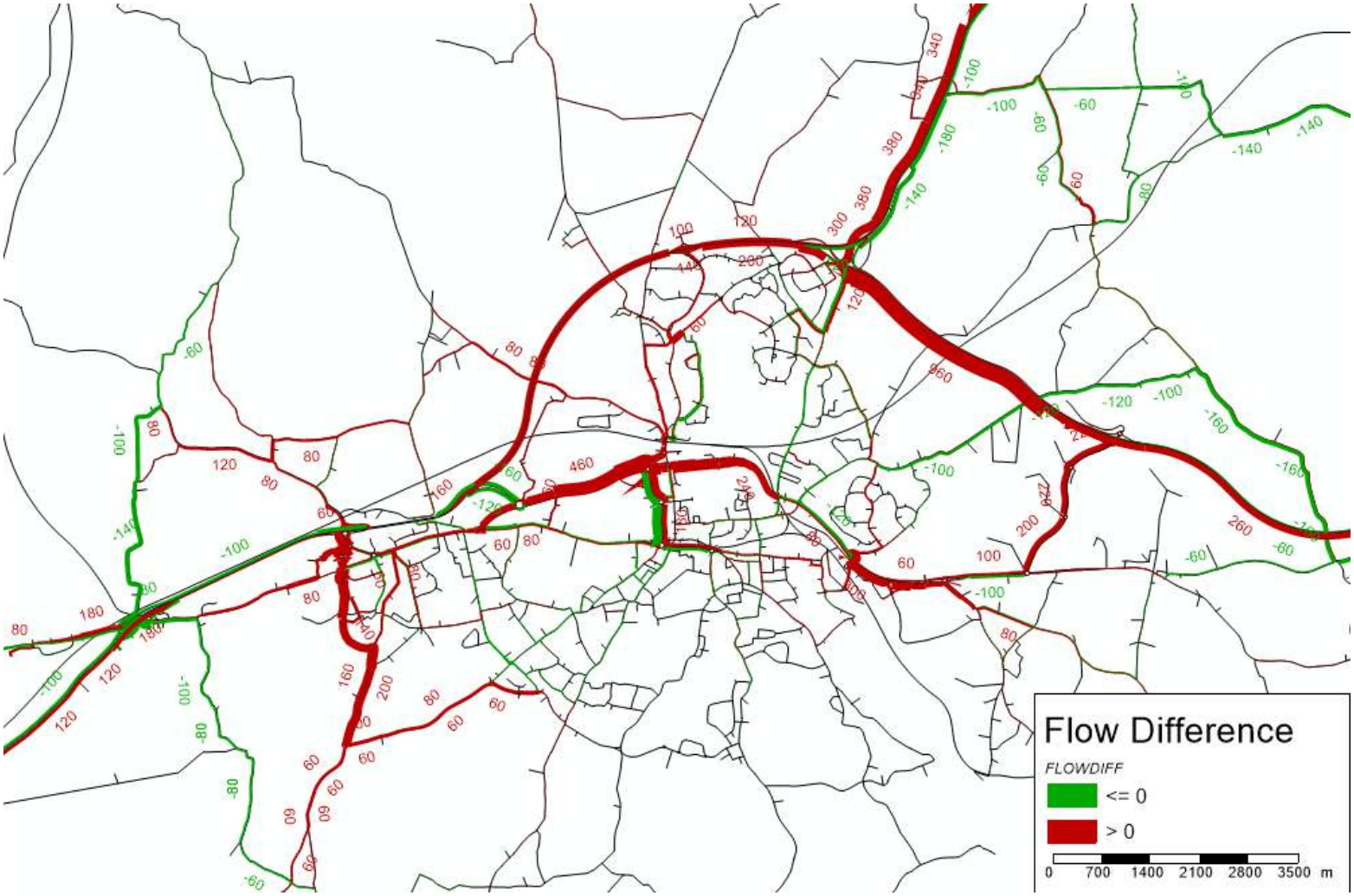

Figure D.3: AM flow difference – Scenario 3 2043 BaU mitigated assessment v Scenario 2 2043 unmitigated assessment

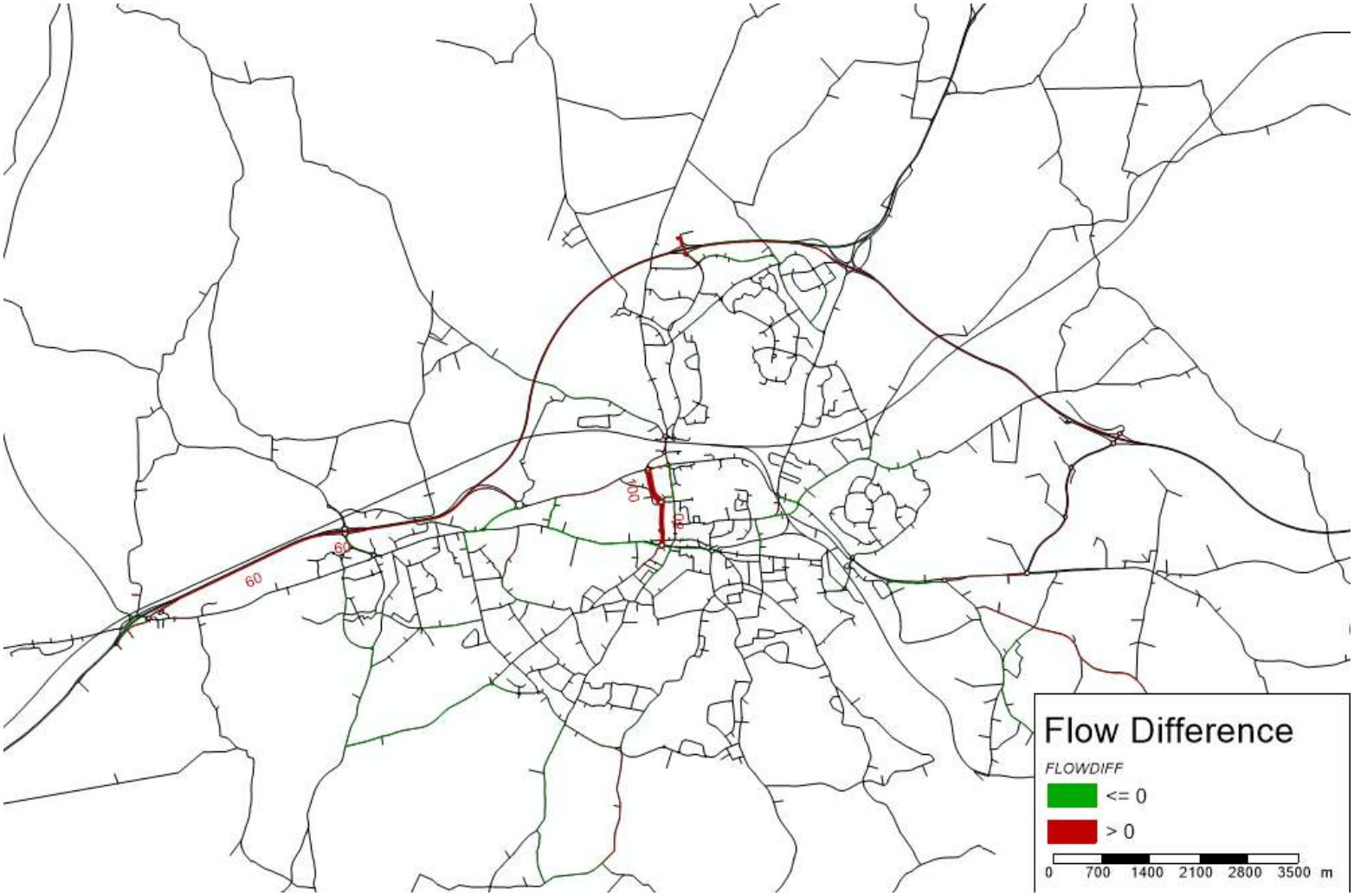

Figure D.4: AM flow difference – Scenario 4 2043 ST mitigated assessment v Scenario 3 2043 BaU mitigated assessment

D.1.3 AM speed plots (modelled speed / free flow speed)

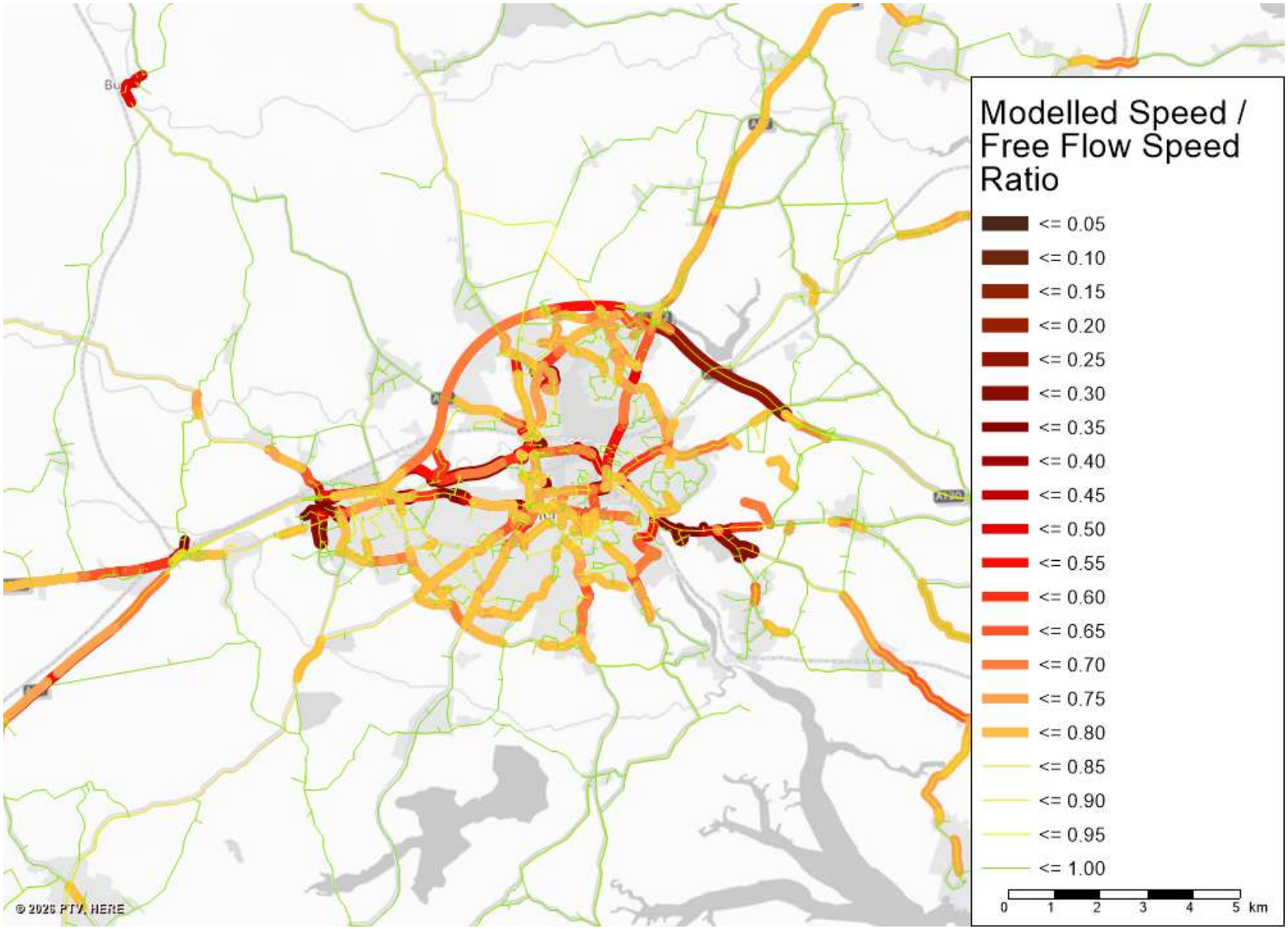

Figure D.5: AM speed ratio – Scenario 1 2043 reference

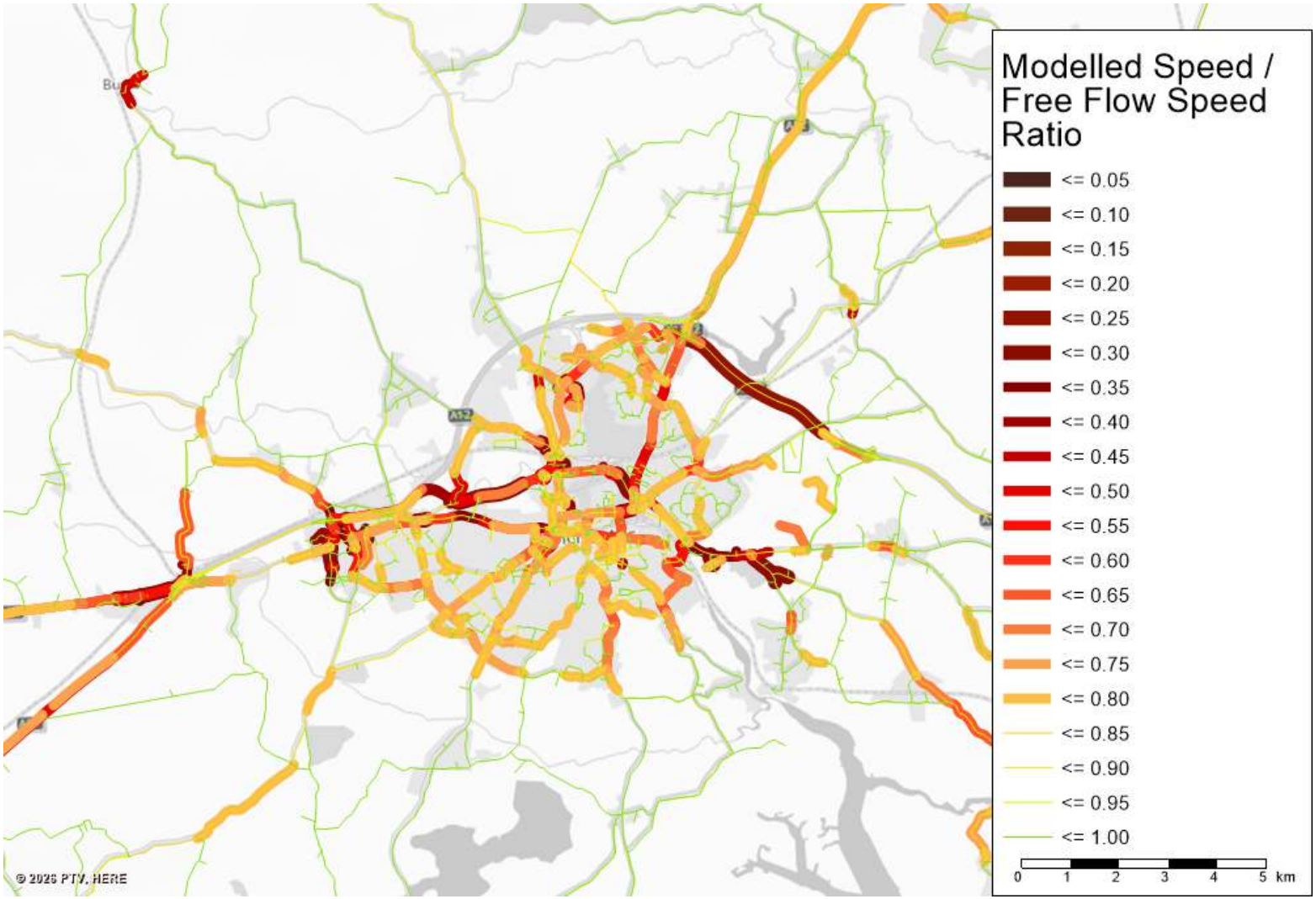

Figure D.6: AM speed ratio – Scenario 2 2043 unmitigated assessment

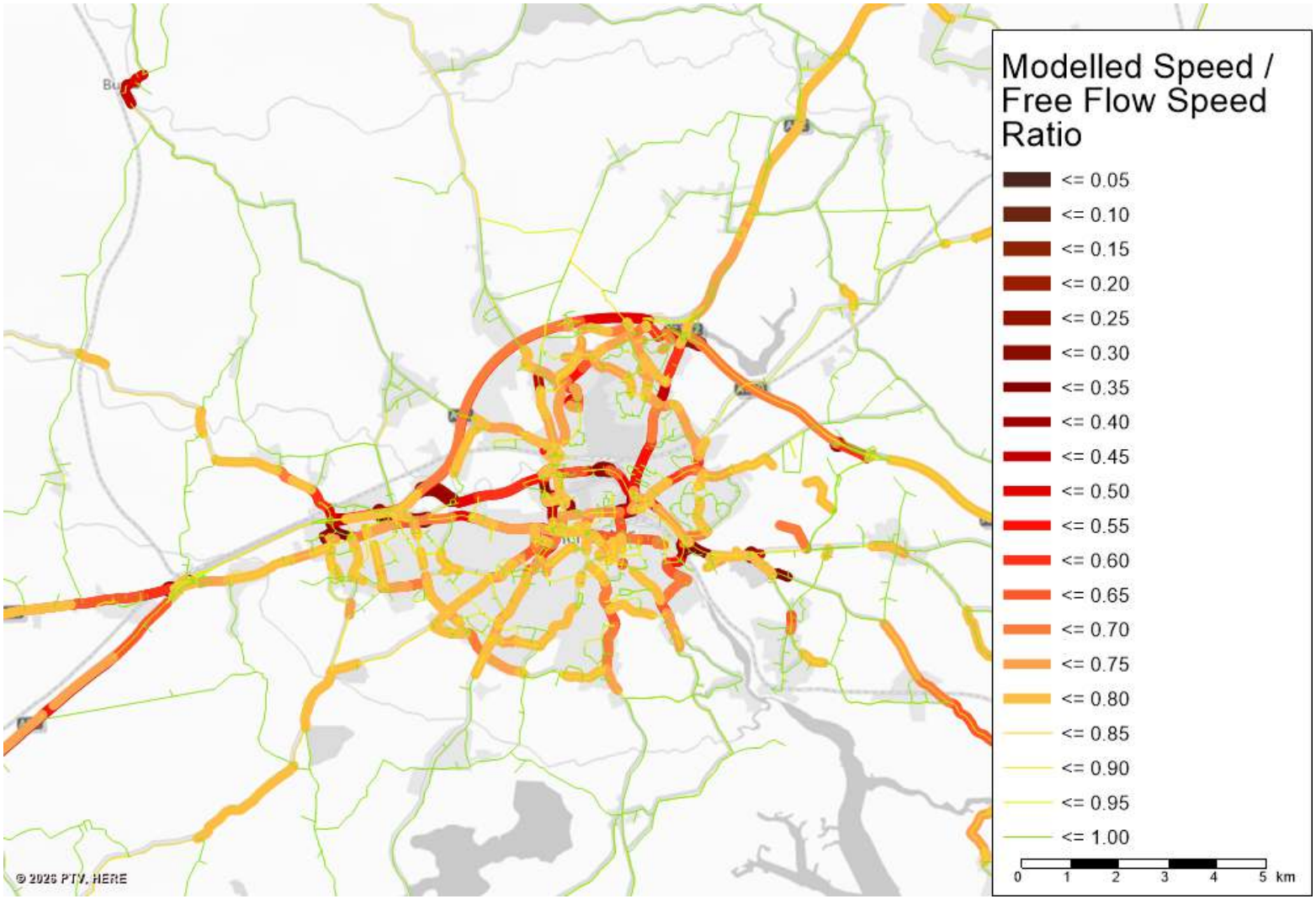

Figure D.7: AM speed ratio – Scenario 3 2043 BaU mitigated assessment

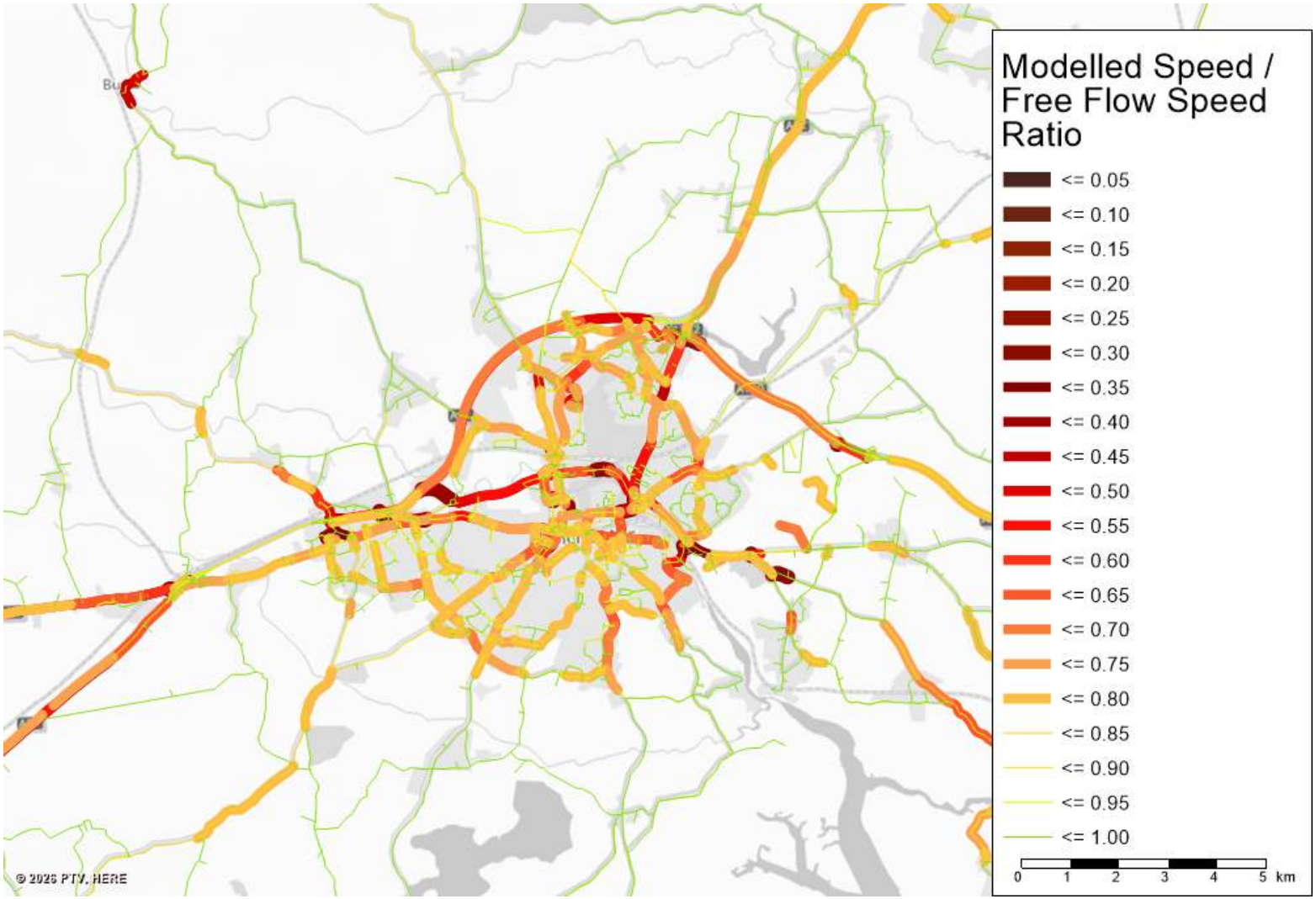

Figure D.8: AM speed ratio – Scenario 4 2043 ST mitigated assessment

D.1.4 AM relative queue plots (blocking back on road links in the model)

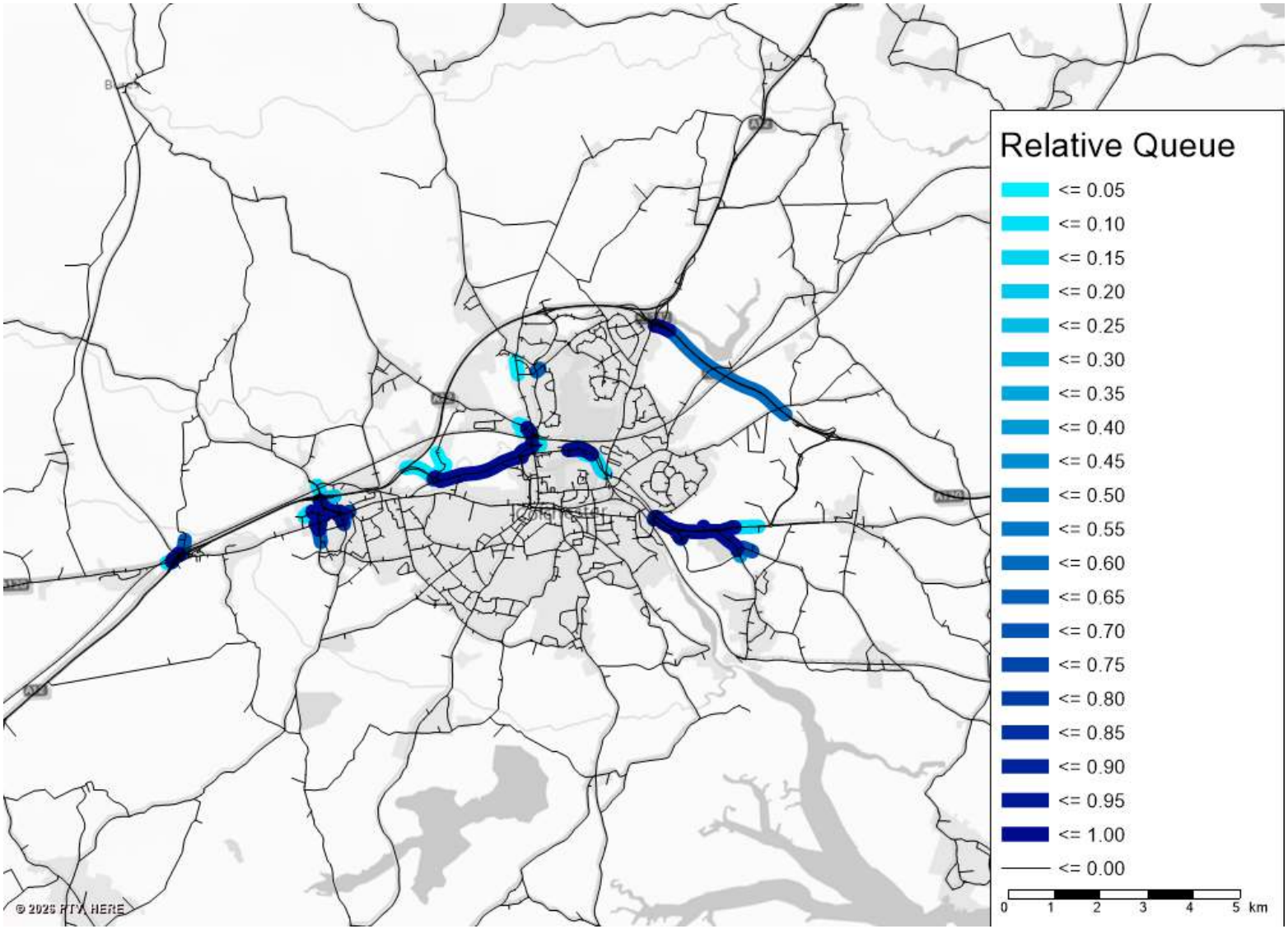

Figure D.9: AM relative queue – Scenario 1 2043 reference

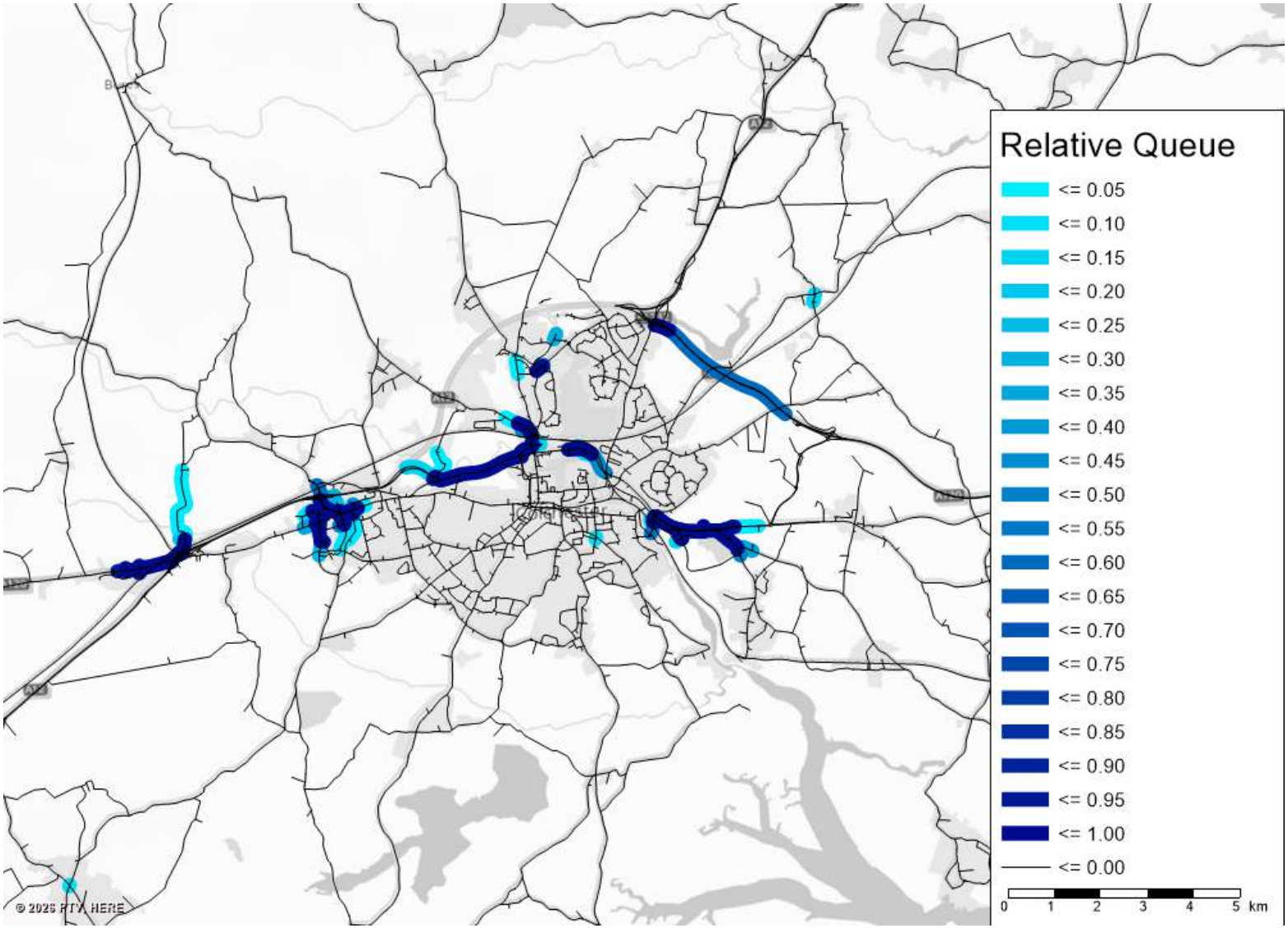

Figure D.10: AM relative queue – Scenario 2 2043 unmitigated assessment

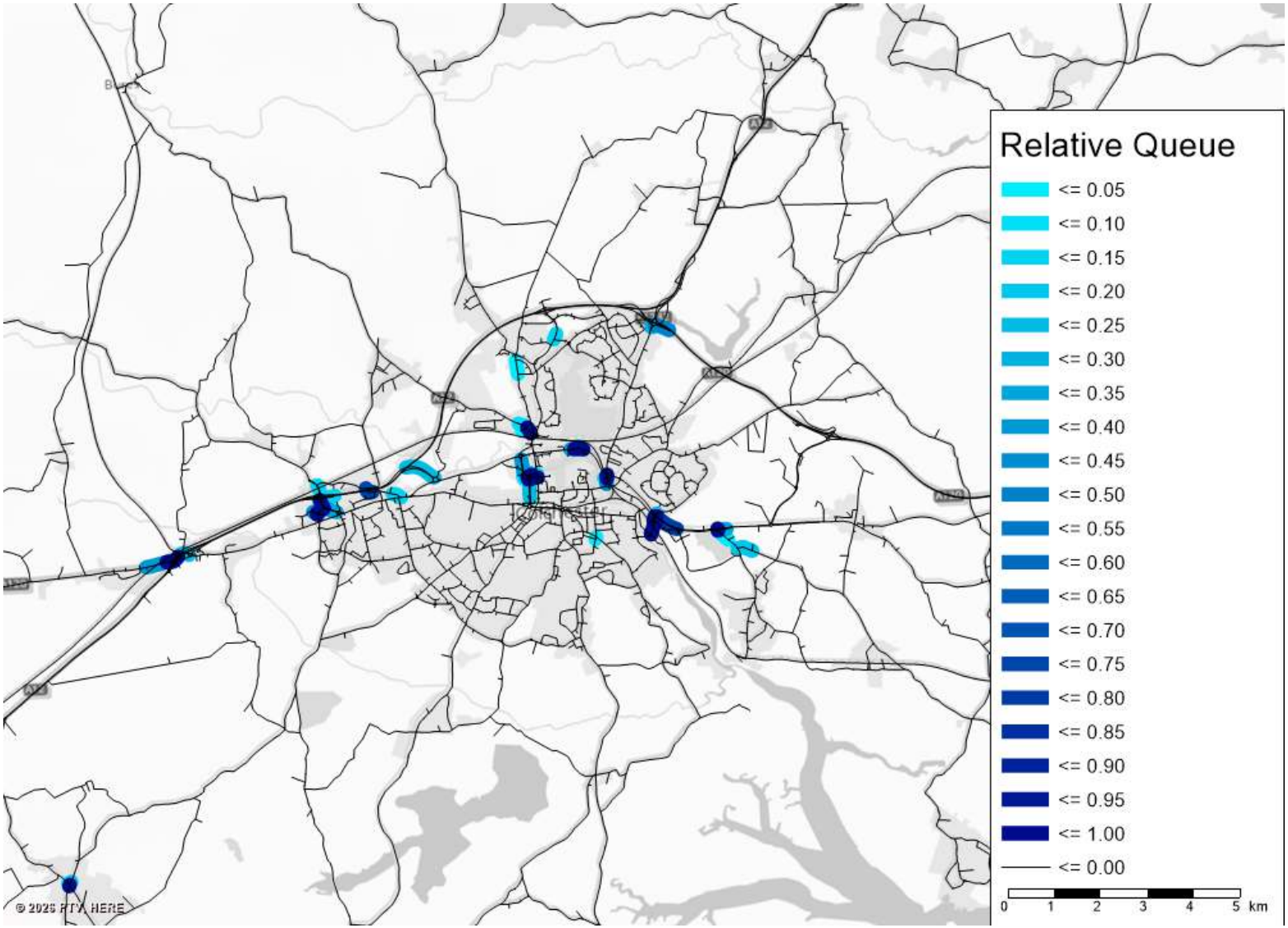

Figure D.11: AM relative queue – Scenario 3 2043 BaU mitigated assessment

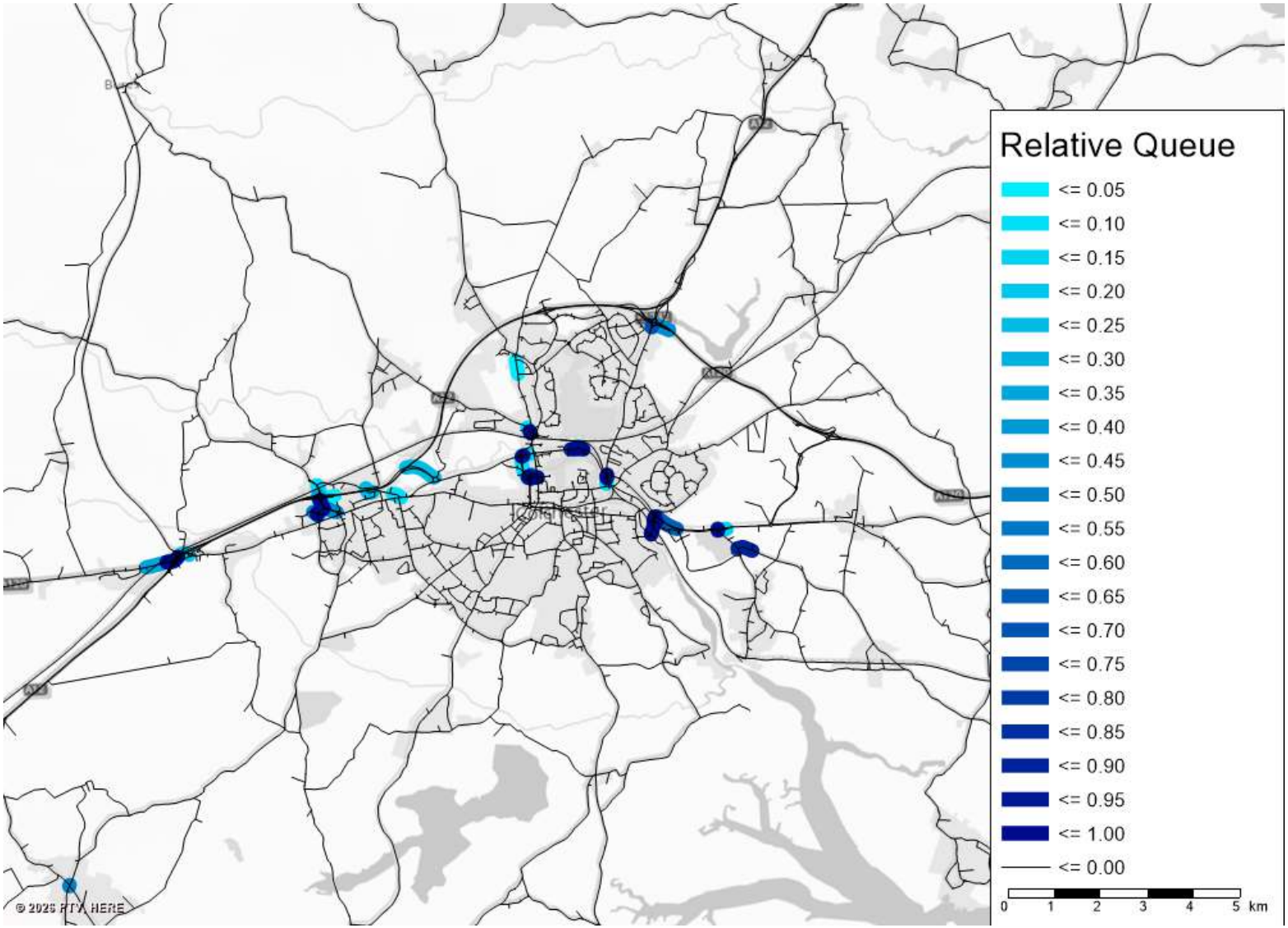

Figure D.12: AM relative queue – Scenario 4 2043 ST mitigated assessment

D.2 PM flow difference, speed and queue plots

D.2.1 Summary of impact in the PM

Table D.2: PM peak movement index scores for 2023 base and 2043 Scenarios 1-4

Sector	Location	PM Peak Impact				
		2023 Base	2043 S1 RC	2043 S2 BAU	2043 S3 BAU Mit	2043 S4 BAU Mit ST
Central	N Station rdbt, Station Way, A134 Westway and Balkerne Hill	8	12	14	9	8
	Ipswich Road, East Street, East Hill and Harwich Road	11	10	11	10	10
East	Greenstead Roundabout, Colne Causeway and Clingoe Hill	11	15	15	11	10
	Colchester Road to Wivenhoe	7	8	8	8	8
West	A12 J26/J27 to London Rd , Lexden Road, Cymbeline Way and Colne Bank Rbt, London Rd	5	9	10	8	8
	A12 J25 / A120 (western)	5	5	6	6	6
North	Northern Approach Road, Via Urbis Romane, Mill Road & A12 J28	8	12	15	10	10
	A12 J29 / A120 (eastern)	7	9	10	8	8
Outer	Tiptree	3	3	4	4	4
	Aldham	3	3	3	3	3
	A12 J20-25	5	7	7	7	7
Overall assessement combining all areas		7	9	10	8	8

Key to movement scale and acceptability of change

More or less free flow			Travelling slower			Moderate congestion			Substantial congestion		
1	2	3	4	5	6	7	8	9	10	11	12
Extreme congestion			Acceptability of change								
13	14	15	Passable ✓			Caution !			Unsatisfactory ✗		

D.2.2 PM flow difference plots

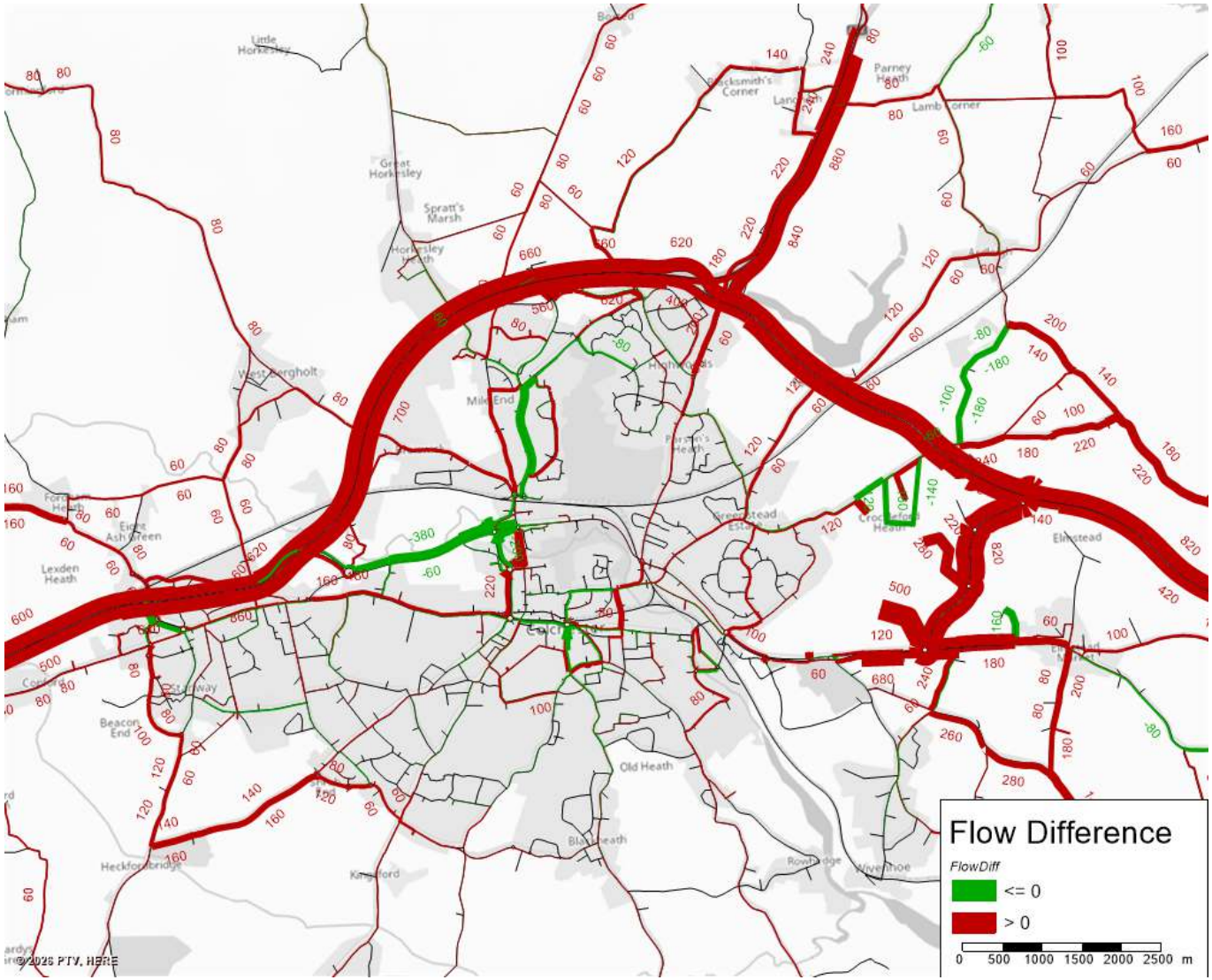

Figure D.13: PM flow difference – Scenario 1 2043 reference v 2023 base

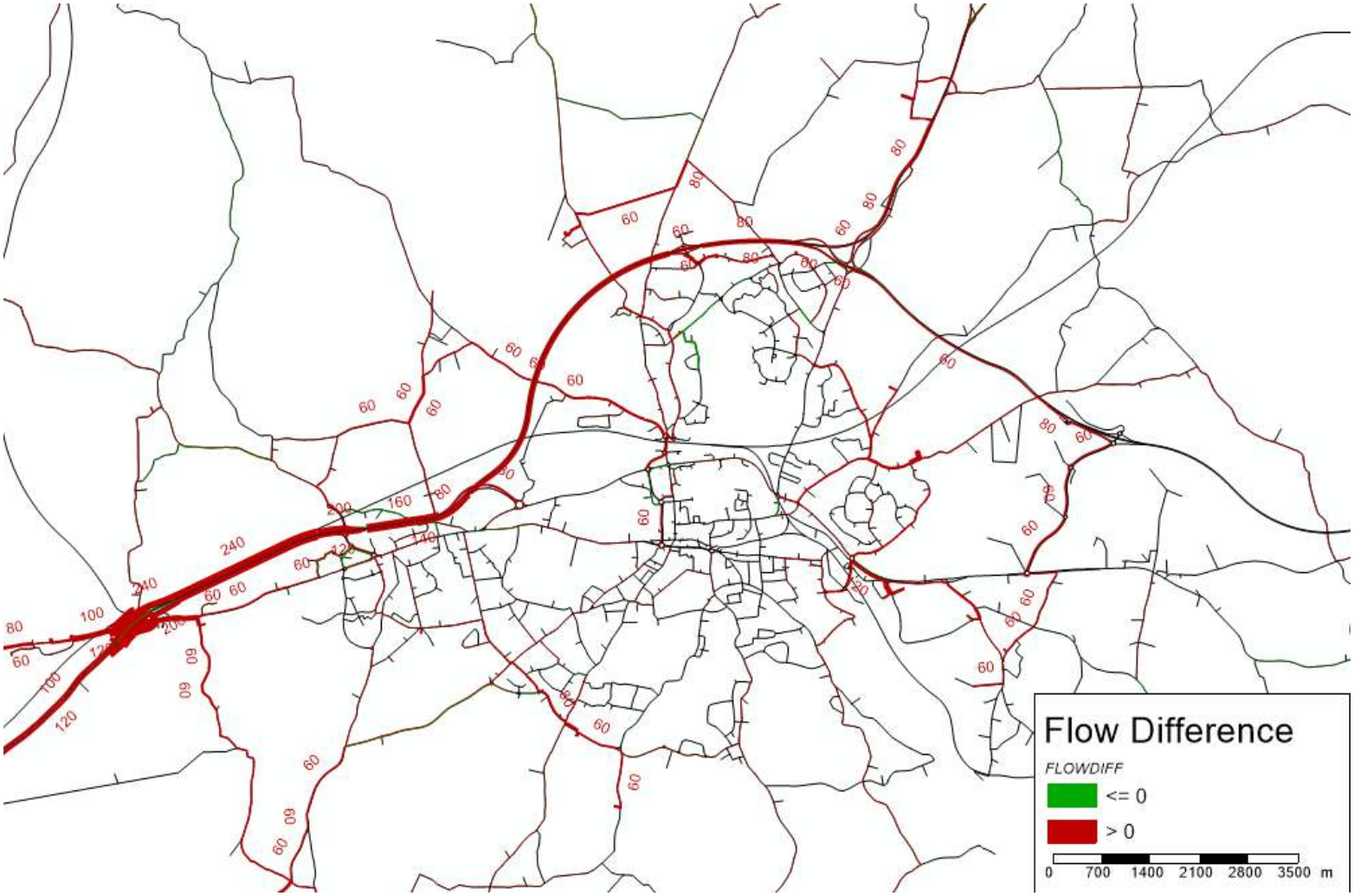

Figure D.14: PM flow difference – Scenario 2 2043 unmitigated assessment v Scenario 1 2043 reference

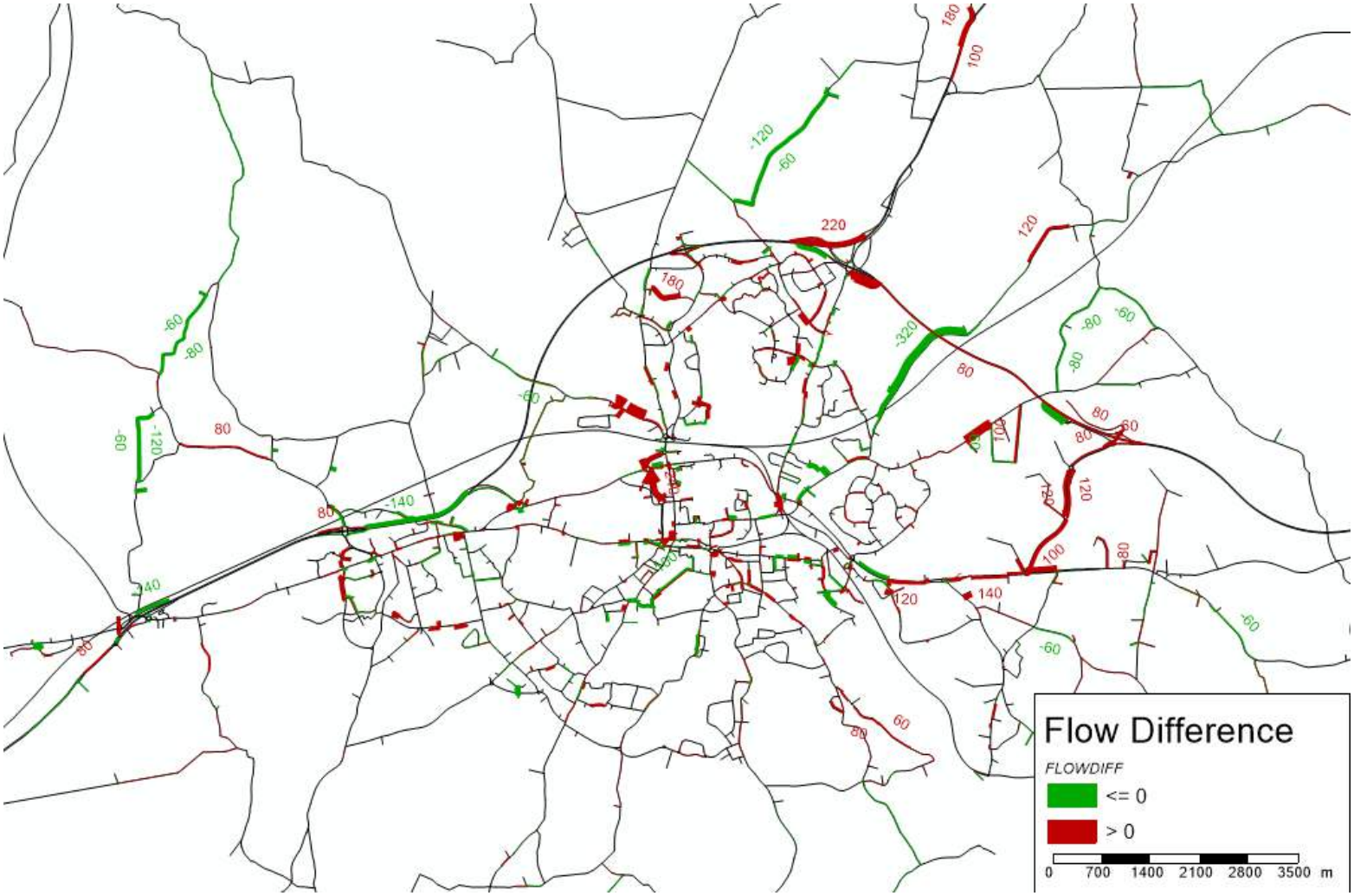

Figure D.15: PM flow difference – Scenario 3 2043 BaU mitigated assessment v Scenario 2 2043 unmitigated assessment

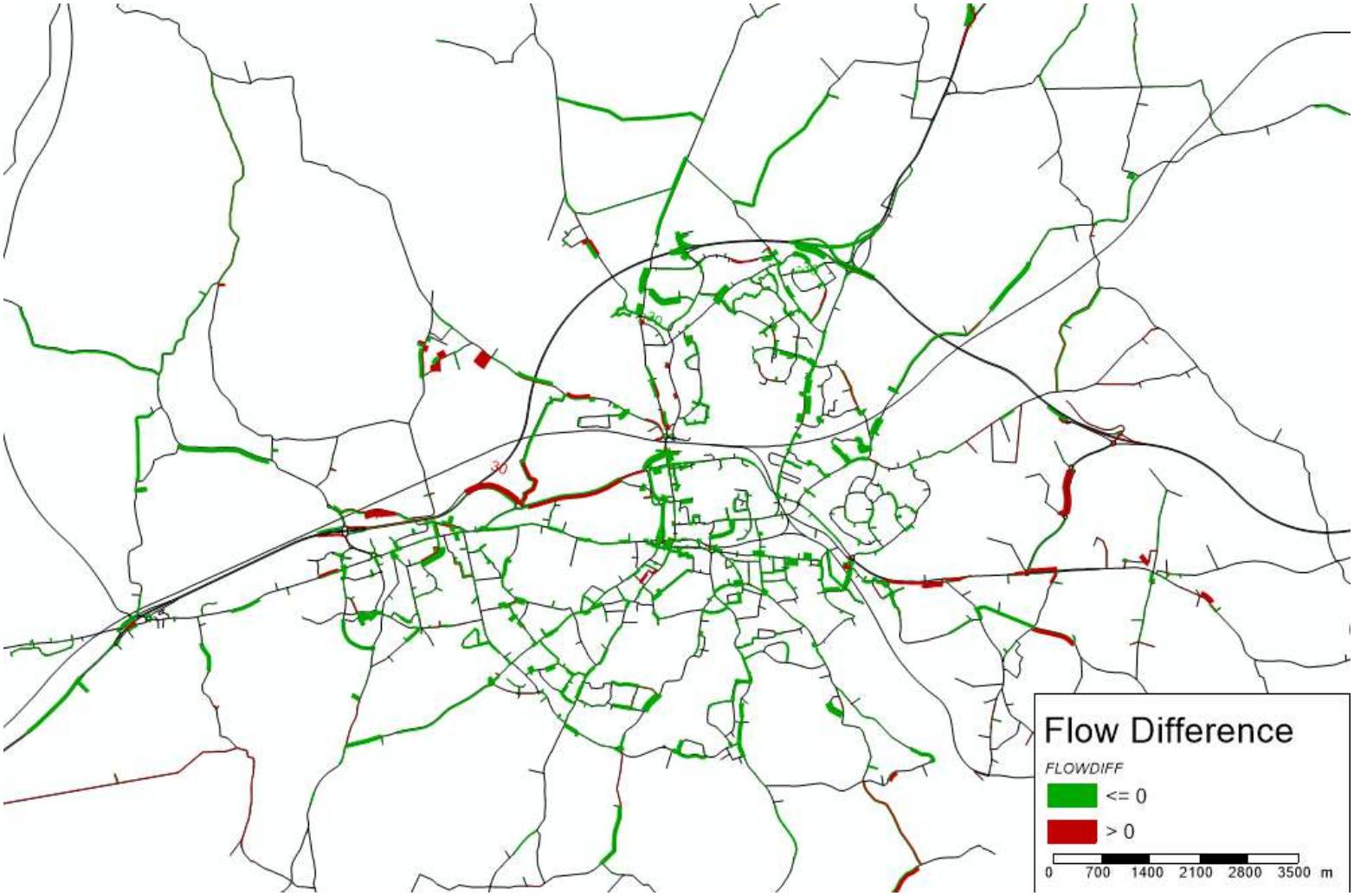

Figure D.16: PM flow difference – Scenario 4 2043 ST mitigated assessment v Scenario 3 2043 BaU mitigated assessment

D.2.3 PM speed plots (modelled speed / free flow speed)

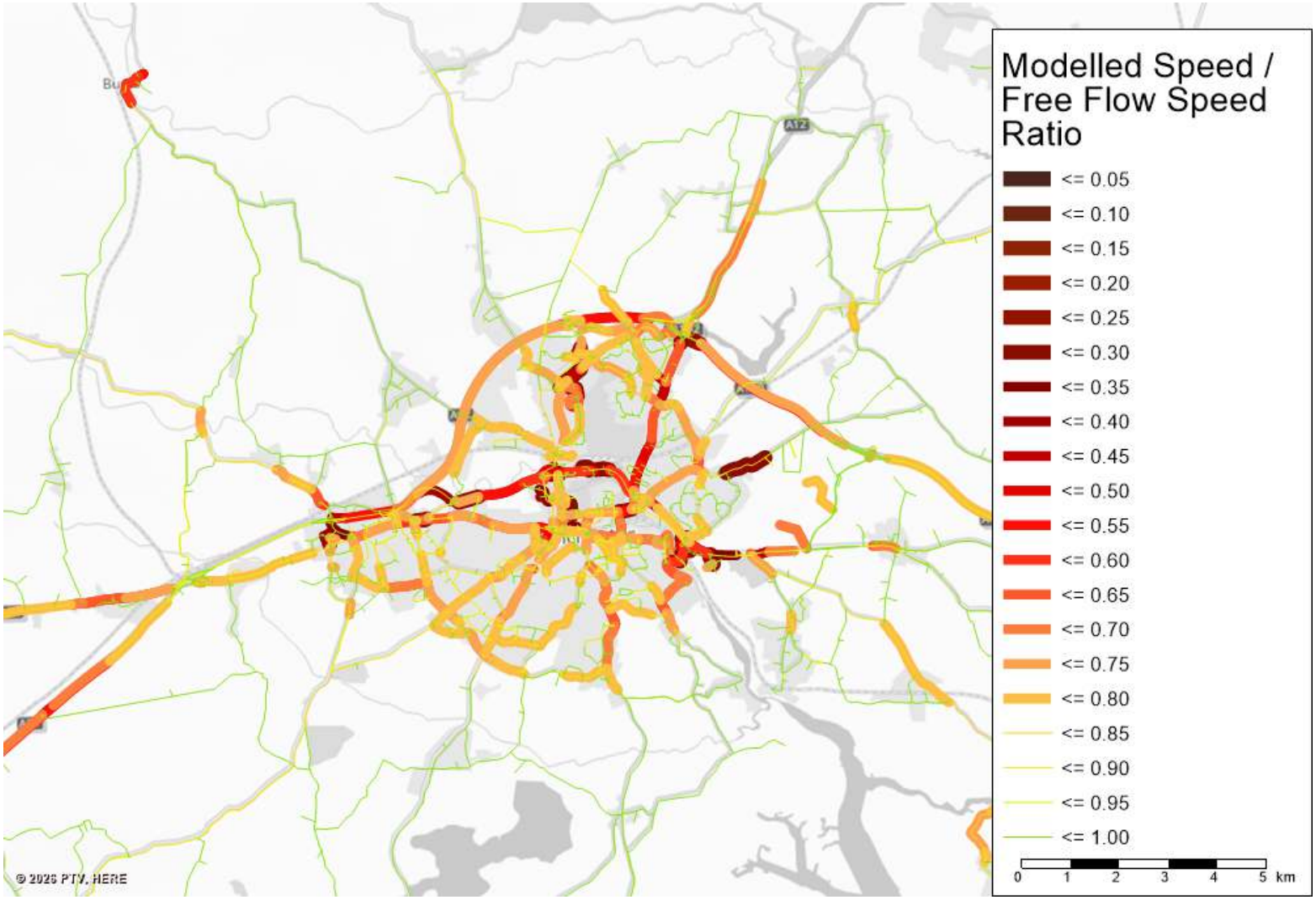

Figure D.17: PM speed ratio – Scenario 1 2043 reference

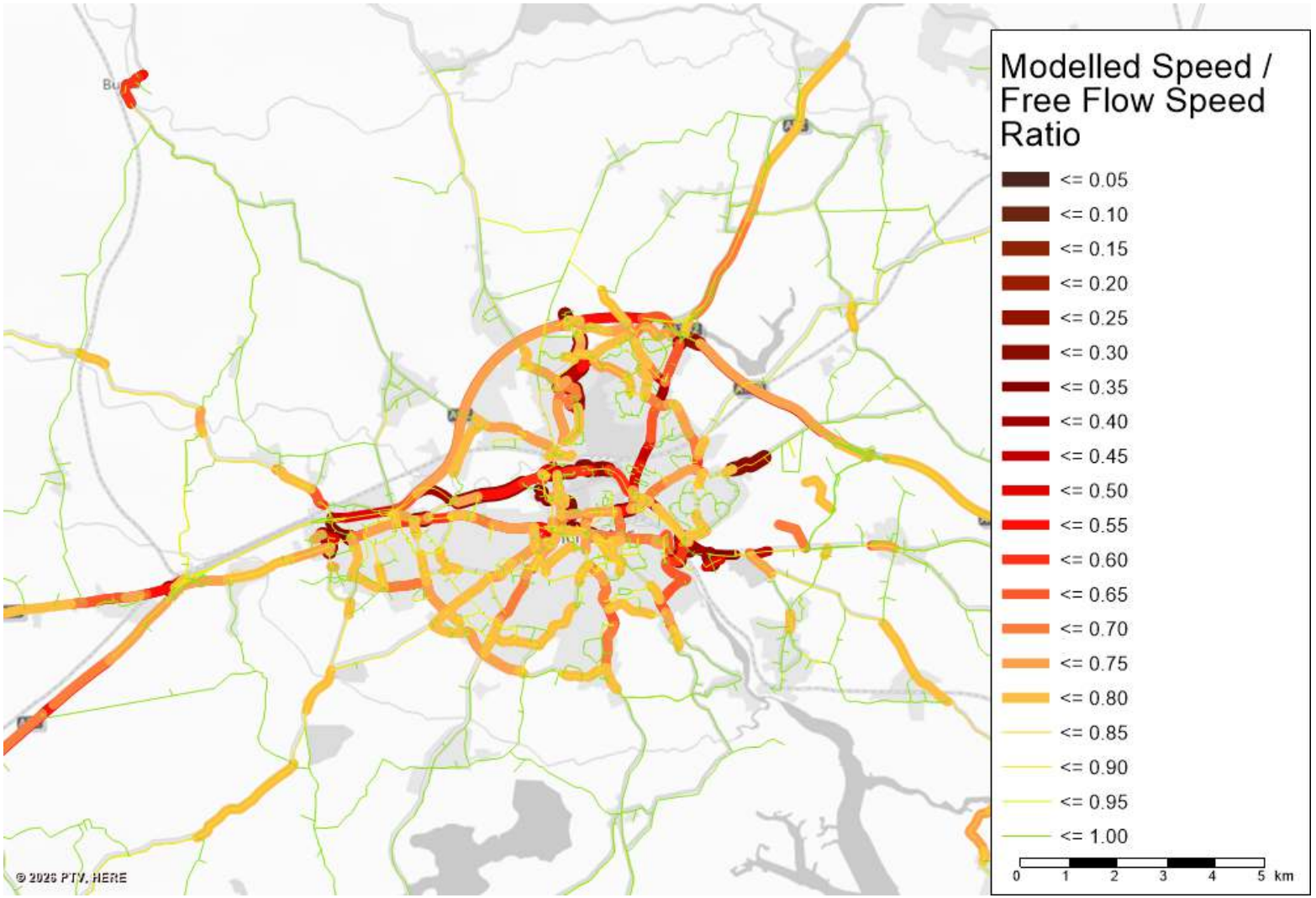

Figure D.18: PM speed ratio – Scenario 2 2043 unmitigated assessment

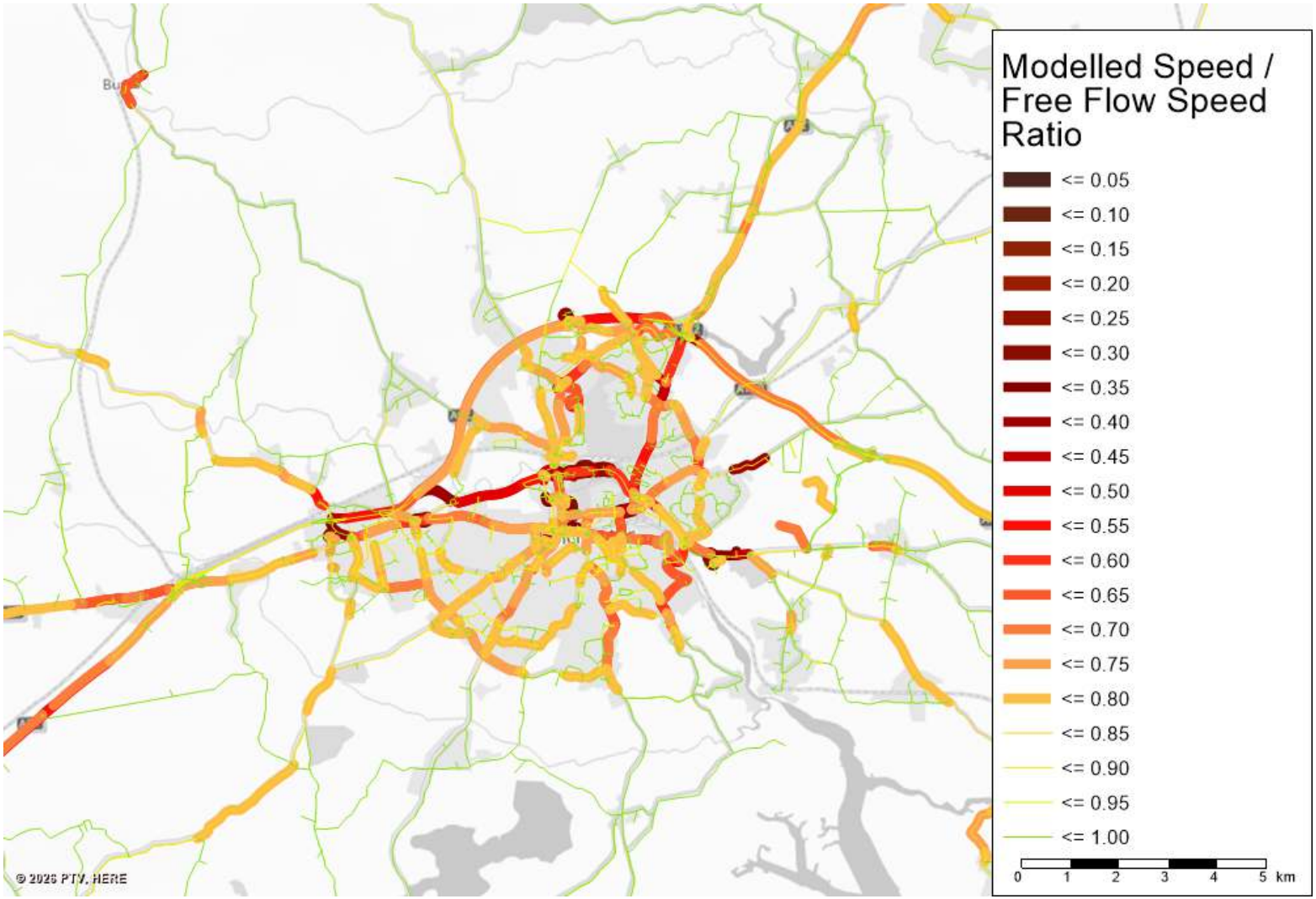

Figure D.19: PM speed ratio – Scenario 3 2043 BaU mitigated assessment

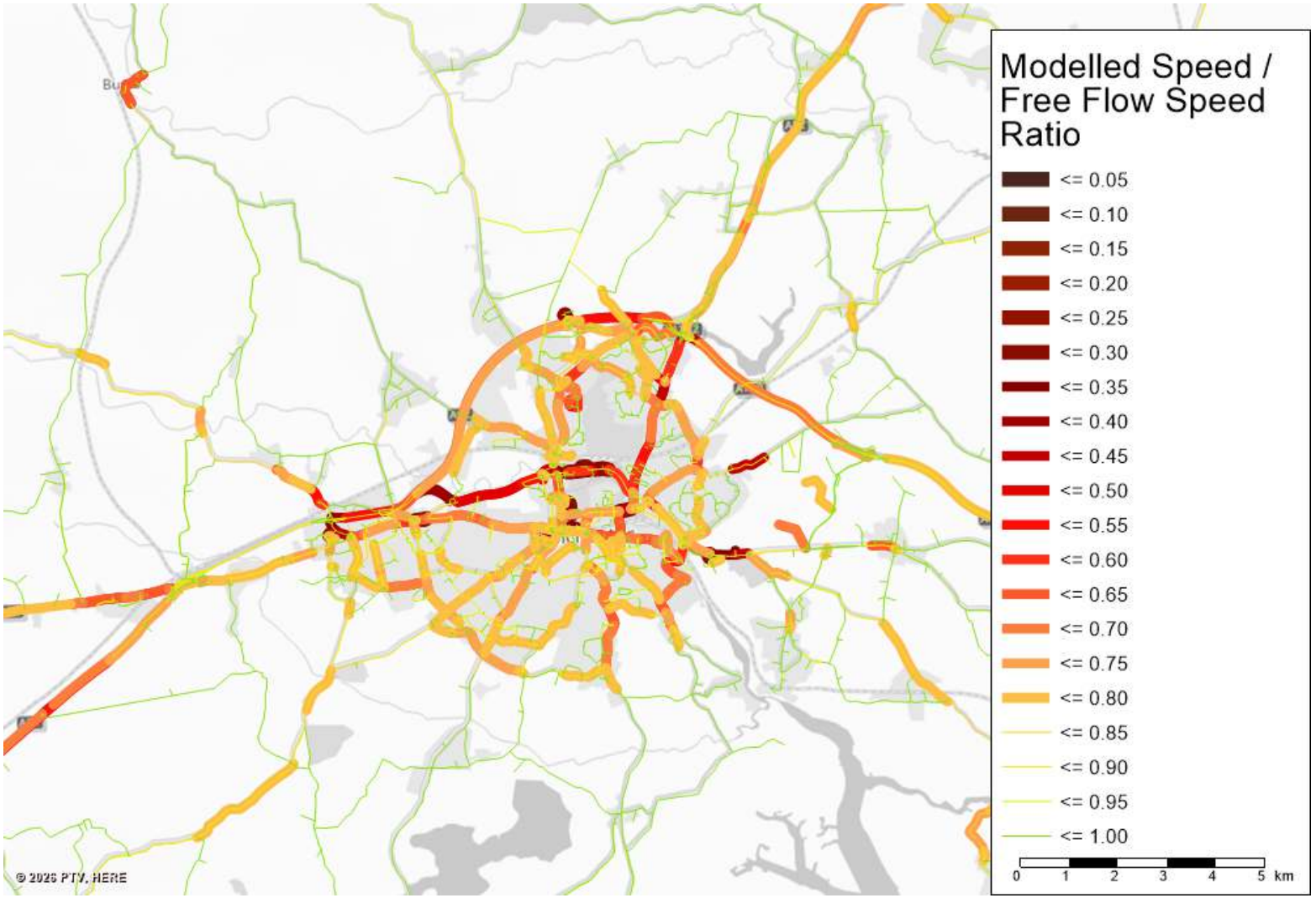

Figure D.20: PM speed ratio – Scenario 4 2043 ST mitigated assessment

D.2.4 PM relative queue plots (blocking back on road links in the model)

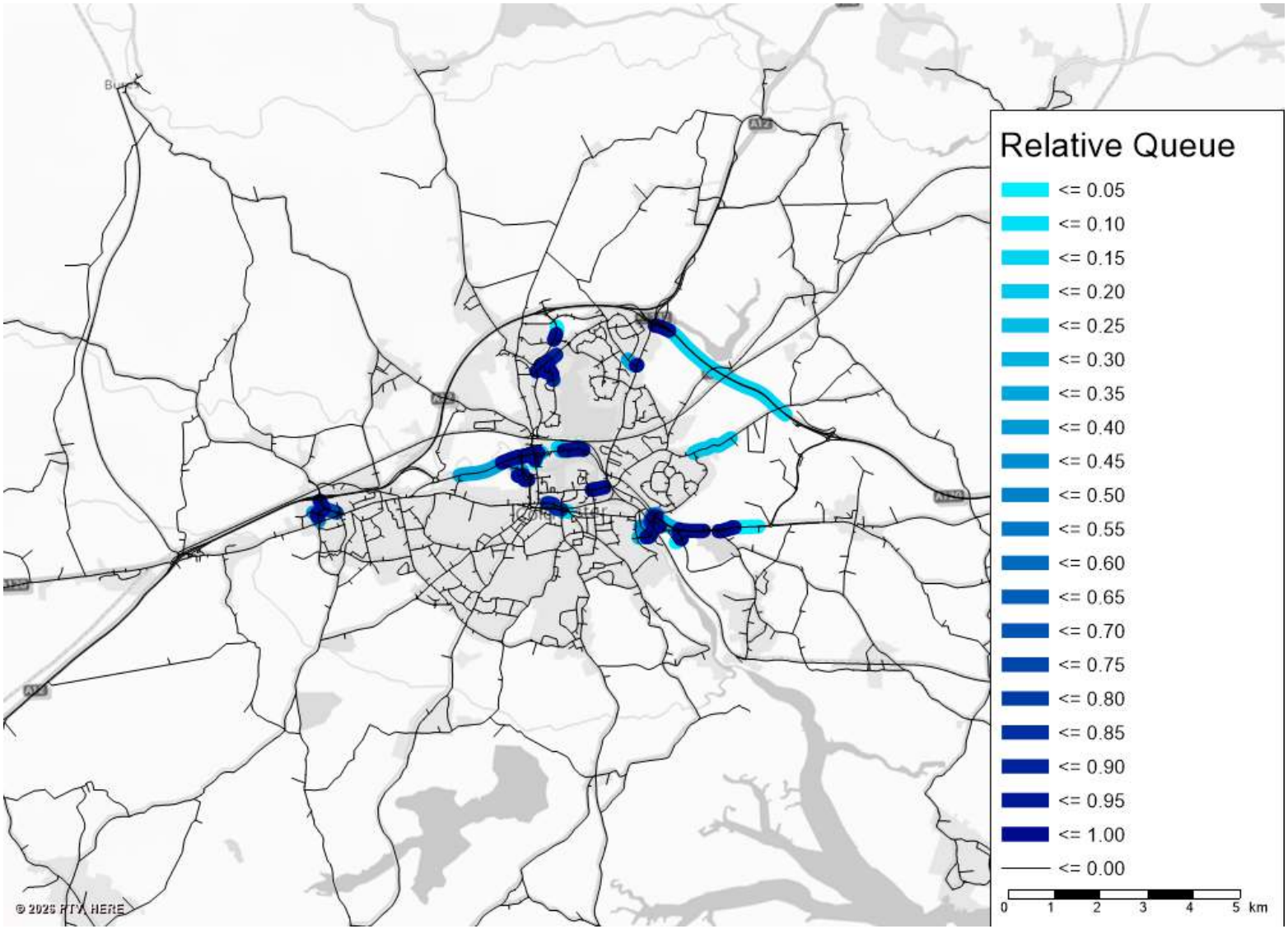

Figure D.21: PM relative queue – Scenario 1 2043 reference

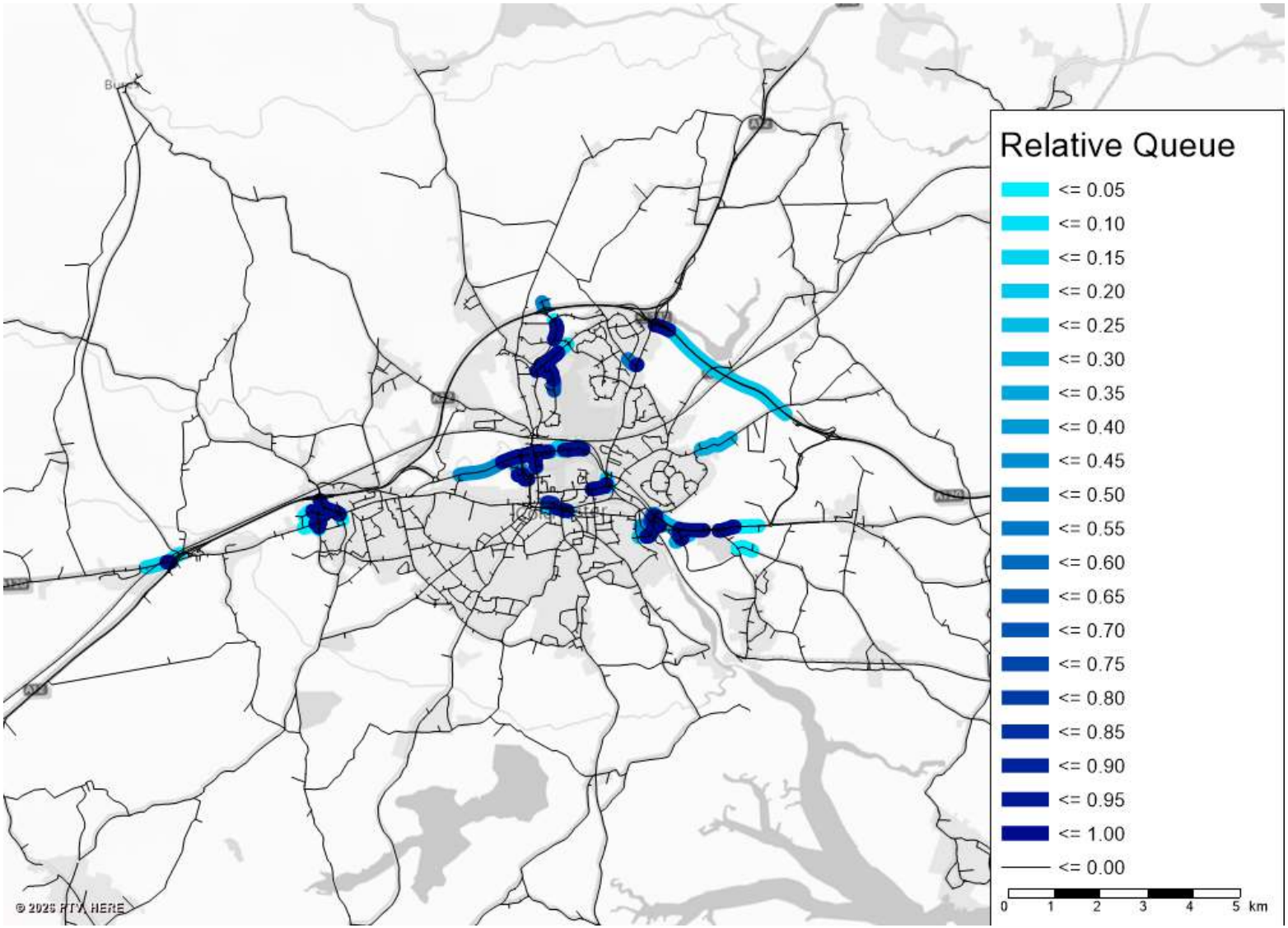

Figure D.22: PM relative queue – Scenario 2 2043 unmitigated assessment

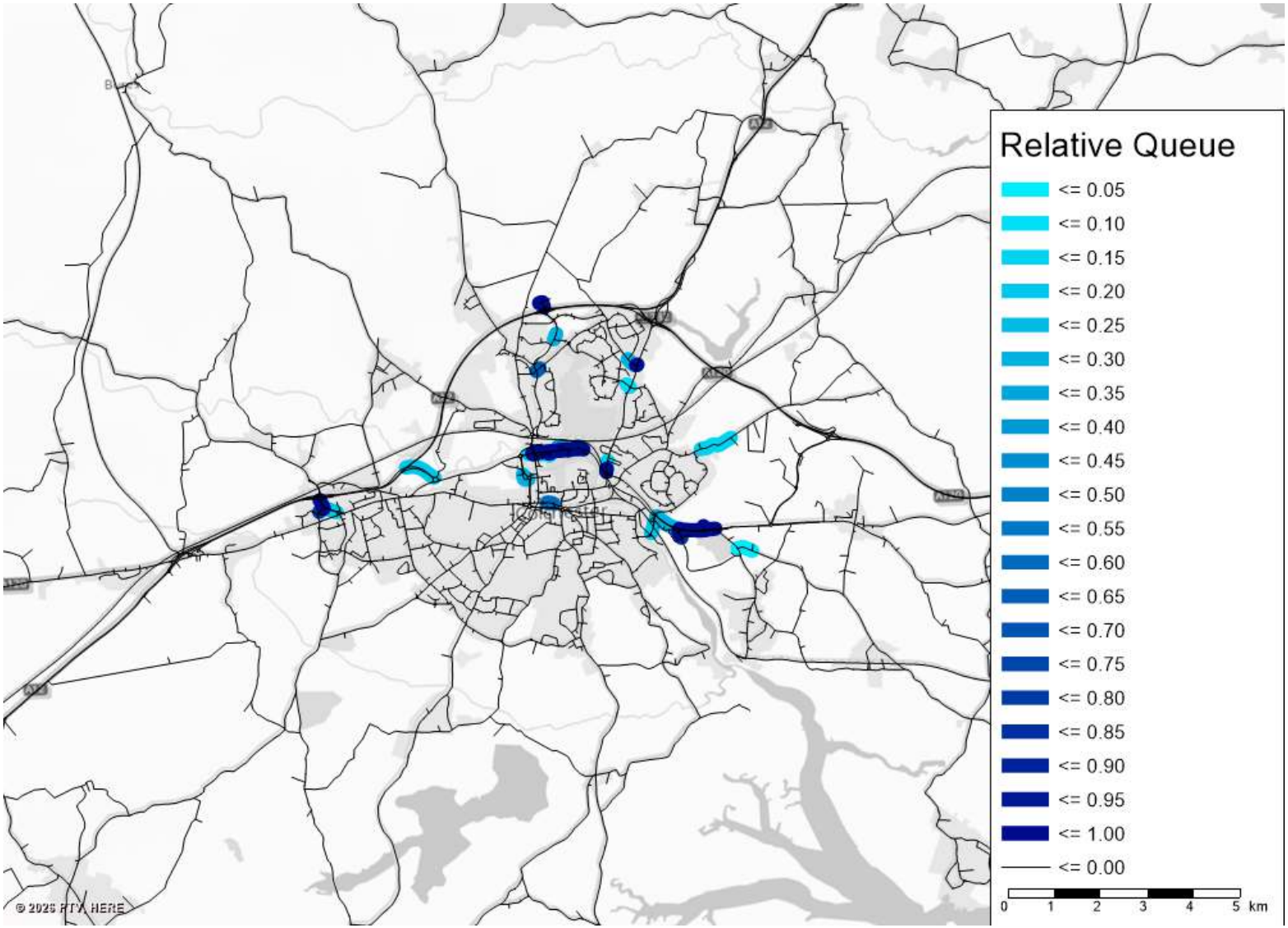

Figure D.23: PM relative queue – Scenario 3 2043 BaU mitigated assessment

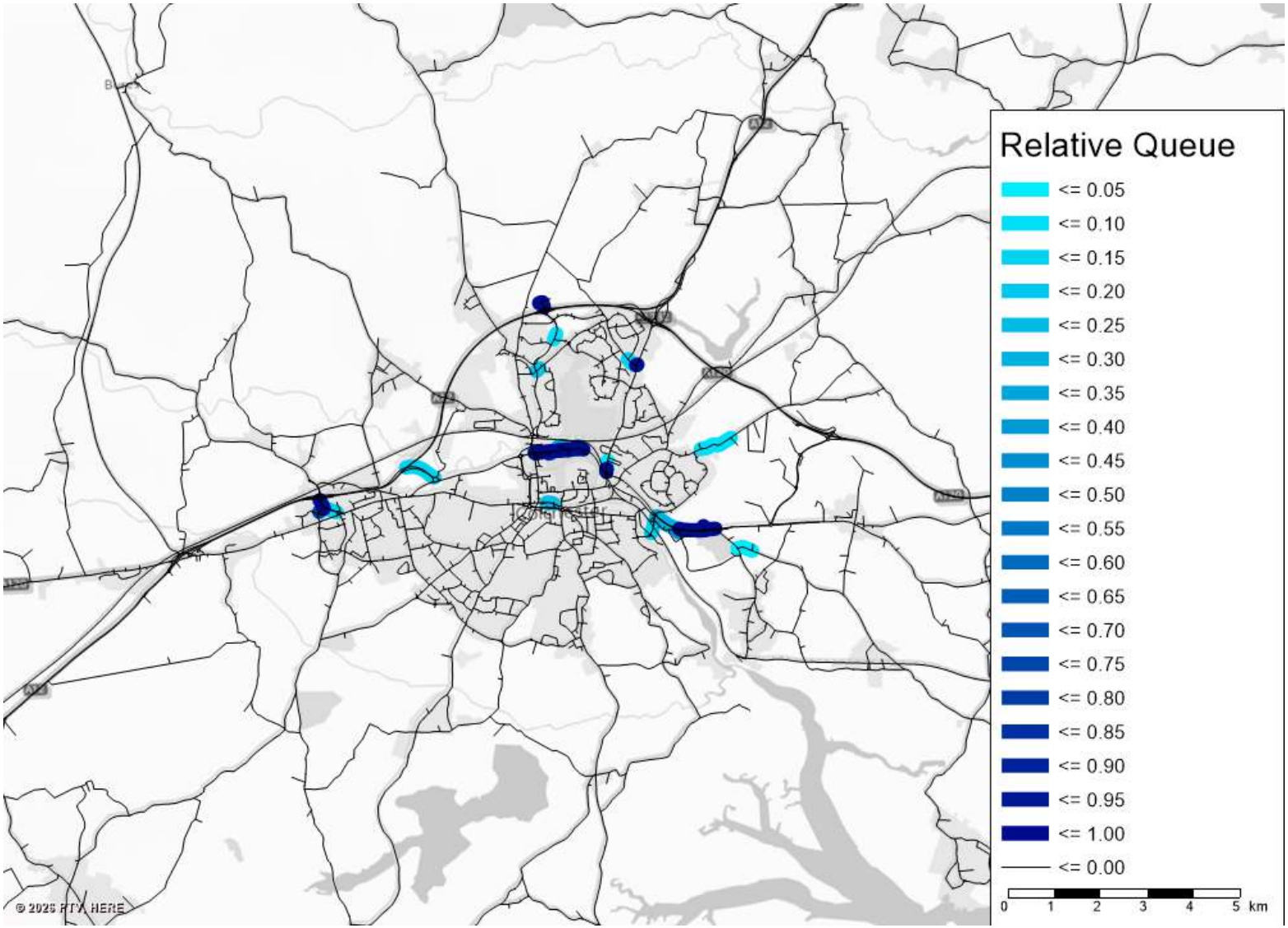

Figure D.24: PM relative queue – Scenario 4 2043 ST mitigated assessment

E Vision-led mitigation measures

E.1 Introduction

This appendix sets out tables of proposed measures to mitigate the impact of trhe combined impact of reference case growth and new local plan growth. The measures are informing the Infrastructure Audit and Delivery Plan (IADP) for the Regulation 19 Local Plan. The cost of schemes are not shown in this report, however, the cost of each intervention has been estimated and input into the viability assessment

The main report explains that the requirement for mitigations arises from reference case growth – which comprises committed sites in the Colchester council area and possible growth in Braintree and Tendring proposed in their current local plan reviews – and proposed new local plan allocation in Colchester.

Accordingly, it is expected that the integrated transport and vision-based mitigations would need to be delivered in stages, with some of the largest schemes divided into phases aligned to specific sites or tranches of growth. Such phasing and incremental delivery would need to be worked out as growth comes forward as part of the planning process. It would be disproportionately complex to devise phasing at this strategic stage of plan making. Instead it was considered more useful to show how the cumulative impact of all growth could be mitigated.

This appendix provides three lists of mitigation, which have been chosen to mitigate severe impacts of growth and connect developments to public transport and active travel routes in line with policies and planning guidance. The three sets of measures are:

- highway measures – which support movement of all modes
- public transport measures
- active travel measures

There is an element of overlap betweeen the sets of measures, as would be expected given the focus on integrated transport. However, it was considered useful to divide the measures into groups to illustrate how the meausures are balancing the needs of all modes.

Each of the tables of measures indicates whether the need for the measures is caused by committed growth in Colchester, growth in other planning areas (principally Braintree or Tendring), or new local plan growth in Colchester. For new local plan growth in Colchester, the proposed allocations have been grouped as shown in Figure E.1. The tables of measures provide an initial indication of which development groups contribute to which measures. It should be noted that this is subject to change as developments come forward and more detailed analysis is undertaken in transport assessments of planning applications.

The subsequent appendix, Appendix F, shows maps of each of the movement corridors on which measures are proposed. The maps combine highway, public transport and active travel measures, and show how they relate to nearby reference and new local plan developments in the Colchester council area. Some measures though are required due to cumulative growth further afield.

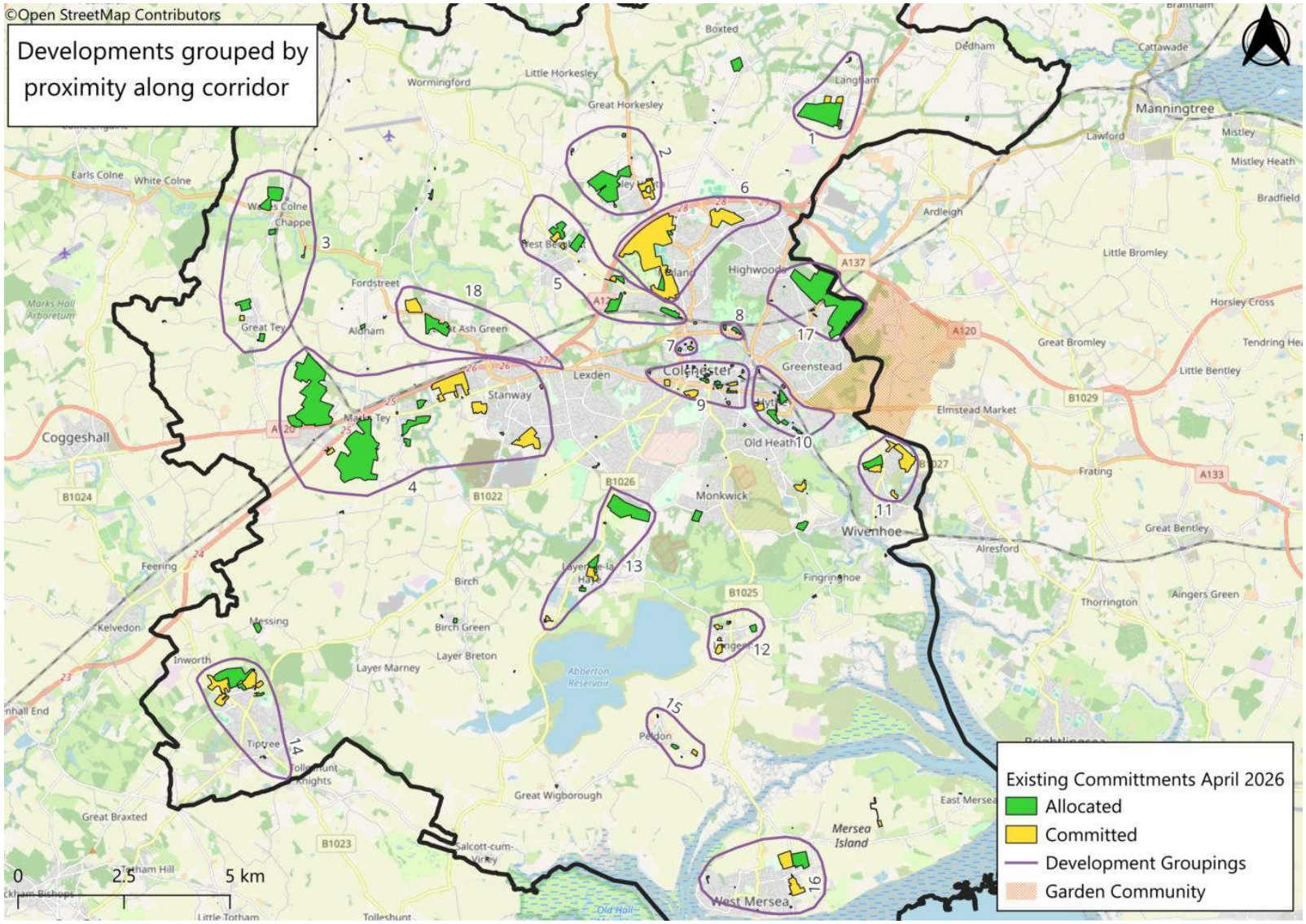

Figure E.1: Development groupings

E.2 Highway measures

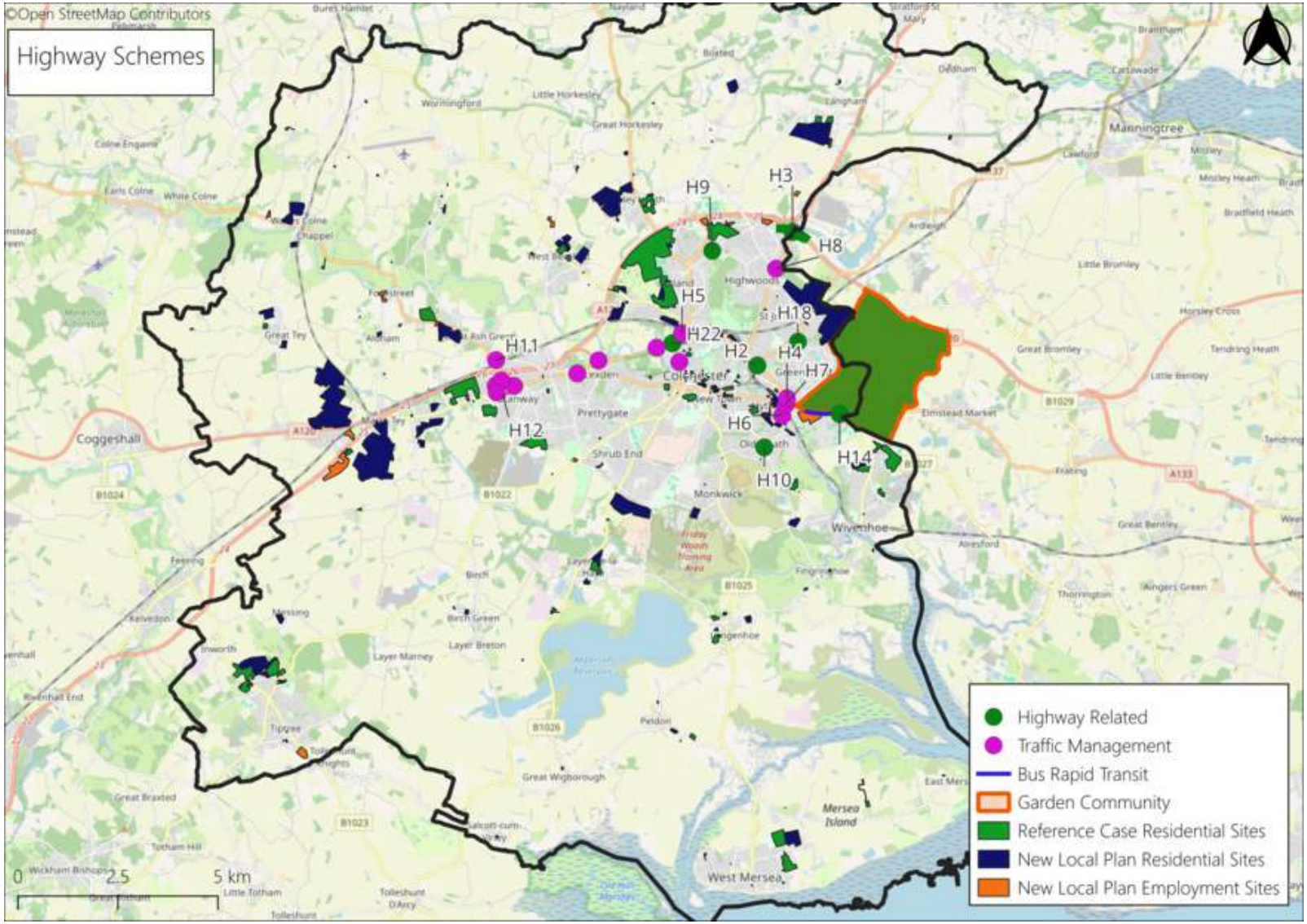

Figure E.2: Highway related mitigation measures

Table E.1: Highway mitigations

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Colchester
H1	District wide	Traffic management	Dynamic traffic management	In built up areas, the role of traffic management is increasingly important to balance movement needs arising from growth. Investment in new technologies more signal timings to be dynamically altered to respond to traffic condtions and incidents over a wider area. This also reduces the extent of new highway infrastructure schemes resulting in cost and environment benefits. While dynamic traffic management provides greater benefit in urban areas, it is reasonable that all developments contribute to such systems since rural developments also contribute to congestion in urban areas.	All		✓		
H3	A120/A12	Highway	A12 Junction 29	Improvements at A12 J29, likely to include: • Extended signalisation • Widening of A120 to Ipswich Road offslip to three lanes • Widening of slip approach to Newcomen Way to two lanes • Widening of the A120 eastbound onslip to two lanes External contributions from National Highways should be explored and developer contributions from developments across Tendring and Colchester council areas should also be considered.	6		✓	✓	✓

Continued on next page

Table E.1: Highway mitigations *(continued)*

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Colchester
H4	A133 Clingoe Hill	Highway	Greenstead roundabout (peninsularisation)	Significant alterations at Greenstead Roundabout, likely to include: • Peninsularisation of the SW side to prioritise key movements and reduce extreme congestion • Full signalisation • Bus priority measures including RTS and priority for local buses • Complementary measures at the Colne Causeway / Elmstead Road Roundabout	10	100	✓	✓	✓
H2	A133 Colchester	Highway	Lower Harwich Rd and Ispwich Roads	Partial signalisation, signal co-ordination and introduction of RTS and bus priority at Ipswich Road and Lower Harwich Road junctions with St Andrews Avenue and at Ipswich Road junction with East Street, to better balance movements of all modes through and around these junctions. Changes need to be co-ordinated with Greenstead roundabout improvements. Multiple developments contribute to congestion at this location including TCB and growth in NE Colchester and Tendring.	9	10	✓	✓	✓
H11	Aldham & Eight Ash Green	Highway	Halstead Road junction improvements	Halstead Road shows limited capacity with V/C higher than 85% between Spring Lane and Abbot's Lane. Signal measures should improve performance of road.	18		✓	✓	
H5	City Centre	Traffic management	Essex Hall full signalisation	Signalisation of all arms of Essex Hall Roundabout to help control traffic around Colchester Railway Station (North).	5	6, 7	✓		

Continued on next page

Table E.1: Highway mitigations *(continued)*

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Colchester
H13	Clingoe Hill / Colne Causeway	Bus rapid transit	Westbound RTS lane Wivenhoe Park Corner to Knowledge Gateway	Dedicated westbound RTS lane in central reservation along the A133 connecting Wivenhoe Park Corner (junction between Colchester Road and Brightlingsea Road) and Knowledge Gateway	100	Tendring developments	✓	✓	✓
H14	Clingoe Hill / Colne Causeway	Highway	Wivenhoe Park Corner roundabout (Colchester Road / Brightlingsea Road junction) improvements	Wivenhoe Park Corner junction re-design to conventional roundabout geometry with RTS lanes priority lanes to access P&C. Includes pedestrian crossings and bus stop improvements. Scheme to include improvements to the Colchester Road / Brightlingsea Road junction.	100	Tendring /Wivenhoe developments	✓	✓	✓
H10	Clingoe Hill / Colne Causeway	Highway	Old Heath Road junction improvements	Signal measures to help improve the performance of Old Heath Road which currently operates with limited capacity with V/C higher than 85% between Whitehall Road and Abbot's Road.	10		✓	✓	
H6	Clingoe Hill / Colne Causeway	Traffic management	A134 Colne Causeway / Hawkins Road signalisation	Signalisation of all arms of the A134 Colne Causeway / Hawkins Road roundabout to help control traffic along Colne Causeway	10		✓	✓	
H7	Clingoe Hill / Colne Causeway	Traffic management	A134 Colne Causeway / Elmstead Road signalisation	Signalisation of all arms of the A134 Colne Causeway / Elmstead Road roundabout to help control traffic along Colne Causeway	10		✓	✓	
H17	Heckfordbridge	Highway	Warren Lane/Maldon Road junction	Measure to address safety issue at junction and large, potential delays, caused by cumualtive traffic growth. Further feasibility work required to understand changes required.	4		✓		

Continued on next page

Table E.1: Highway mitigations *(continued)*

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Colchester
H16	Marks Tey	Highway	A12/A120(W) junction alterations - Inclusive of Marks Tey rdbt and Prince of Wales rdbt	Junction improvements at the A12 / A120 (W) junction, including: • Conversion of the Marks Tey roundabout to a signalised cross-road junction to improve delays • Signalisation of the Prince of Wales roundabout • Provision of bus priority between Marks Tey and Prince of Wales junctions in both directions using existing highway space (no widening required) • Active travel route enhancements supporting LCWIP 3 access. • Remove on-street parking on Station Rd and replace with cycle track and widened footpath	4		✓		
H15	Marks Tey	Traffic management	Coggeshall Road/Ashbury Drive junction signalisation	Signalisation of Coggeshall Road / Ashbury Drive junction to improve delays at Coggeshall Road	4		✓		
H18	North East Central	Highway	Parsons Heath/Harwich Rd/ Bromley Rd signalisation	Siganlisation of Parsons Heath / Harwich Road / Bromley Road junction to support traffic movement and bus priority/reliability through the junction. Feasibility work is required to understand the potential changes required.	17	100	✓	✓	
H8	North East Central	Traffic management	Ipswich Road/Severalls Lane signal improvements	Signal improvements at Ipswich Road junction with Severalls Lane, in coordination with changes at J29 A120	17	100	✓	✓	

Continued on next page

Table E.1: Highway mitigations *(continued)*

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Colchester
H9	Northern Approach from J28	Highway	Mill Road corridor and hospital access package	Mill Road shows limited capacity with V/C higher than 85% and is sensitive to demand growth and network changes further afield. A traffic management package is required along Mill Road corridor to help manage congestion and facilitate access to nearby destinations including the city's hospital. The package will likely require physical work and will need to support active travel and public transport priorities.	6		✓	✓	
H12	West Colchester	Traffic management	A12 junction 26 and Stanway junction alterations	A package of measures to help manage queuing on Essex Yeomanry Way, expected as a result of the Tollgate development, including the following schemes: • Tollgate roundabout signalisation and bus priority lanes • London Road/Western Approach junction geometry change from roundabout to cross-roads with bus priority lanes • Essex Yeomanry Way J27 and Western Approach roundabout signalisation to manage traffic movements	4		✓		

E.3 Public transport measures

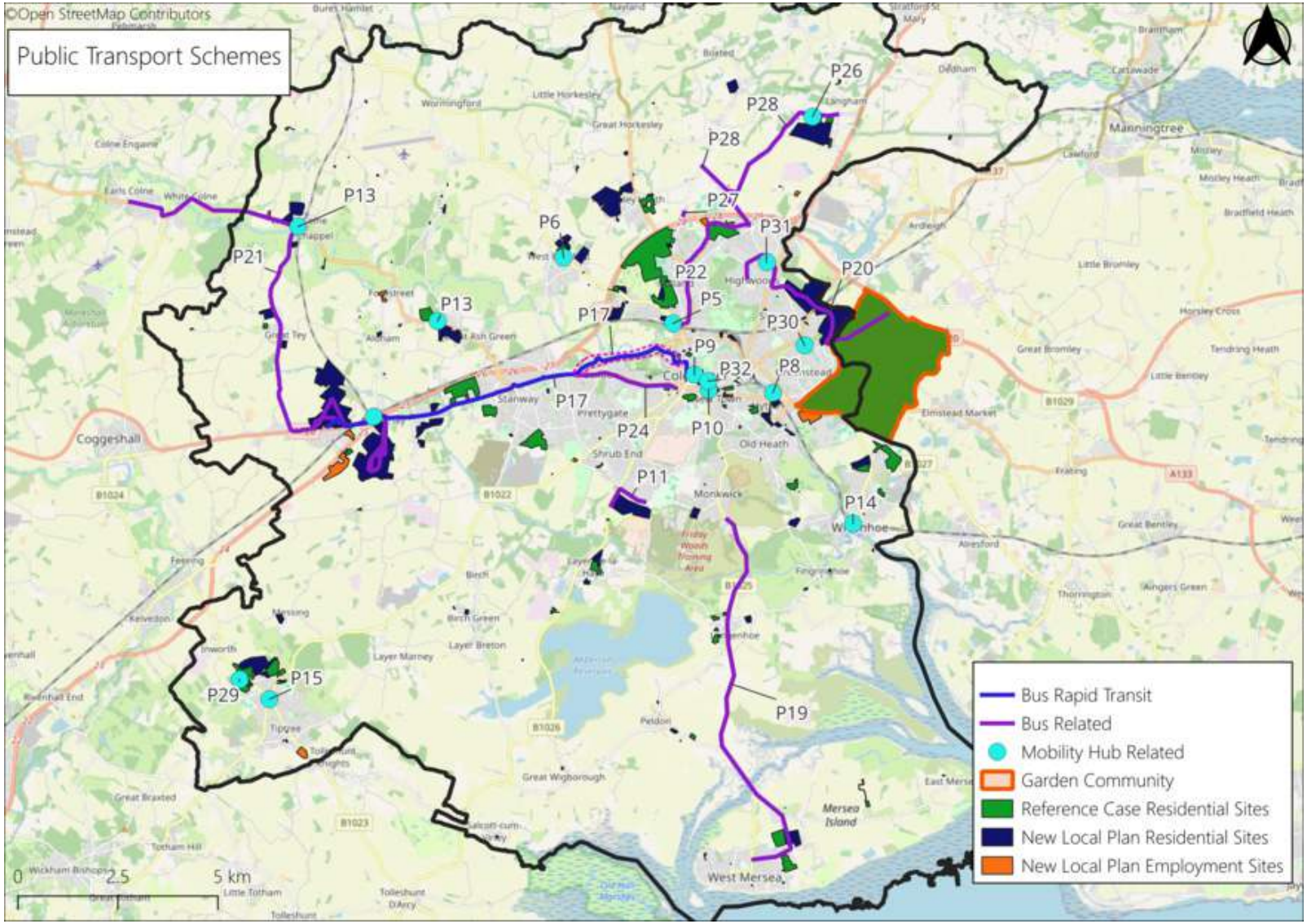

Figure E.3: Public transport related mitigation measures

Table E.2: Public transport mitigations

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Col-chester
P3	District wide	Bus subsidy	Bus subsidy for residents	Allowance for bus subsidy per new dwelling built support bus connectity and establishing new routes	All		✓		
P4	District wide	Bus subsidy	Bus subsidy for employment	Allowance for bus subsidy per new dwelling built support bus connectity and establishing new routes	All		✓		
P1	District wide	Travel planning	Travel planning for residents	Allowance for travel planning at residential developments	All		✓		
P2	District wide	Travel planning	Travel planning for employment	Allowance for travel planning at employment developments (using estimated employment of 10,000 jobs)	All		✓		
P7	A12 J25	Cycling	Marks Tey Cycle Hub	Secure cycle hub at Marks Tey rail station	4		✓	✓	
P25	A12 J25	Mobility hub	Marks Tey Station Mobility Hub	A mobility hub at Marks Tey to support integrated transport, quality of interchanges and access to higher quality public transport services	4		✓		
P12	Aldham & Eight Ash Green	Mobility hub	Eight Ash Green Mobility Hub with new bus stops	A mobility hub at Eight Ash Green to support integrated transport, quality of interchanges and access to higher quality public transport services, including new bus stops	18		✓	✓	
P10	City Centre	Mobility hub	Colchester Town Station Mobility Hub (Hub type 2 - refer to the Essex Mobility Hubs Implementation Guide)	A mobility hub at Colchester Town Station to support integrated transport, quality of interchanges and access to higher quality public transport services	9		✓	✓	

Continued on next page

Table E.2: Public transport mitigations *(continued)*

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Col-chester
P9	City Centre	Mobility hub	Colchester High Street Mobility Hub	A mobility hub on Colchester High Street to support integrated transport, quality of interchanges and access to higher quality public transport services	9		✓		
P8	Clingoe Hill / Colne Causeway	Mobility Hub Related	Hythe Station Mobility Hub	A mobility hub at Hythe Station to support integrated transport, quality of interchanges and access to higher quality public transport services	10		✓	✓	
P14	Colchester Road to Wivenhoe	Mobility hub	Wivenhoe Mobility Hub	A mobility hub in Wivenhoe to support integrated transport, quality of interchanges and access to higher quality public transport services	11		✓		
P21	Great Tey & Wakes Colne	Bus	Great Tey Horkesley / Wakes Colne new bus route	A new bus route between Great Tey Horkesley and Wakes Colne. Its frequency would be expected to increase coordinated with development growth	3		✓		
P13	Great Tey & Wakes Colne	Mobility hub	Wakes Colne Mobility Hub	A mobility hub at Wakes Colne to support integrated transport, quality of interchanges and access to higher quality public transport services	3		✓		

Continued on next page

Table E.2: Public transport mitigations *(continued)*

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Colchester
P28	Langham & Boxted	Bus	Bus connection from Langham to connect to P&R at Boxted Road	A new bus route or existing service alteration between Langham and P	R facility at Boxted. Its frequency would be expected to increase coordinated with development growth	1		✓	
P26	Langham & Boxted	Mobility hub	Langham Mobility Hub	A mobility hub in Langham to support integrated transport, quality of interchanges and access to higher quality public transport services	1		✓		
P11	Layer-de-la-Haye	Bus	Berechurch Hall Road / Layer Road bus stop	Provision of bus stop at development site on Berechurch Hall Road / Layer Road (dependent on site access arrangements)	13		✓		
P18	Marks Tey	Bus	Marks Tey new bus route	Enhanced bus connections into developments at Marks Tey, via one of the following options: • Option 1: Extension of existing route(s) into developments • Option 2: New bus route connecting developments and key amenities	4		✓		

Continued on next page

Table E.2: Public transport mitigations *(continued)*

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Col-chester
P34	Marks Tey	Bus	A12 Bus and Active Travel Bridge - Old London Road to Hall Chase	Provision of a bus and active travel bridge across the A12, connecting Old London Road to Hall Chase in Marks Tey to support local bus movements through new developments, reduce severance caused by the A12 and alleviate pressure on J25	4		✓		
P23	Marks Tey	PnR	Colchester West Park and Choose	The provision of a Park and Choose mobility hub site(s) in the west of Colchester, either in the form of one singular Park and Choose site or multiple smaller mobility hub/park and choose sites with community functions in association with future development beyond the Local Plan period. Feasibility work is ongoing to explore potential sites including North Marks Tey development, Old London Road and Spring Lane.	4		✓		
P33	Marks Tey	Rail	Marks Tey Rail Station accessibility upgrades	Accessibility upgrades at Marks Tey station with a focus on step free access and lift provison	4		✓		
P19	Mersea & Langen-hoe	Bus	West Mersea to Colchester bus route frequency upgrades	Increase the frequency of an existing bus route connecting West Mersea to Colchester, coordinated with development growth	16		✓	✓	

Continued on next page

Table E.2: Public transport mitigations *(continued)*

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Colchester
P20	North East Central	Bus	East Colchester - Land north of Bromley Road new bus route	Enhanced bus connections into / around development north of Bromley Road in East Colchester, via one of the following options: • Option 1: Extension of existing route(s) into developments • Option 2: New orbital bus route	17		✓		
P32	North East Central	Bus	Colchester City Centre Bus Interchange	Colchester City Centre Bus Interchange scheme in development. Consultation on location and options is in Summer/Autumn 2026	17		✓		
P35	North East Central	Bus	Bromley Road, Harwich Road and Ipswich Road Bus frequency upgrades	Bus frequency upgrades for existing inter-urban bus routes along Bromley Road, Harwich Road and Ipswich Road to support TCB and North East Colchester developments' access directly into Colchester City Centre	17	100	✓	✓	✓
P30	North East Central	Mobility hub	Bromley Road Schools Mobility Hub	Bromley Road School mobility hub to support integrated transport, quality of interchanges and access to higher quality public transport services	17		✓		
P31	North East Central	Mobility hub	Ipswich Road/Severalls Way Mobility Hub	Ipswich Road / Severalls Way junction mobility hub to support integrated transport, quality of interchanges and access to higher quality public transport services	17		✓		

Continued on next page

Table E.2: Public transport mitigations *(continued)*

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Col-chester
P22	Northern Approach from J28	Bus	Axial Way / Colchester Business Park new bus route	New bus route to run along Axial Way and connect to Colchester Business Park. Its frequency would be expected to increase coordinated with development growth	6			✓	
P27	Northern Approach from J28	Bus	Boxted Road bus gate	Bus Gate for access to P&R from Boxted Road	2	6	✓		
P5	Northern Approach from J28	Mobility hub	Colchester North Station Mobility Hub (Hub type 1 - refer to the Essex Mobility Hubs Implementation Guide)	Colchester Station (North) mobility hub to support integrated transport, quality of interchanges and access to higher quality public transport services	5		✓	✓	
P29	Tiptree	Mobility hub	Kelvedon Road Mobiity Hub	Mobility hub on Kelvedon Road to support integrated transport, quality of interchanges and access to higher quality public transport services	14		✓		
P15	Tiptree	Mobility hub	Tiptree Mobility Hub	Mobility hub in Tiptree to support integrated transport, quality of interchanges and access to higher quality public transport services	14		✓		
P6	West Bergholt & Braiswick	Mobility Hub Related	West Bergholt Mobility Hub	Mobility hub in West Bergholt to support integrated transport, quality of interchanges and access to higher quality public transport services	5		✓	✓	

Continued on next page

Table E.2: Public transport mitigations *(continued)*

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Colchester
P24	West Colchester	Bus	Lexden Road Sustainable Travel Corridor	A package of active travel, sustainable transport and traffic management measures along and around the Lexden / London Road corridor to enhance access between Marks Tey and Colchester City Centre, as per the recommended package outlined in the Colchester West STC Feasibility Study (March 2026)	4		✓		
P17	West Colchester	Bus rapid transit	RTS operational subsidy	Establishing RTS will require operational subsidy until the service has sufficent patronage to cover costs. Subsidy would need to be spread over the course of the plan period. Since RTS West would serve PnC West, the subsidy also covers the revenue cost for PnC West.	4		✓		

Continued on next page

Table E.2: Public transport mitigations *(continued)*

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Colchester
P16	West Colchester / Marks Tey	Bus rapid transit	RTS extension City Centre to Marks Tey	An extension of the existing RTS service connecting Colchester City Centre and development to the north of Marks Tey, via Cymbeline Way. The following measures are proposed as part of this scheme: • Signal priority along London Road to support RTS reliability • Stops proposed at Spring Lane, Stanway and Marks Tey. There is potential for an additonal stop in Copford to support access for committed developments which will increase residential numbers A number of highway schemes wil also be required to support RTS movement. These have been packaged into the following measures (to avoid double counting of highway infrastructure): • Middleborough Roundabout signalisation • Sheepen Road/Cymbeline Way bus gate and junction alterations • Spring Lane roundabout signalisation • London Road/Cymbeline Way/London Road signalisation and bus priority hurry call • Additional bus priority lanes will be included within the Tollgate roundabout and London Road/Western Approach junctions - which are packaged in H12	4	9	✓		

E.4 Active travel measures

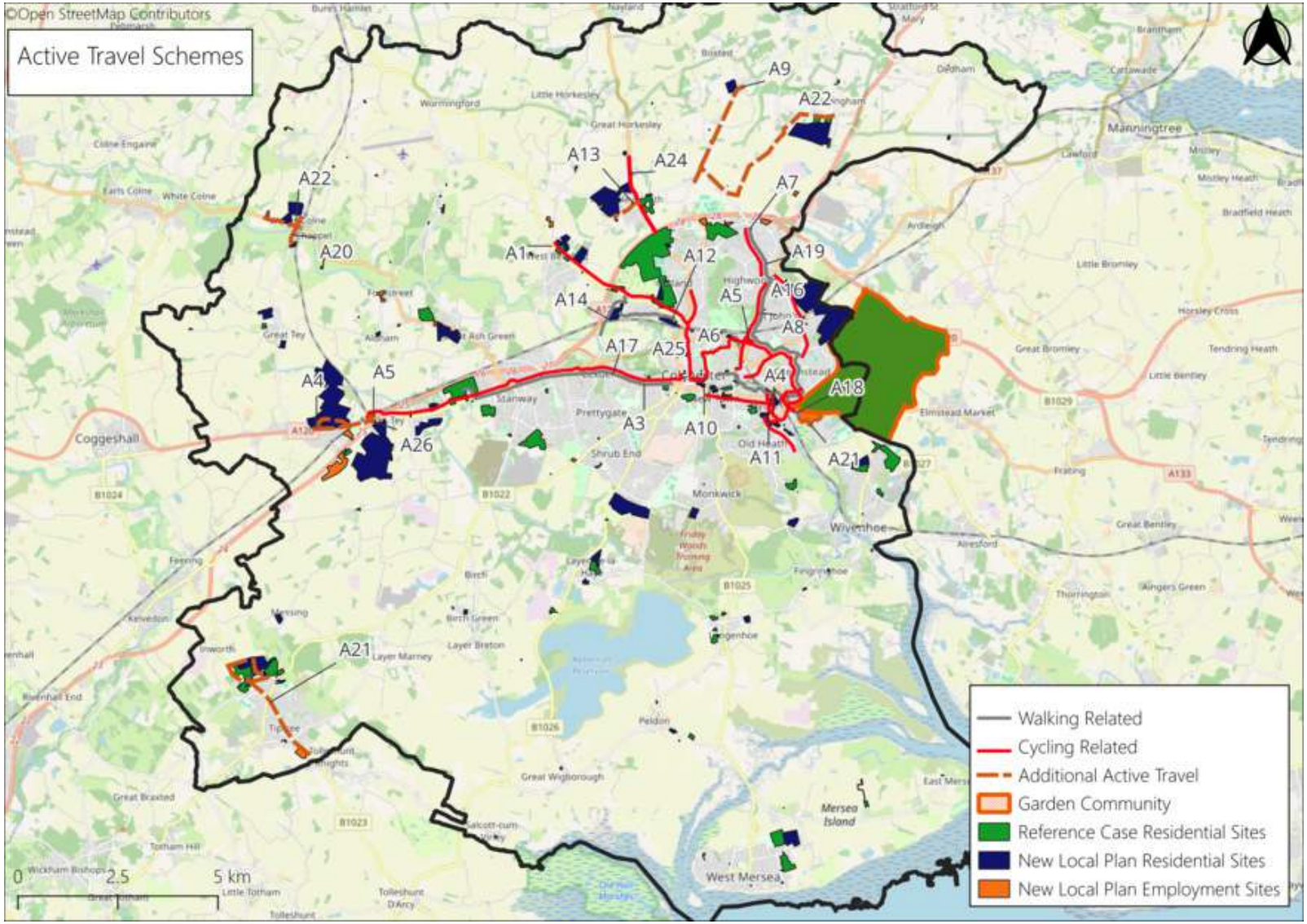

Figure E.4: Active travel related mitigation measures

Table E.3: Active travel mitigations

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Col-chester
A10	City Centre	Cycling	LCWIP Cycle Route 8	LCWIP Cycle Route 8 is a circular route within the city centre which runs along Colchester High Street, Queen Street, Vineyard Street, Vineyard Gate, St John's Street and Head Street. Elements of the route have been delivered through Active Travel Fund Tranche 2 with remaining sections to be progressed (predominately Queens St, High Street improvements).	9		✓	✓	
A25	City Centre	Cycling	LCWIP Cycle and Walking Route 1	LCWIP Cycle and Walking Route 1 runs from north of A12 J28 along Via Urbis Romanae, Northern Approach Road and North Station Road connecting to the City Centre and LCWIP Cycling Route 8 at the High Street and North Hill junction. The route also covers the area between North Hill and Guildford Road, north of the High Street and East Hill.	6	7, 9	✓	✓	
A6	City Centre	Cycling	LCWIP Cycle Route 6 and LCWIP Walking Route 5	LCWIP Cycling Route 6 and Walking Route 5 (follow same route) will provide connectivity between Ipswich Road and the surrounding residential areas with Castle Park and the town centre. It connects Willow Brook Primary School & Nursery on Goring Road to the High Street via Maidenburgh Street Off Road paths within Castle Park.	8	9	✓	✓	

Continued on next page

Table E.3: Active travel mitigations *(continued)*

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Colchester
A11	Clingoe Hill / Colne Causeway	Cycling	LCWIP Cycle Route 9 and overlapping parts of LCWIP Walking Route 2	LCWIP Cycle Route 9 connects Colchester Town Rail Station, Hythe Rail Station via Barrack Street to Old Heath Community Primary School via Old Heath Road. Delivery associated only with the A134 Colchester Town Station - Hythe Hill and Hythe Quay sections of the route. Elements of LCWIP Walking Route 2 overlap with this cycle route and would benefit from this scheme.	10	9	✓	✓	
A4	Clingoe Hill / Colne Causeway	Cycling	LCWIP Cycle Route 4a and overlapping parts of LCWIP Walking Route 2	LCWIP Cycle Route 4a connects Hythe Rail Station to Whitehall Industrial Estate via Hawkins Road and Haven Road. Elements of LCWIP Walking Route 2 overlap with this cycle route and would benefit from this scheme.	10		✓	✓	
A7	Clingoe Hill / Colne Causeway	Cycling	LCWIP Cycle Route 7	LCWIP Cycle Route 7 will look to provide a key north-south route linking Severalls Business Park with the University while at the same time providing a critical route through Greenstead. It connects Colchester Business Park to University of Essex Colchester Campus Via Severalls Road, A1232 Ipswich Road and Greenstead Estate.	17	10, 6	✓	✓	
A18	Clingoe Hill / Colne Causeway	Walking	Walking Route Connecting LCWIP Walking Routes 3, 4 and 12	Walking route along Clinghoe Hill arm of Greenstead roundabout providing connections to LCWIP Walking Routes 3, 4 and 12	10	100	✓		

Continued on next page

Table E.3: Active travel mitigations *(continued)*

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Colchester
A19	Great Tey & Wakes Colne	Cycling	Chappel & Wakes Colne Cycle Hub	Secure cycle hub at Wakes Colne Railway Station	3		✓		
A20	Great Tey & Wakes Colne	Cycling	Wakes Colne Cycle Route	Cycle route connecting developments to south of Swan Grove and development north of A1124 to Wakes Colne Railway Station via Chappel Hill, The Street and Station Road.	3		✓		
A24	Horkesley Heath	Cycling	LCWIP Cycle Route 1b	LCWIP Cycle Route 1b connects Mile End with Horkesley Heath along Nayland Road	2	6	✓	✓	
A13	Horkesley Heath	Walking	Cycling and Walking Route extension of LCWIP Cycle Route 1b	Formalise secondary walking route from Horkesley Heath to LCWIP Route 1b via Coach Road	2		✓		
A22	Langham & Boxted	Cycling	Cycle route to Langham	Formalise secondary cycle route connecting Langham to P&R site and access to RTS via Langham Lane, Moor Road and School Road	1		✓	✓	
A9	Langham & Boxted	Cycling	Cycle route to Boxted	Extend cycling route to access and service development via Straight Road	1		✓		
A3	Marks Tey	Cycling	Extension of LCWIP Cycle Route 3	Route extension of LCWIP Cycle Route 3 to access developments at Marks Tey and Marks Tey Station	4	9	✓		
A23	Marks Tey	Highway	Active travel bridge upgrade across A12 at Marks Tey	Repair and widening of the existing footbridge across the A12 at Marks Tey to enable cycle use and support access to the station.	4		✓		

Continued on next page

Table E.3: Active travel mitigations *(continued)*

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Colchester
A5	North East Central	Cycling	LCWIP Cycle Route 4b	LCWIP Cycle Route 4b consists of 2 sections. The first section follows a 1 km route connecting East Street to Broadlands Way via Ipswich Road. The second section follows a 1 km route connecting East Street to Goring Road via A137 Harwich Road.	17		✓		
A8	North East Central	Cycling	LCWIP Cycle Route 7a	LCWIP Cycle Route 7a connects A1232 Ipswich Road to A137 Parsons Heath Via St. Johns Close and St. Johns Road - passing directly to the south of the NE Colchester development (full routing to be reviewed to align with development site access)	17		✓		
A16	North East Central	Walking	LCWIP Walking Route 4	LCWIP Walking Route 4 connects Colchester Business Park to Greenstead Roundabout via Severalls Lane, Ipswich Road and Greenstead Estate.	17	100	✓		
A12	Northern Approach from J28	Walking	LCWIP Walking Route 1 Extension in Braiswick	Formalise the secondary off-road route branching from LCWIP walking route 1 to improve pedestrian and cycle access to Colchester station (North) and through the Braiswick residential area Explore access from Axial Drive park into new development site	6		✓		

Continued on next page

Table E.3: Active travel mitigations *(continued)*

Scheme ID	Movement corridor	Type of measure	Scheme name	Scheme description	Contributing areas		Expected causal links		
					Primary	Secondary	New local plan sites	Committed sites	Growth beyond Col-chester
A21	Tiptree	Cycling	Cycle route along B1023 to Tiptree	To improve connectivity within the town and access to Kelvedon high street and railway station to support sustainable travel associated with planned growth. The A12 Chelmsford to A120 DCO document identified the delivery of a strategic walking and cycling route linking Tiptree with Kelvedon and the railway station, including a safe crossing at the A12 J24.	14		✓		
A1	West Bergholt & Braiswick	Cycling	LCWIP Cycle Route 1a	LCWIP Cycle Route 1a connects West Bergholt to North Station Roundabout via the B1508.	5		✓	✓	
A14	West Bergholt & Braiswick	Walking	Bakers Lane walking route	Walking route along Bakers Lane to improve access to bus services	5		✓		
A17	West Colchester	Walking	LCWIP Walking Route 10	LCWIP Walking Route 10 connects Essex County Hospital to Stanway via A1124 Lexden Road and London Road.	4		✓		

F Maps of vision-led mitigation measures

F.1 Introduction

The previous appendix, Appendix E, listed proposed integrated transport and vision-based mitigation required to support reference case and proposed new local plan growth. The measures were divided, in approximately manner, into highway, public transport and active travel schemes. The measures in each table were grouped by their location on movement corridors.

This appendix shows the location of highway, public transport and active travel measures together on each movement corridor. The maps also show how the measures relate to nearby reference and new local plan developments in the Colchester council area.

For completeness, a map for each of the movement corridors mentioned in the tables in Appendix E is provided. This means some maps are sparse. Sometimes this is because measures are required due to cumulative growth further afield, such as A12 J29.

The measures provide a good indication of range and scale of mitigation that would likely be required to mitigate and connect reference case and new local plan growth. However, additional measures might be required as more detailed analysis in undertaken, which would support planning applications. Furthermore, each of the mitigation schemes could be divided into phases to align to individual developments or tranches of growth.

F.2 Schemes in the city centre

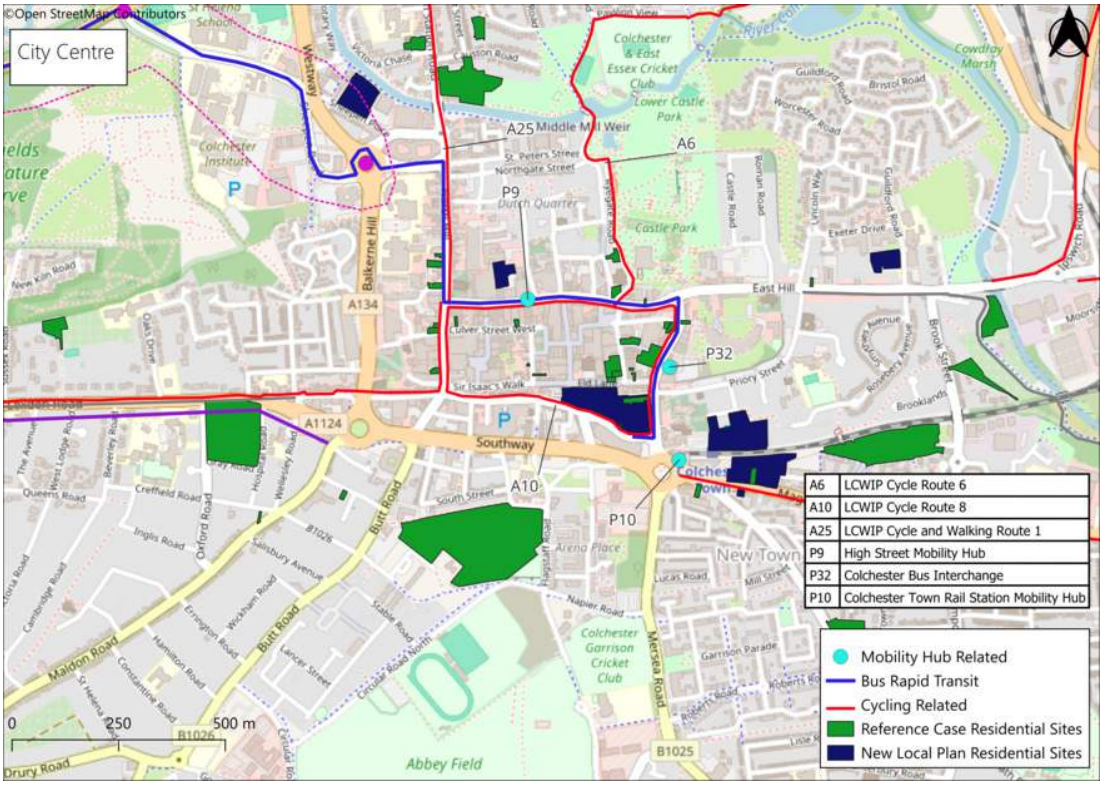

Figure F.1: Mitigations around the city centre

F.3 Schemes in eastern movement corridors

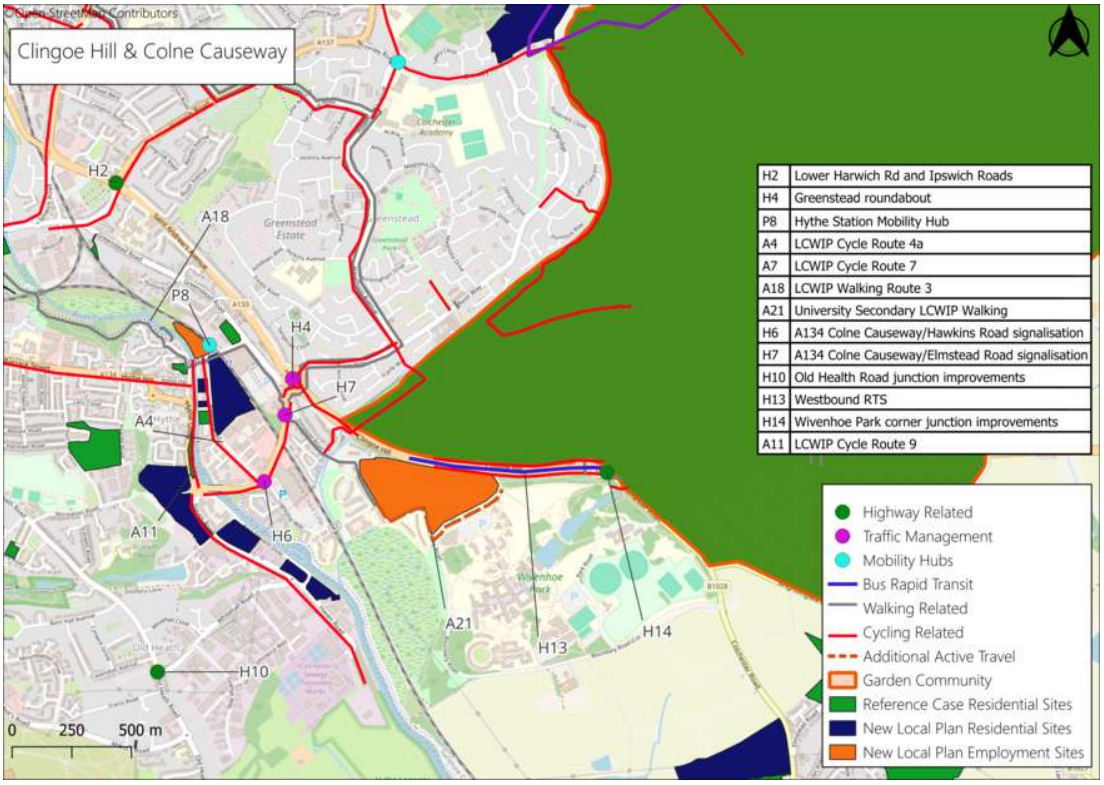

Figure F.2: Mitigations around Clingoe Hill and Colne Causeway

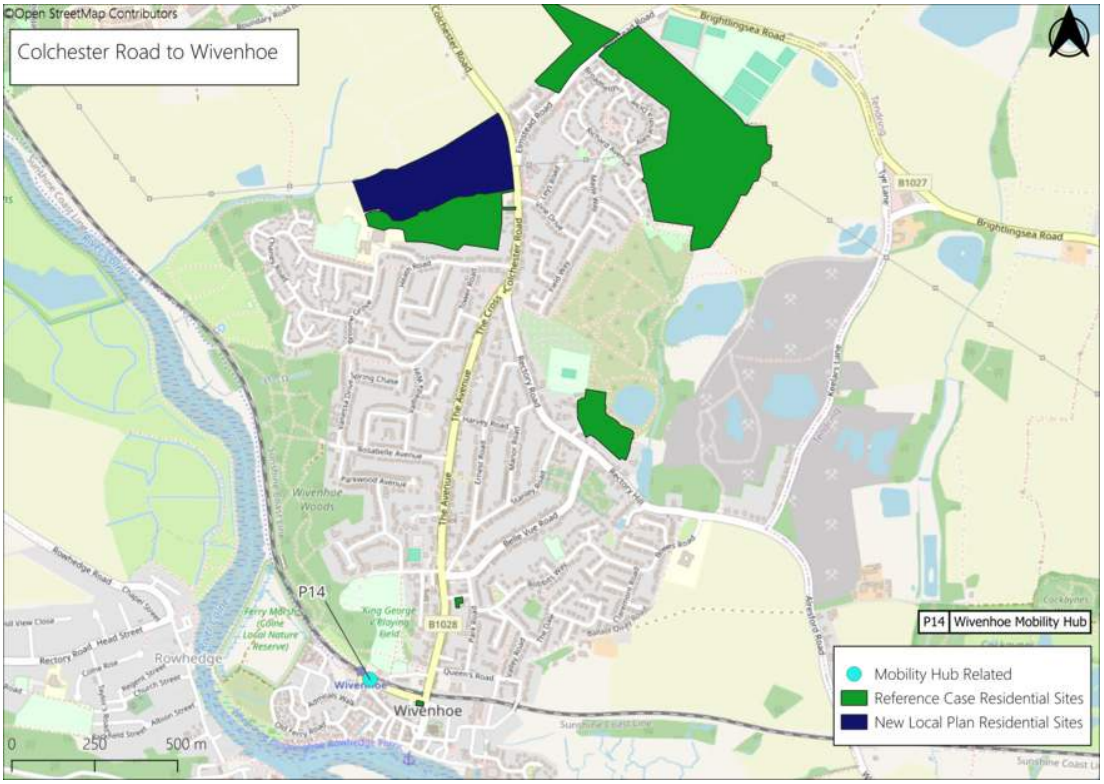

Figure F.3: Mitigations around Colchester Road to Wivenhoe

F.4 Schemes in northern movement corridors

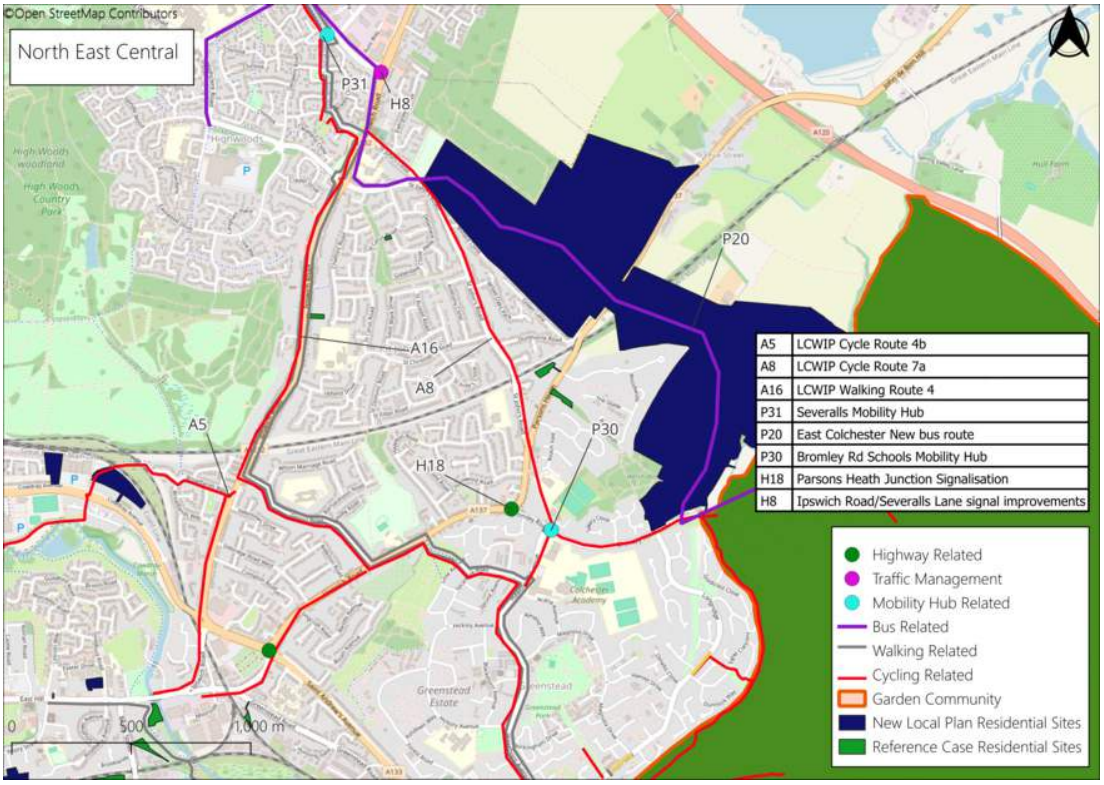

Figure F.4: Mitigations around North East Central

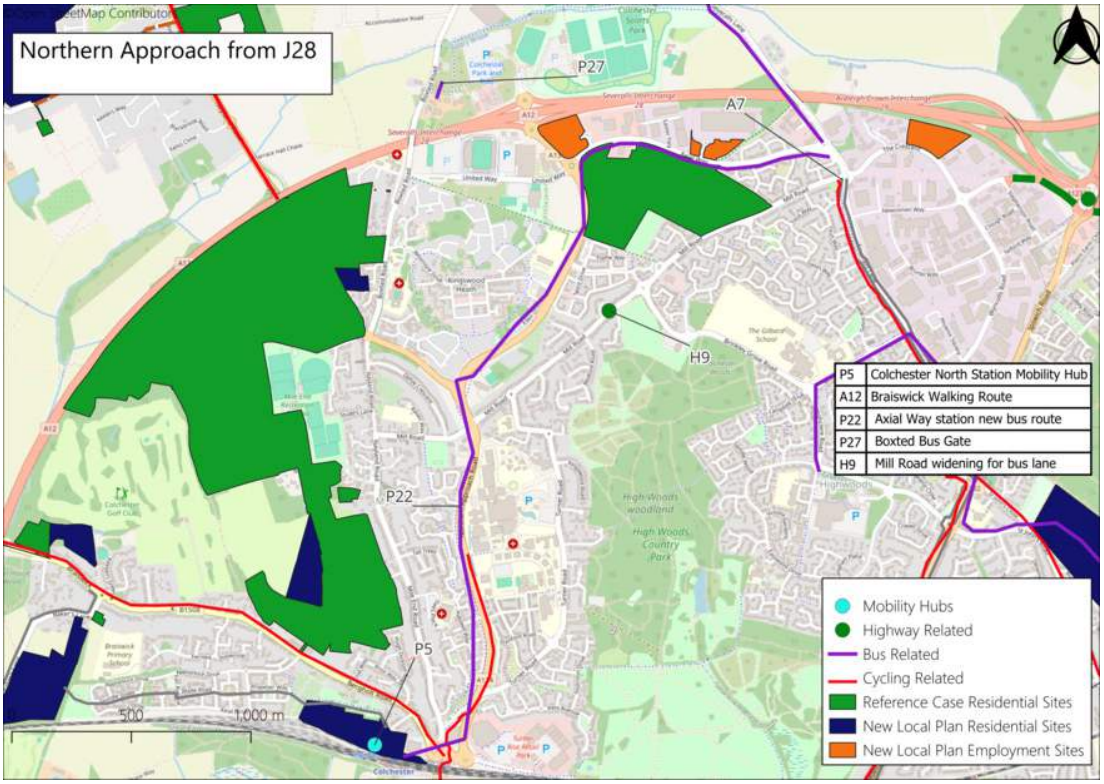

Figure F.5: Mitigations around Northern Approach from J28

Figure F.6: Mitigations at A12 J29

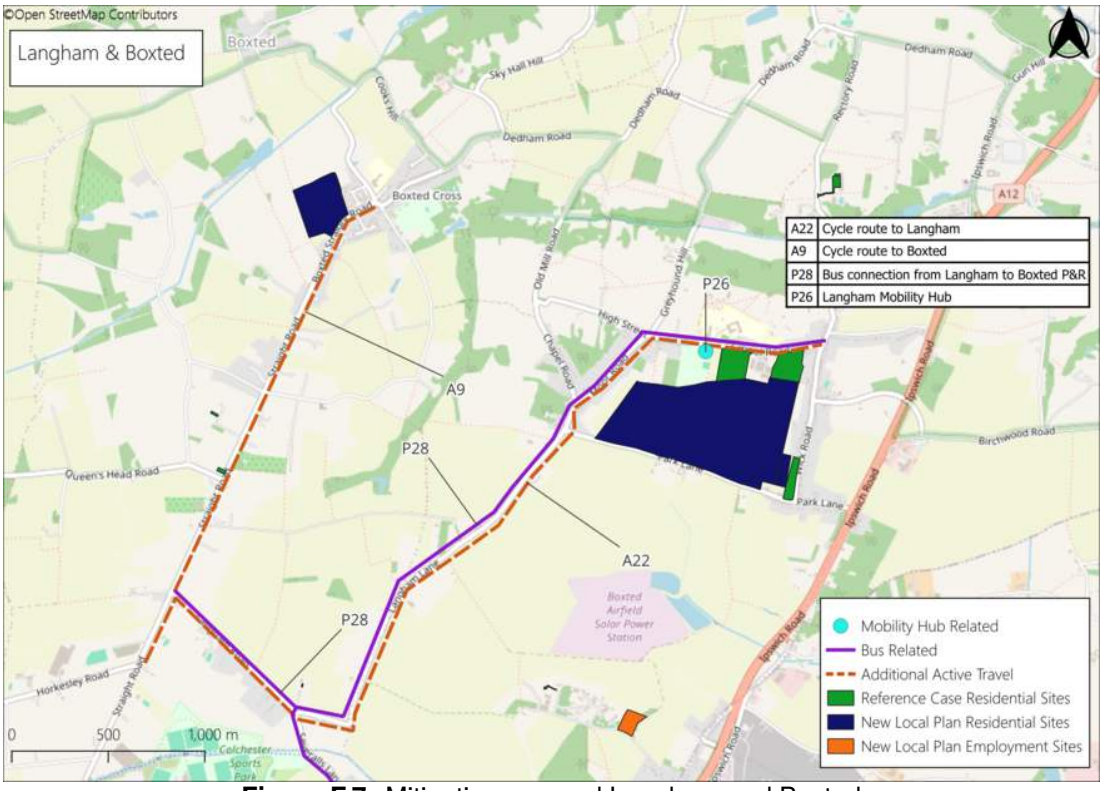

Figure F.7: Mitigations around Langham and Boxted

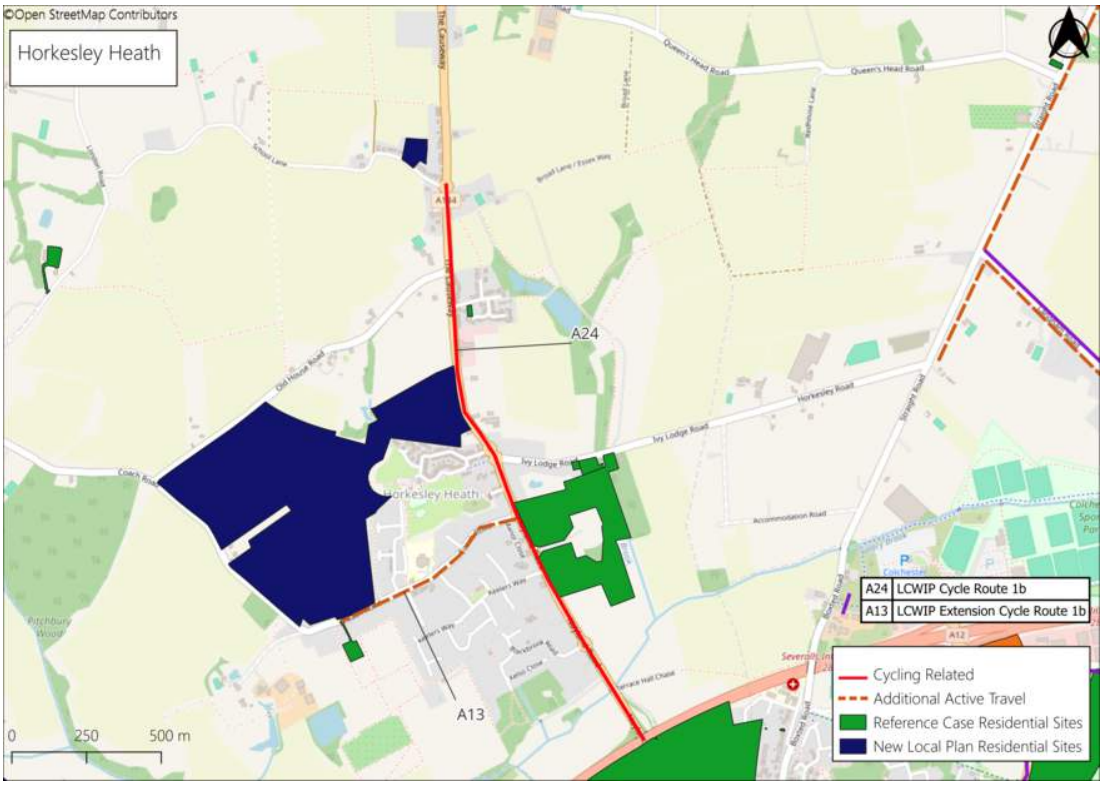

Figure F.8: Mitigations around Horksley Heath

F.5 Schemes in western movement corridors

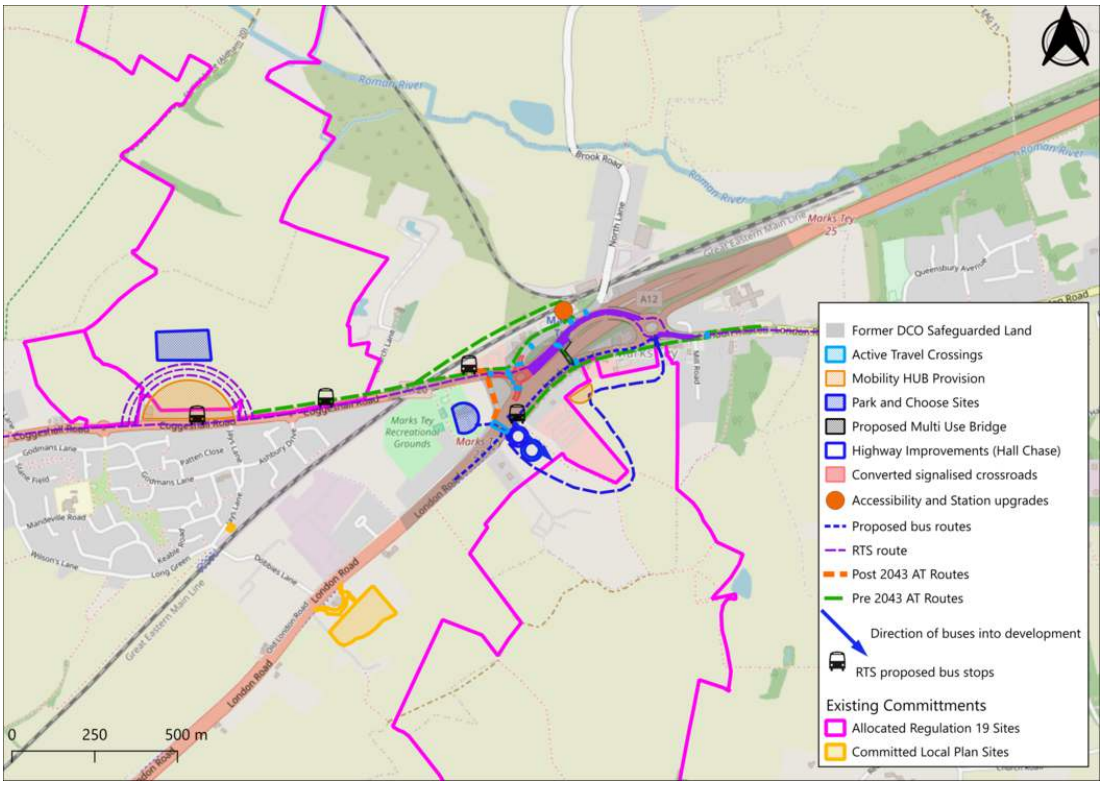

Figure F.9: Mitigations around Marks Tey

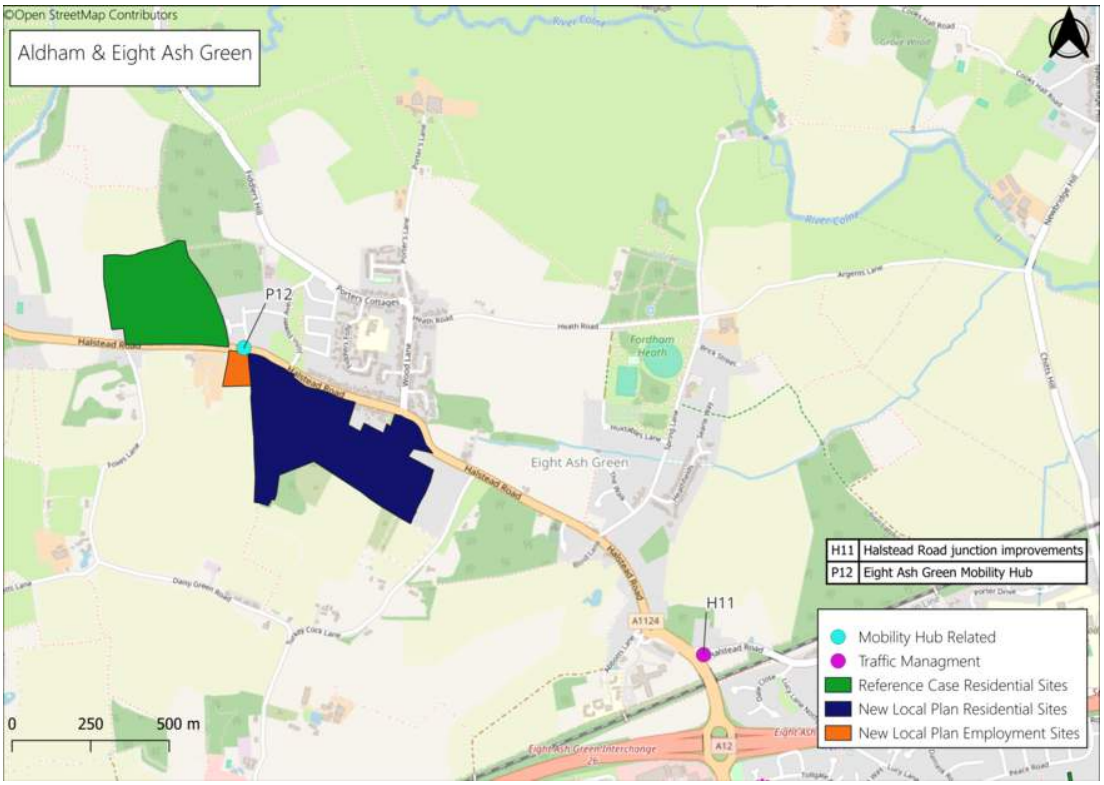

Figure F.10: Mitigations around Aldham and Eight Ash Green

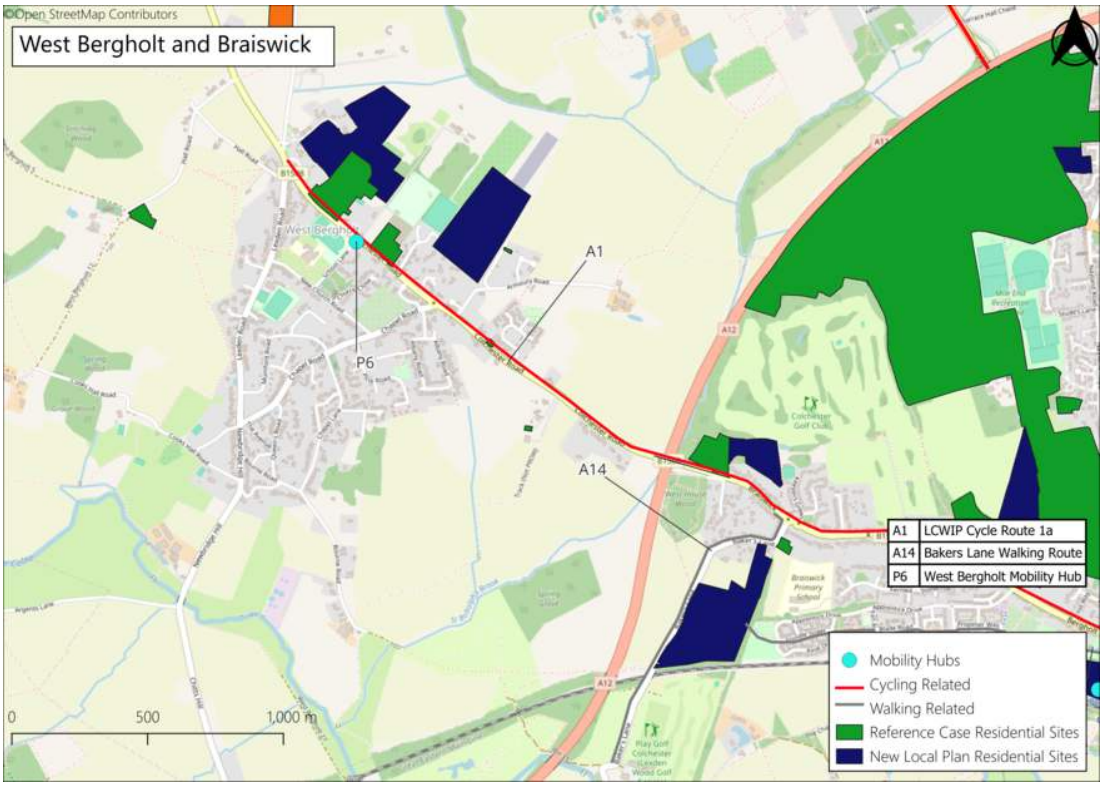

Figure F.11: Mitigations around West Bergholt and Braiswick

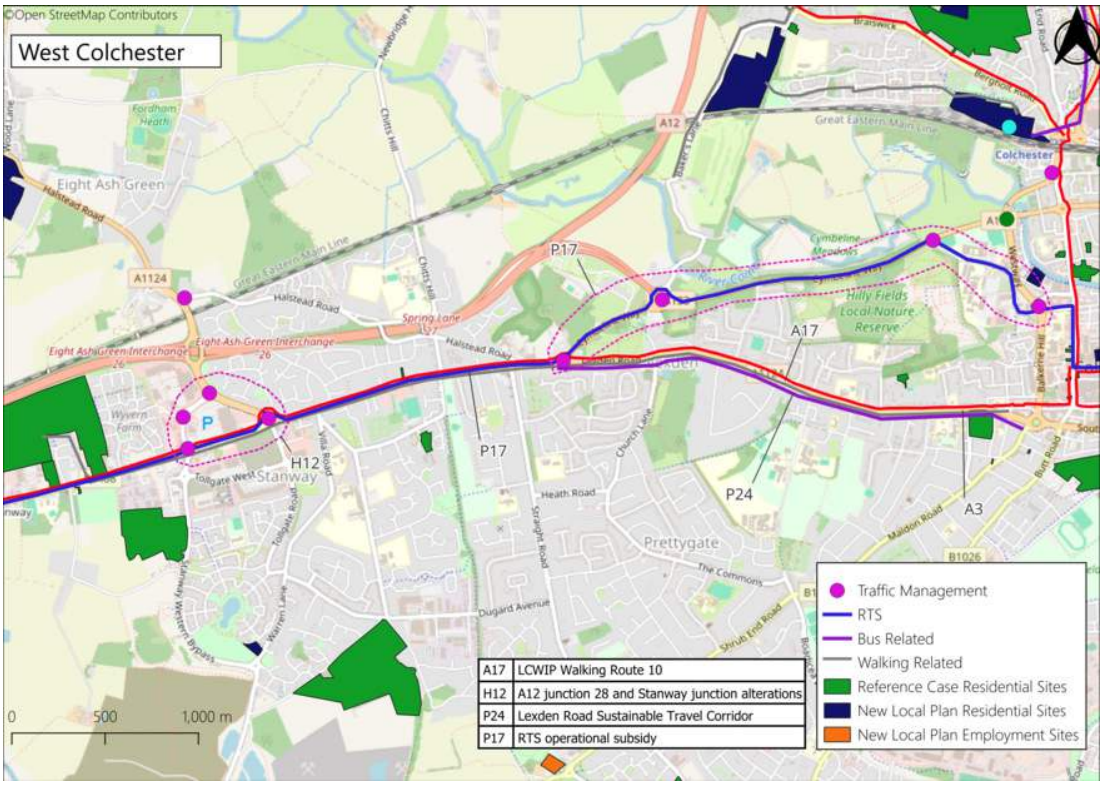

Figure F.12: Mitigations around Colchester

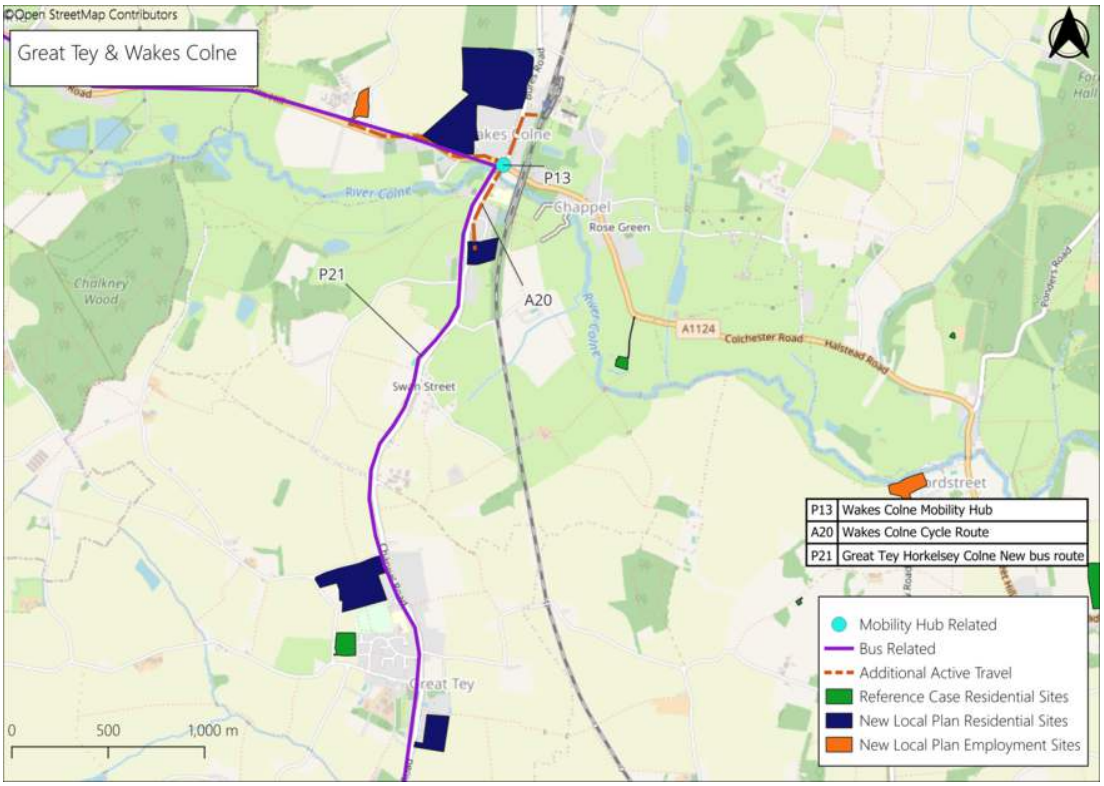

Figure F.13: Mitigations around Great Tey and Wakes Colne

F.6 Schemes in southern movement corridors

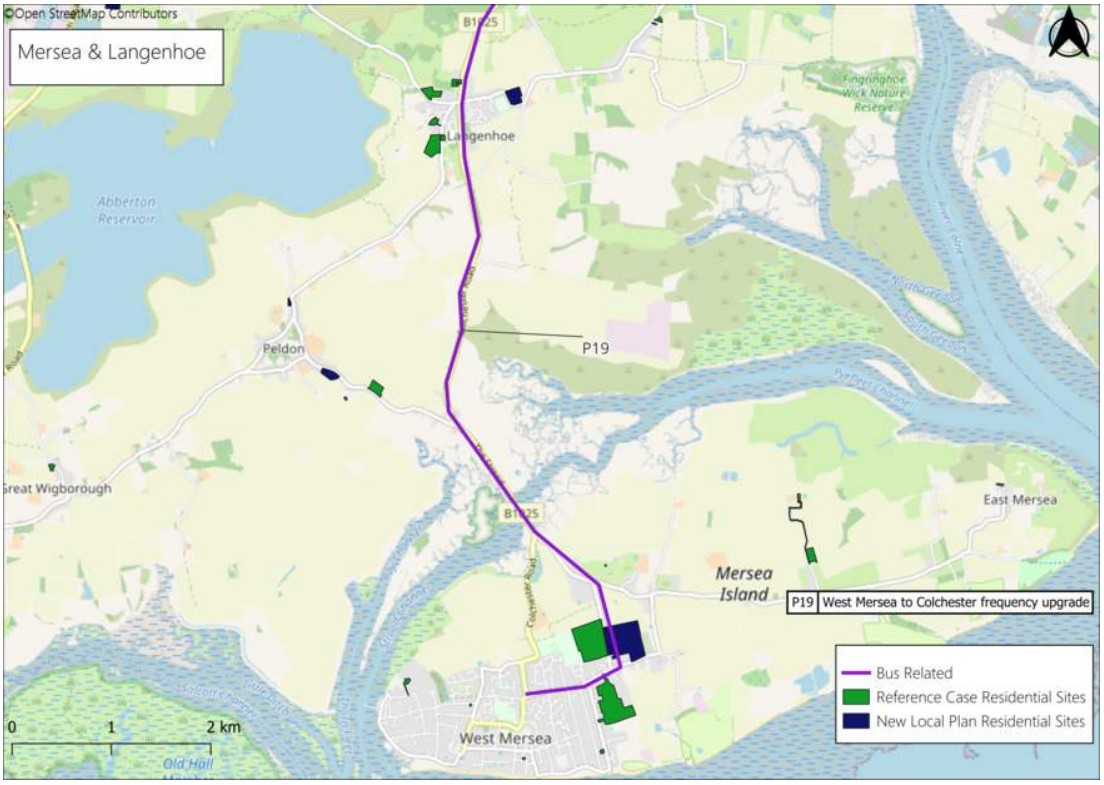

Figure F.14: Mitigations around Mersea and Langenhoe

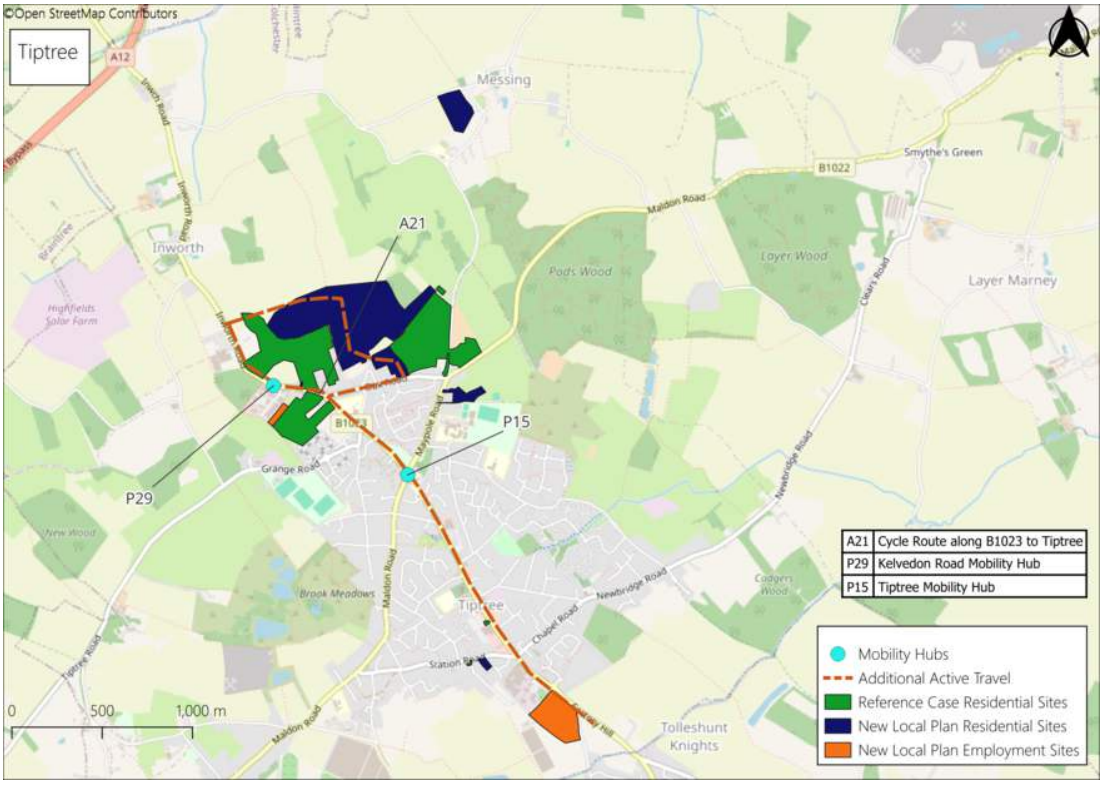

Figure F.15: Mitigations around Tiptree

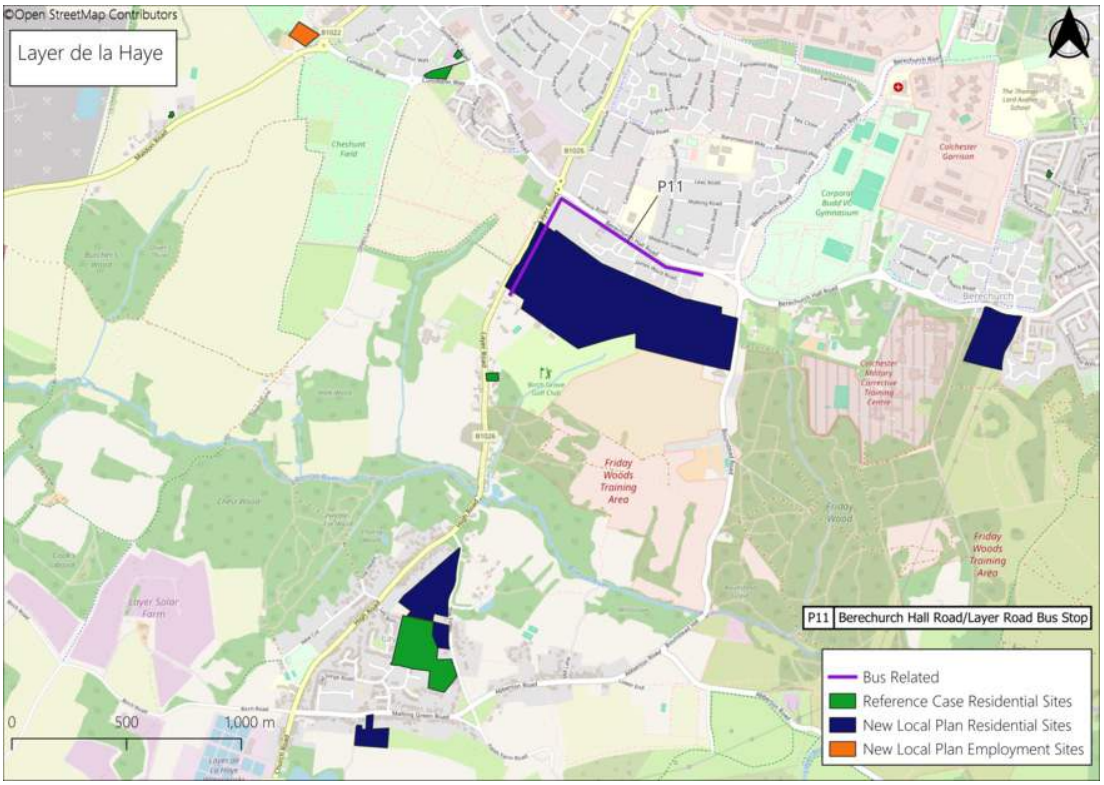

Figure F.16: Mitigations around Layer de la Haye

G Deriving sustainable transport demand

G.1 Introduction

Chapter 3 summarises the vision-led and integrated package of measures in order to accommodate local plan growth. In order to integrate the transport system, all modes should be considered to keep people and good moving suiting different trip purposes. Within this packages, the sustainable travel vision is key to reduce the number of car trips within the city. This chapter presents evidence on the expected scale of reduction in car trips and outlines the the methodology to reduce car trips. The content of this appendix is based on evidence presented in the *Colchester Local Plan Review: Further Transport Evidence* report [10].

Whilst variable demand modelling (VDM) will reflect the impact of significant public transport changes, for example rapid transit system (RTS), it will not reflect the impact of smaller scale changes such as walking and cycling measures, Bus Service Improvement Plan (BSIP) measures and park and choose (P&C) expansion. This chapter discusses how the impact of each of these types of sustainable transport schemes has been gauged and applied in the transport model.

G.2 Evidence for ST

G.2.1 Walking

Walking is unlikely to be a practicable replacement for many car trips. Nevertheless, it is a key complementary measure which should accompany land use polices aiming to reduce the distance being travelled and support access to public transport stops and stations.

There is evidence that creating attractive walking routes and pedestrianised and low traffic areas can encourage less car trips and lead to traffic evaporation. Studies have shown that reallocating road space from cars to other mode users can result in significant reductions in total traffic with 14%-25% of traffic not observed to be displaced onto neighbouring streets, as is commonly assumed [32].

Well planned improvements to public spaces can also boost footfall – which can indicate such schemes contribute to changes in travel behaviour as well as the local economy. For example a £10 million investment in Piccadilly, Stoke-on-Trent, to make the area more pedestrian friendly increased footfall by 30%. Similar improvements in Sheffield Peace Gardens and Coventry City Centre resulted in 35% and 25% increases in footfall, respectively. Altrincham (Greater Manchester) and Kelso (Scottish Borders) have also seen increases in footfall following improvements to streets, pavements, and crossing points. Altrincham experienced a 25% increase in footfall between 2010 and 2017, while Kelso saw a 28% increase above 2011 levels [22].

Of course not all pedestrian interventions will be of the scale of the above. It is therefore relevant that small scale pedestrian interventions also lead to changes in the footfall, which can indicate changes in route but also changes in travel choices. A study in New Zealand assessed the impact of kerb extensions, refuge islands and controlled crossings in eight cities and towns. It found that pedestrian use increased in seven of the eight sites, ranging from 7% to 90% [22].

In addition walking can be encouraged through relatively low cost wayfinding measures, which can help visitors find key attraction and interchanges.

Essex County Council (ECC) has developed and adopted new guidance of place making in developments which is reflected in the draft Local Transport Plan (LTP). Schemes that have been implemented show the intent and capability of the councils to deliver on their ambition. This provides confidence that, dependent on IADP funding and adoption of the new local plan, that the extensive improvements to the pedestrian environment can be implemented across the urban area. Consequently, for preferred options developments, it seems reasonable to allow a reduction in car trips at the lower end of the evidence provided in this section (14%-25%). Crucially, this has been restricted to trips of under 2km.

Application to modelling assumptions

Proposed measures include walkability at new developments and connecting development to key facilities and infrastructure. In addition, Local Cycling and Walking Infrastructure Plan (LCWIP) measures will improve the pedestian environment at reference case developments and for existing settlements.

Based on the evidence it is considered reasonable that a reduction in short car trips of less that 2km in urban areas could occur. This reduction is estimated at 15% at preferred allocations and one third of this reduction for trips in the reference case, which also benefit from the infrastructure (i.e. a 5% reduction in car trips less than 2km in distance).

G.2.2 Cycling

The implementation of cycle infrastructure in Colchester has shown an increase in cycle movements and associated decrease in vehicle flows. Monitoring of Active Travel Fund schemes by Essex Highways in Colchester recorded that:

- the introduction of two-way cycle tracks in the city centre increased cycle flow by 43%-78%
- the presence of on-road cycling markings and signage was followed by a 3% and 22% increase in cycle flow
- associated vehicle flows on the strategic routes towards the city centre reduced by up to 4%, while vehicle flows within the congested city centre decreased by 10%

The Department for Transport (DfT) commissioned research to understand the extent to which implementation of cycle lanes and junction treatments convert car trips to cycle trips [6]. Drawing on surveys between 2016 and 2019 the research estimated a conversion percentage ranged from 12%-40% across case studies. Norwich, being a comparable city in size, characteristic and historic value in the East of England showed percentages towards the higher end of this scale.

As would be expected, studies such as by Sustrans [33] and Transport of Scotland [38], concur that for the cycle routes to be effective they must be part of a coherent network linking key destinations.

Developing a network also requires secure and sheltered cycle storage facilities at both ends of a trip. Sustran's Bike Life, the UK's biggest assessment of cycling in 12 cities and towns, found that the absence of sufficient and secure cycle storage facilities is one

of the major barriers to encouraging more people to cycle [31]. This is corroborated in research by CCC which found residents prefer secure parking options to standard unsheltered bicycle racks. CCC reports that its secure cycle parking hub operated by Spokesafe is seeing year on year increases in membership and number of individual bike storage entries to the facility. This is forecast to outgrow the existing facility early in the local plan period, with the demand showing the need for new facilities city wide.

Paying for cycle storage can, however, be a deterrent as well as inconvenient locations as found in research in the Netherlands [24] – cheaper cycle parking options are more beneficial than bike storage lockers. This has also been found to be the case in Greater Manchester where Transport for Greater Manchester (TfGM) have moved away from providing secure, paid for cycle lockers to covered shelters with good surveillance and CCTV coverage.

Cycling use can also be boosted significantly in cases where a major barrier is overcome through a bridge or tunnel. In Colchester this is relevant given the need to bridge the A12 to encourage sustainable travel to and from allocations around Marks Tey. Sustrans reports increases ranging from 126% to 1700% [34] – where lower increases were seen in closer proximity to urban and residential areas potentially due to the presence of alternative routes. Extremely high changes can be recorded where a bridge, for example, opens up a new route for cyclists which previously had extremely low flow.

New cyclists can also be encouraged through cycle training and the presence of cycle hire schemes, of which the latter lowers the entry barrier to cycling by avoiding the costs of purchase and maintenance and concerns over secure cycle parking.

An online survey of Dr Bike maintenance session users showed a 38% shift from car to cycling for various journey purposes between 2020 and 2021, based on 20,627 trips. Additionally, Hertfordshire's Bikeability training for schools, combined with NTS data from 2008-2013, demonstrated a 12% car-to-cycle ratio [6]. These findings highlight how cycle training initiatives can reduce car dependency, improve traffic flow, and promote more sustainable transportation options.

For cycle hire schemes, a significant shift is observed from public transport and walking to cycling. For instance, a survey of cycle hire users in London revealed that most new cycle hire trips replaced public transport and walking trips rather than car trips [38]. Although the shift from car usage to bike share is less pronounced, it is still notable. Studies from Melbourne, Brisbane and Minneapolis showed that around 20% of cycle hire users substituted car trips with cycling trips. In Washington, 5% of bike share users sold a household vehicle, with 80% of them citing cycle hire as a factor in their decision [11]. Furthermore, it is estimated that approximately 5-8% of trips taken by cycle hire are new journeys that would not have occurred without the availability of the cycle hire system. Indicating that cycle share can induce new trip demand on the network, which supports cycling infrastructure development [11].

Similar to bike share schemes, e-sooters and e-bikes have shown potential for encouraging modal shift from private cars. For example, the CoMoUK Annual Bike Share Report found that 34% of e-bike users replaced car trips, compared to 24% for regular cyclists [23]. In the Solent e-scooter trial the average trip duration was between 15 and 20 minutes, highlighting the potential for e-scooters to replace short car journeys [23], which relates closely with the Colchester e-scooter trial data where analysis of using data shows average weekly ride trip distance is around 2km. E-bikes share can facilit-

ate seamless integration between cycling and public transport. The CoMoUK Annual Bike Share Report found 46% of respondents use e-bike share to make their journeys easier, and 26% use it due to a lack of access to public transport [23].

As for walking, ECC has adopted appropriate policies and begun to roll out high quality cycle infrastructure. Figure G.1 shows a section of the segregated RTS, cycling and walking infrastructure completed in 2025. Meanwhile the plans shown in Section 3.4.2 on which the vision-based mitigation strategy in the IADP is based shows how all key destinations in the urban area will be linked by the LCWIP network.

Figure G.1: Integrated RTS, cycling and walking infrastructure completed in 2025

The evidence presented in the report shows a large range of impacts of cycle infrastructure. The DfT commissioned research identified a range between 12-40%. Given the quality of the infrastructure being provided in Colchester, which is backed up by policies and the planning system, it seemed reasonable to assume that development sites will be in this range at development sites but not as high for reference case demand. However, erring on the side of caution, a maximum 15% shift at development sites was chosen as it was close to the lower end of the range. This is applied only to journeys with trip ends in the urban area with a maximum length of 10km (just over 6 miles). While reference case demand will also benefit, only third of the 15% reduction has been applied.

Application to modelling assumptions

Proposed measures include a sigificant expansion of the LCWIP network across the urban area along with enhancements to routes in non-urban locations connnecting allocations to key facilities and interchanges. Furthermore planned measures would extend secure cycle parking and training and travel behaviour change towards cycling would be incentivised through travel planning.

Cycleable trips are considered those less than 10km long but are not confined only to urban areas, especially given the rise in e-bikes. Of these trips, it is within the bounds of the evidence that the shift from car should be no less than 15% at site allocations where cycling routes, facilities and travel planning would be concentrated. Reference case trips would also benefit, but a lesser shift of 5% from car trips is estimated.

It should be noted that an increase in cycling will also abstract trips from public transport.

G.2.3 Park and choose facilities

Colchester already has a park and ride (P&R) site in the north by A12 J28 and, in the reference case, it is assumed that P&C in the east of Colchester opens as part of the Tendring Colchester Borders Garden Community (TCBGC) development. By 2043 both facilities would be served by RTS. It is proposed that a mitigation measure should be a third site to the west – P&C West.

Evidence suggests that the P&R is successful when supported by parking controls in terms of price and restrictions on availability. Through CCC parking strategy, the principles and mechanism for incrementally controlling parking supply have been established which will support successful P&R use.

Therefore it is reasonable to surmise that creating a ring of P&R facilities backed up with parking changes ensure P&R is well used as for example in Chelmsford, Cambridge and Oxford.

Application to modelling assumptions

It is assumed that across P&R North, P&C East and the proposed P&C West there will be no less than 2,400 spaces. By 2041, the parking policies will lead to high usage of the order of 1,800 spaces.

Of these spaces, half, that is 900 spaces would become occupied during the AM peak period between 7.00-10.00, which means that over a peak hour there would be 300 trips made to the P&R sites and not to the urban area.

This estimated is also corroborated using CCC's parking model and aligns well with an extrapolation of observed use at P&R North.

G.2.4 Local bus improvements

While premium RTS and P&R services are important on key corridors and to connect well-used destinations, it would be amiss not to consider local bus services to other destinations, which would have a significant role in modal shift as well as maintaining accessibility for those without access to a car.

The proposed measures include new bus services and bus priority measures, which have been influenced by Colchester BSIP. Case studies from cities like Nottingham and Reading [20] demonstrate that well implemented bus priority strategies lead to higher bus patronage. Research indicates that each percentage-point increase in bus priority coverage can lead to a 1.1% increase in ridership [39].

Furthermore extension of digital Real time information (RTI) displays can improve the predictability of journeys and ease of journey planning, and reduce their wait time at a bus stop, thereby improving the customer experience. RTIs can reduce the transit stop wait time by three minutes [2]. This is particularly beneficial to users boarding a bus in rural areas, where scheduled bus services are less frequent, potential delays to buses may significantly deter users from using bus services, especially as a connection to another stage of their journey such as a connection to a train station. The provision of real time information displays at bus stops may increase the uptake of bus journeys by providing users with the confidence that they are receiving accurate information, allowing users to plan their trips more efficiently [9]. In Norfolk County Council, 162 real time information screens had been installed, contributing to a 16% increase in bus passengers in the last year [26].

New and enhanced bus services themselves also contribute to increases in bus patronage. Overall, studies indicate that increases in bus service frequency and operating times can lead to uplifts in excess of 7% in passenger numbers across various regions in the UK, for example:

- Nottingham – 12% [12]
- Hertfordshire – 7% [12]
- Derbyshire – 17% [12]
- Transport for London (TfL) – 10-15% [35]
- Reading – 9% [5]

In addition, fare incentives have been shown to increase patronage. Nottingham reported a 10% increase [4], West Yorkshire Combined Authority (WYCA) a 15% with fare reductions and simplified ticketing [21] and TfGM a 12% increase in an initiative targeted at young adults and students [27].

Application to modelling assumptions

The proposed vision-led mitgation supports step improvements in extension and enhancment of the local bus network, which includes priority measures, better RTI and simplified ticketing. At preferred allocations incentive schemes would also encourage greater use of local buses.

Car trips considered in scope to switch are those starting and finishing within the Colchester council area that are 2-15km long. At development sites it is estimated local bus improvements could contrubute to a 10% modal switch away from car but only 3% for reference case demand.

G.2.5 Mobility hubs and interchanges

Mobility Hubs combine a range of facilities to support inter-modal travel and facilitate micro-mobility sharing including e-scooters and cycle hire. Mobility hubs can enhance both the legibility of public transport and active travel networks by providing efficient transfer between two modes, such as bus and cycle, thereby further increasing the attractiveness of travelling actively or by public transport for long journeys.

For the purposes of this assessment, and the avoidance of double counting modal shift from walking, cycling, RTS, P&R and bus interventions, mobility hubs will focus on the added contribution from car clubs, demand responsive transport (DRT) and freight consolidation.

G.2.5.1 Car Clubs

DfT commissioned research has found that [3] found that:

- vehicle ownership among car club members decreased by 9.5% - 33.1%. The UK-based example showed that 19% of car club members using the back-to-bay model of car sharing relinquished their household vehicle.
- for the UK-based example, 27% of car club members claimed they would have purchased or leased a private car if they had not joined the car club.
- evidence from a study undertaken in The Netherlands suggests that 15% of kilometres driven by a car club member would not have been travelled without their membership – but still pointed to an overall decrease in distance travelled by car.
- a significant percentage (68%) of UK business-to-business car club members used a car club vehicle for their usual business travel (51% would have used a private car for these trips).
- in the UK-based study, 8% of car club members would swap back to using a rental or private car for journeys they take using car club vehicles.
- where car-club pick up points are located nearby public transport, back-to-bay car club members increased their car club use and were more likely to use public transport to travel to and from car club pick-up locations.
- in Bristol, car club members say they are 50% less likely to own a car compared to the general population. This is supported by data from Edinburgh and Brighton and Hove where car club membership has been associated with a reduction in private car

ownership.

- in London, data suggests that each car club vehicle can replace up to 10 privately owned cars [7], while in Bremen data shows each car club vehicle removes 16 cars from the road [8]. This is supported by data in Bergen which shows after the introduction of car clubs at mobility hubs, usage increased by 70%, resulting in a reduction in street residential car permits being sold [8].
- car sharing schemes, whether point-to-point or free floating, also lead to reduced car ownership with studies indicating 5-15 cars are replaced for each shared car added to the fleet [36].

G.2.5.2 Demand Responsive Transport (DRT)

DRT has demonstrated a measurable success in reducing private car trips and in the way of customer satisfaction, reportedly due to the convenience, affordability and flexibility of the service, particularly in largely rural and dispersed areas where local bus services are limited, or it may not be commercially feasible to implement a timetabled bus service:

- the Northwest Downloads service, and the Thatcham Connect service (collectively known as the West Berkshire DRT) have both successfully attracted new users [12]
- West Midlands On-Demand launched in 2019 and reduced private car trips by 20% in the first year [25]
- since the launch of the Arriva Click service in Liverpool, which is known for being particularly affordable, there has been a 15% reduction in private car trips [1]
- Go2 in Oxfordshire has shown a 10% decrease in private car trips within the first 6 months in operation [40]
- Tees Flex, in the Tees Valley, launched in 2020 and has contributed to a 12% reduction in private car trips [30]
- Hertfordshire and West Berkshire noted a large proportion of users were accounted for by concessionary fare users and connecting rural areas [12] (which demonstrates how the service can remove the barriers to transport providing essential connectivity to those who may not have alternative modes of transport)

G.2.5.3 Sustainable last mile journeys and freight consolidation

A significant barrier to the adoption of non-car alternatives is the perception that public transport and active modes are less convenient, especially for picking up up deliveries. Mobility hubs therefore provide opportunities for the delivery of goods as they act as convenient collection points, i.e., at parcel lockers, or through the provision of e-cargo bikes as an alternative to last-mile delivery.

Application to modelling assumptions

The proposed vision-led measures support the introduction of a network of mobility hubs, which will improve interchanges between public transport and active modes. Parcel lockers and shared e-cargo bikes will support the convenience of public transort and active modes; while DRT will enhance the reach of the local bus network.

Last mile freight and DRT are considered supporting measures for cycling, RTS and local buses, so no additional contribution to modal shift is estimated.

However, car clubs are seen as able to reduce car trips. On the assumption that one club car could be provided for every 40-50 homes, this could lead to no less than 250 car trips removed from the peak hours. Furthermore, since car clubs can be at other locations this could reduce reference case car trips by no less than 80 trips.

G.2.5.4 Other measures to encourage sustainable transport

Categories of sustainable transport interventions also include land use, travel planning and highways and traffic management.

There is strong evidence that concentrating development around public transport interchanges increases public transport use. Indeed, this is a key reason why some continental European cities and towns have greater public transport use than UK cities and towns with comparable public transport systems [29]. However, such a change could only occur over the very long term and there is no evidence to suggest that land use changes would result in additional mode shift by 2041.

This does not mean that new developments should not be taking every opportunity to integrate land use and sustainable transport – thereby reducing the distance of trips and prioritising sustainable travel in accordance with national, ECC and CCC policies. Integrated land use and transport planning will also support the achievement of modal shift evidenced in earlier parts of this section ([37] and [28]). Land use and transport integration also extends to use of parking policies. This was discussed in relation to P&R in Subsection G.2.3, but would also support sustainable transport choices more widely.

There is wide range of evidence on the effectiveness of travel planning, which would be targeted at new developments. Travel plans at new developments would be expected to set and and monitor progress against targets for sustainable transport; promote use of ST through providing information and incentives; and arrange complementary measures to overcome barriers to using ST which could include providing cycles and cycle maintenance facilities, subsidising public transport tickets and arranging car clubs. It is considered sensible that the contribution of travel planning is not counted in addition to the modal shift associated with walking, cycling, RTS, P&R bus and mobility hub measures, as identified in the previous subsections. Nevertheless, travel planning is a key measure to support use of ST infrastructure:

- In Sheffield, the BetterPoints behaviour change program significantly reduced car journeys. Within six months, the initiative eliminated 830,000 car trips and achieved nearly a 200% return on investment in carbon savings [13].
- In Milton Keynes, the Get Around Rewards pilot attracted high levels of engagement

and achieved a 62% shift from car travel to more sustainable modes [17].

- Renfrewshire Council's "Not Far? Leave the Car" campaign incentivised local residents to make active and sustainable journeys. Between March 2022 and April 2023, the program successfully shifted 200,000 car journeys to more sustainable transport options [18].
- In Buckinghamshire, 54% of the assessed trips replaced car journeys [14].
- BetterPoints surveys of 9 local areas showed reductions in short car journeys by an average of 20% [19] .
- Leicester City and Leicestershire County councils' "Choose How You Move" programme promotes active and sustainable travel while reducing unnecessary car journeys. The successful "Drive Less" campaign, which targeted regular drivers of short trips, resulted in 52% of participants changing their behaviour, collectively making 25% fewer car journeys [16].
- Brighton & Hove City Council's "Move for Change" campaign, launched in 2021, aimed to reduce reliance on private motor vehicles among local residents and workers. In its second year (2022), participants recorded over a million sustainable journeys, with more than 620,000 of these replacing single-occupancy car trips [15].

Highways and traffic management measures also have a key role in supporting sustainable transport, for example, safe walking and cycling routes and priority bus measures, which have been discussed in Section 3.2.

The next section explains how a cumulative modal shift amount has been calculated and tested in the transport model.

G.3 Reduction in car trips

G.3.1 Method

Chapter 3 introduced the integrated transport measures required to mitigate the growth of the local plan. Meanwhile, Section G.2 identified evidence for a reduction in car trips due to walking, cycling, P&C, local bus and mobility hubs. These are measures that have not been able to be represented in NEMo which has only included significant highway and public transport changes.

This section explains how ST demand has been generated to reflect the impact of the above measures by reducing BaU car demand according to geography and and distance of trips. The ST demand is then used in Scenario 4.

Firstly the geography of where trips occur in the council area are defined as being:

- Urban to Urban trips
- Non-Urban to Non-Urban trips
- Non-Urban to Urban trips
- External (outside council area) to Urban trips
- External (outside council area) to Non-Urban trips

Using these trip geographies, for each of the categories of interventions, those trips that are in scope to switch from car to public transport are identified as shown in table G.1. The number 1 shows that a category of interventions will influence trips in that

geography; and 0 that there will be no influence. (Numbers are used to reflect the mathematics underlying the method.)

Table G.1: Relationship categories of measures and geography of trips

Group	Urban -> Urban	Non-Urban -> Urban	External -> Urban	Non-Urban -> Non-Urban	External -> Non-Urban
P&C	0	1	1	0	0
Bus	1	1	0	1	0
Mobility hubs	1	1	0	1	0
Cycling	1	1	0	1	0
Walking	1	0	0	0	0

Then for each of the categories of interventions, the distance of trips are considered. For example car trips are only considered in scope to switch to cycling if they are under 10km in length (as suggested in section G.2). Table G.2 shows the constraints on categories of interventions by distance.

Table G.2: Relationship categories of measures and distance of trips

Group	0<d<=2 km	2<d<=5 km	5<d<=10 km	10<d<=15 km	15<d<=20 km	20<d<=40 km	d>40 km
P&C	0	1	1	1	1	1	1
Bus	0	1	1	1	0	0	0
Mobility hubs	1	1	1	0	0	0	0
Cycling	1	1	1	0	0	0	0
Walking	1	0	0	0	0	0	0

As presented, Tables G.1 and G.2 are matrices. Matrix multiplication can be thought of as a filtering or sorting system. Hence, if the first row of Table G.1 is multiplied by the first row of Table G.2 this will produce a new matrix identifying those trips in scope by geography and distance for the P&R category. (The mathematical calculation is the transpose of the first row of Table G.1 multiplied using matrix multiplication with the first row of Table G.2). The resulting matrix constrains P&R trips in scope to switch from driving all the way to using P&R is shown in table G.3.

Table G.3: Trips in scope to switch to P&R by geography and distance

	0<d<=2 km	2<d<=5 km	5<d<=10 km	10<d<=15 km	15<d<=20 km	20<d<=40 km	d>40 km
Urban -> Urban	0	0	0	0	0	0	0
Non Urban -> Urban	0	1	1	1	1	1	1
External -> Urban	0	1	1	1	1	1	1
Non Urban -> Non Urban	0	0	0	0	0	0	0
External -> Non Urban	0	0	0	0	0	0	0

The process is repeated for subsequent rows of Tables G.1 and G.2 to identify trips in scope, constraining by geograpahy and distance, for the remaining categories of measures. These are not shown.

Next the impact of each of the categories of measures is considered. Firstly it is necessary to identify between which modes would trips switch. For example, there was evidence that cycling improvements would abstract trips from public transport as well as car. This is reflected in Table G.4.

Table G.4: Switching of trips between modes by category of intervention

Group	Car	P&C	Bus	Rail	Cycling	Walking
P&C	-1	1	0	0	0	0
Bus	-1	0	1	0	0	0
Mobility hubs	-1	0	0.5	0	0.5	0
Cycling	-0.5	0	-0.5	0	1	0
Walking	-1	0	0	0	0	1

Then for each of the categories of interventions the scale of switching from car was defined – noting that estimates of the scale of impact of categories of interventions were considered in terms of abstraction from car trips. The scale of impact also differs between preferred site allocations and settlements in the reference case as shown in Table G.5.

Table G.5: Scale of abstraction from car trips to sustainable transport by categoory of sustainable transport interventions

Group	Unit of change	Impact on development car trips	Impact on reference car trips
P&C	Cars	40	260
Bus	Proportion	0.10	0.03
Mobility hubs	Cars	250	80
Cycling	Proportion	0.15	0.05
Walking	Proportion	0.15	0.05

Having ascertained car trips in scope for switching, to which modes they will switch and the scale of car trips in scope, the next part of the method applies the information to trips in the Colchester council area.

G.3.2 Change in car trips

The transport model contains detailed information on origins and destinations of trips by car commuting, car business, car other, light goods vehicle (LGV), heavy goods vehicle (HGV), bus and rail trips. In addition, there is a spreadsheet model that estimates P&R trips.

Consequently, the model was interrogated to identify the number of trips in each of the geographies and for each of the distance bands described in Subsection G.3.1. However, the transport model does not include cycling and walking trips. Therefore, the latest National Travel Survey (NTS) was used to estimate the proportionate of walking and cycling trips in the geographic and distance bands being used. For example, NTS can provide an estimate of the proportion of walk or cycle trips compared to car trips by its geographic categories and distance bands. These were sufficient to derive an estimate of walking and cycling trips in the council area given that the amounts of car trip were known from NEMo.

It should be noted that this method is likely to under-estimate the total amount of sustainable travel since car trips in a strategic transport model do not accurately represent very short trips of which there are a large number. Nevertheless, these short trips, most of which are already walked, are unlikely to be impacted by the interventions proposed to mitigate the transport impact of preferred site allocations.

The top rows of the tables below show the BaU car and ST trips for preferred allocations, reference case trips and total trips in the 2041 AM and PM peaks by geography. The middle rows show the reduction in car trips for each of the categories of measures by geography (which, using the method above, have also been constrained by distance). The final rows show the resulting amount of trips after the ST reductions.

Table G.6: Approximate sustainable transport trip reductions applied to AM BaU demand at new local plan sites

Trip type	Local urban	Local rural	Local rural to urban	External to urban	External to rural	Total trips
BaU car trips	1677	348	759	1890	1070	5745
Approximate BaU car mode share	0.65	0.77	0.68	0.79	0.87	0.74
Impact of BSIP	-8	-1	-7	0	0	-17
Impact of P&C	0	0	-24	-16	0	-40
Impact of mobility hubs	-194	-11	-45	0	0	-250
Impact of LCWIP	-57	0	-2	0	0	-59
Total impact of ST measures	-259	-13	-77	-16	0	-366
ST car trips	1418	335	682	1873	1070	5379
ST car mode share	0.5	0.72	0.57	0.77	0.87	0.66
% point change in mode share	-15%pts	-5%pts	-11%pts	-2%pts	0%pts	-8%pts

Table G.7: Approximate sustainable transport trip reductions applied to AM BaU reference case demand

Trip type	Local urban	Local rural	Local rural to urban	External to urban	External to rural	Total trips
BaU car trips	10310	2141	4665	11614	6578	35308
Approximate BaU car mode share	0.65	0.77	0.68	0.79	0.87	0.74
Impact of BSIP	-92	0	-9	0	0	-102
Impact of P&C	0	0	-65	-195	0	-260
Impact of mobility hubs	-62	-4	-14	0	0	-80
Impact of LCWIP	-207	0	-7	0	0	-214
Total impact of ST measures	-361	-4	-95	-195	0	-656
ST car trips	9949	2137	4570	11419	6578	34653
ST car mode share	0.62	0.77	0.66	0.76	0.87	0.72
% point change in mode share	-3%pts	0%pts	-2%pts	-3%pts	0%pts	-2%pts

Table G.8: Approximate total sustainable transport trip reductions applied to AM BaU reference case and new local plan demand

Trip type	Local urban	Local rural	Local rural to urban	External to urban	External to rural	Total trips
BaU car trips	11988	2489	5424	13503	7649	41053
Approximate BaU car mode share	0.65	0.77	0.68	0.79	0.87	0.74
Impact of BSIP	-100	-2	-16	0	0	-118
Impact of P&C	0	0	-89	-211	0	-300
Impact of mobility hubs	-256	-15	-59	0	0	-330
Impact of LCWIP	-264	0	-8	0	0	-273
Total impact of ST measures	-620	-17	-173	-211	0	-1021
ST car trips	11368	2472	5251	13292	7649	40032
ST car mode share	0.6	0.76	0.64	0.76	0.87	0.71
% point change in mode share	-5%pts	-1%pts	-4%pts	-3%pts	0%pts	-3%pts

The tables indicate that the evidence on the impact of ST leads to a modest change in car mode share of all trips. In some respect, this runs counter to rhetoric on mode share targets and the estimate could be criticised for not being ambitious or visionary enough. However, it is hoped that the reader will gather the effort being placed in ensuring that mode share is grounded strongly in evidence of what has been attained elsewhere.

It is worth noting that care needs to be taken in making a direct comparison between the car mode share information in the above tables and mode share targets because short distance trips are being excluded. The tables do *not* provide evidence that large developments should *not* set ambitious targets as part of their visions – which would exceed the modal shift to ST estimated in this report. However, the National Planning Policy Framework (NPPF) vision-based approach needs to be validated against empirical evidence. Whilst modal shift at development shown in the above tables may be less than aimed for by developers and written into policies such as the TCBGC Development Plan Document (DPD), the evidence does point to a shift towards ST for reference case trips, which is not surprising given route interventions benefit others outside of preferred site allocations. While the percentage mode share change at preferred allocations is much greater than for reference case trips, the absolute impact on car trips is greater for reference case trips than for trips at preferred allocations.

This, of course, is why the local plan is vision-based. It is not providing a vision for only preferred site allocations, but for the whole council area – to ensure that growth is carried out in a way that benefits all.

Table G.9: Approximate sustainable transport trip reductions applied to PM BaU demand at new local plan sites

Trip type	Local urban	Local rural	Local rural to urban	External to urban	External to rural	Total trips
BaU car trips	1891	274	705	2080	1024	5975
Approximate BaU car mode share	0.66	0.78	0.69	0.78	0.87	0.74
Impact of BSIP	-9	-2	-8	0	0	-20
Impact of P&C	0	0	-24	-16	0	-40
Impact of mobility hubs	-194	-11	-45	0	0	-250
Impact of LCWIP	-33	0	-1	0	0	-34
Total impact of ST measures	-236	-13	-79	-16	0	-343
ST car trips	1655	262	627	2064	1024	5632
ST car mode share	0.53	0.72	0.57	0.77	0.87	0.67
% point change in mode share	-13%pts	-6%pts	-12%pts	-1%pts	0%pts	-7%pts

Table G.10: Approximate sustainable transport trip reductions applied to PM BaU reference case demand

Trip type	Local urban	Local rural	Local rural to urban	External to urban	External to rural	Total trips
BaU car trips	11625	1687	4336	12782	6294	36724
Approximate BaU car mode share	0.66	0.78	0.69	0.78	0.87	0.74
Impact of BSIP	-111	0	-9	0	0	-120
Impact of P&C	0	0	-67	-193	0	-260
Impact of mobility hubs	-62	-3	-14	0	0	-80
Impact of LCWIP	-200	0	-7	0	0	-207
Total impact of ST measures	-373	-4	-98	-193	0	-667
ST car trips	11252	1683	4238	12589	6294	36056
ST car mode share	0.62	0.78	0.66	0.76	0.87	0.72
% point change in mode share	-4%pts	0%pts	-3%pts	-2%pts	0%pts	-2%pts

Table G.11: Approximate total sustainable transport trip reductions applied to PM BaU reference case and new local plan demand

Trip type	Local urban	Local rural	Local rural to urban	External to urban	External to rural	Total trips
BaU car trips	13516	1961	5041	14862	7319	42699
Approximate BaU car mode share	0.66	0.78	0.69	0.78	0.87	0.74
Impact of BSIP	-120	-2	-18	0	0	-140
Impact of P&C	0	0	-92	-208	0	-300
Impact of mobility hubs	-256	-14	-59	0	0	-330
Impact of LCWIP	-233	0	-8	0	0	-241
Total impact of ST measures	-609	-17	-177	-208	0	-1011
ST car trips	12908	1944	4864	14653	7319	41688
ST car mode share	0.61	0.77	0.65	0.76	0.87	0.71
% point change in mode share	-5%pts	-1%pts	-4%pts	-2%pts	0%pts	-3%pts

Having established the likely scale of reduction in car trips, the ST demand was used in NEMo as described in Section 4.3.

List of references used in Appendix G

[1] M. G. Armellini and L. Bieker-Walz. *Simulation of a Demand Responsive Transport feeder system: A case study of Brunswick*. 2020. URL: https://eclipse.dev/sumo/documents/2020/SUMO2020_paper_8.pdf.

[2] M. T. Ashraf et al. 'Impacts of real-time transit information on transit accessibility – A case study'. In: *Journal of Public Transportation* 25 (2023). ISSN: 1077-291X. URL: https://www.sciencedirect.com/science/article/pii/S1077291X23000048.

[3] E. Bromley et al. *Car Clubs Rapid Evidence Assessment*. NatCen. Jan. 2024. URL: https://assets.publishing.service.gov.uk/media/6707f77b30536cb927483000/dft-car-clubs-rapid-assessment.pdf.

[4] Centre for Cities. *Collected case studies: Making the most of transport*. Aug. 2017. URL: https://centreforcities.org/wp-content/uploads/2017/07/17-09-09-Transport-Collected-Case-Studies.pdf.

[5] G. Cheng and Y. He. 'Enhancing passenger comfort and operator efficiency through multi-objective bus timetable optimization'. In: *Electronic Research Archive* 32.1 (Jan. 2024). URL: https://www.aimspress.com/article/doi/10.3934/era.2024028.

[6] B. Clark and J. Parkin. *Cycling Diversion Factors Rapid Evidence Assessment Summary Report*. Department for Transport. London, UK, July 2022. URL: https://assets.publishing.service.gov.uk/media/644a9513c33b46000cf5e380/cycling-version-factors-summary-report-.pdf.

[7] Collaborative Mobility UK. *Car Club Annual Report UK 2023*. 2024. URL: https://www.como.org.uk/documents/car-club-annual-report-uk-2023.

[8] Collaborative Mobility UK. *Mobility hub evidence – a dossier compiled by CoMoUK*. URL: https://cdn.prod.website-files.com/6102564995f71c83fba14d54/63342a494d25aa6aa761f3b4_CoMoUK%20collection%20of%20mobility%20hub%20evidence%20v02_Sept%202022.pdf.

[9] Department for Transport. *Passengers to plan journeys down to the minute as big data revitalises country's bus use*. Dec. 2019. URL: https://www.gov.uk/government/news/passengers-to-plan-journeys-down-to-the-minute-as-big-data-revitalises-countrys-bus-use#:~:text=News%20story-,Passengers%20to%20plan%20journeys%20down%20to%20the%20minute%20as%20big,to%202022%20Johnson%20Conservative%20government.

[10] Essex Highways. *Colchester Local Plan Review: Further Transport Evidence*. London, UK, Oct. 2025. URL: https://cbccrmdata.blob.core.windows.net/noteattachment/CBC-Evidence-base-Further-Transport-Evidence-Colchester-Local-Plan-October-2025-Further%20Transport%20Evidence%20Colchester%20Local%20PLan%20(Preferred%20Options)%20October%202025.pdf.

[11] E. Fishman and V. Allan. 'Chapter Six - Bike share'. In: *The Sharing Economy and The Relevance for Transport*. Ed. by E. Fishman. Vol. 4. Advances in Transport Policy and Planning. Academic Press, 2019, pp. 121–152. DOI: https://doi.org/10.1016/bs.atpp.2019.05.003. URL: https://www.sciencedirect.com/science/article/pii/S2543000919300058.

[12] Frontier Economics. *Evaluation of bus service improvement plans phase 1 interventions: interim report*. Oct. 2024. URL: https://assets.publishing.service.gov.uk/media/6720ffaa3aa14203d06ef41d/evaluation-of-bus-service-improvement-plan-bsip-phase-1-interventions.pdf.

[13] M. Grimes. *830,000 car journeys cut in Sheffield, with nearly 200% rate on investment in carbon savings*. Better Points. June 2024. URL: https://www.betterpoints.ltd/download/830000-car-journeys-cut-in-sheffield-with-nearly-200-roi-in-carbon-savings/.

[14] M. Grimes. *Buckinghamshire behaviour change programme paid for itself four times over*. Better Points. May 2024. URL: https://www.betterpoints.ltd/download/buckinghamshire-behaviour-change-programme-paid-for-itself-four-times-over/.

[15] M. Grimes. *Cutting car journeys in Brighton & Hove*. Better Points. July 2023. URL: https://www.betterpoints.ltd/download/622000-car-journeys-cut-in-brighton-hove/.

[16] M. Grimes. *Leicestershire councils change travel behaviour with BetterPoints*. Better Points. Aug. 2023. URL: https://www.betterpoints.ltd/download/leicestershire-councils-change-travel-behaviour-with-betterpoints/#reducing-car-journeys.

[17] M. Grimes. *Milton Keynes: 62% of incentivised journeys replaced car travel*. Better Points. Mar. 2023. URL: https://www.betterpoints.ltd/download/incentivising-sustainable-travel-in-milton-keynes/.

[18] M. Grimes. *Renfrewshire Council shifted 200k car journeys to sustainable transport*. Better Points. June 2023. URL: https://www.betterpoints.ltd/download/renfrewshire-council-shifted-200k-car-journeys-to-sustainable-transport/.

[19] M. Grimes. *Short car journeys cut by a fifth*. Better Points. Nov. 2023. URL: https://www.betterpoints.ltd/download/short-car-journeys-cut-by-a-fifth-across-nine-trials/.

[20] P. Halford. *Learning from the success stories of bus patronage growth*. Mar. 2024. URL: https://www.route-one.net/features/learning-from-the-success-stories-of-bus-patronage-growth/.

[21] International Transport Forum. 'Fare's Fair: Experiences and Impacts of Fare Policies'. In: International Transport Forum Policy Papers 132 (2024). URL: https://www.itf-oecd.org/sites/default/files/docs/fares-fair-experiences-impacts-policies.pdf.

[22] Living Streets. *The pedestrian pound*. 2018. URL: https://www.livingstreets.org.uk/media/2t0hyzcm/pedestrian-pound-2018.pdf.

[23] Local Government Association. *Shared micromobility within the UK*. Jan. 2023. URL: https://www.local.gov.uk/publications/shared-micromobility-within-uk.

[24] K. Martens. 'Promoting bike-and-ride: The Dutch experience'. In: *Transportation Research Part A: Policy and Practice* 41 (May 2007). URL: https://www.researchgate.net/publication/222411314_Promoting_bike-and-ride_The_Dutch_experience.

[25] P. Martí et al. 'Sustainable Demand-Responsive Transportation: A Case Study in Rural Guimarães'. In: *Intelligent Data Engineering and Automated Learning – IDEAL 2024*. Ed. by V. Julian et al. Springer Nature Switzerland, 2025, pp. 147–158. URL: https://link.springer.com/chapter/10.1007/978-3-031-77738-7_13.

[26] P. Moseley. *Millions could be spent on bus stop screens*. BBC. Apr. 2025. URL: https://www.bbc.co.uk/news/articles/c078zk1k0ypo.

[27] Passenger Transport Executive Group. *The Benefits of Simplified and Integrated Ticketing in Public Transport*. Oct. 2009. URL: https://www.urbantransportgroup.org/system/files/general-docs/integratedticketingreportFINALOct09.pdf.

[28] T. Pharoah. *Buses in Urban Developments*. Chartered Institute of Highways and Transportation. Jan. 2018. URL: https://www.transportfornewhomes.org.uk/wp-content/uploads/2018/07/transport-for-new-homes-summary-web.pdf.

[29] G. Rodrigues and A. Breach. *Comparing public transport in the UK and Europe's biggest cities*. Centre for Cities. Nov. 2021. URL: https://www.centreforcities.org/wp-content/uploads/2021/11/Measuring-up-Comparing-public-transport-in-the-UK-and-Europes-biggest-cities.pdf.

[30] Stagecoach. *Welcome to Tees Flex! The on-demand bus service for Tees Valley*. 2025. URL: https://www.stagecoachbus.com/promos-and-offers/north-east/tees-flex#:~:text=Welcome%20to%20Tees%20Flex!,bus%20service%20for%20Tees%20Valley.

[31] Sustrans. *Bike life – Cities for people: UK report*. July 2019. URL: https://www.sustrans.org.uk/media/5942/bikelife19_aggregatedreport.pdf.

[32] Sustrans. *Common Misconceptions of Active Travel Investment*. July 2019. URL: https://www.sustrans.org.uk/media/5224/common-misconceptions-of-active-travel-investment.pdf.

[33] Sustrans. *Evaluation of the Cycling City and Towns and the Cycling Demonstration Towns programmes*. July 2017. URL: https://www.sustrans.org.uk/our-blog/research/evaluation-of-the-cycling-city-and-towns-and-the-cycling-demonstration-towns-programmes/.

[34] Sustrans. *Improving access for local journeys*. July 2014. URL: https://www.sustrans.org.uk/media/3690/3690.pdf.

[35] Tranport for London. *Buses performance data*. 2025. URL: https://tfl.gov.uk/corporate/publications-and-reports/buses-performance-data.

[36] Transport & Environment. *Does sharing cars really reduce car use?* June 2017. URL: https://www.transportenvironment.org/uploads/files/Does-sharing-cars-really-reduce-car-use-June202017.pdf.

[37] Transport for New Homes. *Transport for New Homes*. July 2018. URL: https://www.transportfornewhomes.org.uk/wp-content/uploads/2018/07/transport-for-new-homes-summary-web.pdf.

[38] Transport Scotland. *Infrastructure: what has been found to work?* 2025. URL: https://www.transport.gov.scot/publication/literature-review-best-practice-in-active-travel-and-its-associated-benefits/infrastructure-what-has-been-found-to-work/.

[39] D. Veryard. *Measuring and incorporating a wider set of bus priority benefits in strategic modelling*. Veitch Lister Consulting. Jan. 2025. URL: https://veitchlister.com/bus-priority-benefits-in-strategic-modelling/.

[40] C. Wang, M. Quddus and M. Enoch. 'Multilevel modelling of Demand Responsive Transport (DRT) trips in Greater Manchester based on area-wide socio-economic data'. In: *Transportation* 41 (2014). URL: https://doi.org/10.1007/s11116-013-9506-1.

H Findings from microsimulation models

H.1 A12 J25-26

H.1.1 Summary of network performance

H.1.1.1 AM peak

Table H.1: A12 J25-26 VISSIM AM peak hour summary performance

Performance parameter	2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
Average Delay (secs)	113	143	157	158
Average No. of Stops (No.)	2	5	6	4
Average Speed (mph)	26.4	27.9	26.2	25.9
Latent Demand (No.)	51	117	107	72

Table H.2: A12 J25-26 VISSIM AM peak hour summary performance for buses

Performance parameter	2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
Average Delay (secs)	279	480	487	317
Average No. of Stops (No.)	2	7	8	6
Average Speed (mph)	12.3	9.0	9.0	12.5

H.1.1.2 PM peak

Table H.3: A12 J25-26 VISSIM PM peak hour summary performance

Performance parameter	2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
Average Delay (secs)	124	114	162	153
Average No. of Stops (No.)	4	3	7	4
Average Speed (mph)	25.4	30.1	25.4	25.9
Latent Demand (No.)	3	37	334	34

Table H.4: A12 J25-26 VISSIM PM peak hour summary performance for buses

Performance parameter	2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
Average Delay (secs)	137	377	470	334
Average No. of Stops (No.)	2	4	7	7
Average Speed (mph)	12.5	10.5	9.1	12.3

H.1.2 Journey times

H.1.2.1 AM peak

Table H.5: A12 J25-26 VISSIM AM peak hour journey times (general traffic, seconds)

AM Travel Times (seconds)	2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
Blue Route: A12 Eastbound	454	297	323	305
Blue Route: A12 Westbound	304	275	262	303
Red Route: Coggeshall Rd & London Rd Eastbound	1348	1319	1339	1156
Red Route: London Rd & Coggeshall Rd Westbound	823	804	954	936
Orange Route: Halstead Rd & Essex Yeomanry Way Southbound	248	263	268	263
Orange Route: Essex Yeomanry Way & Halstead Rd Northbound	202	214	218	273
A12 West to North Lane	170	216	324	289
A12 East to Retail Park	150	136	133	138
A12 West to Halstead Rd	655	354	371	419
A12 East to Coggeshall Rd	766	732	871	821

H.1.2.2 PM peak

Table H.6: A12 J25-26 VISSIM PM peak hour journey times (general traffic, seconds)

PM Travel Times (seconds)	2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
Blue Route: A12 Eastbound	471	302	375	319
Blue Route: A12 Westbound	294	255	258	257
Red Route: Coggeshall Rd & London Rd Eastbound	1224	1198	1418	1073
Red Route: London Rd & Coggeshall Rd Westbound	811	786	810	928
Orange Route: Halstead Rd & Essex Yeomanry Way Southbound	229	392	382	519
Orange Route: Essex Yeomanry Way & Halstead Rd Northbound	207	256	213	278
A12 West to North Lane	256	177	415	270
A12 East to Retail Park	145	146	140	141
A12 West to Halstead Rd	603	487	441	410
A12 East to Coggeshall Rd	752	684	723	776

H.1.2.3 Journey time route descriptions

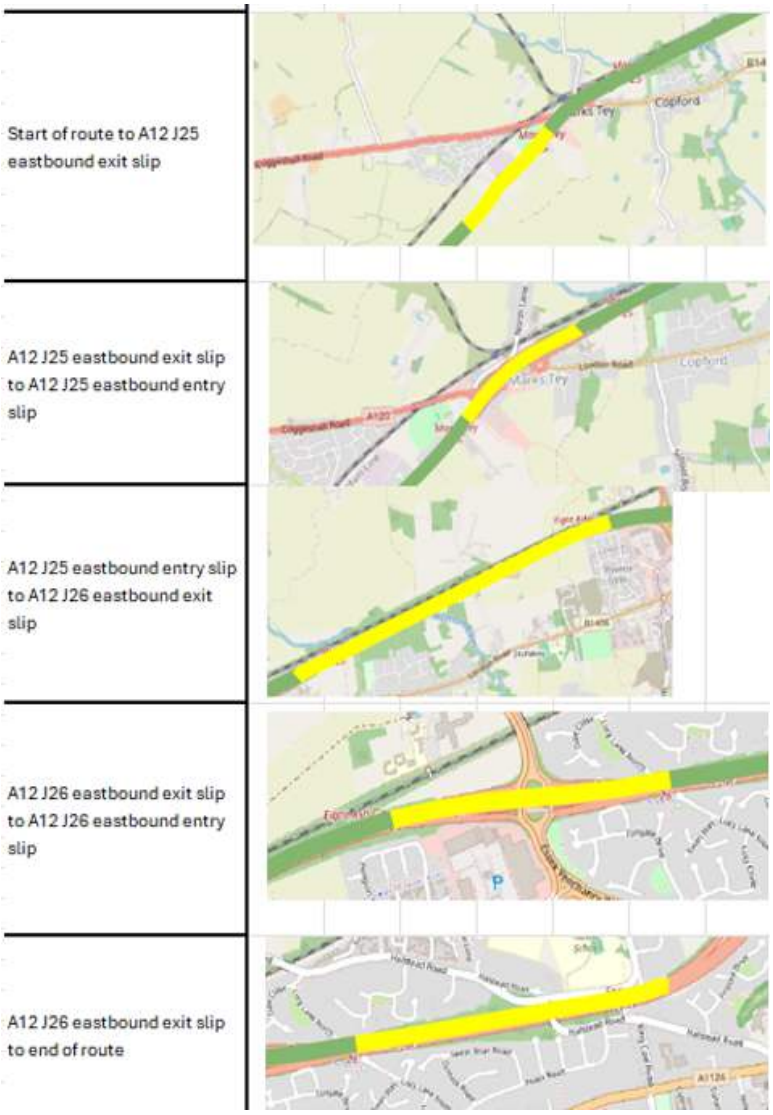

Figure H.1: Blue journey time route segments used in the A12 J25-26 VISSIM model

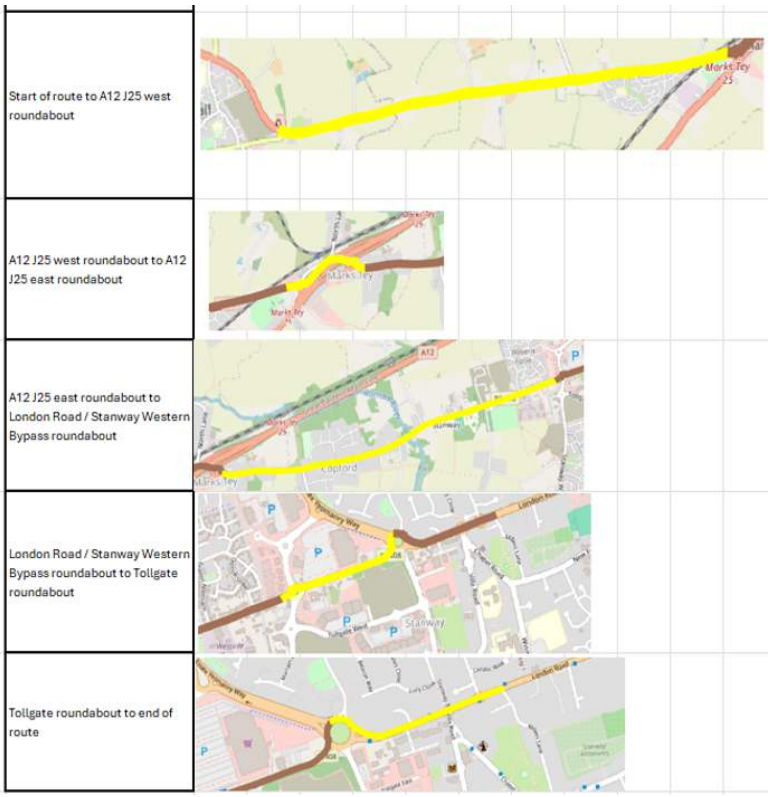

Figure H.2: Red journey time route segments used in the A12 J25-26 VISSIM model

Halstead Road to Essex Yeomanry Way / Western Approach roundabout	
Essex Yeomanry Way / Western Approach roundabout to Western Approach / Retail Park roundabout	
Western Approach / Retail Park roundabout to London Road / Stanway Western Bypass roundabout	
London Road / Stanway Western Bypass roundabout to end of route	

Figure H.3: Orange journey time route segments used in the A12 J25-26 VISSIM model

H.1.3 Average queues

H.1.3.1 AM peak

Table H.7: A12 J25-26 VISSIM AM peak hour average queue lengths

Junction	Approach	Average Queue (metres)			
		2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
A12 J26	A12 J26: Halstead Rd	61	20	27	27
	A12 J26: A12 (East)	35	30	24	30
	A12 J26: Essex Yeomanry Way	29	23	32	56
	A12 J26: A12 (West)	126	24	21	59
Junction Average		**63**	**24**	**26**	**43**
Essex Yeomanry Way / Western Approach Round-about	EYW / WA: Essex Yeomanry Way	1	1	1	6
	EYW / WA: Western Approach	1	0	1	4
Junction Average		**1**	**1**	**1**	**5**
Stane Retail Park Round-about	Retail Park Rbt: Western Approach (North)	0	3	1	6
	Retail Park Rbt: Sainsburys	0	0	0	1
	Retail Park Rbt: Western Approach (South)	8	7	10	15
	Retail Park Rbt: Stane Retail Park	0	0	0	0
Junction Average		**2**	**2**	**3**	**5**

Continued on next page

Table H.7: A12 J25-26 VISSIM AM peak hour average queue lengths *(continued)*

Junction	Approach	Average Queue (metres)			
		2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
Tollgate Round-about	Tollgate Rbt: Essex Yeomanry Way	10	6	6	50
	Tollgate Rbt: Tollgate Drive	0	0	0	0
	Tollgate Rbt: London Rd (East)	1	1	1	15
	Tollgate Rbt: Tollgate Rd	7	3	3	89
	Tollgate Rbt: London Rd (West)	3	0	0	20
Junction Average		**4**	**2**	**2**	**35**
London Road Round-about	London Rd Rbt: Western Approach	0	1	1	40
	London Rd Rbt: London Road (East)	1	4	3	10
	London Rd Rbt: Stanway Western Bypass	4	8	5	58
	London Rd Rbt: London Road (West)	7	4	12	68
Junction Average		**3**	**4**	**5**	**44**
A12 J25: East Round-about	A12 J26 (East): A12 (East)	52	57	334	129
	A12 J26 (East): London Road (East)	25	270	338	23
	A12 J26 (East): London Road (West)	0	1	3	70
	A12 J26 (East): Marks Tey	0	0	0	116
Junction Average		**19**	**82**	**169**	**84**

Continued on next page

Table H.7: A12 J25-26 VISSIM AM peak hour average queue lengths *(continued)*

Junction	Approach	Average Queue (metres)			
		2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
A12 J25: West Round-about	A12 J26 (West): North Lane	8	2	2	51
	A12 J26 (West): Marks Tey	2	10	4	45
	A12 J26 (West): A12 (West)	12	38	303	39
	A12 J26 (West): Coggeshall	644	1777	1821	1494
Junction Average		**166**	**457**	**532**	**407**
Average across junctions		**38**	**85**	**109**	**93**

H.1.3.2 PM peak

Table H.8: A12 J25-26 VISSIM PM peak hour average queue lengths

Junction	Approach	Average Queue (metres)			
		2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
A12 J26	A12 J26: Halstead Rd	33	41	34	285
	A12 J26: A12 (East)	24	53	29	34
	A12 J26: Essex Yeomanry Way	36	56	35	83
	A12 J26: A12 (West)	76	147	38	55
Junction Average		**42**	**74**	**34**	**114**
Essex Yeomanry Way / Western Approach Round-about	EYW / WA: Essex Yeomanry Way	3	3	1	7
	EYW / WA: Western Approach	2	14	1	13
Junction Average		**2**	**9**	**1**	**10**

Continued on next page

Table H.8: A12 J25-26 VISSIM PM peak hour average queue lengths *(continued)*

Junction	Approach	Average Queue (metres)			
		2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
Stane Retail Park Round-about	Retail Park Rbt: Western Approach (North)	5	24	1	28
	Retail Park Rbt: Sainsburys	0	2	0	5
	Retail Park Rbt: Western Approach (South)	10	19	9	7
	Retail Park Rbt: Stane Retail Park	1	3	0	1
Junction Average		**4**	**12**	**2**	**10**
Tollgate Round-about	Tollgate Rbt: Essex Yeomanry Way	74	158	169	94
	Tollgate Rbt: Tollgate Drive	1	2	1	5
	Tollgate Rbt: London Rd (East)	3	7	5	48
	Tollgate Rbt: Tollgate Rd	2	26	10	115
	Tollgate Rbt: London Rd (West)	8		1	39
Junction Average		**18**	**48**	**37**	**60**
London Road Round-about	London Rd Rbt: Western Approach	5	24	7	84
	London Rd Rbt: London Road (East)	2	47	10	21
	London Rd Rbt: Stanway Western Bypass	3	36	3	78
	London Rd Rbt: London Road (West)	5	24	5	197
Junction Average		**4**	**33**	**6**	**95**

Continued on next page

Table H.8: A12 J25-26 VISSIM PM peak hour average queue lengths *(continued)*

Junction	Approach	Average Queue (metres)			
		2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
A12 J25: East Round-about	A12 J26 (East): A12 (East)	12	11	66	46
	A12 J26 (East): London Road (East)	13	5	83	19
	A12 J26 (East): London Road (West)	0	0	1	11
	A12 J26 (East): Marks Tey	0	0	0	25
Junction Average		**6**	**4**	**38**	**25**
A12 J25: West Round-about	A12 J26 (West): North Lane	1	2	2	114
	A12 J26 (West): Marks Tey	2	1	2	41
	A12 J26 (West): A12 (West)	145	15	696	38
	A12 J26 (West): Coggeshall	1069	1099	1788	1099
Junction Average		**304**	**279**	**622**	**323**
Average across junctions		**57**	**70**	**111**	**96**

H.2 A12 J29

H.2.1 Summary of network performance

Table H.9: A12 J29 VISSIM AM peak hour summary performance

Performance parameter	2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
Delay (sec per veh)	73	127	163	96
Speed (mph)	46	40	36	44
Latent Demand (vehs)	1	264	268	251

Table H.10: A12 J29 VISSIM PM peak hour summary performance

Performance parameter	2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
Delay (sec per veh)	55	163	184	92
Speed (mph)	50	37	36	45
Latent Demand (vehs)	2	1033	1271	239

H.2.2 Journey times

Table H.11: A12 J29 VISSIM AM peak hour journey time performance (general traffic, seconds)

Route	2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
A12 (E) - A120 (E)	349	388	507	397
A12 (E) - Ipswich Rd	226	269	374	330
A12 (E) - Newcommon Way	150	185	291	264
A12 (E) - A12 (W)	163	173	192	179
A120 (E) - A12 (N)	656	683	797	546
A120 (E) - Ipswich Rd	682	671	794	492
A120 (E) - Newcommon Way	629	614	739	430
A120 (E) - A12 (W)	452	519	586	485
Ipswich Rd - A12 (N)	190	504	221	431
Ipswich Rd - A120 (E)	327	629	354	581
Ipswich Rd - A12 (W)	176	454	186	418
Ipswich Rd - A12 (N)	170	178	178	181
A12 (W) - A120 (W)	319	320	323	324
A12 (W) - Newcommon Way	255	261	260	343
A12 (E): ALL	222	254	341	292
A120 (E): ALL	605	622	729	488
Ipswich Rd: ALL	231	529	253	477
A12 (W): ALL	248	253	254	283

Table H.12: A12 J29 VISSIM PM peak hour journey time performance (general traffic, seconds)

Route	2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
A12 (E) - A120 (E)	349	388	507	352
A12 (E) - Ipswich Rd	226	269	374	232
A12 (E) - Newcommon Way	150	185	291	158
A12 (E) - A12 (W)	163	173	192	174
A120 (E) - A12 (N)	656	683	797	650
A120 (E) - Ipswich Rd	682	671	794	598
A120 (E) - Newcommon Way	629	614	739	554
A120 (E) - A12 (W)	452	519	586	488
Ipswich Rd - A12 (N)	190	504	221	393
Ipswich Rd - A120 (E)	327	629	354	551
Ipswich Rd - A12 (W)	176	454	186	385
Ipswich Rd - A12 (N)	170	178	178	180
A12 (W) - A120 (W)	319	320	323	325
A12 (W) - Newcommon Way	255	261	260	272
A12 (E)	222	254	341	229
A120 (E)	605	622	729	572
Ipswich Rd	231	529	253	443
A12 (W)	248	253	254	259

H.2.3 Average queues

Table H.13: A12 J29 VISSIM AM peak hour queue length

Parameter	Arm	2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
Average (metres)	A12 (N)	27	113	475	156
	A120 (E)	762	620	1104	41
	Ipswich Rd	9	713	62	750
	A120 (W)	12	4	7	6
Max (metres)	A12 (N)	135	430	1548	573
	A120 (E)	1975	1821	2008	203
	Ipswich Rd	104	817	524	813
	A120 (W)	108	50	59	57

Table H.14: A12 J29 VISSIM PM peak hour queue length

Parameter	Arm	2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
Average (metres)	A12 (N)	129	1581	1766	335
	A120 (E)	25	34	33	5
	Ipswich Rd	2	144	50	178
	A120 (W)	22	3	2	0
Max (metres)	A12 (N)	320	2009	2009	1108
	A120 (E)	124	124	126	42
	Ipswich Rd	76	817	677	817
	A120 (W)	144	76	70	47

H.3 A133 Clingoe Hill

H.3.1 Journey times

H.3.1.1 AM peak

Table H.15: Clingoe Hill VISSIM AM peak hour journey time performance (general traffic, minutes)

Journey Time	Routes measured in minutes	2023 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
Route A	A120 westbound	7.32	7.33	7.37	7.67
	A120 eastbound	6.57	6.73	6.77	7.48
Route B	A133 WB: Elmstead Market to St Andrews Avenue Clockwise	8.35	27.27	24.00	10.80
	A133 EB: St Andrews Avenue to Elmstead Market Clockwise	4.37	6.15	6.58	9.55
Route C	A133 WB: Elmstead Market to Eastern Approach Clockwise	9.00	26.30	23.68	11.32
	A133 EB: Eastern Approach to Elmstead Market Anticlockwise	4.37	5.35	5.35	5.18
Route D	Link Road northbound	n/a	3.35	3.30	3.30
	Link Road southbound	n/a	3.45	3.42	3.42

Table H.16: Clingoe Hill VISSIM AM peak hour journey time (buses and RTS, minutes)

Journey Time	Routes measured in minutes	2019 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
1	EB - Wivenhoe Junction to Elmstead Market	3.53	3.18	3.00	3.12
2	WB - Wivenhoe Junction to Boundary Rd Junction	1.58	1.77	1.75	1.77
	EB - Boundary Rd Junction to Wivenhoe Junction	0.77	1.20	1.18	1.32
3	WB - Boundary Rd Junction to Greenstead Rdbt	6.97	2.00	1.95	1.60
	EB - Greenstead Rdbt to Boundary Rd Junction	0.90	1.17	2.03	1.03
4	WB - Avon Way to Greenstead Rd	2.07	2.55	2.75	1.83
	EB - Greenstead Rd to Avon Way	1.97	1.88	2.50	1.87
5	NB - Elmstead Rd to Greenstead Rd	1.77	2.12	2.07	2.77
	SB - Greenstead Rd to Elmstead Rd	1.60	3.20	4.55	2.65
6	NB - Eastern Approach	0.50	0.53	0.55	0.55
	SB - Eastern Approach	0.38	0.42	0.40	0.73
7	WB - Eastern Approach to Haven Rd	n/a	1.50	1.50	1.43
	EB - Haven Rd to Eastern Approach	1.48	2.40	2.80	4.55
RTS	WB – Garden Community to Boundary Rd	n/a	3.97	3.90	4.30
	WB – Boundary Rd to St Andrews Avenue	n/a	4.57	4.65	3.80
	WB – Total journey	n/a	8.53	8.53	8.10
	EB – St Andrews Avenue to Boundary Rd	n/a	4.53	8.73	5.35
	EB – Boundary Rd to Garden Community	n/a	3.45	3.50	4.30
	EB – Total journey	n/a	7.98	12.22	9.65

H.3.1.2 PM peak

Table H.17: Clingoe Hill VISSIM PM peak hour journey time performance (general traffic, minutes)

Journey Time Routes measured in minutes		2019 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
Route A	A120 westbound	6.58	6.83	6.92	7.00
	A120 eastbound	7.23	8.58	8.68	10.53
Route B	A133 WB: Elmstead Market to St Andrews Avenue Clockwise	6.32	15.58	19.35	7.80
	A133 EB: St Andrews Avenue to Elmstead Market Clockwise	4.77	10.53	11.85	13.30
Route C	A133 WB: Elmstead Market to Eastern Approach Clockwise	7.02	13.98	18.40	8.28
	A133 EB: Eastern Approach to Elmstead Market Anticlockwise	6.33	8.42	8.50	6.67
Route D	Link Road northbound	n/a	3.30	3.33	3.33
	Link Road southbound	n/a	3.38	3.37	3.42

Table H.18: Clingoe Hill VISSIM PM peak hour journey time (buses and RTS, minutes)

Journey Time	Routes measured in minutes	2019 Base	2043 Reference case demand without mitigation	2043 Local Plan BaU demand without mitigation	2043 Local Plan BaU demand with mitigation
1	WB - Elmstead Market to Wivenhoe Junction	2.37	3.52	3.33	3.38
2	WB - Wivenhoe Junction to Boundary Rd Junction	0.78	1.68	1.73	1.93
	EB - Boundary Rd Junction to Wivenhoe Junction	n/a	1.28	1.27	1.37
3	WB - Boundary Rd Junction to Greenstead Rdbt	4.55	1.42	1.57	1.23
	EB - Greenstead Rdbt to Boundary Rd Junction	n/a	0.98	1.22	1.08
4	WB - Avon Way to Greenstead Rd	2.35	3.65	4.50	1.52
	EB - Greenstead Rd to Avon Way	1.93	6.22	6.45	2.15
5	NB - Elmstead Rd to Greenstead Rd	2.10	2.78	2.13	3.23
	SB - Greenstead Rd to Elmstead Rd	2.33	8.62	9.30	2.35
6	NB - Eastern Approach	1.52	2.53	2.65	1.23
	SB - Eastern Approach	0.50	0.42	0.40	0.48
7	WB - Eastern Approach to Haven Rd	n/a	1.32	1.37	1.45
	EB - Haven Rd to Eastern Approach	n/a	2.10	2.32	2.50
RTS	WB – Garden Community to Boundary Rd	n/a	3.83	3.87	4.33
	WB – Boundary Rd to St Andrews Avenue	n/a	4.42	5.20	3.43
	WB – Total journey	n/a	8.25	9.07	7.77
	EB – St Andrews Avenue to Boundary Rd	n/a	16.28	21.60	10.62
	EB – Boundary Rd to Garden Community	n/a	3.75	4.15	4.57
	EB – Total journey	n/a	20.03	25.75	15.17

H.3.1.3 Journey time route descriptions

Figure H.4: Journey time routes used in the A133 Clingoe Hill VISSIM model

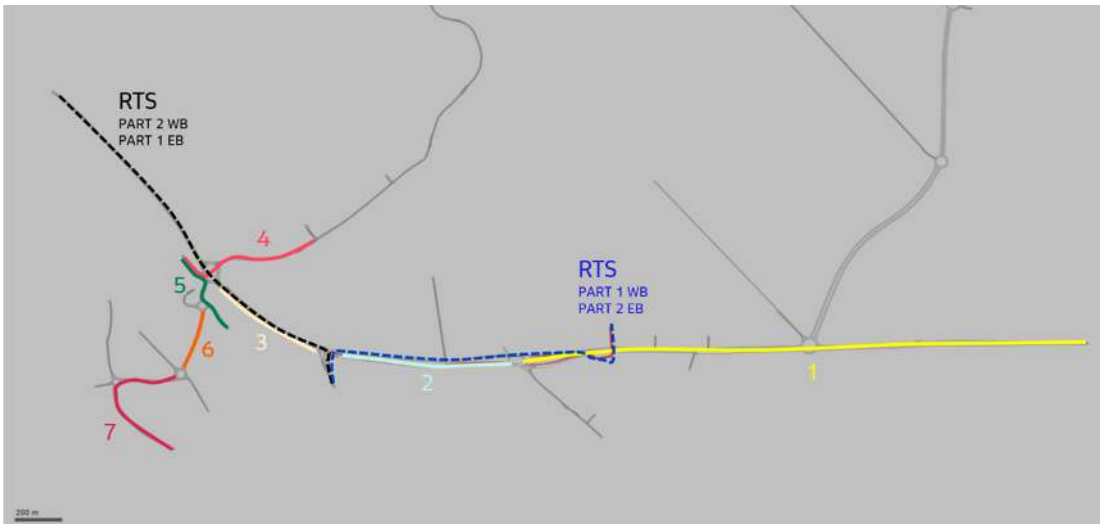

Figure H.5: Bus journey time routes used in the A133 Clingoe Hill VISSIM model

I Strategic model plots for long range forecasts

Introduction

This appendix brings together flow difference, relative queue and speed plots from the 2058 NEMo reference and assessment case AM and PM models. They have been grouped by plot type and time period to facilitate comparison between scenarios. The key assumptions in the scenarios are summarised in Table 5.1:

- Scenario 5 – 2058 reference case, which includes committed growth at TCBGC, caps growth at 2043 levels at Marks Tey, Hare Green and Horsley Cross, and grows elsewhere by the levels predicted by NTEM. The highway and public transport network is that used in the 2043 mitigated new local plan scenario (Scenario 3). ST demand reductions as used in 2043 Scenario 4 have not been applied since Scenario 5 is run with VDM, which requires 24 hour tip demand.
- Scenario 6 – 2058 assessment case, which grows Marks Tey to 6,000 homes, and Hare Green and Horsley Cross proposed garden villages to 10,000 homes. Elsewhere the demand is as per Scenario 5. The highway and public transport network is also the same as Scenario 5.

I.1 AM flow, speed queue plots

I.1.1 Summary of impact in the AM

Table I.1: AM movement index scores for 2023 base and 2043 Scenarios 1-6

Sector	Location	AM Peak Impact						
		2023 Base	2043 S1 RC	2043 S2 BaU	2043 S3 BaU Mit	2043 S4 ST Mit	2058 S5 RC	2058 S6 BaU
Central	N Station rdbt, Station Way, A134 Westway and Balkerne Hill	14	13	14	9	8	11	10
	Ipswich Road, East Street, East Hill and Harwich Road	11	11	12	10	9	11	11
East	Greenstead Roundabout, Colne Causeway and Clingoe Hill	9	15	15	14	12	15	15
	Colchester Road to Wivenhoe	7	15	15	8	9	13	15
West	A12 J26/J27 to London Rd , Lexden Road, Cymbeline Way and Colne Bank Rbt, London Rd	6	12	12	9	9	11	11
	A12 J25 / A120 (western)	5	6	11	8	8	9	12
North	Northern Approach Road, Via Urbis Romane, Mill Road & A12 J28	9	9	10	9	9	9	9
	A12 J29 / A120 (eastern)	7	12	12	8	8	10	11
Outer	Tiptree	3	4	4	4	4	4	4
	Aldham	3	3	3	3	3	3	4
	A12 J20-25	6	8	8	8	8	9	10
Overall assessement combining all areas		8	11	11	9	9	10	11

Key to movement scale and acceptability of change

More or less free flow			Travelling slower			Moderate congestion			Substantial congestion		
1	2	3	4	5	6	7	8	9	10	11	12
Extreme congestion			Acceptability of change								
13	14	15	Passable ✓			Caution !			Unsatisfactory ✗		

I.1.2 AM flow difference plots

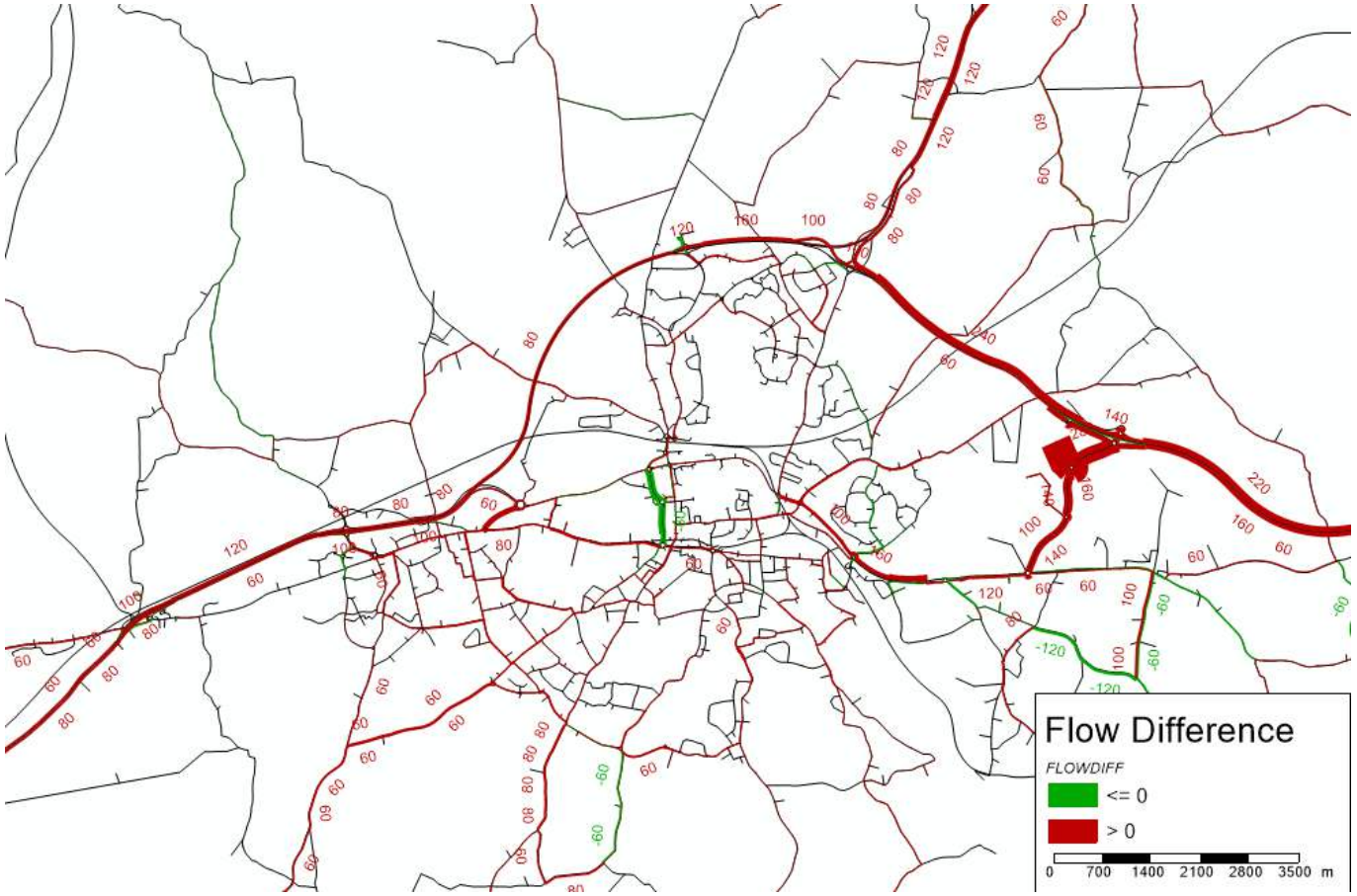

Figure I.1: AM flow difference – Scenario 5 2058 reference case with mitigation v Scenario 4 2043 ST mitigated assessment

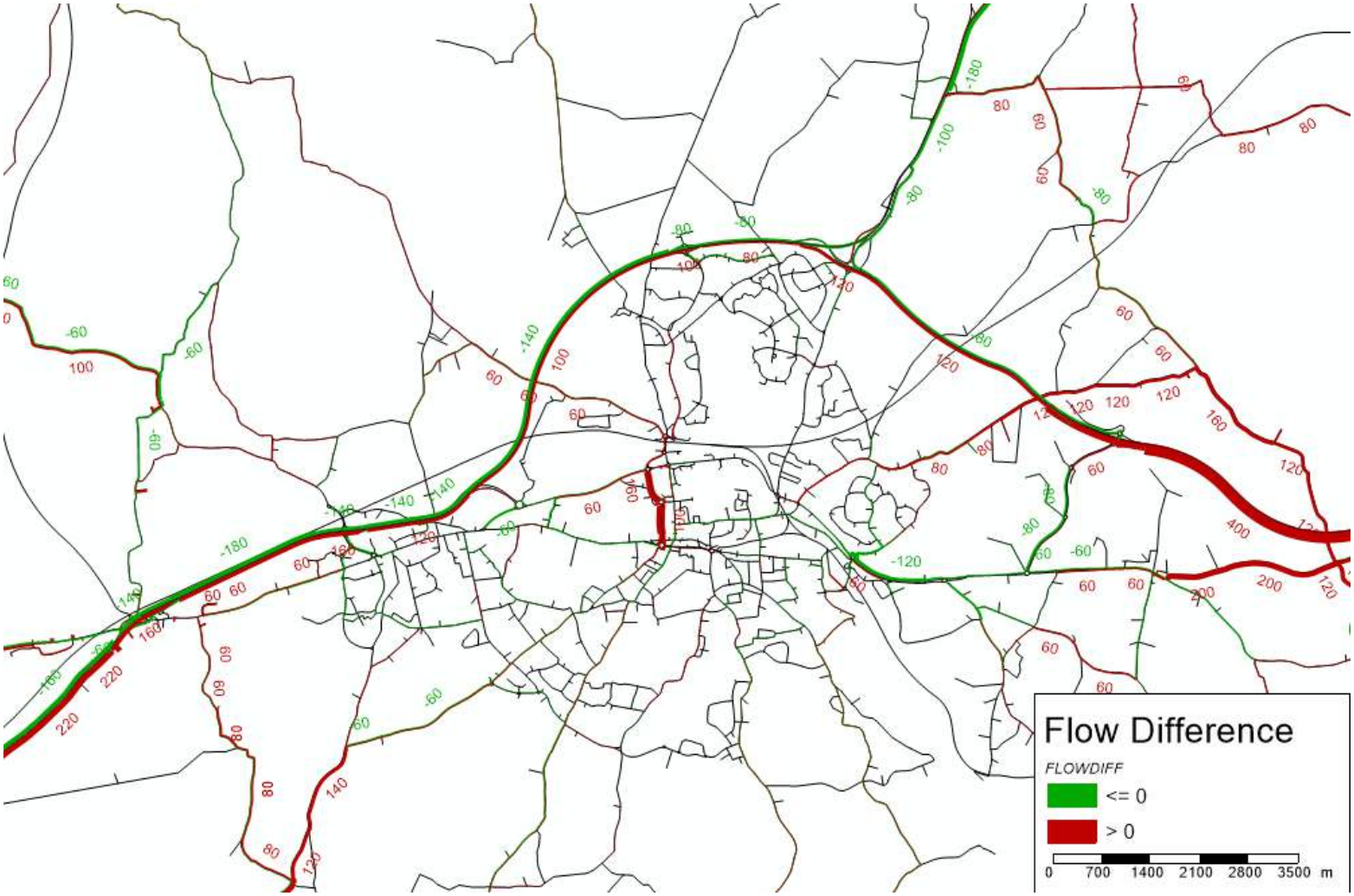

Figure I.2: AM flow difference – Scenario 6 2058 assessment case with mitigation and BaU demand v Scenario 5 2058 reference case with mitigation

I.1.3 AM speed plots (modelled speed / free flow speed)

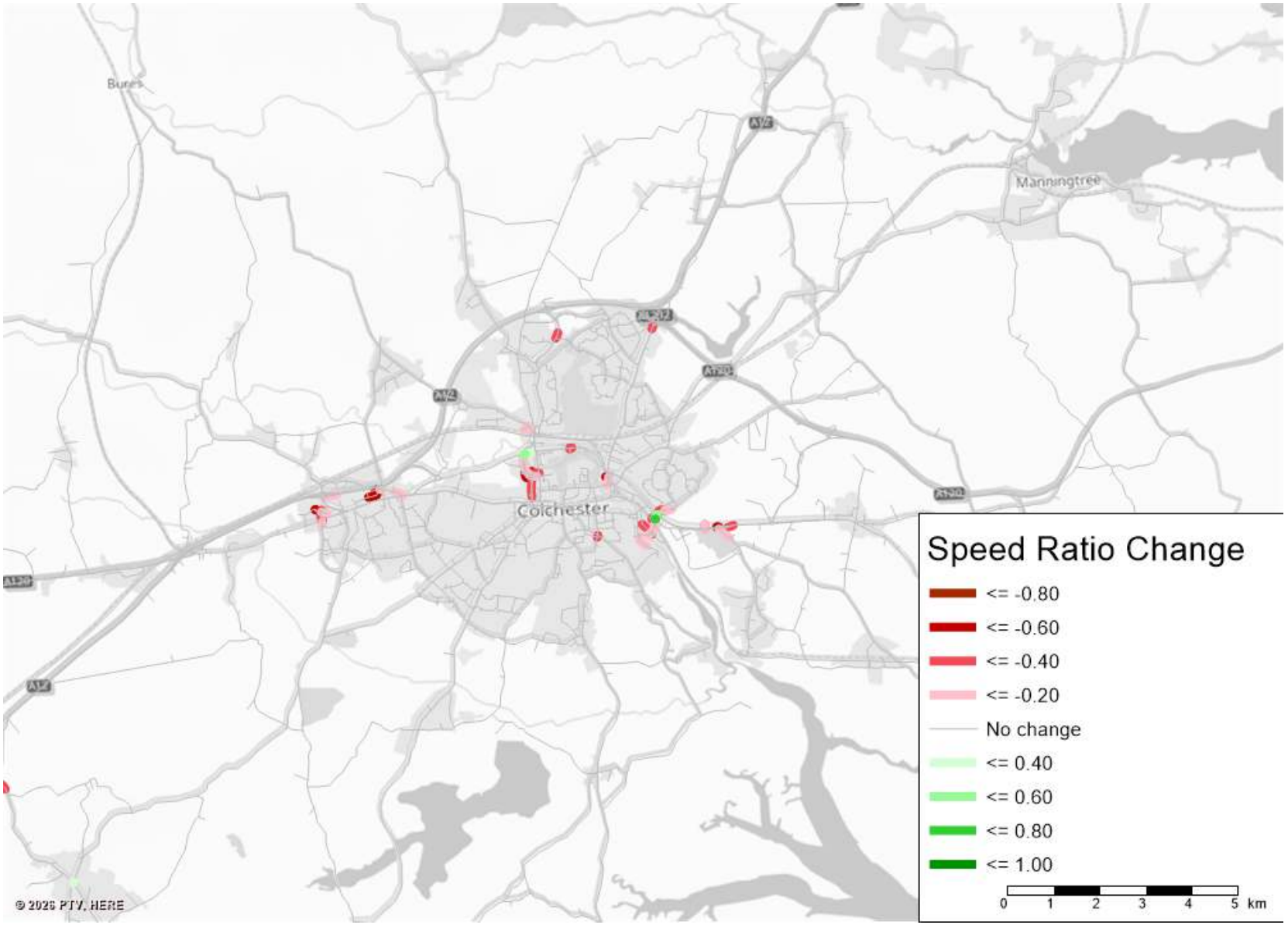

Figure I.3: AM Difference in traffic speed between Scenario 5 and Scenario 4

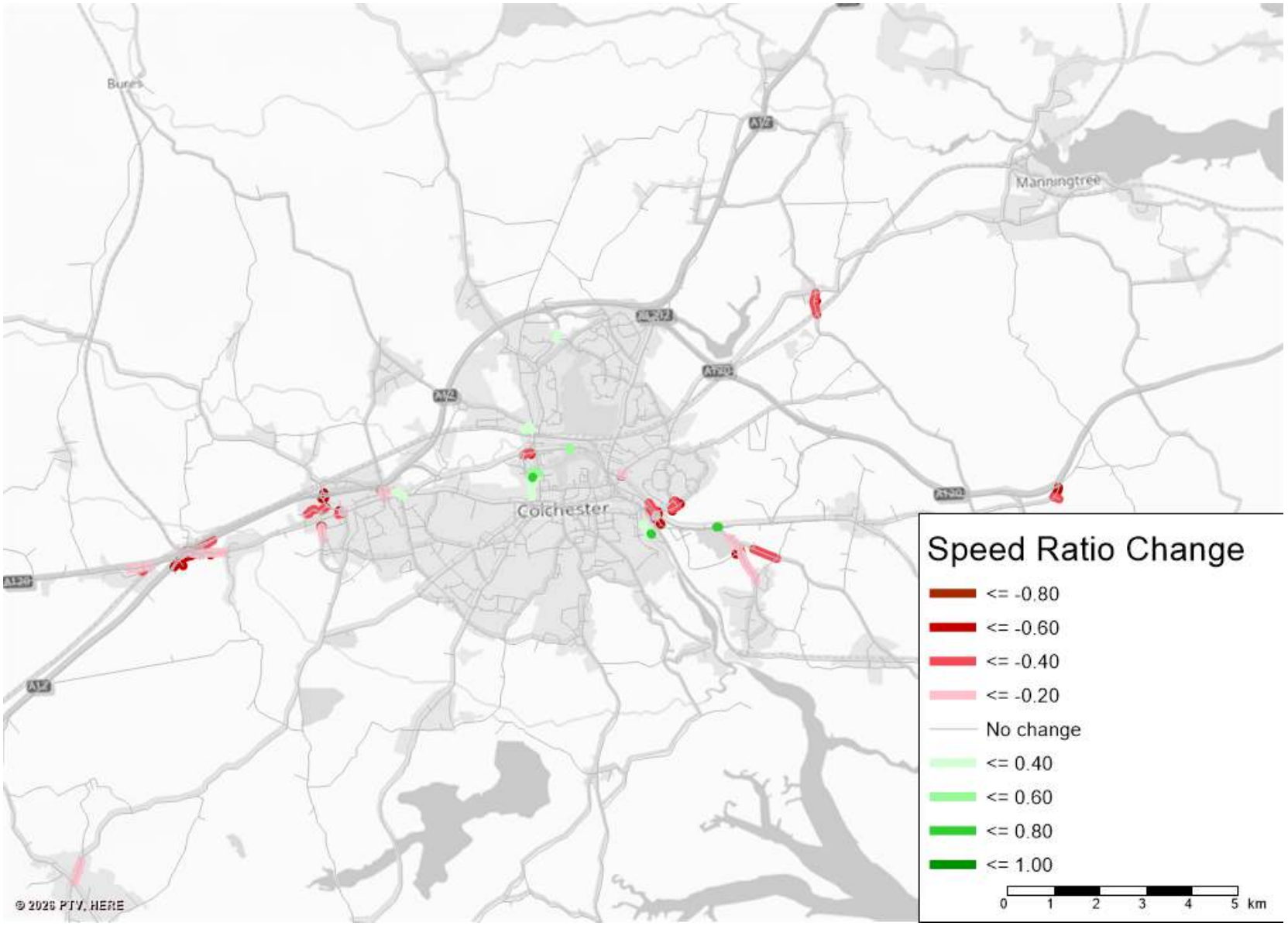

Figure I.4: AM Difference in traffic speed between Scenario 6 and Scenario 5

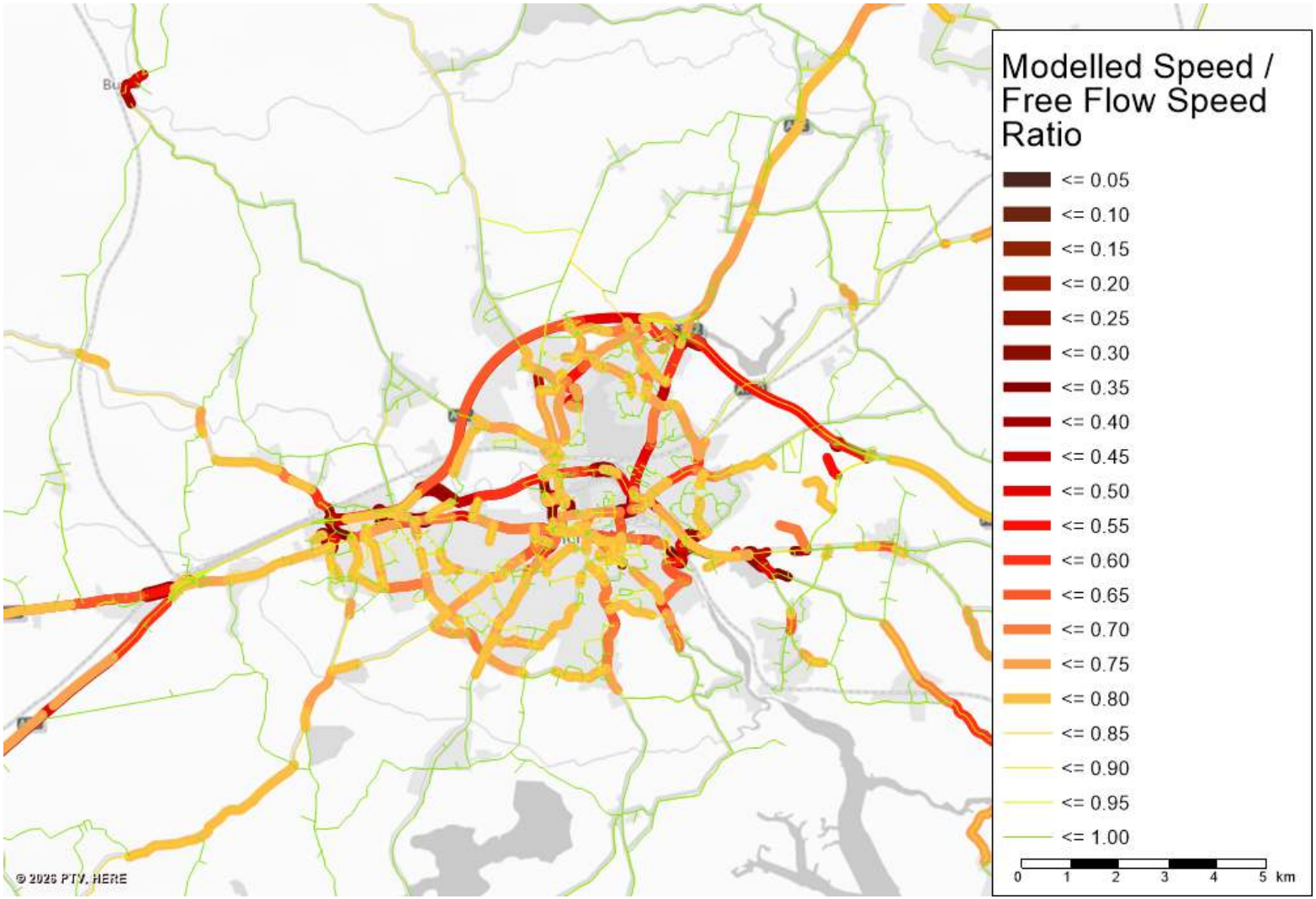

Figure I.5: AM speed ratio – Scenario 5 2058 reference case with mitigation

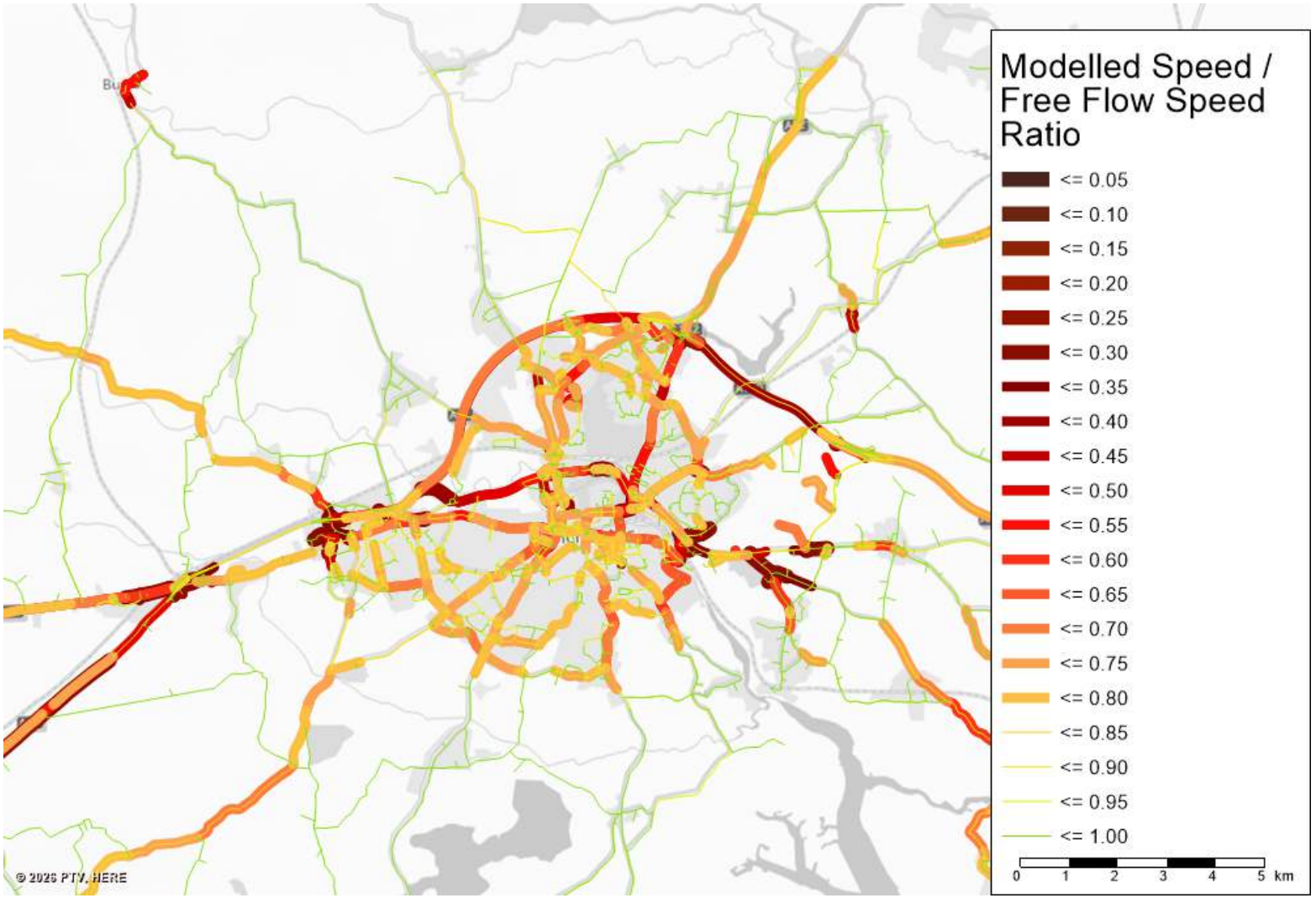

Figure I.6: AM speed ratio – Scenario 6 2058 assessment case with mitigation and BaU demand

I.1.4 AM relative queue plots (blocking back on road links in the model)

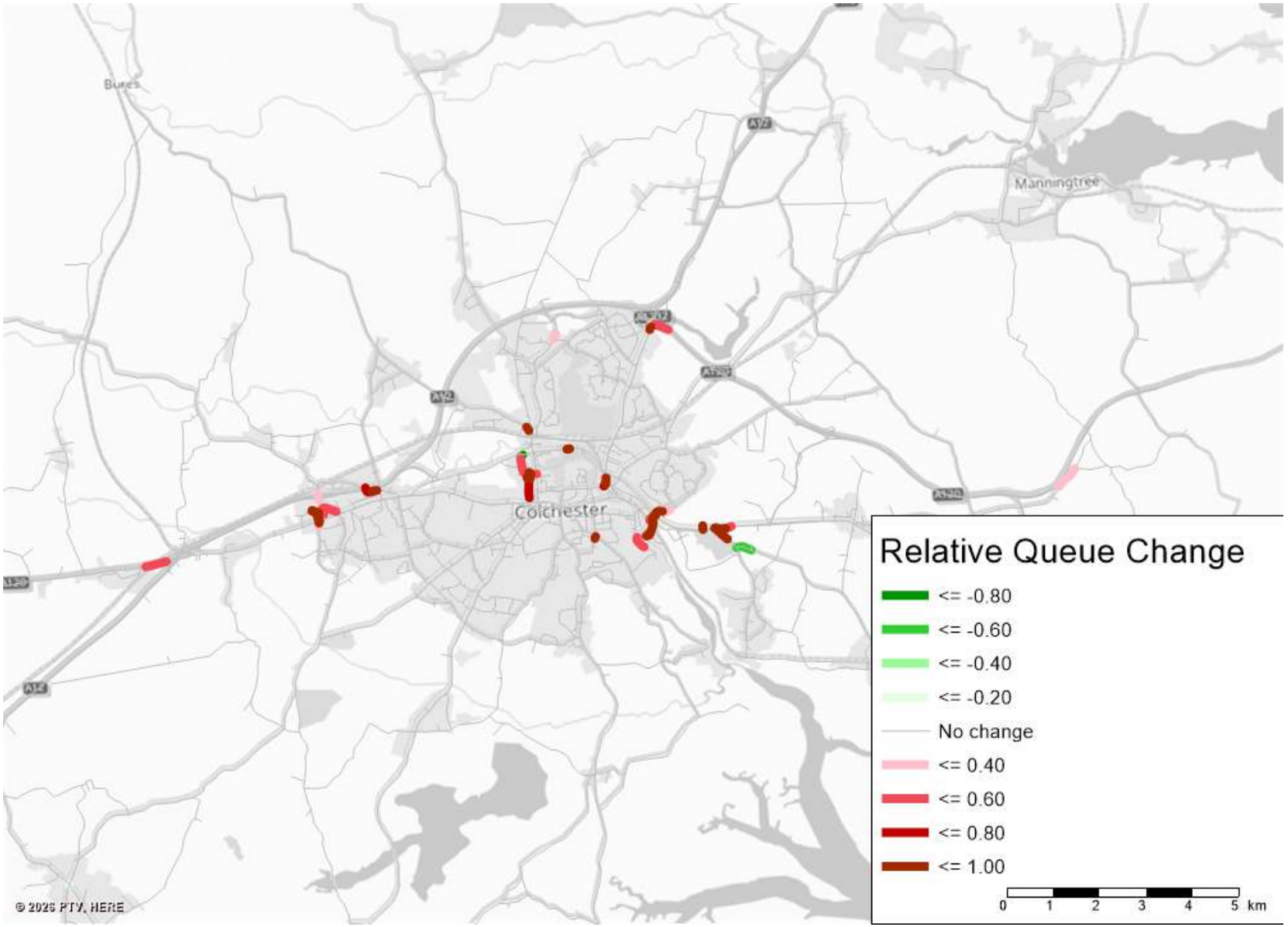

Figure I.7: AM Difference in blocking back (relative queues) between Scenario 5 and Scenario 4

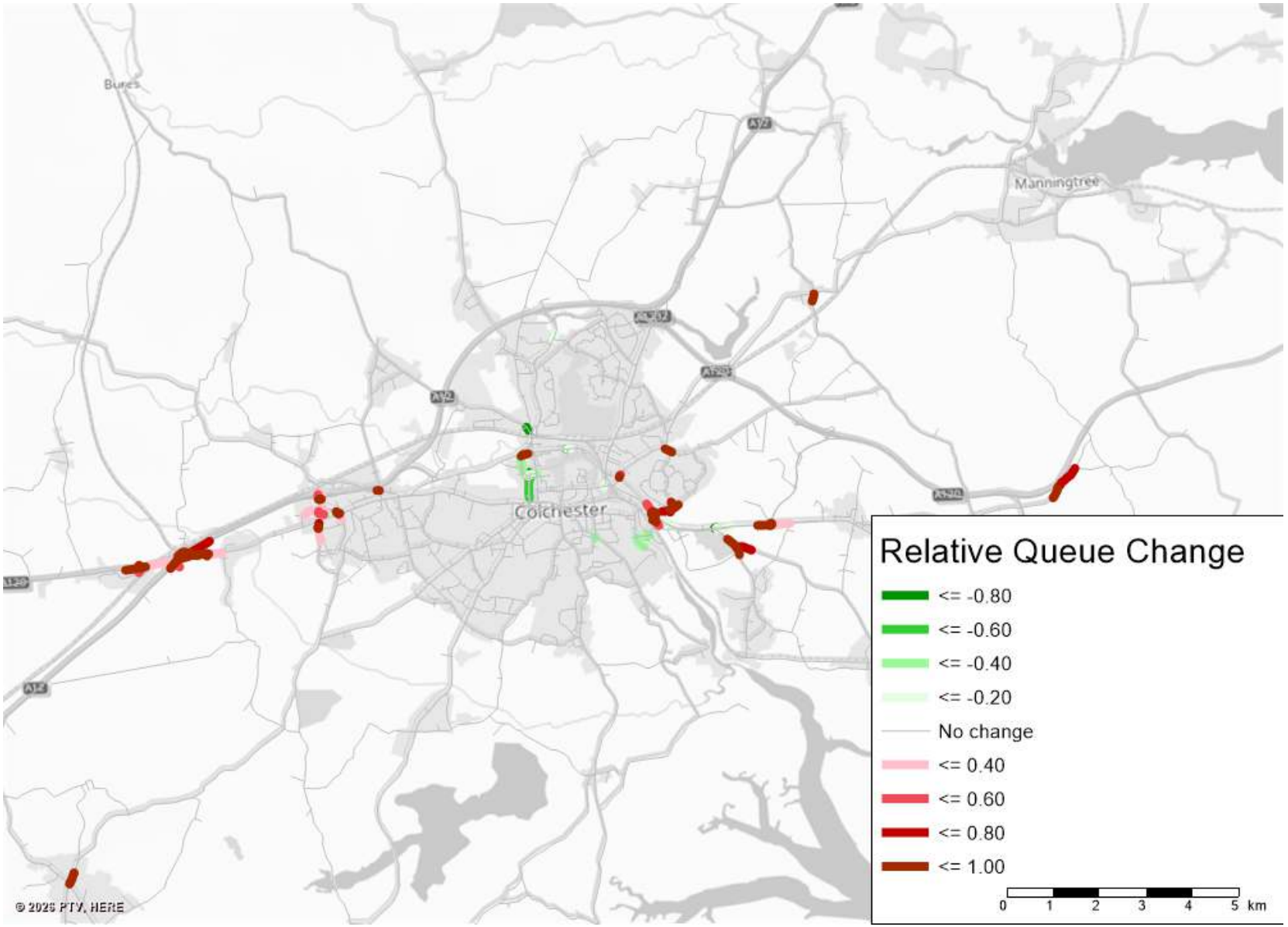

Figure I.8: AM Difference in blocking back (relative queues) between Scenario 6 and Scenario 5

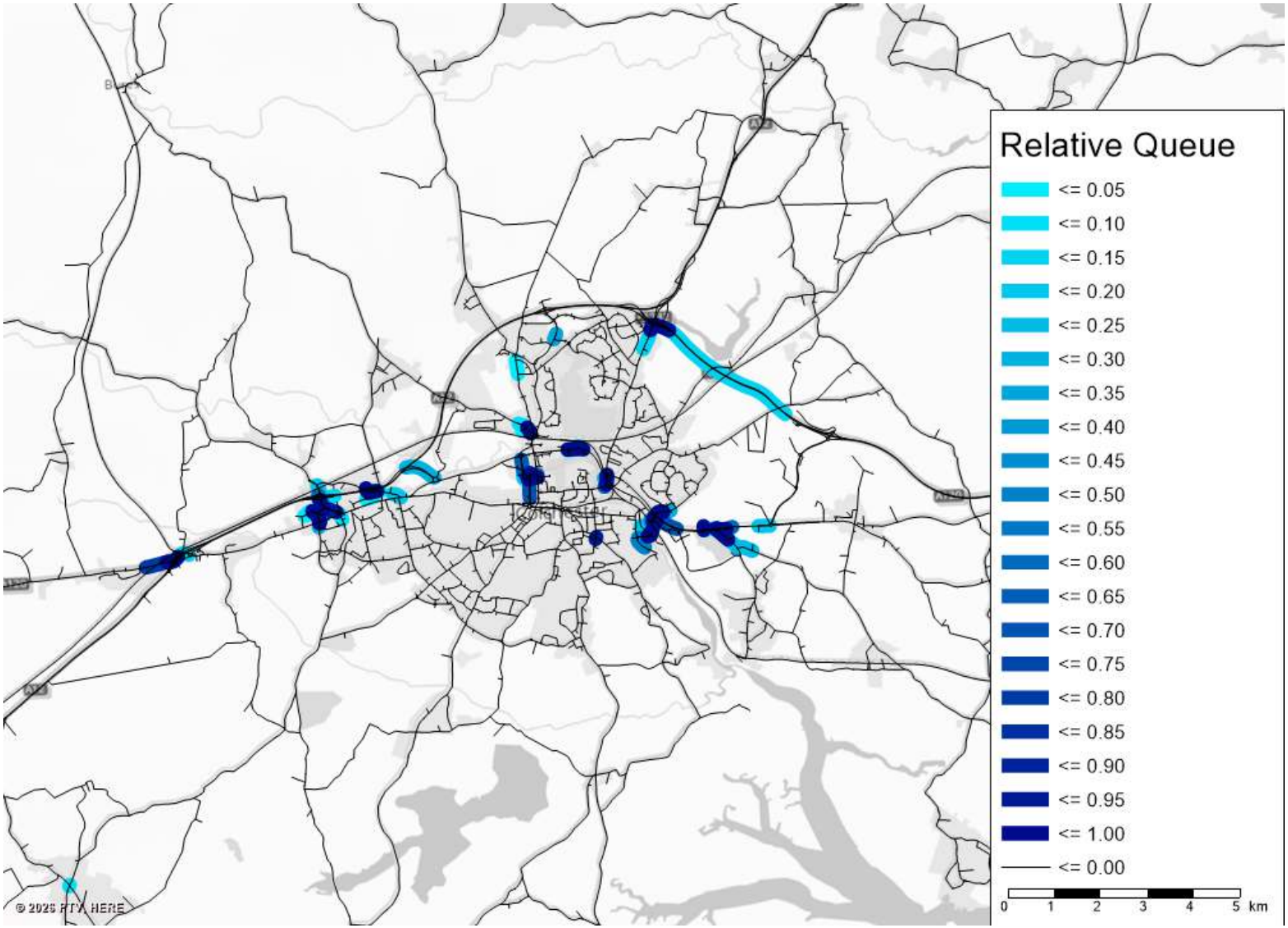

Figure I.9: AM relative queue – Scenario 5 2058 reference case with mitigation

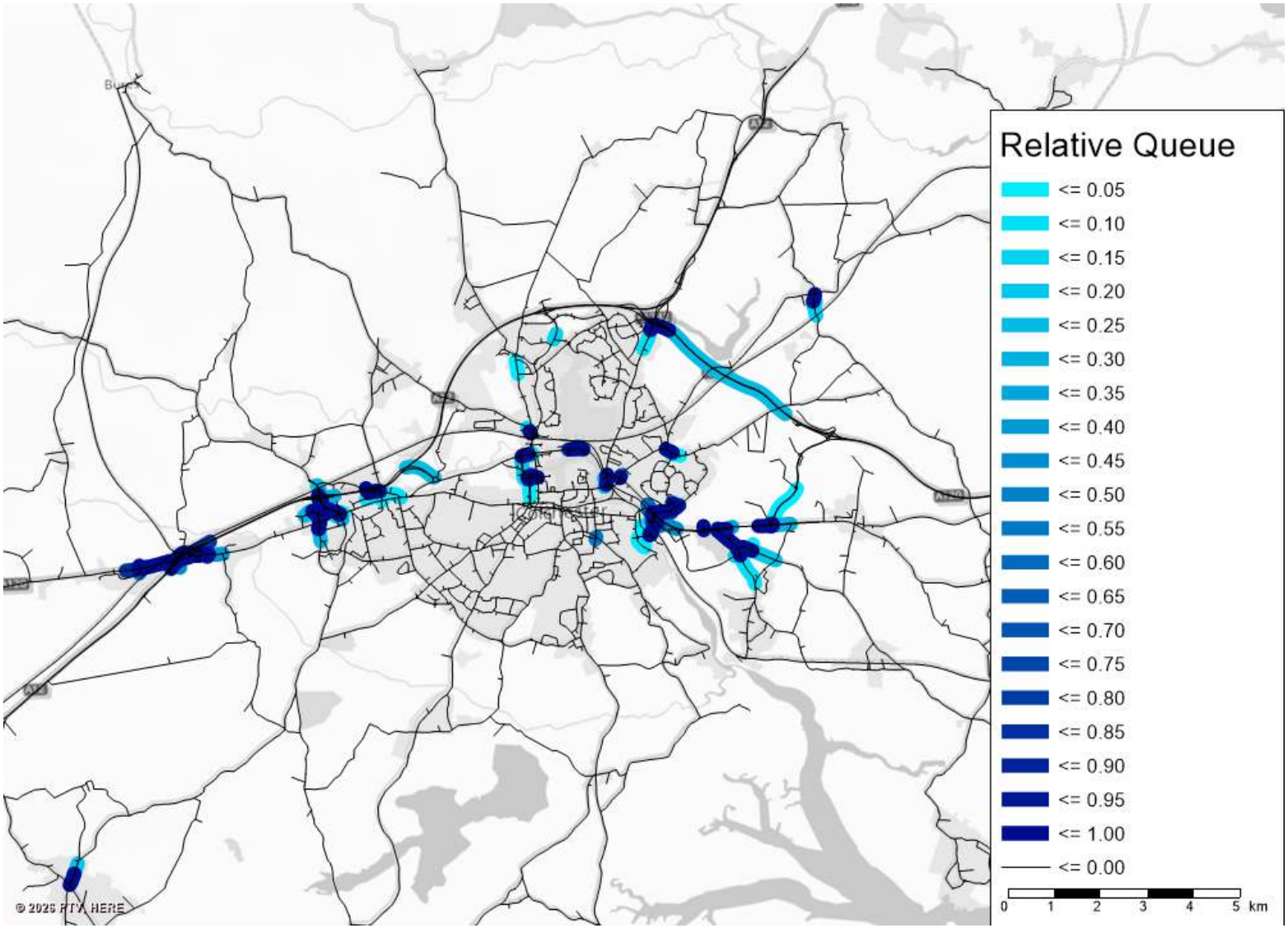

Figure I.10: AM relative queue – Scenario 6 2058 assessment case with mitigation and BaU demand

I.2 PM flow difference, speed and queue plots

I.2.1 Summary of impact in the PM

Table I.2: PM peak movement index scores for 2023 base and 2043 Scenarios 1-6

Sector	Location	PM Peak Impact						
		2023 Base	2043 S1 RC	2043 S2 BaU	2043 S3 BaU Mit	2043 S4 ST Mit	2058 S5 RC	2058 S6 BaU
Central	N Station rdbt, Station Way, A134 Westway and Balkerne Hill	8	12	14	9	8	11	10
	Ipswich Road, East Street, East Hill and Harwich Road	11	10	11	10	10	11	11
East	Greenstead Roundabout, Colne Causeway and Clingoe Hill	11	15	15	11	10	15	15
	Colchester Road to Wivenhoe	7	8	8	8	8	13	15
West	A12 J26/J27 to London Rd , Lexden Road, Cymbeline Way and Colne Bank Rbt, London Rd	5	9	10	8	8	11	11
	A12 J25 / A120 (western)	5	5	6	6	6	9	12
North	Northern Approach Road, Via Urbis Romane, Mill Road & A12 J28	8	12	15	10	10	9	9
	A12 J29 / A120 (eastern)	7	9	10	8	8	10	11
Outer	Tiptree	3	3	4	4	4	4	4
	Aldham	3	3	3	3	3	3	4
	A12 J20-25	5	7	7	7	7	9	10
Overall assessement combining all areas		7	9	10	8	8	10	11

Key to movement scale and acceptability of change

More or less free flow			Travelling slower			Moderate congestion			Substantial congestion		
1	2	3	4	5	6	7	8	9	10	11	12
Extreme congestion			Acceptability of change								
13	14	15	Passable ✓			Caution !			Unsatisfactory ✗		

I.2.2 PM flow difference plots

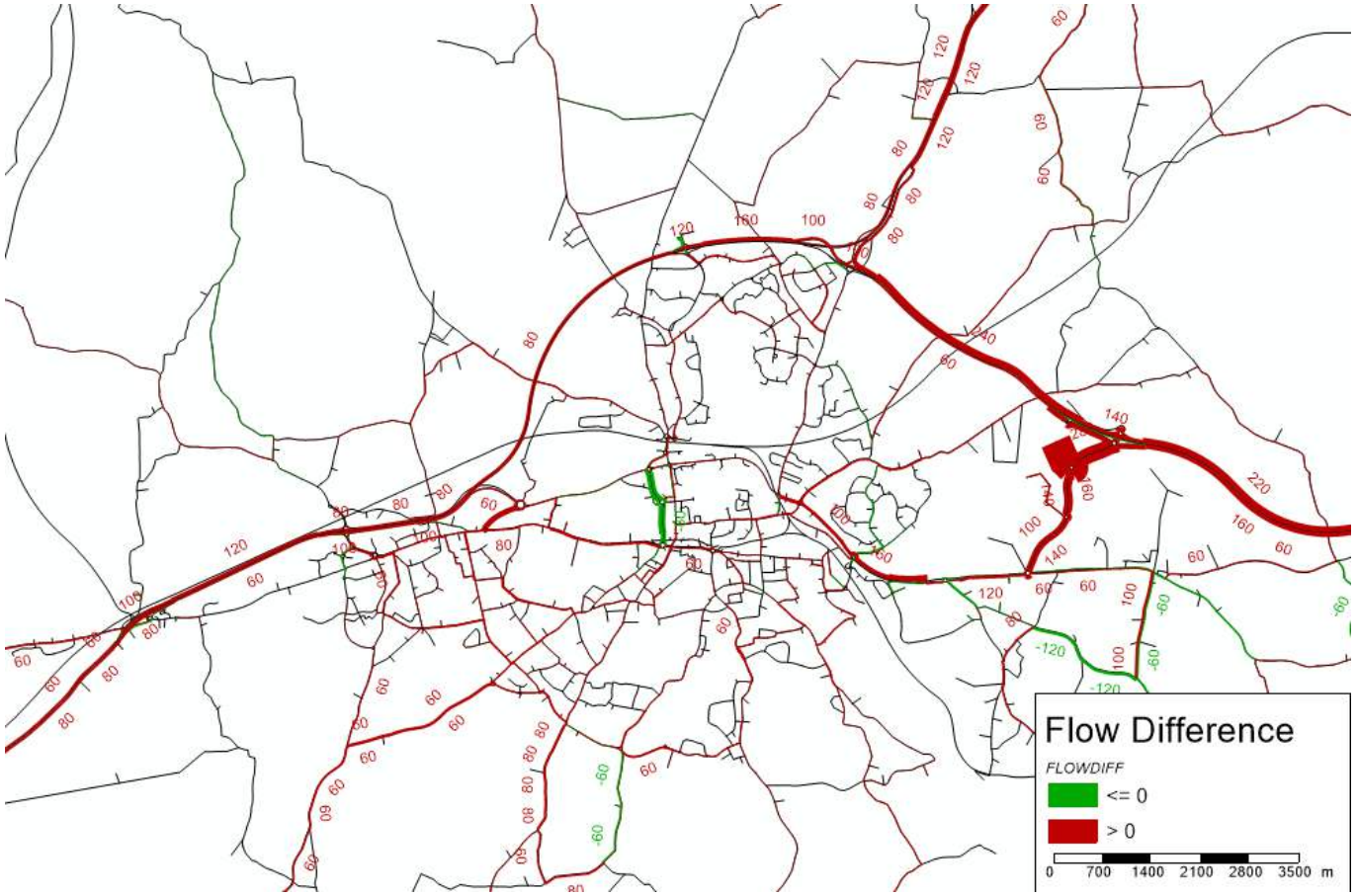

Figure I.11: PM flow difference – Scenario 5 2058 reference case with mitigation v Scenario 4 2043 ST mitigated assessment

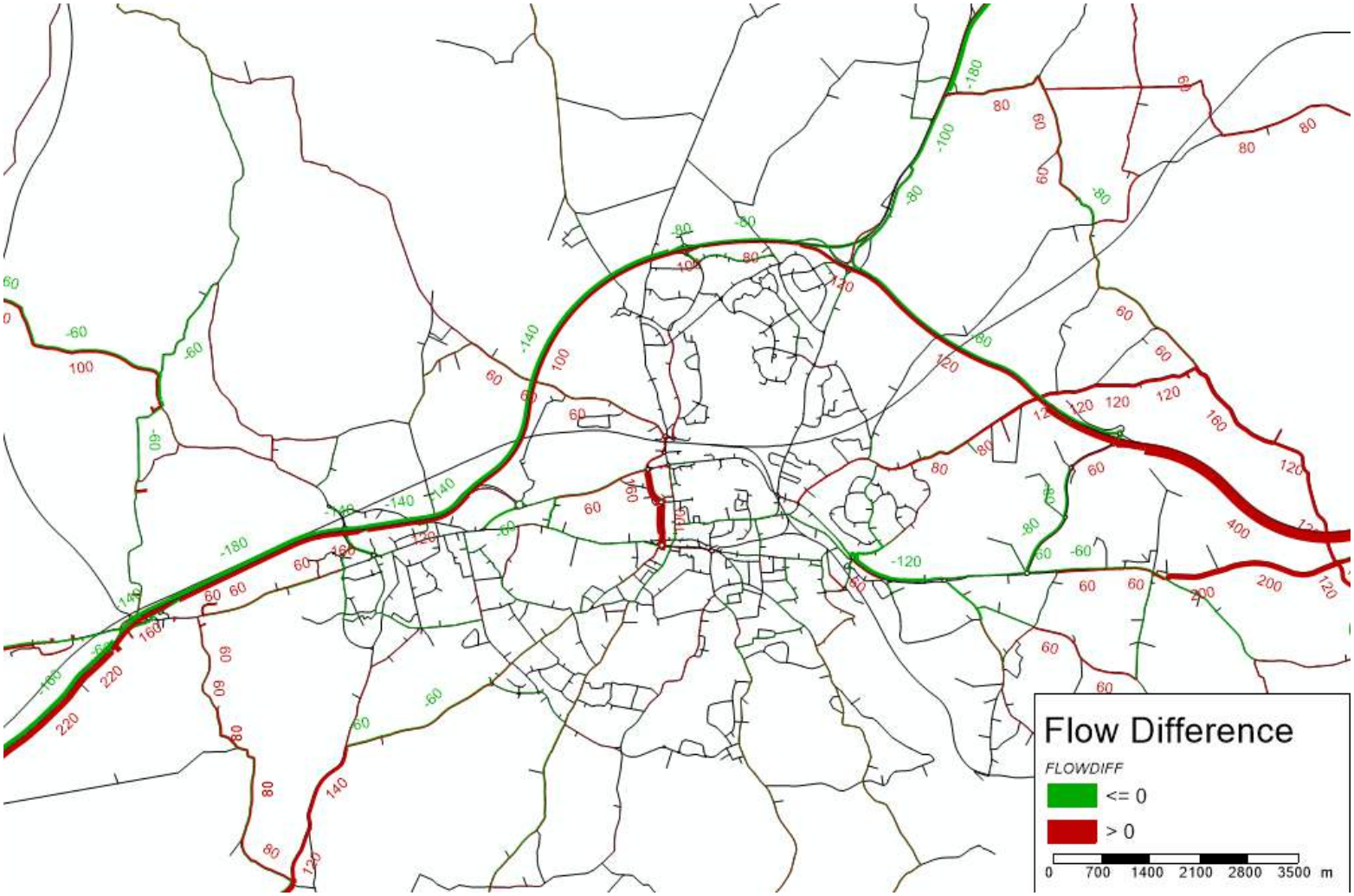

Figure I.12: PM flow difference – Scenario 6 2058 assessment case with mitigation and BaU demand v Scenario 5 2058 reference case with mitigation

I.2.3 PM speed plots (modelled speed / free flow speed)

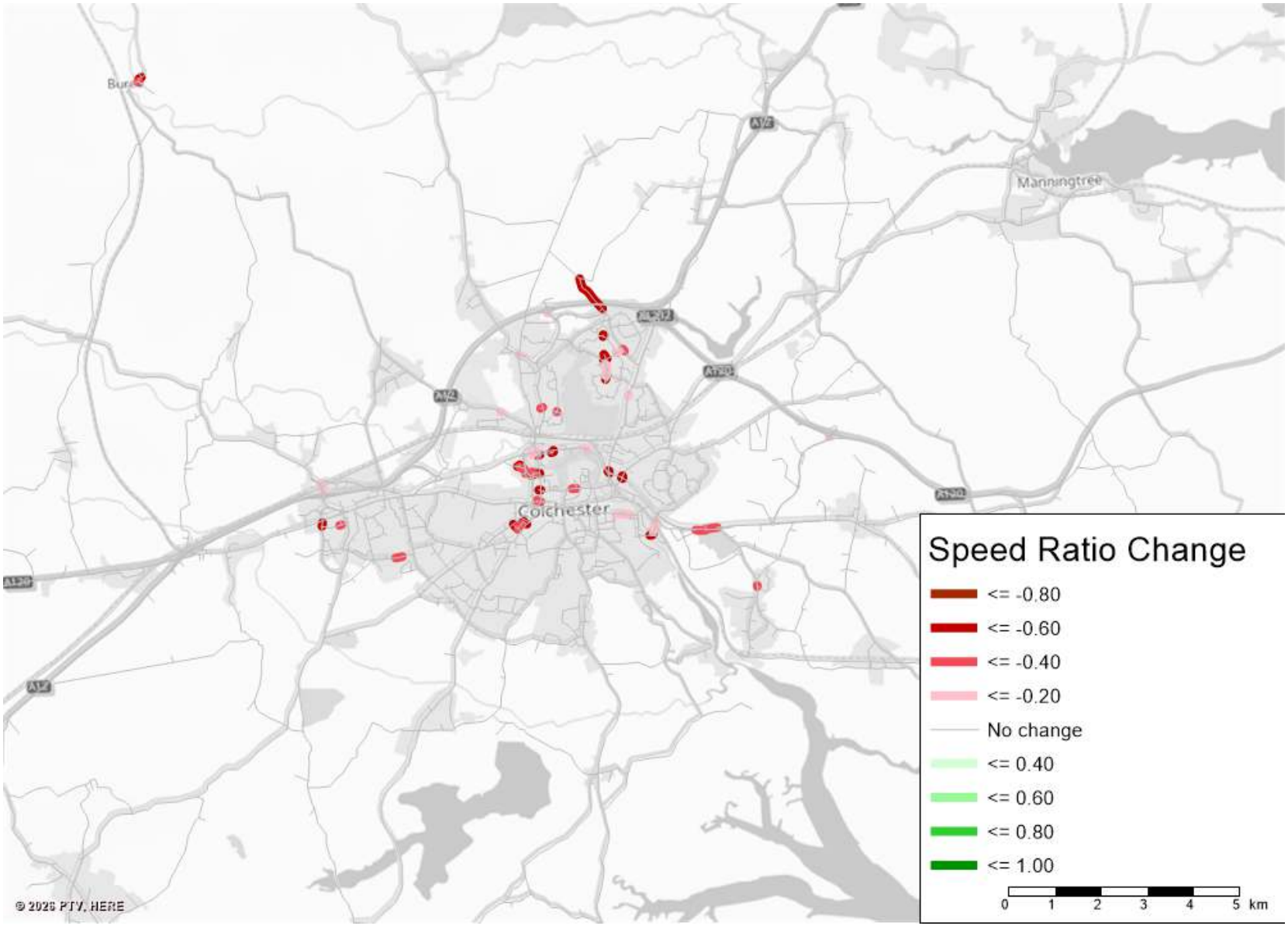

Figure I.13: PM Difference in traffic speed between Scenario 5 and Scenario 4

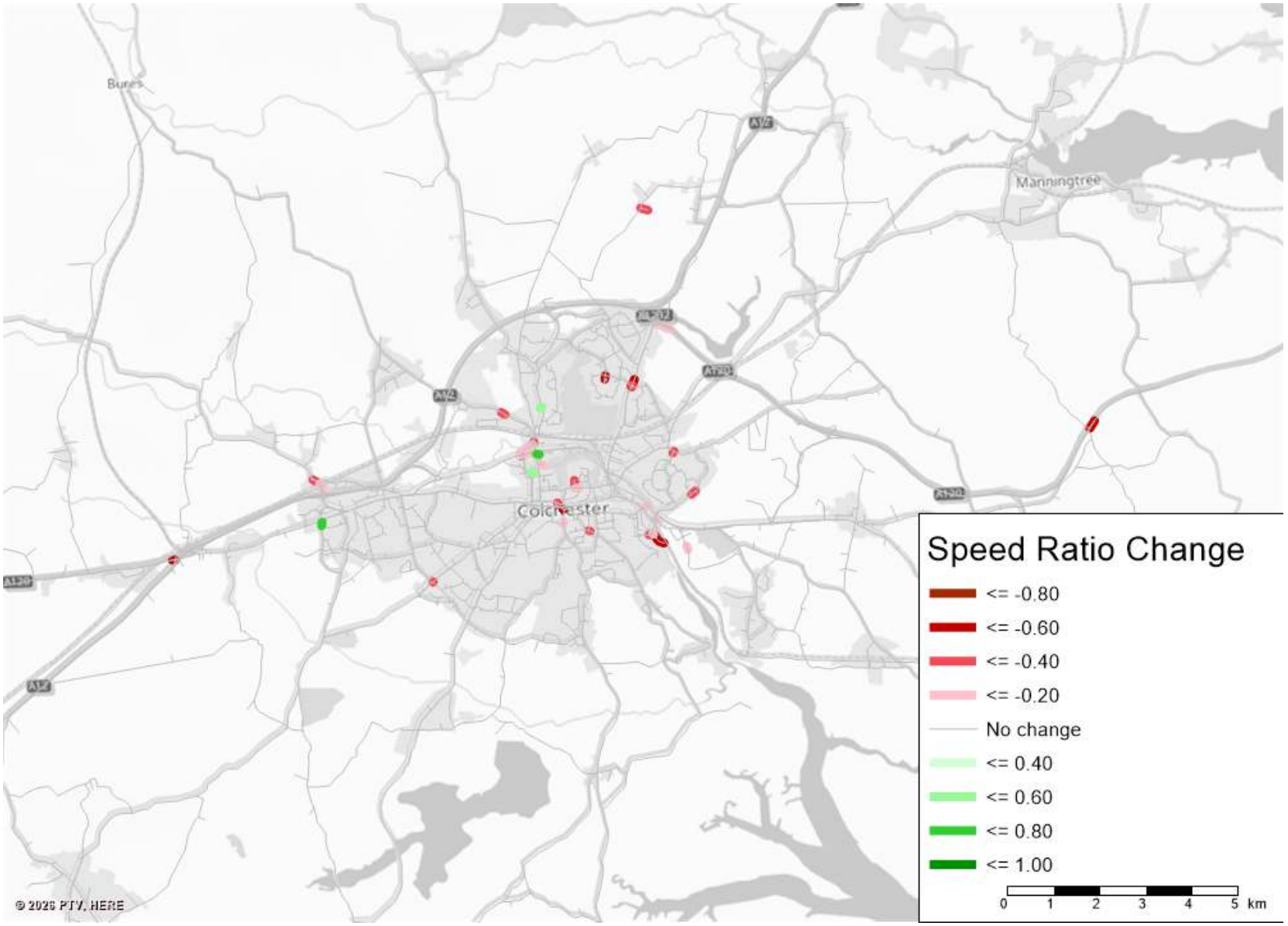

Figure I.14: PM Difference in traffic speed between Scenario 6 and Scenario 5

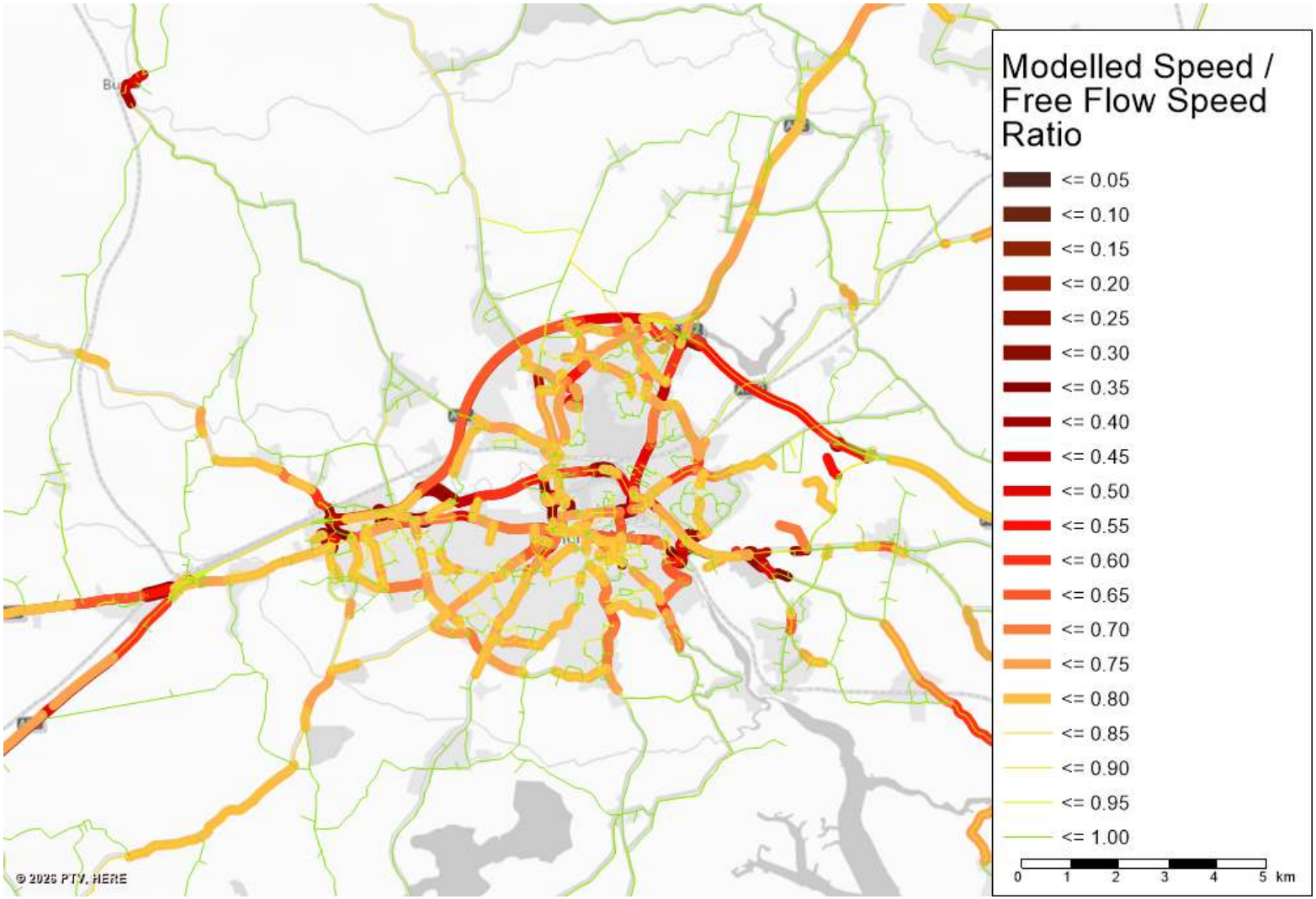

Figure I.15: PM speed ratio – Scenario 5 2058 reference case with mitigation

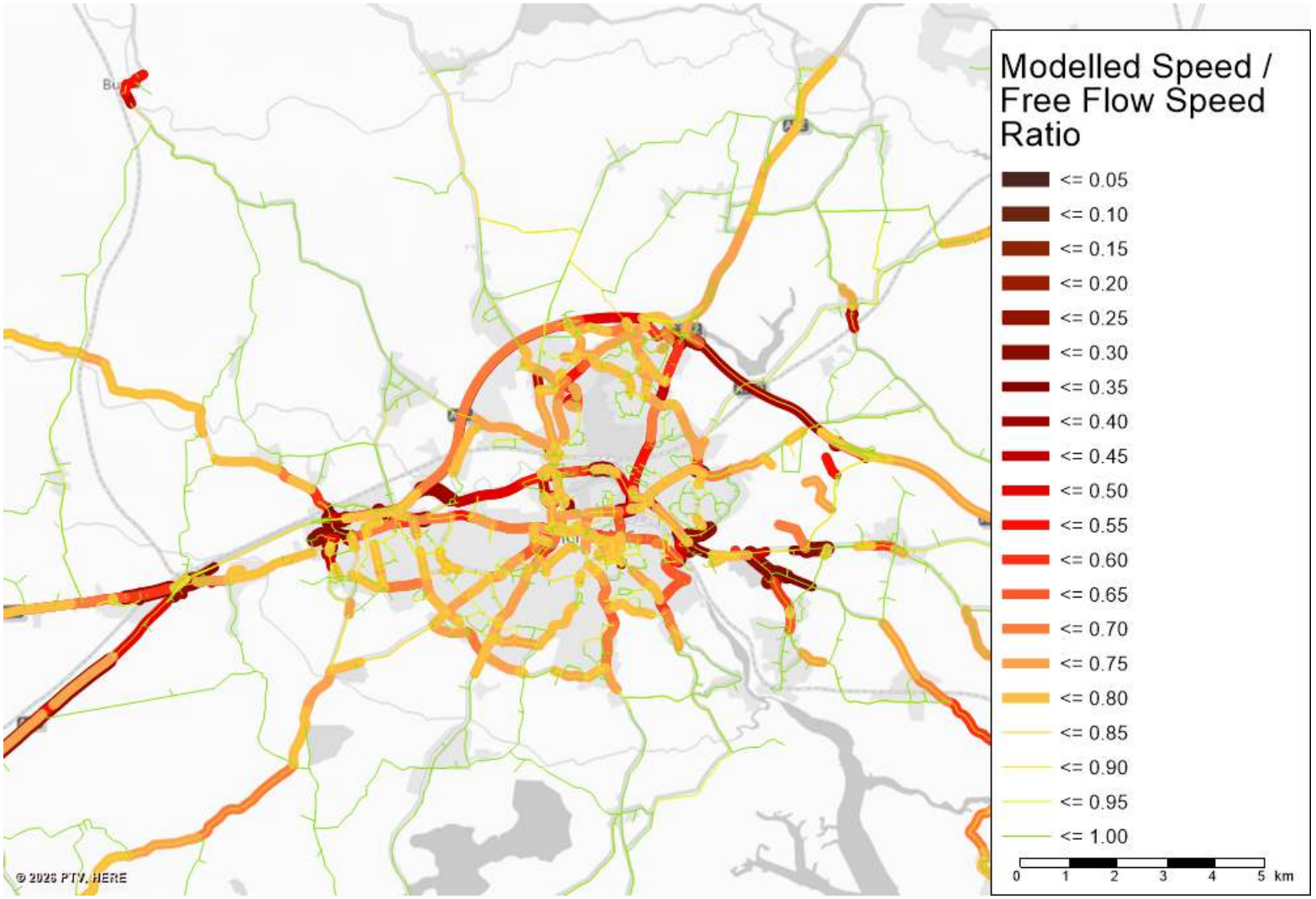

Figure I.16: PM speed ratio – Scenario 6 2058 assessment case with mitigation and BaU demand

I.2.4 PM relative queue plots (blocking back on road links in the model)

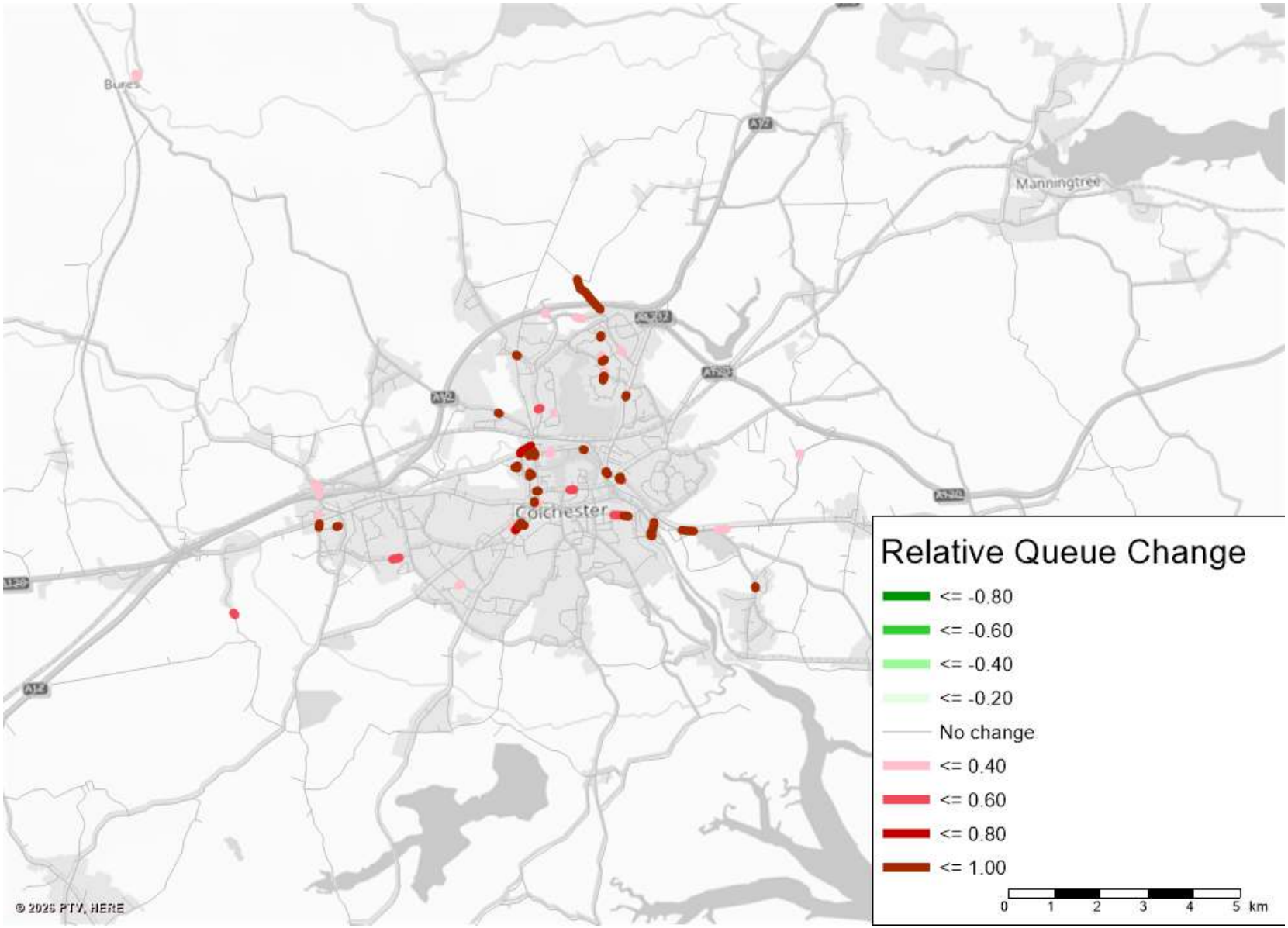

Figure I.17: PM Difference in blocking back (relative queues) between Scenario 5 and Scenario 4

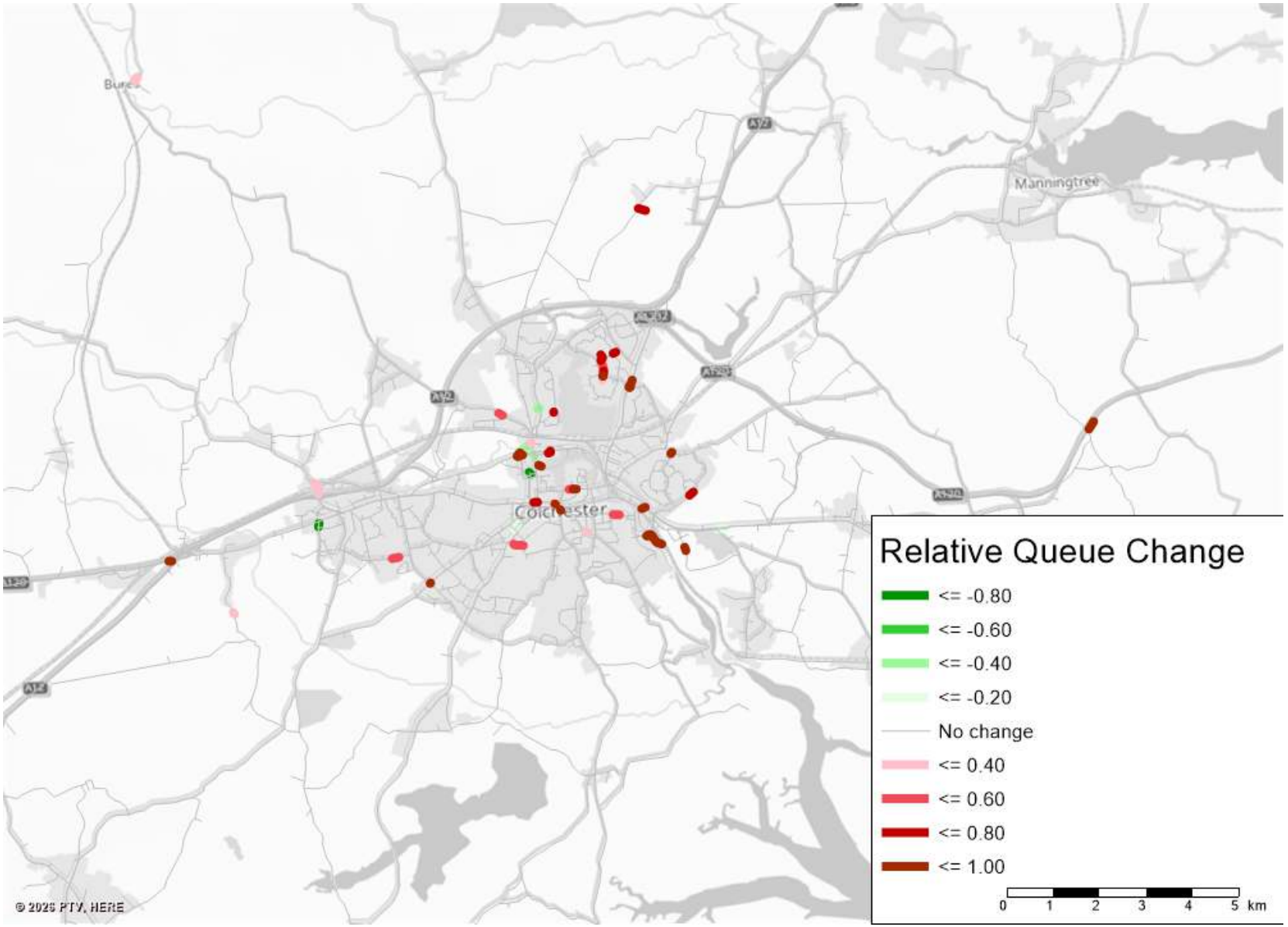

Figure I.18: PM Difference in blocking back (relative queues) between Scenario 6 and Scenario 5

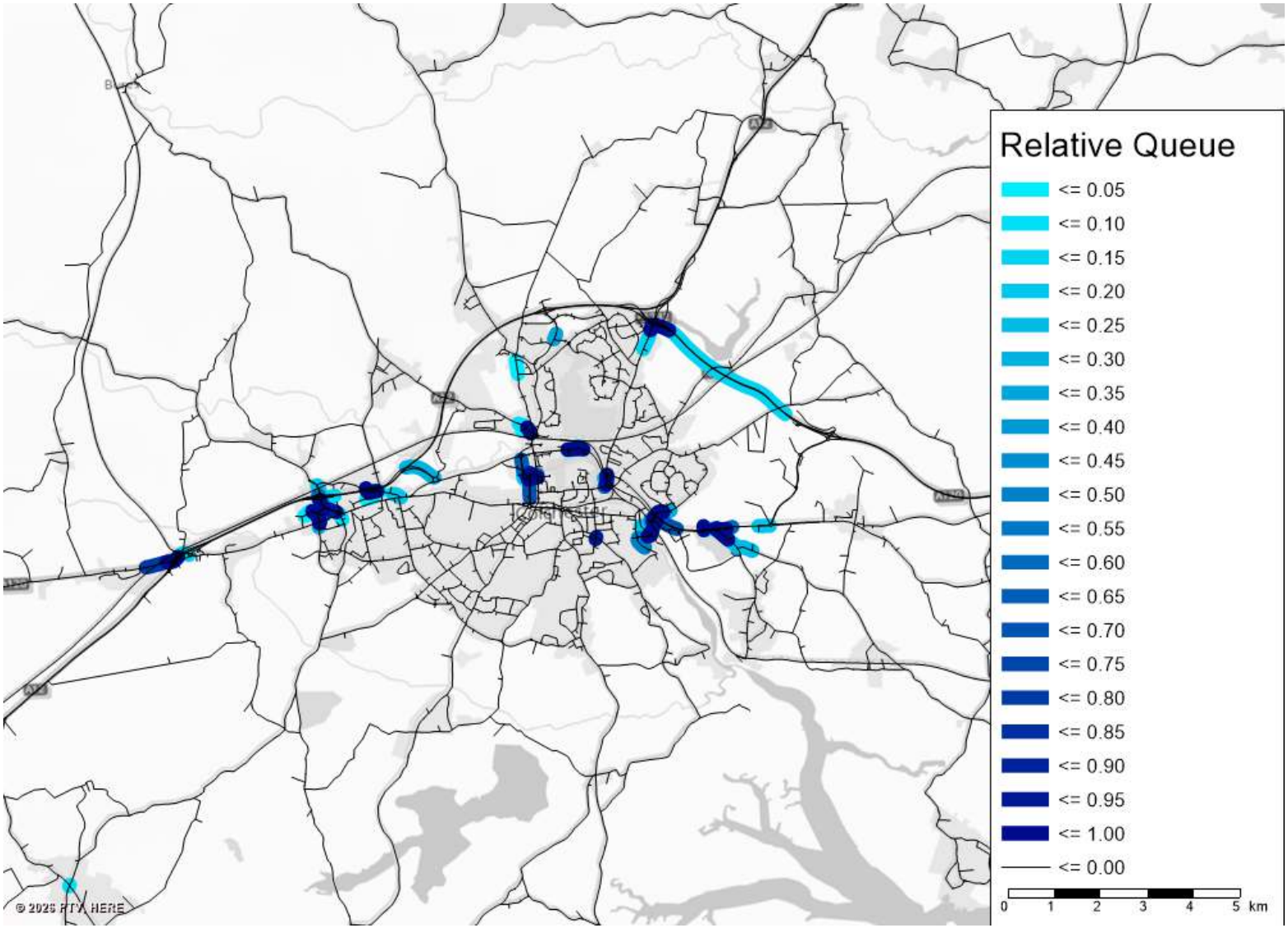

Figure I.19: PM relative queue – Scenario 5 2058 reference case with mitigation

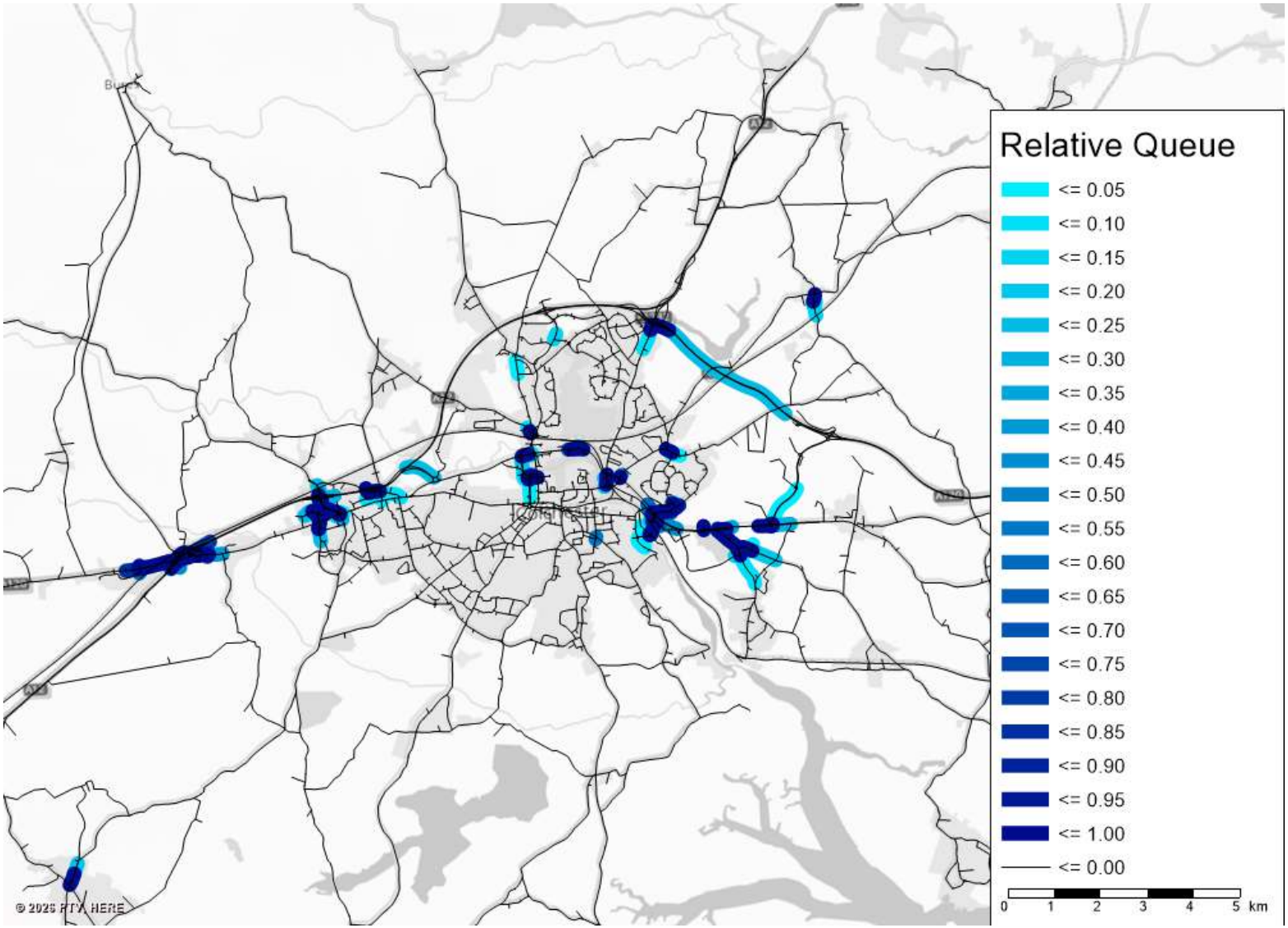

Figure I.20: PM relative queue – Scenario 6 2058 assessment case with mitigation and BaU demand

J Connectivity Tool plots

J.1 Baseline overall connectivity

Figure J.1: Marks Tey & West Colchester Baseline Connectivity

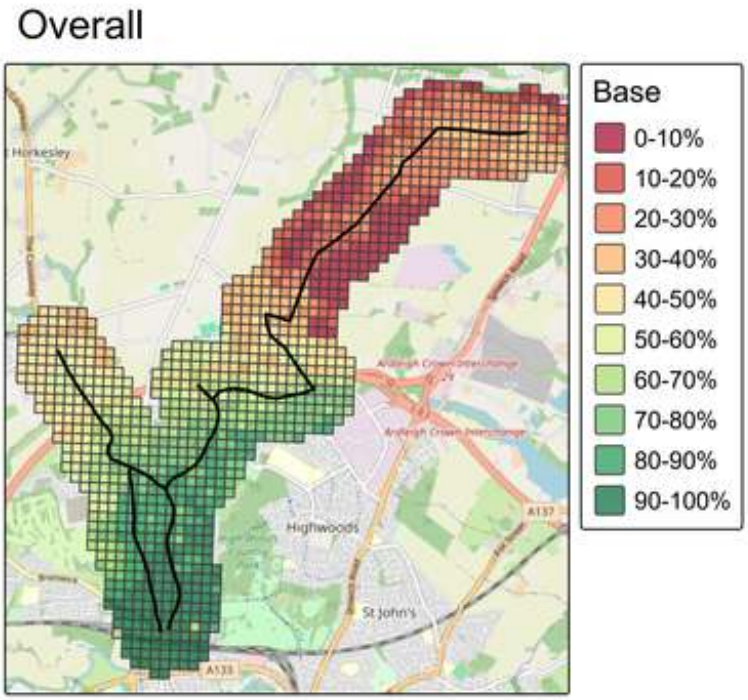

Figure J.2: J29 & Northern Approach Baseline Connectivity

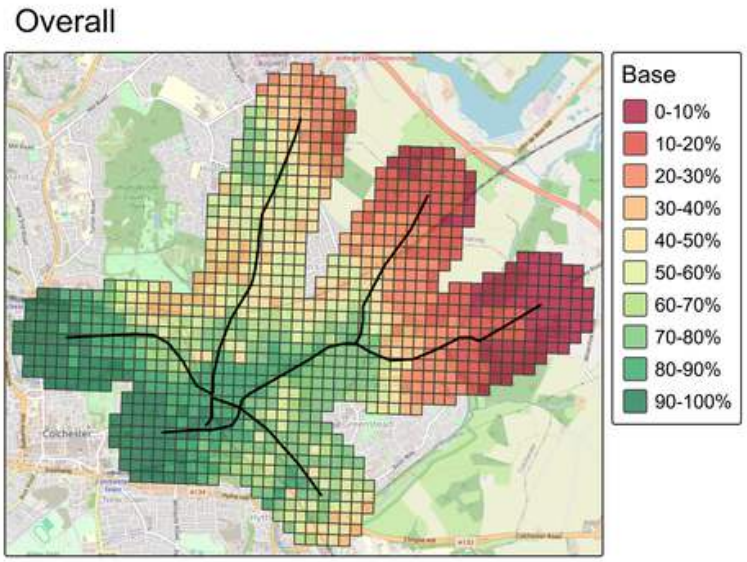

Figure J.3: NE Colchester Baseline Connectivity

J.2 Marks Tey baseline and leisure connectivity impact

Figure J.4: Marks Tey & West Colchester Lesiure Baseline Connectivity

Figure J.5: Marks Tey & West Colchester Impact on Leisure Connectivity

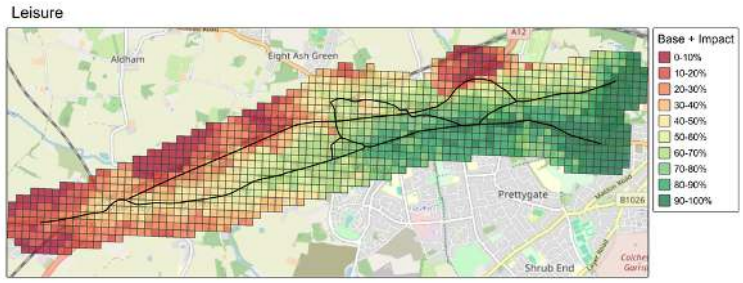

Figure J.6: Marks Tey & West Colchester Baseline plus Impact on Leisure Connectivity

J.3 J29 and Northern Approach corridor baseline plus education connectivity impact

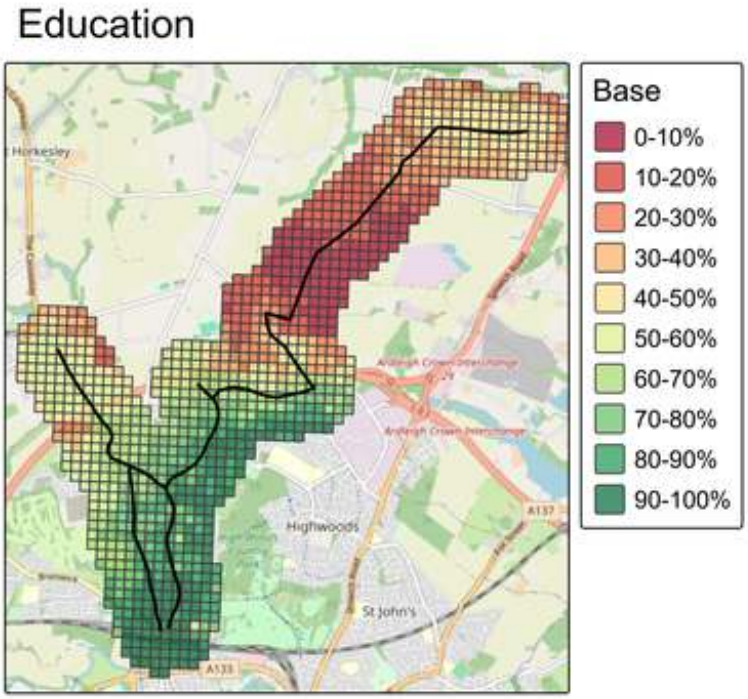

Figure J.7: J29 & Northern Approach Road Education Baseline Connectivity

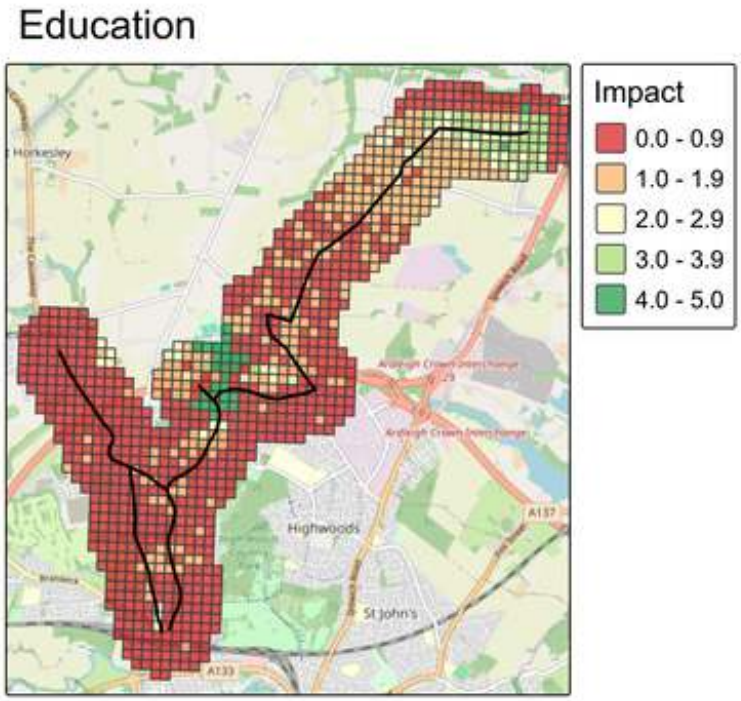

Figure J.8: J29 & Northern Approach Road Impact on Education Connectivity

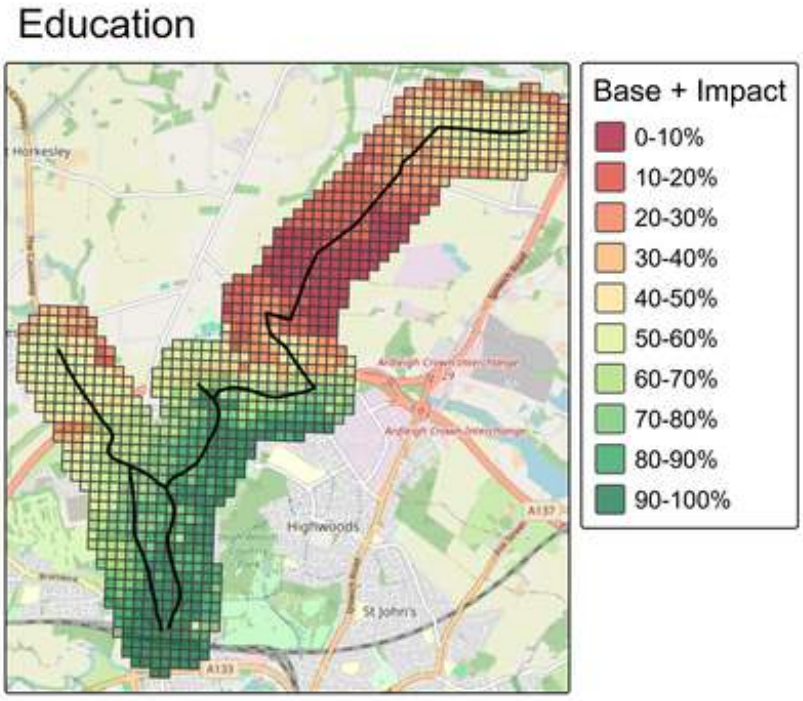

Figure J.9: J29 & Northern Approach Road Baseline plus Impact on Education Connectivity

J.4 North East Colchester corridor baseline plus employment connectivity impact

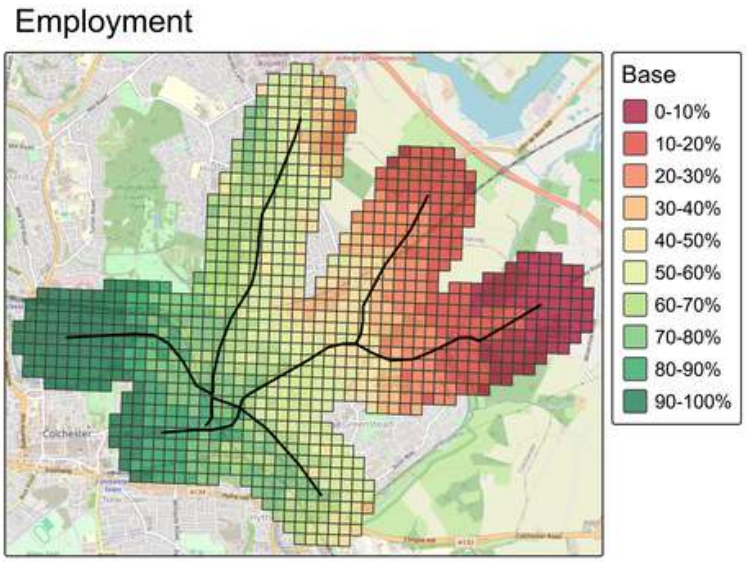

Figure J.10: NE Colchester Education Employment Connectivity

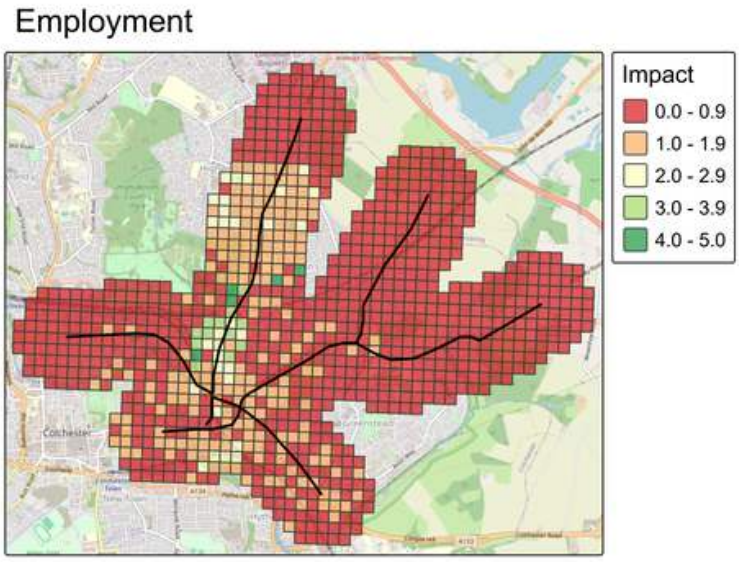

Figure J.11: NE Colchester Impact on Employment Connectivity

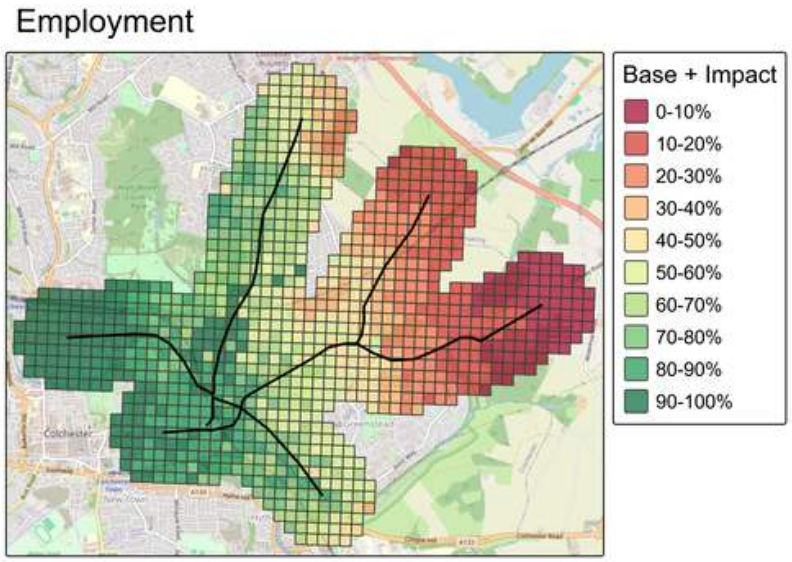

Figure J.12: NE Colchester Baseline plus Impact on Employment Connectivity