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West Essex and East Hertfordshire Local Plans Sustainable Transport Modelling

Essex County Council

Technical Note 7

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WEEH Local Plan Modelling Next Steps

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Limitation Statement

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This report is part of a suite of technical notes on the West Essex and East Hertfordshire (WEEH) Local Plans' modelling project and should be read in conjunction with these other technical notes. The analysis and forecasts contained in this report make use of information and input assumptions made available to Jacobs at a point in time. As conditions change the analysis and forecasts would be expected to change. Hence the findings set out in this report should be understood as relevant to that point in time when the information and assumptions were made.

The WEEH transport model is focussed on the Harlow district but covers adjacent districts in West Essex and East Hertfordshire. The WEEH model contributes to the understanding of strategic impacts between the districts but is not intended to replace any local transport models used in the districts surrounding Harlow.

Executive Summary

Harlow is on the border of West Essex and East Hertfordshire (WEEH). Emerging Local Plans of the WEEH districts identify significant levels of development in the wider Harlow area by 2033 to meet forecast housing and growth needs. Between 2014 and 2033, which is the period of highway model, approximately 15,000 new homes and 15,000 additional jobs are identified in the emerging Local Plans of WEEH districts of Harlow, Epping Forest, Uttlesford and East Hertfordshire. The Local Plans themselves cover the period 2011-2033.

The existing Visum Harlow strategic highway 2014 base model was updated in 2016 to improve its validation and calibration within the Harlow area. This updated base model was then used to model the impact of the emerging Local Plan developments on the highway network, with a forecast year of 2033. Hence the time period of the forecast Visum modelling differs from the LP period, and housing and job values quoted within this report vary from those within the LPs due to the time period differential. While the model extends beyond the WEEH districts, its main purpose is to forecast strategic impacts in the wider Harlow area and to enable high level comparisons to be made between development scenarios.

Previous Technical Notes 1-6 have reported on model development and identified the potential highway impact of emerging Local Plan growth. These notes identified locations where the network would be likely to be under particular stress including: A414 Edinburgh Way, B183 Gilden Way, A1169 Katherine's Way, A1025 Third Avenue, A1025 Second Avenue and A1169 Southern Way, Junction 7, Eastwick Road and First Avenue. The notes also explored the impacts of the strategic development sites in the wider Harlow area, including Gilston, East Harlow, Latton Priory, West Katherine's and West Sumners, and options to reduce their highway impact.

This Technical Note explores the potential for and likely impact of achieving greater levels of travel by sustainable modes – including public transport and the active modes of walking and cycling – and a greater level of commuting trips remaining in the wider Harlow area. These findings are then used to develop a case for investment in sustainable transport measures. The findings are expected to inform work in progress on the Harlow and Gilston Garden Town, particularly delivering "*Integrated and accessible transport systems, with walking, cycling and public transport designed to be the most attractive forms of local transport*".

A package of sustainable transport measures is identified based on creating north-south and east-west sustainable transport corridors, improving the density of the cycle network and travel planning. With reference to sustainable travel modal share targets used in the North Essex Garden Communities study and other evidence, ambitious and intermediate modal share assumptions are devised. These are used to reduce the number of local car trips generated in each of the model zones in wider Harlow. Different assumptions are applied depending on the proximity to the sustainable travel corridors and the size of development.

The model is run in 26 scenarios. However, only the most realistic scenarios using intermediate and standard (i.e. unadjusted) sustainable travel assumptions are reported on and compared in the main body of the report. These are:

1. Reference network using standard sustainable travel assumptions;
2. Reference network with Second Stort Crossing (SSC) using standard sustainable travel assumptions;
3. Reference network with SSC and improved sustainable travel corridor using standard sustainable travel assumptions;
4. Reference network with SSC and improved sustainable travel corridor using intermediate sustainable travel assumptions; and
5. Reference network with SSC and improved sustainable travel corridor using intermediate sustainable travel assumptions and higher internalisation of trips (representing people living and working closer at some new development sites).

Overall, the report finds that options (4) and (5) perform more favourably compared to options (1) - (3) as indicated by reduced flows and increased vehicle speeds. There are exceptions which are locations where highway capacity improvements may still be required as well as further sustainable transport measures. Nevertheless, within the capabilities and limitations of a strategic highway assignment model, a case for the benefits of increased investment in sustainable transport measures can be made.

The report concludes by exploring the difference that sustainable travel assumptions make at the larger, strategic development sites. An argument is formed that with a standard level of sustainable travel significantly less new housing can be accommodated by the highway network, even assuming significant highway improvements such as the SSC. Whereas with intermediate sustainable travel assumptions and more people living and working close by, the improved highway network could possibly accommodate the growth.

In fact, a case could be made that the quantum of development proposed in the emerging Local Plan would provide an opportunity to fund a significant step change in sustainable travel alternatives in wider Harlow and provide an increased level of patronage to sustain commercial public transport services. This would benefit existing residents and contribute to environmental quality across the town.

A series of ideas for a package of sustainable transport measures to complement highway improvements is provided to inform next steps. These need to be fully appraised, a task that is more fully explained in the Harlow and Gilston Garden Town Sustainable Transport Corridors Strategy but provide a basis for comparing delivery of sustainable infrastructure against larger highway schemes such as a Northern Bypass of Harlow. Accordingly, it is hoped that the findings in this technical note inform:

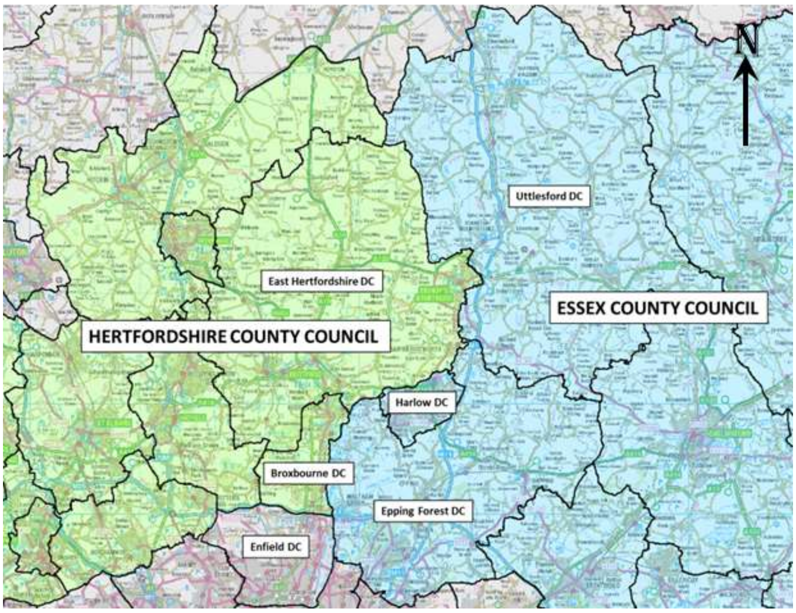
- Development of a sustainable, integrated transport strategy for wider Harlow;
- Design of development sites to support sustainable travel across wider Harlow;
- The choice of transport measures considered for developer contributions.

1. Introduction

1.1 Introduction

The first stage of the West Essex and East Hertfordshire (WEEH) Local Plan Modelling project for Essex County Council (ECC) has been completed, which made use of the Harlow Transport Model (developed to model the impact of the M11 junction 7a scheme) in order to provide an evidence base for the emerging Local Plan (LP) proposals of the four districts which comprise the WEEH Strategic Housing Market Assessment (SHMA) area. These are East Hertfordshire, Epping Forest, Harlow and Uttlesford District Councils.

Figure 1-1: Local Authorities in the Vicinity of Harlow

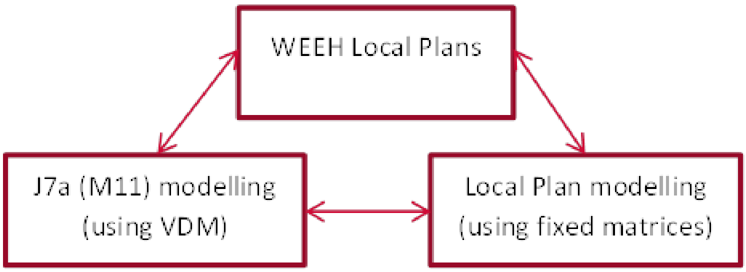


The first stage of the work comprised:

- Updating the Harlow Transport Model (created using Visum 14) and forecast methodology including use of an Uncertainty Log provided by ECC (Technical Note 1)
- Assessment of five WEEH LP spatial options A-E using the model (Technical Note 2)
- Preliminary assessment of Phases 2 and 3 of the Harlow Northern Bypass, which links to Phase 1 which is the proposed new J7a of the M11 (Technical Note 3)
- Assessment of the Emerging Option of the Local Plan (Technical Note 4)
- Local area studies in South Harlow and East Harlow (Technical Notes 5 and 6)

It should be noted that a separate J7a modelling and design project is reporting elsewhere. The diagram below shows how these two modelling projects support Local Plans. Growth assumptions and the modelled network in these projects align as far as practicable, given that these have evolved over time.

Figure 1-2: Local Plan support by the modelling projects



A simpler approach of using fixed trip matrices was used in the WEEH Local Plan traffic modelling as this was considered sufficient to provide feedback on likely impacts to inform the LP process. It was recognised by ECC that this would have limitations, including possible model convergence issues when dealing with high growth scenarios, but that this was acceptable for the initial tests of planning scenarios in order to identify relative differences between options.

The second stage of the project seeks to understand ways in which garden community principles, including delivering "*Integrated and accessible transport systems, with walking, cycling and public transport designed to be the most attractive forms of local transport*", could be implemented. The study aims to evaluate the impact of modal shift towards more sustainable travel and possible sustainable travel corridors on the wider Harlow area. This is the purpose of this report and involves developing a methodology for identifying appropriate sustainable travel assumptions, relevant areas to apply these, carrying out fixed trip matrix model runs for sustainable travel scenarios, and interpretation of the findings. In particular, our approach reflects the application of the sustainability principles of garden towns and communities, which are guiding the planning and design of larger strategic developments in wider Harlow.

1.2 Objectives

Although developments are required to consider sustainable transport alternatives, the study focuses on identifying the impact of investment in sustainable transport that goes beyond standard provision. Hence the objectives of the study are to:

1. Identify realistic levels of modal shift towards more sustainable travel and which measures could achieve such an increase in sustainable travel;
2. Identify what impacts increases in sustainable travel may have on the highway network;
3. Identify a case for investment in sustainable transport measures and its viability

1.3 Report structure and terminology

Even though a transport modelling report is by necessity a technical document, the report attempts to explain the modelling process and findings in plain English. However, the introduction of some new terminology and abbreviations is unavoidable. Accordingly, a glossary is provided.

Chapter 2 of this report explains how the WEEH transport model, which was used for the previous Local Plan technical notes, has been updated to a newer version of background growth (NTEM v7.2) and the assumptions checked for the road network in 2033.

Chapter 3 addresses Objective 1 by identifying realistic levels of modal shift. This reviews trends, current strategies and the development of sustainable travel corridors. From this we define intermediate and ambitious sustainable travel assumptions, primarily based on proximity to potential sustainable travel corridors.

Chapter 4 then provides information from the transport modelling, including network statistics and likely flow changes, to support Objective 2 with and without the Second Stort Crossing (SSC). In addition, we report on tests assuming higher levels of internalisation of trips within wider Harlow. This recognises that sustainable travel can also involve travelling less, such as living and working in the same town.

Chapter 5 further analyses the transport model outputs in terms of changes in journey time on key routes through Harlow. This helps to substantiate the findings from Section 4 and contributes to Objective 2.

Chapter 6 then addresses Objective 3, by drawing out the key findings from Section 4 and 5, to demonstrate a case for investment in sustainable transport measures and identifying key development levels.

Chapter 7 provides a conclusion.

2. General Model Updates

2.1 Background to model

The Harlow highway model uses version 15 of PTV's Visum software and comprises a model highway network and a trip matrix for the forecast year 2033. The model then assigns trips to the highway network and produces outputs which include vehicle flows, travel time and speed. The outputs can be summarised and analysed in various ways. This report uses a combination of vehicle flow plots, summary statistics and journey time analysis.

The transport model covers a wide area extending beyond the boundaries of the four WEEH districts. The model is divided into zones. Within the area of wider Harlow the zones are relatively small but further away from Harlow the zones become much larger. Hence the model provides a reasonable level of accuracy on strategic routes around wider Harlow, but is less reliable further out and so would be unsuitable for strategic modelling beyond wider Harlow. For this reason, it is also unlikely that model outputs would be comparable with any strategic transport models in surrounding areas.

Within each model zone there is at least one connector through which trips, as defined in the trip matrix, are loaded onto the model highway network. The first section of this chapter describes how both the zone structure has been reviewed and revised in wider Harlow and the model highway network checked and updated in order that it represents the 2033 situation as closely as possible within the limitations of a strategic transport model.

The trip matrix provides the number of trips travelling from a zone (the origin) to another zone (the destination) for the forecast year 2033. Hence the matrix shows the distribution of trips between zone origins and destinations and is sometimes referred to as an OD matrix. The forecast matrix is calculated by taking the base matrix from 2014 (the year which the model was validated) and adding in trips expected to be generated from proposed Local Plan developments and trips expected to result from general background growth. The second section of this chapter reviews Local Plan developments and describes an update to the method of estimating background growth.

There are different highway networks and trip matrices for the AM and PM peaks. The highway networks include signal timings, which might differ between the AM and PM peaks even though the location of roads is fixed. The trip matrices differ since zones with residential land uses are often origins of trips while zones with employment uses are often destinations of trips in the AM peak. In the PM peak this is reversed.

2.2 Network Changes

The road network used in the model is similar to the "Committed Network" used to test the Emerging Option of Local Plan developments described in Technical Note 4. However, some changes have been made to update the planning and modelling assumptions, which are described in the following sections.

2.2.1 Zoning System

After reviewing the current zoning boundaries in the study area, particularly those zones which contain strategic development sites, model zones 19 (Old Harlow) and 149 (Latton Priory) have been divided in order to separate the future traffic (see Figure 2-2). New model zone 500 contains residential development in Latton Priory whilst employment development is contained in zone 149. Meanwhile new model zone 501 contains new residential development at East Harlow (see Figure 2-1). The zone connectors have also been reviewed in these two model zones. The connectors and traffic from the base model have been compared to the future model; existing traffic still uses the existing connectors, while development traffic uses the new connectors in the future model.

Figure 2-1: Changes to zoning system – model zones 149 & 500

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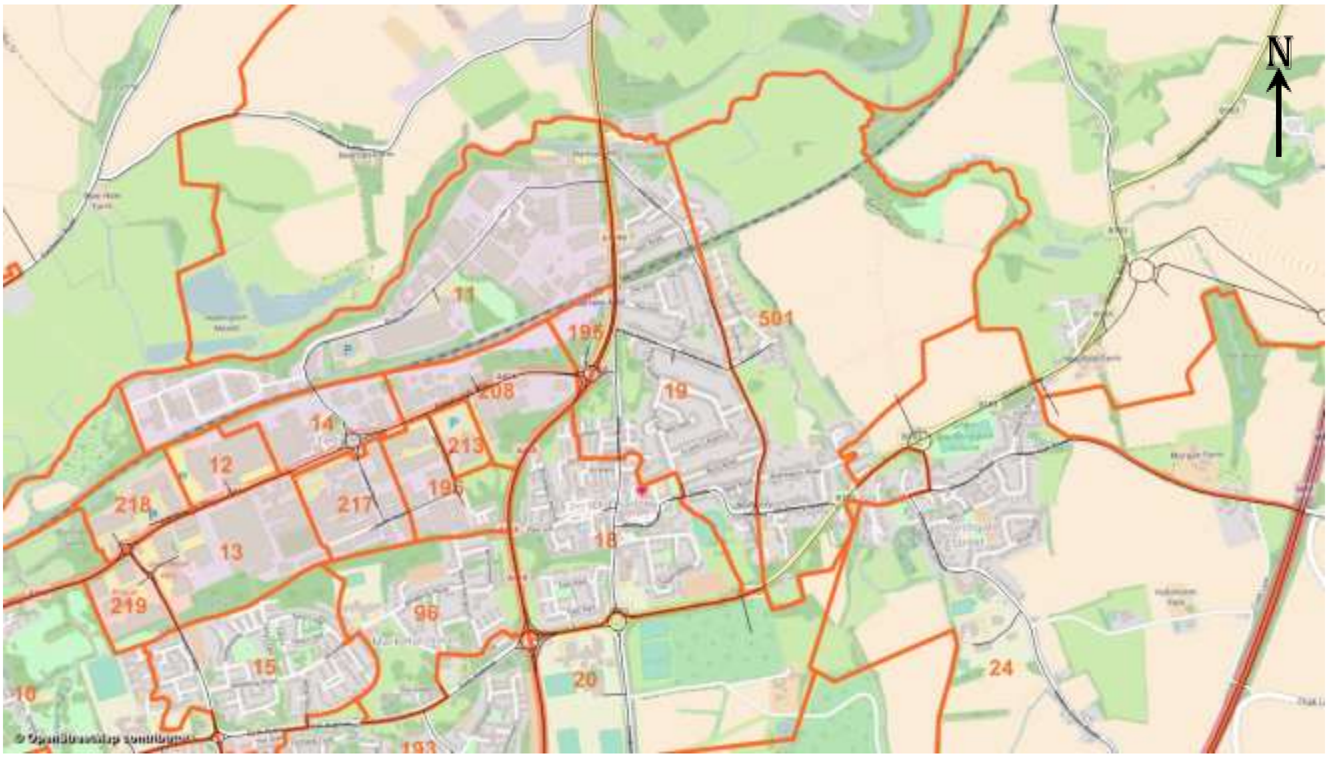
Figure 2-2: Changes to zoning system – model zones 19 & 501



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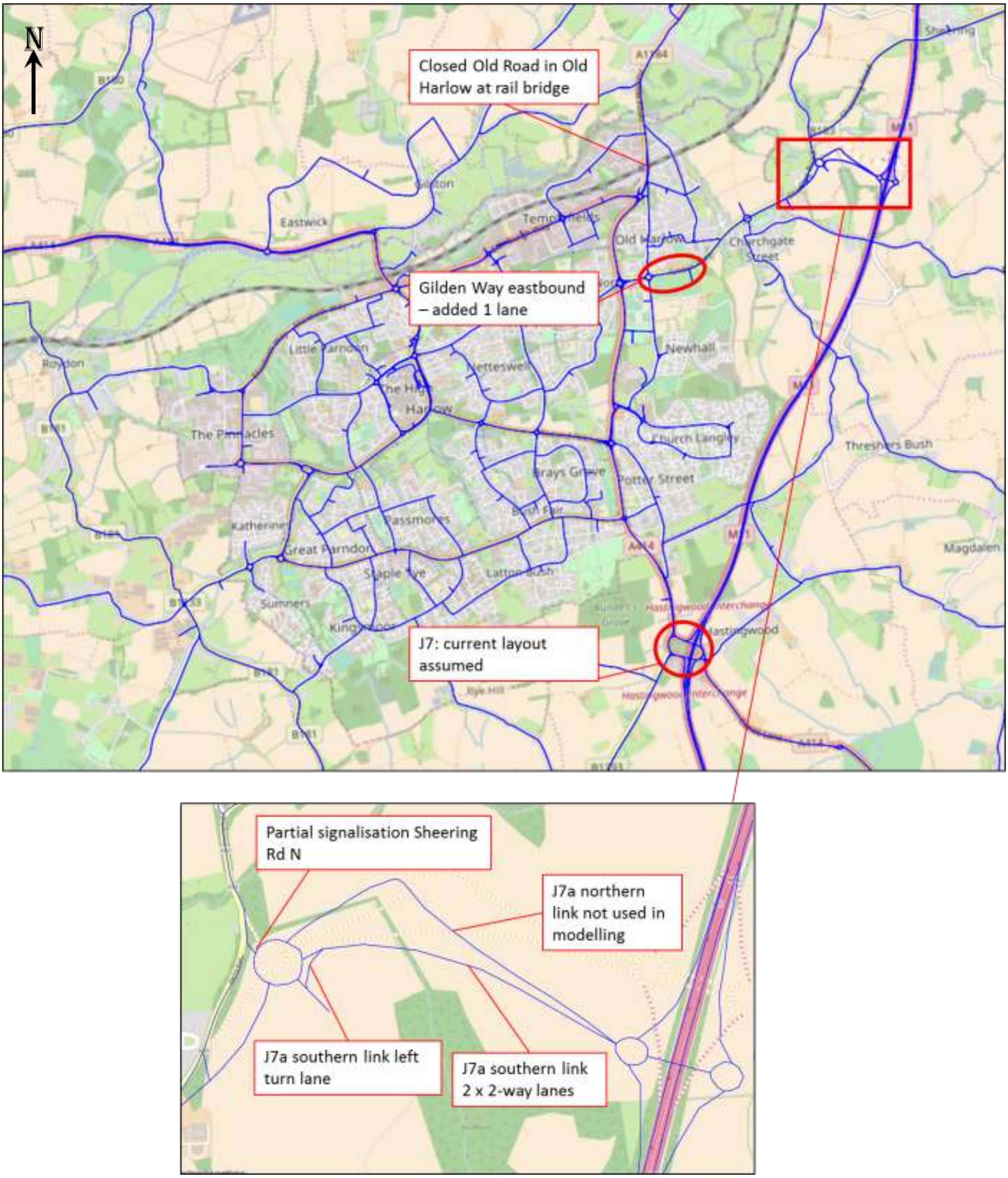
2.2.2 Links and Nodes

The following links and nodes have been updated in the model. The changes are illustrated in Figure 2-3.

- As part of the traffic management relating to the M11 J7a scheme, Old Road in Old Harlow is assumed to be closed off at the rail bridge to represent the removal of through traffic, and the A1184/Old Road junction has been made all movements;
- The proposed short term capacity improvements at J7 of the M11 have not been included (since the improvements included for the earlier model at this junction are not in the forward programme of schemes);
- Latest J7A design with associated Gilden Way improvements has been incorporated;
- Additional Gilden Way layout changes, as proposed within Technical Note 5, associated with possible access arrangements for the East Harlow strategic site include:
    - B183 Gilden Way eastbound has been widened to two lanes between the exit of London Road roundabout and a proposed signalised junction, representing a possible south-western access for the East Harlow strategic site;
    - Provision of a left turn slip road from the new Campions roundabout J7a link road to a possible East Harlow site north-eastern access road;
    - Provision of traffic signals for the Sheering Road North arm at the Campions roundabout.
- Dual carriageway on the A414 Fifth Avenue between Eastwick to Burnt Mill has been returned to single carriageway in some of the scenarios to reflect reduced highway capacity and to represent the improved north:south sustainable travel corridor.

Figure 2-3: Link and node changes in the network



2.3 Development Assumptions

The development assumptions used in sustainable modelling are as set out in the Uncertainty Log, which has been developed over time in consultation with the four districts, version “160914 UL 2033 Emerging Max_V2_Final” and is as described in Technical Note 4. No changes were made to these earlier assumptions. It should be noted that the modelling timeframe is 2014-2033 as the base highway model was developed in 2014. Accordingly planning numbers contained in this note are lower than those contained in the WEEH districts emerging Plans, which have a timeframe of 2011-2033.

The uncertainty log provides information on development growth expected across the four WEEH districts. Specifically, for the purpose of the highway modelling, it provides:

- A 2033 ‘Emerging Option’ forecast which includes all developments identified by the WEEH districts in their emerging Local Plans;
- A 2033 Reference Case which includes all currently committed development, those planned sites with a probability status of ‘near certain’ or ‘more than likely’, an element of each of the strategic sites (approx. 10% on each site).

In Technical Note 7, the majority of the investigation and analysis focuses on the likely impact of increased levels of sustainable travel on the 2033 Emerging Option. However, occasionally comparison to the Reference Case is made to assist in the understanding of likely future impacts.

The number of homes within each district for both forecast scenarios are set out in Table 2-1 below.

Table 2-1: Distribution of housing developments across the WEEH districts

District / Site	Reference Case	Emerging Option
East Herts:	5,710	15,295
Epping Forest:	2,513	9,998
Harlow:	3,997	8,108
Uttlesford	6,383	9,683
HMA Overall	**18,603**	**43,084**
Wider Harlow Sub-Total (rounded)	**4,585**	**15,250**

Of a total of over 43,000 new homes in the Emerging Option across the WEEH districts approximately 15,000 homes are expected in the wider Harlow area. The spatial distribution for the wider Harlow area development sites is summarised in Table 2-2.

Table 2-2: Distribution of wider Harlow area housing development across districts and sites (rounded)

District / Site	Reference Case	Emerging Option
East Herts:		
Gilston	200	3,250
Harlow:		
Rest of town	3,735	5,500
East Harlow	260	2,600
Epping Forest:		
Latton Priory	105	1,050
West Sumners	100	1,000
West Katherines	110	1,100
East Harlow	75	750
Wider Harlow Total:	**4,585**	**15,250**

As discussed in Technical Note 2, there is less certainty with regard to the likely level of employment within the WEEH area. The assumptions made for employment in the Emerging Option and the Reference Case are summarised in **Table 2-3**.

Table 2-3: Development assumptions – WEEH employment sites estimated jobs

District / Area	Reference Case	Emerging Option
East Herts	0	2,847
Epping Forest	409	7,954
Harlow	8,531	8,531
Uttlesford	4,640	11,135
HMA Overall	**13,580**	**30,467**
Wider Harlow Sub-Total	**8,940**	**15,321**

The employment sites and jobs totals assumed for the developments in wider-Harlow are shown in Table 2-4. It should be noted that Epping Forest District Council were still undertaking an Employment Land Review at the time that the modelling work for this Technical Note was being undertaken, which may change the assumed quantum and location of employment across the district.

Table 2-4: Development assumptions – Estimated jobs, wider Harlow area employment sites

Log Reference	Site	Type	Reference Case	Emerging Option
372	Latton Priory Farm	Employment	409	4,091
336	Harlow Enterprise Zone – London Road North	Business Park	3,000	3,000
456	Public Health England – The Pinnacles	Business Park	3,000	3,000
378	Latton Park	Commercial	0	1,842
338	Harlow Enterprise Zone – Templefields North East	Industrial Estate	1,479	1,479
325	East Harlow	Employment	0	0
337	Harlow Enterprise Zone – London Road South	Office	1,052	1,052
374	Harlow Park Nursery	Commercial	0	784
386	Southfield Nursery	Commercial	0	72
	Total		**8,940**	**15,321**

2.4 NTEM Background Growth Update

The National Trip End Model (NTEM) background growth factors have been updated using the latest version, 7.2. These updated forecasts are considered to be more robust since they incorporate more recent 2011 Census and planning data, the latest trends in driving licence holding, and more recent trip rate assumptions from the National Travel Survey.

The methodology set out in TN1 has been used to derive the updated background growth for zones outside of the WEEH area, and to modify the growth within the WEEH area where necessary, For instance, in the Reference Case, in model zones where WEEH Local Plan development exceeded NTEM forecast growth, NTEM growth has been set to zero to avoid introducing negative growth, using the method and spreadsheet already developed in the first stage of the project and reported in TN1.

New forecast OD matrices have been produced for the AM and PM peak hours showing the number of trips to and from model zones, which represent the demand input required by the Visum model.

3. Sustainable Travel Assumptions

Study Objective 1 aims to identify realistic levels of additional sustainable transport that are achievable and what those levels might comprise. Accordingly, this Chapter reviews evidence of existing bus (PT), cycle and walking (active mode) use, and how intermediate and ambitious sustainable travel assumptions were devised in order to apply these in the WEEH transport model. The current model already includes an assumption that a ‘standard’ level of sustainable travel already occurs.

The study also considers changes to trip distribution as a separate test; this change could reasonably be expected to occur over time as a result of more sustainable land use patterns, with more people within the wider Harlow area choosing to live and work within it. This is referred to as greater internalisation of trips – as more trips will stay within the wider Harlow area.

3.1 Vision

As set out in the ‘Harlow & Gilston Garden Town Expression of Interest’, October 2016, “*Harlow, East Hertfordshire, and Epping Forest District Councils, and Hertfordshire and Essex County Councils, are working in partnership together with Hertfordshire LEP, South East LEP and site promoters to bring forward transformational growth at Harlow.*” Furthermore, it states that “*The opportunity exists to extend and strengthen the existing framework of green wedges and spaces through a landscape-led approach aligned with Garden City principles. The Councils share an ambition to create sustainable travel corridors as part of managing overall travel demand and linking new communities and Enterprise Zones through a choice of transport modes.*”

Taking advantage of the existing public transport corridors within Harlow as well as the green wedges, two sustainable travel corridors have been identified which would link the strategic sites to and through the town centre and to each other. In addition, spurs to these corridors would be enabled, which could help to deliver a transformational change in travel modes not only for new residents and employees, but for existing ones as well.

An evaluation of the existing travel modes, and the assumptions made regarding future travel within the Garden Town, is set out in the following sections. The key drivers for these have been based on the work done to support the North Essex Garden Communities (NEGC), with particular reference to the NEGC Movement and Access Study.

This vision is in line with UK government objectives to double cycling use and increase walking by 2025 (DfT 2017). It is also recognised that a modal shift to active modes and public transport is required to meet targets for air quality improvement (DEFRA 2017).

3.2 Current Mode Share Assumptions

3.2.1 Mode Share Evidence from transport modelling data

The current WEEH transport forecast model has been built from a base model validated against observed vehicle flows in 2014. The forecast for the number of vehicle trips in 2033 combines:

a) Trip rates at committed and Local Plan developments based on TRICS data

b) Background growth in vehicle traffic taken from NTEM

Implicit within both the TRICS data and NTEM data is an assumption that a proportion of trips will be made by sustainable transport modes. This level of sustainable travel is referred to in this report as the standard sustainable travel assumption.

Technical Note 1 extracted information on modal share for person trips across all trip categories based on the TRICS data used in the model. Table 3-1 below reproduces this modal share information.

Table 3-1: Standard assumptions of modal split per person trip (derived from TRICS)

Modal Choice	AM Period			PM Period		
	Arrivals	Departures	Totals	Arrivals	Departures	Totals
Vehicle Occupants	78.2%	75.1%	**75.7%**	81.8%	82.5%	**82.0%**
Bus/Tram Passengers	0.7%	1.3%	**1.2%**	2.2%	1.3%	**1.9%**
Total Rail Passengers	0.0%	0.2%	**0.2%**	0.3%	0.1%	**0.2%**
Coach Passengers	0.1%	0.2%	**0.2%**	0.0%	0.0%	**0.1%**
Pedestrians	19.6%	20.9%	**20.6%**	12.7%	13.4%	**12.9%**
Cyclists	1.6%	2.3%	**2.1%**	3.0%	2.8%	**2.9%**

Meanwhile NTEM background growth methodology applies a flat rate assumption for the amount of vehicle trips as a proportion of all trips taken from the National Travel Survey. In the forecasting procedure this is adjusted in the matrix building process by also considering changes in incomes and fuel prices. Hence there is an in-built assumption that some trips will be by sustainable modes.

3.2.2 Mode Share Evidence from the Census Data

Given the TRICS mode share assumptions set out in Table 3-1 are approximate, these have been compared with 2011 Census journey to work data. Table 3-2 below shows the actual mode share for journey to work from the 2011 Census data. When it is considered that journey to work data excludes school trips, the modal splits in the model appear reasonable.

Table 3-2: Essex and East Hertfordshire districts mode share (Journey to Work Census 2011 data)

	Car	Train	Bus	Bicycle	Walk	Other
Basildon	64.0%	18.0%	3.9%	2.0%	9.8%	2.4%
Braintree	73.6%	9.9%	2.6%	1.7%	10.7%	1.5%
Brentwood	58.3%	26.8%	2.2%	1.1%	8.6%	3.1%
Castle Point	69.8%	15.6%	4.2%	1.8%	6.9%	1.8%
Chelmsford	64.4%	14.8%	4.5%	3.4%	11.3%	1.5%
Colchester	64.8%	8.6%	6.6%	4.6%	13.8%	1.6%
Epping Forest	61.4%	4.8%	2.5%	0.9%	6.5%	23.9%
Harlow	**70.1%**	**4.5%**	**6.0%**	**2.9%**	**11.7%**	**4.9%**
Maldon	76.7%	9.1%	1.9%	2.3%	8.6%	1.4%
Rochford	68.9%	18.1%	3.9%	1.4%	6.1%	1.6%
Tendring	73.6%	5.8%	2.8%	3.8%	12.2%	1.8%
Uttlesford	75.1%	10.3%	1.7%	1.3%	9.8%	1.8%
East Herts	69.2%	15.3%	2.2%	1.5%	10.1%	1.8%

Note that that ‘other’ category includes underground, metro, light rail or tram, taxi, motorcycle, scooter or moped, or any other method of travel to work.

We then considered the trend between 2001 and 2011 in order to see if there was an increase or decrease in the mode share. The following table compares 2001 and 2011 mode share information to indicate the trend. It shows the absolute percentage difference, that is the percentage share in 2011 minus the percentage share in 2001. Hence a positive number shows an increase in mode share from 2001 to 2011.

It is notable that there has been negligible change recorded across all the districts for bicycle and bus use and a minimal increase in walking. This is despite there having been investment in sustainable travel in the decade between the censuses. For example, in Harlow bus lanes were extended.

Harlow itself exhibits a relatively high share of bus use compared to its neighbouring districts of East Hertfordshire, Epping Forest and Uttlesford. This is likely to be related to Harlow comprising Harlow town whereas the other districts include rural areas. A similar pattern is shown for cycling and walking.

Travel to work by train has seen a slight upward increase in all districts. This is likely to be influenced by the continued growth of London over this period. Notably East Hertfordshire and Uttlesford have a greater share of rail journeys than Harlow and Epping Forest.

Car use as the main journey to work mode has also seen slight increases across all the districts, although Harlow, East Hertfordshire and Epping Forest are at the lower end of the increases. Harlow and East Hertfordshire showed similar proportions travelling by car at around 70%. Epping Forest was lower at around 60% and Uttlesford higher at 75%

Overall Table 3-3 shows a minimal impact from sustainable travel investment locally on journey to work trips. A case could be made that an increase in train travel is related to job growth in London

Table 3-3: Essex and East Hertfordshire districts mode share comparison (Absolute % difference between 2001 to 2011 census data)

District	Car	Train	Bus	Bicycle	Walk	Other
Basildon	2.3%	2.7%	0.0%	0.0%	0.2%	-0.7%
Braintree	5.1%	0.9%	0.0%	0.0%	0.1%	-0.3%
Brentwood	0.9%	5.6%	0.0%	0.0%	0.1%	-1.3%
Castle Point	3.6%	2.1%	0.0%	0.0%	0.1%	-0.5%
Chelmsford	2.1%	1.9%	0.0%	0.0%	0.3%	-0.4%
Colchester	2.4%	0.6%	0.0%	0.0%	0.5%	-0.3%
Epping Forest	1.4%	0.2%	0.0%	0.0%	0.1%	-2.1%
Harlow	**2.3%**	**0.2%**	**0.1%**	**0.0%**	**0.2%**	**-0.6%**
Maldon	6.1%	0.7%	0.0%	0.0%	0.1%	-0.3%
Rochford	3.6%	2.7%	0.0%	0.0%	0.0%	-0.5%
Tendring	5.5%	0.3%	0.0%	0.0%	0.3%	-0.3%
Uttlesford	6.4%	0.9%	0.0%	0.0%	0.1%	-0.5%
East Herts	2.1%	2.0%	0.0%	0.0%	0.1%	-0.5%

3.3 Considerations in Deriving Future Travel Assumptions

The aim is to develop assumptions for greater levels of sustainable travel, above the levels indicated in the existing datasets which input into the model. Specifically we have used two levels for sustainable travel assumptions:

- Intermediate sustainable travel; and
- Ambitious sustainable travel,

which can be applied to reduce the number of car trips generated from:

- Proposed strategic and other development sites in wider Harlow; and
- Existing neighbourhoods in wider Harlow (i.e. referred to as background trips).

In order to achieve this, we consider:

- The approach to North Essex Garden Communities as an example of how increased sustainable travel assumptions have been derived
- Feasible sustainable transport improvements (bus, cycling and walking) and possible impact on modal split
- Changes in trip distribution if more people live and work in the wider Harlow area and the associated impact on modal split – referred to as increased internalisation of trips.

3.3.1 Mode Share Assumptions

A study has been carried out for three garden communities being planned in North Essex, and reported in the NEGC Movement and Access Study report (Jacobs, May 2017). The proposed communities comprise:

- West Tendring / Colchester Borders (mainly Tendring DC) – up to 10,700 homes;
- Colchester / Braintree Borders (West Marks Tey) (mainly Colchester BC) – up to 25,500 homes; and
- West Braintree / Uttlesford Borders (mainly Braintree DC) – up to 8,000 homes.

In addition, each of the communities includes employment. The ambition for these communities is for them to be planned and designed using the principles of garden cities promoted by the Town and Country Planning Association but tailored to the character of North Essex. Although each of these garden community developments is eventually expected to be larger than the majority of the strategic sites in wider Harlow and are in relatively more rural settings than Harlow, their sustainable travel ambition is considered to be appropriate for use in this study. While the details of the vision for the Harlow & Gilston Garden Town (H&GGT) is emerging, as mentioned in Section 3.1, it likely that the strategic sites masterplans will be required to deliver similar garden cities principles. It is considered that, because Harlow already has key infrastructure and facilities, higher levels of sustainable and internal travel may be more readily achieved for the strategic sites, provided that suitable facilities and delivery mechanisms are enabled.

The methodology used in the NEGC study has influenced the approach used in this study to derive ambitious and intermediate sustainable travel assumptions for the H&GGT. The NEGC study sets an ambitious upper level of sustainable travel which aims for overall mode shares of 40% active modes, 30% sustainable and 30% car use, across all journeys generated from the garden communities. It also recognises that nearby/shorter trips are more likely to be by active mode, thus supporting the case for higher levels of internal trips to reduce development impacts.

At this stage the extent of the H&GGT has not been defined, but for the purposes of this study it has been assumed that the whole wider Harlow area comprises the H&GGT, or ‘hinterland’, within which internal, more sustainable trips should be encouraged. Within this area, the individual strategic sites are the main ‘developments’ and all other existing areas within Harlow are the ‘background’. As such the ‘background’ trips form the major part of the modelled area and, therefore, it would be more difficult to fundamentally influence their mode choice. Whilst it may not, therefore, be possible to achieve the NEGC ambitious overall mode share levels for the whole of the H&GGT it is considered feasible to significantly increase levels of sustainable travel by targeting any new developments, including at the strategic sites.

The mode share assumptions from the NEGC study and those assumed for the H&GGT study area set out in Table 3-4. An intermediate level of mode switch was also identified, in order to assess the impact of a less ambitious or interim level of mode switch. This represents an approximate mid-point between the existing modal split within Harlow and the NEGC ambitious target.

Table 3-4: Essex Garden Communities Mode Share Targets

Location	Assumption	Trip Type	AM trips modal split		
			Car	PT	Active
All zones	Current modal split	All trips	**76%**	2%	23%
On corridor (good potential)	Intermediate	Development	**60%**	25%	15%
		Background	**65%**	10%	25%
	Ambitious	*Development*	***40%***	*35%*	*25%*
		Background	**45%**	20%	35%
NEGC	Ambitious	All journeys	**30%**	30%	40%
		Hinterland	***38%***	*38%*	*24%*
		Within NEGC	**19%**	19%	62%

Within the NEGC study report consideration is given to some of the measures that would be needed in order to achieve such a modal split, and include:

- Encouragement of living and working locally within a community
- Provision of significantly improved public transport including rapid transit
- Implementation of site travel plans following ECC Sustainable Modes of Travel Strategy (2016)

The NEGC sites are relatively remote from existing urban centres and so sustainable travel changes and infrastructure would be less likely to influence existing residents, whereas in Harlow any such improvements would greatly benefit existing residents and encourage their mode shift towards sustainable travel and away from single occupancy car use.

The NEGC study considered the ambitious modal split targets as an upper level. It also developed a tool in order to provide trip generation and distribution information at lower levels of sustainable travel using less ambitious modal split assumptions.

3.3.2 Sustainable travel assumptions in wider Harlow

It has been assumed that sustainable travel improvements will be implemented as part of the H&GGT, and be mostly associated with the strategic sites. Given the locations of the major sites, improvements on north-south and east-west axes are logical and likely to result in the most direct and attractive sustainable facilities. These corridors would also be likely to encourage existing residents and workers within Harlow to change to more sustainable modes. It is considered that the propensity to switch modes would depend on a number of factors, including:

- Proximity to the north-south or east-west sustainable corridors;

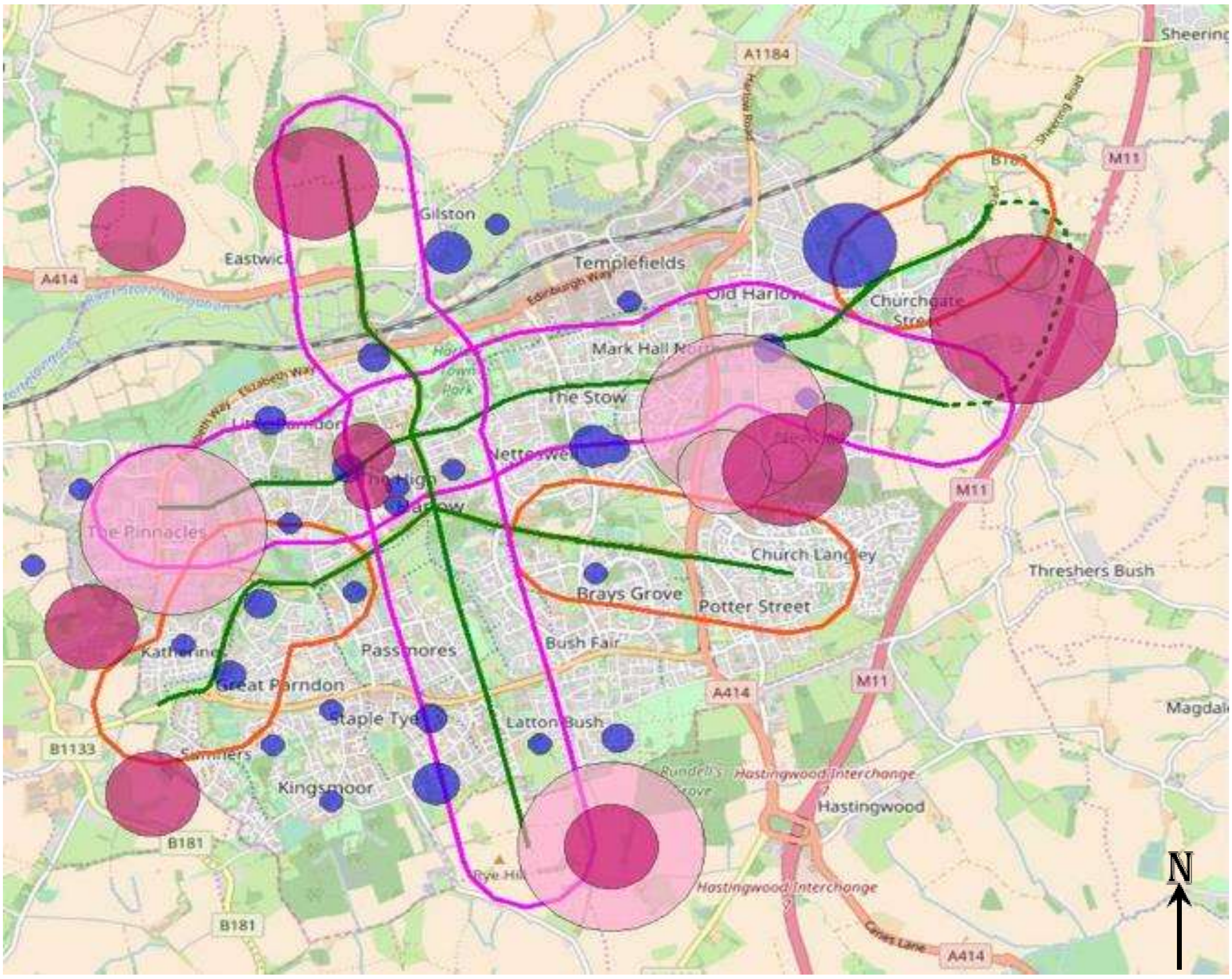
- Quality and frequency of services and facilities; and
- For the strategic sites, the H&GGT masterplanning to encourage mode switch and more internalisation of travel, and the size of development proposed in order to deliver viable infrastructure and greater likelihood of commercially-run services.

Accordingly, in order to estimate the level of mode share change to be modelled within the H&GGT, the existing and proposed planning information was overlaid onto mapping, together with possible sustainable travel corridors. The representation of the corridors included the immediate areas (generally within about 400m) which could be assumed to be attracted to use the improved facilities, as shown in Figure 3-1. Those developments that are likely to be close to the main corridors (with magenta borders) are considered likely to have good potential for sustainable travel, while those in the vicinity of the outer elements of the corridors (bordered in orange) are considered to have some potential to switch.:

The mode switch percentages set out in Table 3-4 were further refined within the modelling, taking into account the relative proximities, and trip distribution, etc. These more detailed assumptions are included in Appendix B.

The modal share assumptions applied are shown in tables in Section 3.4.

Figure 3-1: Wider Harlow Committed & Planned Development Sites: Sustainable Travel Potential



3.3.3 Internalisation of trips

The 2011 census shows that just under half of all work trips of Harlow residents are to outside of the Harlow area. These movements amount to approximately 16,500 trips, while approximately 17,500 trips are within Harlow itself. Conversely approximately 16,000 work trips are made from external areas into Harlow. Currently, in the AM peak, the majority of the journey-to-work trips of existing Harlow residents by car are to destinations external to the wider Harlow area. This is consistent with analysis which has considered where people are travelling from Harlow. Table 3-5 shows that only 33% of journey-to-work car trips are within Harlow.

Table 3-5: Journey-to-work destinations of Harlow residents taken from Census 2011 data

From Harlow							
	Car	Train	Bus	Bicycle	Walk	Other	Total
Broxbourne	3.8%	0.1%	0.1%	0.1%	0.1%	0.1%	**4%**
Chelmsford	0.9%	0.0%	0.1%	0.0%	0.0%	0.0%	**1%**
East Hertfordshire	7.0%	0.2%	0.6%	0.1%	0.1%	0.2%	**8%**
Epping Forest	7.3%	0.1%	0.4%	0.1%	0.2%	0.2%	**8%**
Harlow	**33.3%**	0.3%	4.1%	2.4%	10.9%	1.2%	**52%**
Uttlesford	2.6%	0.2%	0.1%	0.0%	0.0%	0.0%	**3%**
London	8.5%	3.5%	0.4%	0.1%	0.3%	3.0%	**16%**
Waltham Forest	1.3%	0.0%	0.0%	0.0%	0.0%	0.1%	**1%**
Other	5.3%	0.1%	0.2%	0.0%	0.2%	0.1%	**6%**

For the strategic development sites, the trip distribution is either based on the trip distribution in the existing zone or, in the case of larger strategic sites where the existing zone distribution would not be suitable, this has been based on parent zones. In either case there is an assumption within the modelling methodology that most work trips will be external to Harlow. This is because the trip distribution patterns used in transport model are assumed to reflect existing trip patterns.

However, given that the strategic developments and wider Harlow growth will result in significant numbers of new homes and new employment opportunities, it could be expected in a more sustainable travel scenario that more people could be influenced to choose to live and work locally. Therefore, a modelling methodology was devised to increase local employment trips and decrease external employment trips for the strategic residential sites including:

- Gilston (Model zone 117)
- Latton Priory (Model zone 149)
- West Sumners and West Katherine’s (Model zone 140)
- East Harlow (Model zone 24)

Accordingly, we identified model zones within wider Harlow and defined these as hinterland (or internal) zones. All other model zones were deemed to be external zones. For each of the strategic site zones (which are all hinterland zones) we then identified which modelled car commuting trips were to destinations in hinterland zones and which were to external zones. Then we:

- Reduced car commuting trips of the strategic sites to external zones by 10% minded that at this value a change could be perceived and is likely to be achievable; and
- Increased strategic sites car commuting trips to internal zones by an equivalent value to ensure that the total increase in these trips matched the overall reduction in trips to external zones.

This methodology was only applied to the larger strategic development sites in recognition of the stronger influence that the H&GGT masterplanning would be expected to have on their future travel, although changes in trip destinations could be expected to occur for other hinterland zones.

In the modelling process this increased 'internalisation' of trips was applied before any sustainable travel assumptions. This has the effect of reducing longer vehicle trips on the wider model network, and increasing shorter trips on the local Harlow network, albeit that a proportion of the latter would do so sustainably.

3.4 Future Travel Assumptions

While Section 3.3 provides a rationale and methodology for sustainable travel assumptions this section provides the actual modal split assumptions that have been used in the transport model. The relative proportions of car-only travel, which is the input used in the transport model, are shown in charts in this section.

This section is divided into two parts. The first part shows the modal splits assumed at strategic development sites within wider Harlow. As shown in Table 3-6 these sites have been classed as either having:

- Good potential for sustainable travel
- Some potential for sustainable travel

At these sites we considered if the trips were to zones in wider Harlow (hinterland) or were to external zones. In each case intermediate and ambitious sustainable travel modal splits have been created.

The second section sets out the modal splits assumed for all other trips. For example, trips from existing Harlow residences and employment, other non-strategic development sites and also any background growth predicted using NTEM data. Depending on which zone the background trip is in determines what reduction is applied:

- Good potential – Background trips in wider Harlow zones with developments with good potential
- Some potential – Background trips in wider Harlow zones with developments with some potential
- Low potential – Background trips in wider Harlow (which could be expected to benefit only minimally from Harlow wide improvements sustainable travel.)

3.4.1 Sustainable travel assumptions at development sites

Table 3-6 shows the intermediate sustainable travel assumptions for trips from development sites within and between sites that are considered to have good or some potential (as shown in Figure 3-1).

Table 3-6: Development Sites Trips: Intermediate sustainable travel modal splits (AM and PM peaks)

		AM		PM	
		To zones in the hinterland (wider Harlow)	To zones in the wider network (beyond wider Harlow)	To zones in the hinterland (wider Harlow)	To zones in the wider network (beyond wider Harlow)
Active mode	From strategic development sites with good potential	15%	n/a	15%	n/a
	From strategic development sites with some potential	15%	n/a	10%	n/a
PT	From strategic development sites with good potential	25%	35%	25%	35%
	From strategic development sites with some potential	20%	30%	20%	25%
Car	From strategic development sites with good potential	60%	65%	60%	65%
	From strategic development sites with some potential	65%	70%	70%	75%

Table 3-7 shows the corresponding ambitious sustainable travel assumptions for development trips from and between strategic development sites with good or some potential. In this case the same modal splits are used in the AM and PM peaks.

Table 3-7: Development Site Trips: Ambitious sustainability modal splits (AM and PM period are the same)

		To zones in the hinterland (wider Harlow)	To zones in the wider network (beyond wider Harlow)
Active mode	From strategic development sites with good potential	25%	n/a
	From strategic development sites with some potential	15%	n/a
PT	From strategic development sites with good potential	35%	50%
	From strategic development sites with some potential	25%	25%
Car	From strategic development sites with good potential	40%	50%
	From strategic development sites with some potential	60%	60%

3.4.2 Sustainable Travel Assumptions for Other Trips

The modal split assumptions for other trips are applicable in wider Harlow only, that is trips which stay within the hinterland of Harlow (which is also referred to as internal to internal trips). Within the model background trips are generated from each model zone. Based on the rationale that other trips generated from zones with developments with good or some potential for sustainable travel will benefit from the improved sustainable transport measures available to the developments; sustainable travel assumptions for other trips are related to whether they are in a zone with a development with good or some potential.

For other trips in wider Harlow in zones without developments with good or some potential, low assumptions for modal shift were still incorporated if they were close to one of the sustainable travel corridors or spurs. For other trips in all other zones in wider Harlow, the minimal sustainable travel assumption was applied. This reflects that sustainable travel opportunities could be increased, for instance through Harlow-wide measures for cycling. Table 3-8 shows the intermediate sustainable travel assumptions applied to background trips.

Table 3-8: Intermediate sustainable travel assumptions for other trips (applicable to wider Harlow only)

	AM			PM		
	Active mode	**PT**	**Car**	**Active mode**	**PT**	**Car**
From zones with good potential	25%	10%	65%	20%	10%	70%
From zones with some potential	25%	5%	70%	20%	5%	75%
From zones close to sustainable travel corridors – low potential	25%	0%	75%	20%	0%	80%
From other zones in wider Harlow not included above	25%	0%	75%	20%	0%	80%

Table 3-9 shows the ambitious sustainable travel assumptions that have been applied to other trips in wider Harlow according to which zone they fall into.

Table 3-9: Other Trips: Ambitious Sustainability Modal Splits (applicable to wider Harlow only)

	AM			PM		
	Active mode	**PT**	**Car**	**Active mode**	**PT**	**Car**
From zones with good potential	35%	20%	45%	30%	20%	50%
From zones with some potential	35%	10%	55%	25%	10%	65%
From zones close to sustainable travel corridors - low potential	35%	5%	60%	25%	5%	70%
From other zones in wider Harlow not included above	35%	0%	65%	30%	0%	70%

3.5 Summary of Future Assumptions

While Sections 3.4 has focussed on detailing full modal-split assumptions the transport modelling process has only been carried out for car trips. This summary, therefore, focusses only on vehicle trip assumptions.

In the transport model, the modelled area is subdivided into model zones. Each of these zones generates a defined number of vehicle trips forecast for 2033, set out in a trip matrix for a weekday AM peak hour and a trip matrix for a weekday PM peak hour. The number of trips in the 2033 forecast includes:

- Trips from emerging Local Plan developments in the detailed model zone. These trips are referred to as development trips.
- Trips related to the wider model area and assumptions about growth in trips based on non-strategic development sites and NTEM forecasts. These trips are referred to as other trips.

The methods used to forecast the number of vehicle trips are outlined in Chapter 2 and include a standard assumption that a certain amount of trips will be by a sustainable transport mode such as public transport, cycling or walking. This chapter has made additional assumptions that the number of trips generated will be reduced further by improved sustainable transport options introduced along sustainable travel corridors. These sets of assumptions are called:

- Intermediate sustainable travel assumptions
- Ambitious sustainable travel assumptions

Within each of these set of assumptions we take into account:

- Proximity to sustainable travel corridor
- Whether the trips are within wider Harlow (internal zones) or to external zones
- Whether the trips are from strategic development sites or other trips

Table 3-10 and Table 3-11 set out the resulting percentages of trips by car in each of the zones in wider Harlow categorised according to the above classification. These have been derived by applying the car mode factors set out in Table 3-6, Table 3-7, Table 3-8, and Table 3-9 to the base model all zones car use position as set out in Table 3-4.

Appendix B sets out the values applied on a zone by zone basis. This way the differences between the assumptions used in the modelling can be seen.

Table 3-10: Intermediate Sustainability Assumptions

Location	Destination of trips	Type	% AM vehicle trips compared to standard assumption	% PM vehicle trips compared to standard assumption
On corridor (good potential)	Within wider Harlow (internal)	Development	79	73
		Other trips	86	85
	Outside wider Harlow (external)	Development	86	79
		Other trips	n/a	n/a
Off corridor (some potential)	Within wider Harlow (internal)	Development	86	85
		Other trips	93	91
	Outside wider Harlow (external)	Development	92	91
		Other trips	n/a	n/a

Table 3-11: Ambitious Sustainability Assumptions

Location	Destination of trips	Type	% AM vehicle trips compared to standard assumption	% PM vehicle trips compared to standard assumption
On corridor (good potential)	Within wider Harlow (internal)	Development	53	49
		Other trips	64	64
	Outside wider Harlow (external)	Development	66	61
		Other trips	n/a	n/a
Off corridor (some potential)	Within wider Harlow (internal)	Development	79	73
		Other trips	75	74
	Outside wider Harlow (external)	Development	86	79
		Other trips	n/a	n/a

4. Model Strategic Outputs and Results

4.1 Introduction

This section addresses Objective 2, the likely impacts of applying the sustainable travel assumptions. Table 4-1 describes which sustainable travel assumptions have been applied to which versions of the network. For each scenario fixed trip demand matrices have been matched to an appropriate version of the network, recognising that the matrix and network may differ depending on the scenario. In addition, for each scenario both the AM and PM transport model has been run.

Table 4-1: Scenarios

Forecast year 2033		Demand variables					
		Committed forecast (NTEM and minimal development)	Standard sustainable travel assumptions	Intermediate sustainable travel assumptions	Ambitious sustainable travel assumptions	Intermediate sustainable travel with 10% fewer external trips	Ambitious sustainable travel with 10% fewer external trips
Network variables	Reference network	C1	E1	E2	×	E2L	×
	Reference network with improved sustainable corridor	×	×	×	E3	×	E3L
	Reference network with Second Stort Crossing (SSC)	×	S1	S2	×	S2L	×
	Reference network with SSC and improved sustainable corridor	×	S21	S21B	S3	S21LB	S3L

As can be seen, the intermediate sustainable travel assumptions are applied to versions of the network with and without the Second Stort Crossing (SSC). The scenarios with the SSC have been tested with and without an improved sustainable transport corridor – which involves incorporating bus lanes and cycle provision into the scheme to dual the section of the A414 between Eastwick and Burnt Mill along Fifth Avenue. Then for each of these scenarios a sensitivity test is run which assumes that there will be increased internalisation of trips (that is 10% fewer external trips) from the strategic development sites as set out in section 3.3.3.

The ambitious sustainable travel assumptions are applied to versions of the network with and without the SSC. Tests are also run with the improved sustainable corridor along Fifth Avenue with the SSC. Then a sensitivity test is run which assumes that there will be increased internalisation of trips from the strategic development sites.

Including AM and PM model runs gives 26 scenarios, which generates a large number of potential comparisons. Consequently, this section focuses on comparing and contrasting a subset which illustrates the general findings of the research. In particular, for both the AM and PM models, we compare:

- Standard sustainable travel on reference network with the SSC ('S1') v. Standard sustainable travel on reference network (without the SSC) ('E1')
- Standard sustainable travel on reference network with the SSC and improved sustainable corridor ('S21') v. Standard sustainable travel on reference network (without the SSC) ('E1')
- Intermediate sustainable travel on reference network with the SSC and improved sustainable corridor ('S21B') .v. Standard sustainable travel on reference network with the SSC and improved sustainable corridor ('S21')
- Intermediate sustainable travel and higher internalisation on reference network with the SSC and improved sustainable corridor ('S21LB') .v. Standard sustainable travel on reference network with the SSC and improved sustainable corridor ('S21')

We make reference to differences in the other scenarios only where it is useful to help interpret or explain the behaviour of the model. However, outputs from all other scenarios have been presented in the Appendices.

The following abbreviations for the scenarios are used:

Abbreviation	Description
Base (2014)	Base network and trips from 2014
Ref Case (2033)	Standard sustainable travel on reference network
SSC Ref Case (2033)	Standard sustainable travel on reference network with the SSC
SSC Ref Case Corr (2033)	Standard sustainable travel on reference network with the SSC and improved sustainable corridor
SSC ImSust Corr (2033)	Intermediate sustainable travel on reference network with the SSC and improved sustainable corridor
SSC ImSust Corr HighInt (2033)	Intermediate sustainable travel and higher internalisation on reference network with the SSC and improved sustainable corridor

4.2 Whole Model Area Network Statistics

Table 4-2 shows the total number of trips, total vehicle time, total vehicle miles and average network speed of the whole WEEH modelled area in the morning peak hour. As would be expected, in all the scenarios, in which reduced trip rates have been applied to represent more sustainable travel within Harlow (ImSust), the overall total number of trips decreases only slightly (-0.5%), as the Harlow area is a small element of the whole Visum model. Small changes in network statistics are also shown to occur between scenarios, but these are all less than 1%.

Table 4-2: Network Statistics for WEEH area (AM peak)

Scenario	Total Number of Trips	Total Vehicle Time (veh*hr)	Total Vehicle Miles (veh*miles)	Average Network Speed (miles/hr)
Base (2014)	186,800	90,200	4,339,800	48.1
Ref Case (2033)	255,900	108,600	5,776,500	53.2
SSC Ref Case (2033)	255,900	108,500	5,781,400	53.3
SSC Ref Case Corr (2033)	255,900	108,800	5,777,800	53.1
SSC ImSust Corr (2033)	254,700	108,300	5,775,000	53.3
SSC ImSust Corr HighInt (2033)	254,700	108,200	5,776,200	53.4

Table 4-3 shows the same information for the evening peak, which indicates similar slight data changes to the morning peak for the whole modelled area.

Table 4-3: Network Statistics for WEEH area (PM peak)

Scenario	Total Number of Trips	Total Vehicle Time (veh*hr)	Total Vehicle Miles (veh*miles)	Average Network Speed (miles/hr)
Base (2014)	189,900	93,600	4,526,400	48.4
Ref Case (2033)	253,650	109,600	5,893,000	53.7
SSC Ref Case (2033)	253,650	109,600	5,893,500	53.8
SSC Ref Case Corr (2033)	253,650	109,800	5,893,000	53.7
SSC ImSust Corr (2033)	252,300	109,500	5,890,400	53.8
SSC ImSust Corr HighInt (2033)	252,300	109,500	5,889,000	53.8

4.3 Wider Harlow Area: Reference Case

In the following sections, network statistics and outputs are reported over the wider Harlow area, instead of over the whole model area, . Figure 4-1 illustrates the Harlow model network for which the network statistics have been extracted, these also include the SSC where appropriate.

Figure 4-1: Harlow road network for which network statistics are reported

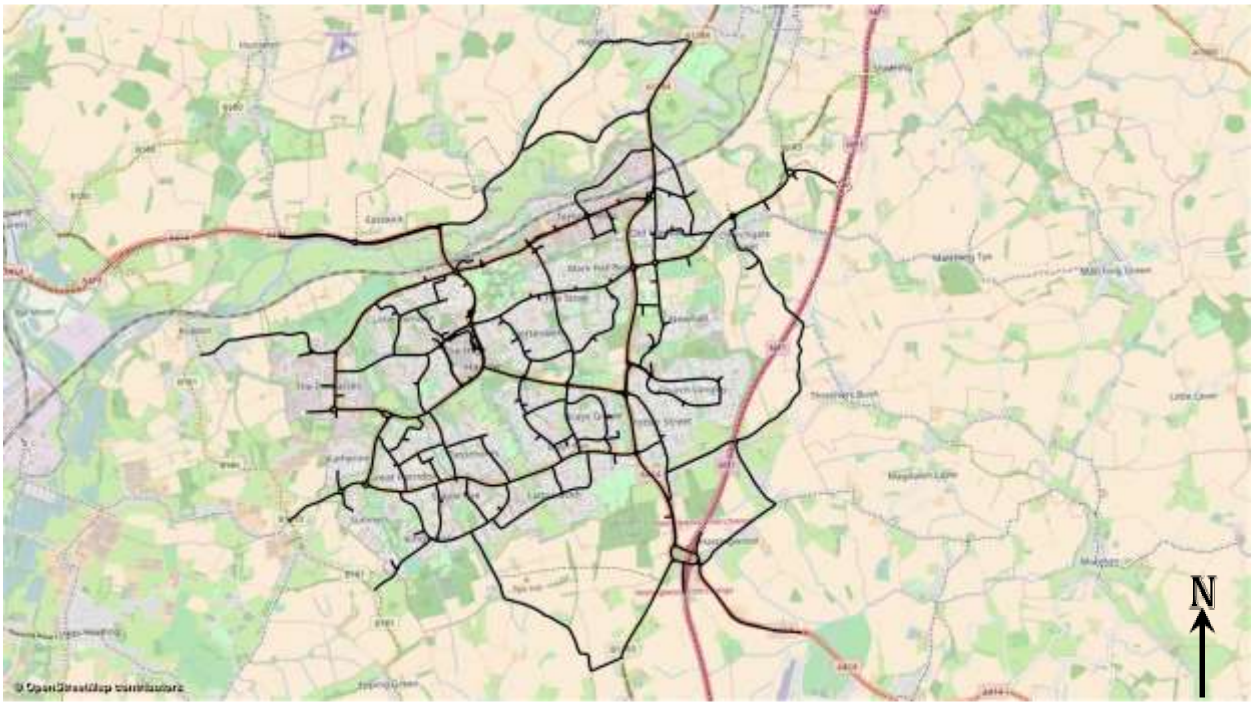


Table 4-4 presents morning peak hour network statistics with standard sustainability assumptions for all scenarios. It can be seen that the total number of trips on the Harlow road network is expected to increase by 50% between 2014 and 2033 as a result of background traffic growth, and housing and employment development within the area. As would be expected this growth results in increases in total vehicle time and distance and a reduction in the average network speed.

With the two infrastructure options only marginal changes in total trips would be likely without any change in sustainable travel use, but total vehicle time on this network would be expected to reduce with the SSC in place, and the average speed to increase. Without greater levels of sustainable travel, with the bus lanes in place, network speed would be expected to reduce to less than the Reference Case.

Table 4-4: Network Statistics for wider Harlow area (AM peak)

Scenario	Total Number of Trips	Total Vehicle Time (veh*hr)	Total Vehicle Miles (veh*miles)	Average Network Speed (miles/hr)
Base (2014)	21,175	1,750	54,600	31.3
Ref Case (2033) E1	31,650	3,050	79,590	26.0
SSC Ref Case (2033) S1	31,900	2,850	80,260	28.2
SSC Ref Case Corr (2033) S21	31,800	3,150	78,690	25.0

Table 4-5 shows network statistics for the evening peak period, where the increase in the total number of trips between 2014 and 2033 is expected to be lower than for the morning peak, at around 44%. There is little variation of total trips for the two infrastructure options. It is noted that there is less variation in the time, distance and speed network statistics for the three forecast scenarios in the PM peak than in the AM peak, and the network speeds would be expected to be faster in the PM period.

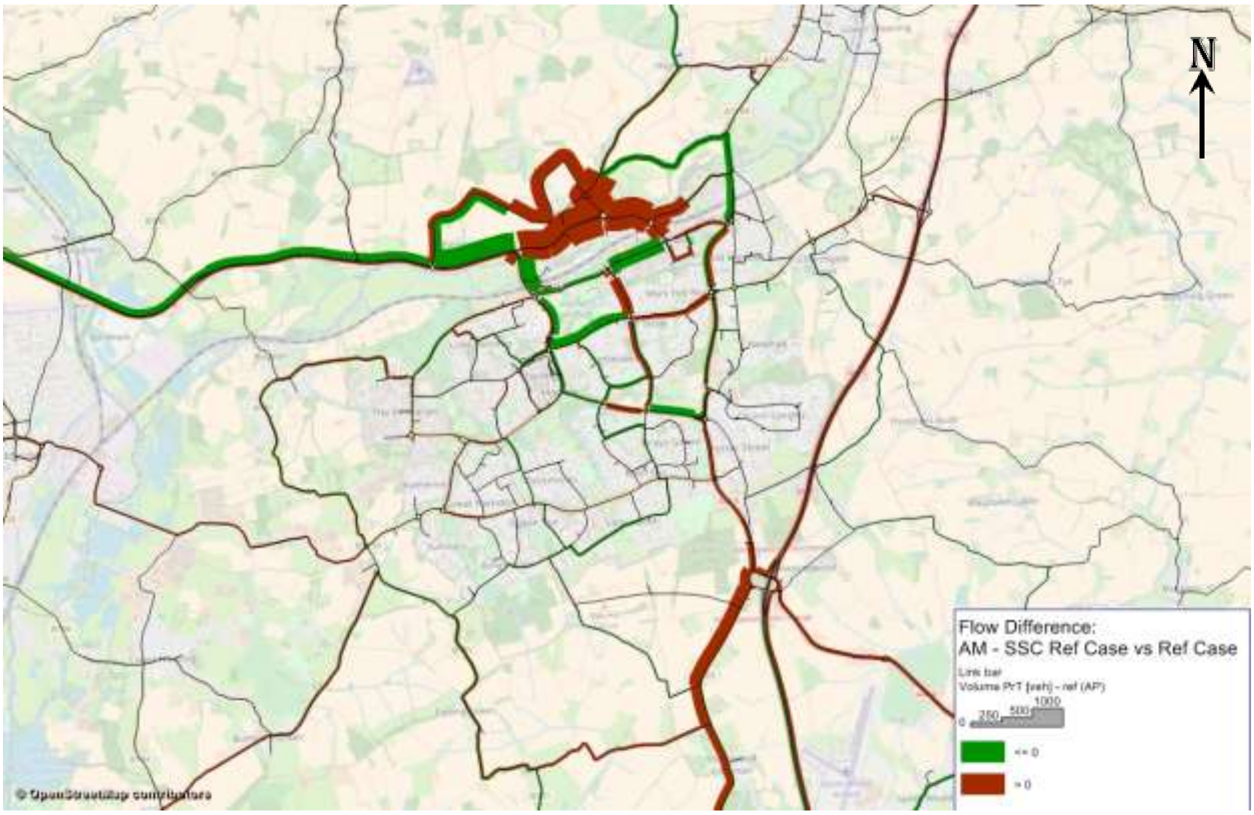
Table 4-5: Reference Case Scenarios - Network Statistics for wider Harlow area (PM peak)

Scenario	Total Number of Trips	Total Vehicle Time (veh*hr)	Total Vehicle Miles (veh*miles)	Average Network Speed (miles/hr)
Base (2014)	21,3754	1,800	56,240	31.3
Ref Case (2033) E1	30,750	2,600	78,560	30.2
SSC Ref Case (2033) S1	30,550	2,500	76,520	30.4
SSC Ref Case Corr (2033) S21	30,775	2,700	76,630	28.5

In this section we set out a series of plots showing flow differences. It should be noted that where the two networks are not the same, i.e. without and with the SSC, the change in flows may not reflect the situation as the same links don’t appear in both models.

Figure 4-2 illustrates the morning peak changes in flows between the Reference Case scenarios with and without the SSC, with standard sustainability assumptions. It should be noted that the Visum modelling of the Gilston strategic site includes very broad assumptions with regard to highway access; for instance it assumes only two connections to the highway network: an eastern one at Pye Corner, and a western one at Eastwick village. As a consequence the introduction of the SSC results in flow changes within the site as some site traffic would be likely to switch between using the western and eastern accesses. In addition, select link analysis has identified rerouting of some A414 traffic via the Gilston development. The figure also shows that construction of the SSC is likely to result in a reduction in traffic along sections of the A414 Edinburgh Way and on sections in First Avenue, as traffic reassigns to use the new crossing.

Figure 4-2: Flow Differences Reference Case with SSC v. – Reference Case (AM peak) S1 vs E1



On the other hand, traffic is likely to increase along the B1393 London Road. As Figure 4-3 shows, traffic is likely to increase along Eastwick Road, after the construction of SSC, resulting in higher delays on the A414 / Eastwick Road / Fifth Avenue roundabout. As a result, traffic reassigns to use the B1393 London Road to go to Harlow and north, instead of using the A414. In addition, there is some reassignment to the M11 which becomes a relatively faster route.

As the above illustrates, we are aware that there are some inconsistencies in the route choices being made by the model, which affect the interpretation of this other plots in this report. These are to be investigated in any subsequent projects using the model.

Figure 4-3: Flow differences in Eastwick Road in Reference Case Scenarios

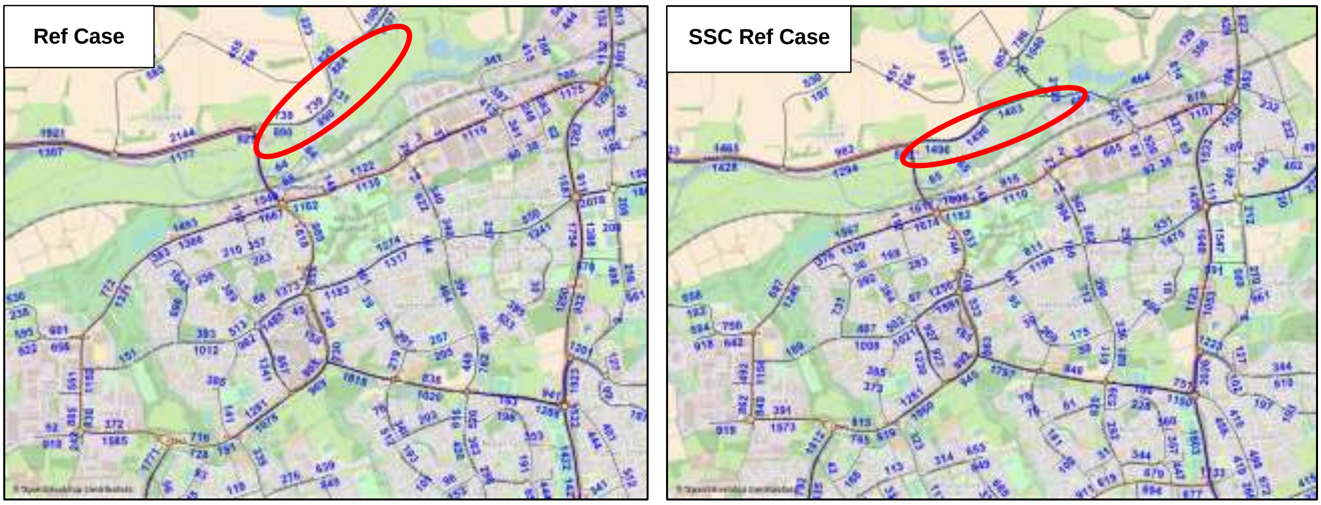


Figure 4-4 presents the evening peak flow differences for the same scenarios as above. In this comparison it is easier to see the switch in Gilston site traffic from the western to the eastern access junctions. As in the morning peak, the construction of the SSC is likely to result in a reduction in traffic along the A414 (north of Harlow), Fifth Avenue, A414 Edinburgh Way and on sections of First Avenue, as traffic reassigns to use the new crossing. Traffic would be expected to increase slightly on the M11 as traffic reassigns to use J7a and B183 Gilden Way.

There is likely to be some reassignment of east-west traffic within Harlow, particularly along First Avenue and to a lesser extent along A1025 Second Avenue.

Figure 4-4: Flow Differences –Reference Case with SSC v. Reference Case (PM peak) S1 vs E1

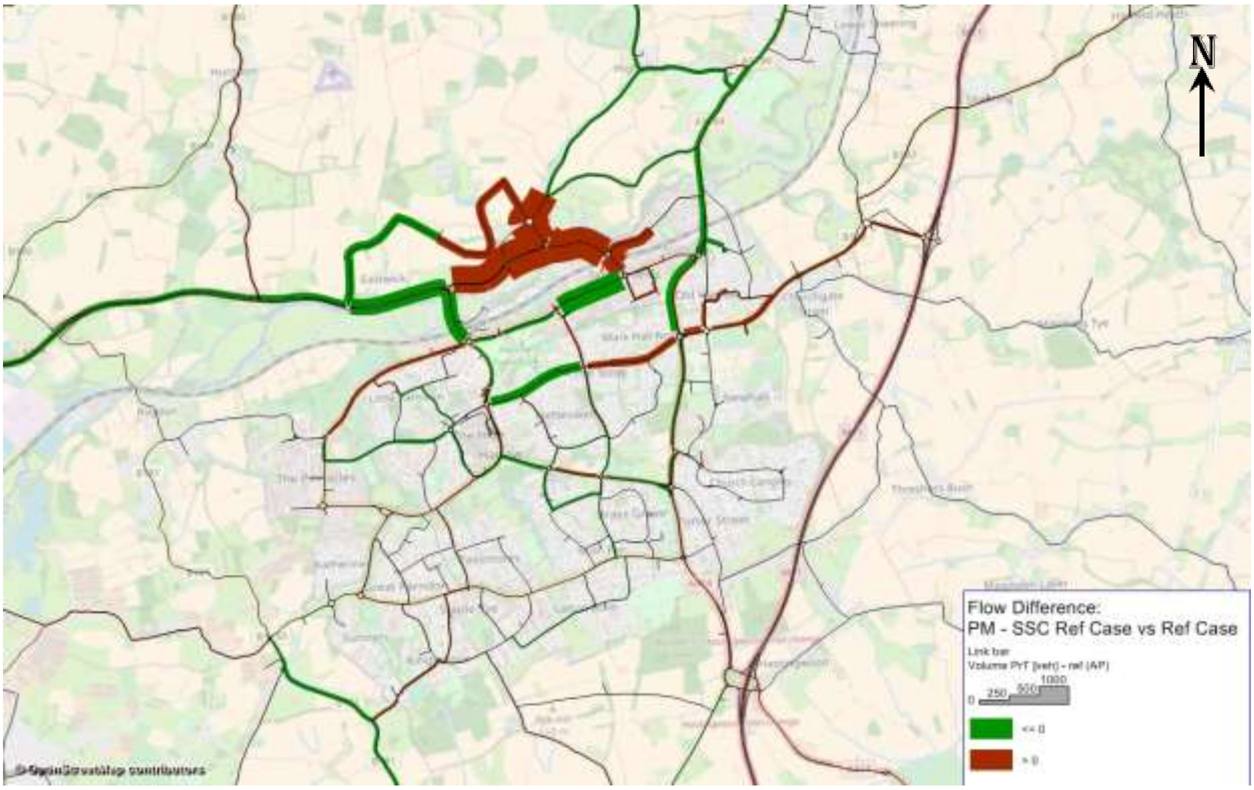


Figure 4-5 presents the morning peak flow differences before and after the construction of the SSC and the addition of the bus lanes in Fifth Avenue with standard sustainable travel assumptions. As mentioned previously (above Figure 4-2) there are routeing issues in the model, such as seem around the Gilston site.

The changes in flows do not appear to be very different to the 'without bus lanes' comparison (see Figure 4-2 above), the main difference being reduced flows in the south-west of Harlow in the vicinity of these strategic sites As such, the addition of improved sustainable links does not appear to have a detrimental impact on the local road network in the AM peak hour.

Figure 4-5: Flow Differences – Reference Case with SSC and Bus Lane v. Reference Case (AM peak) S21 vs E1

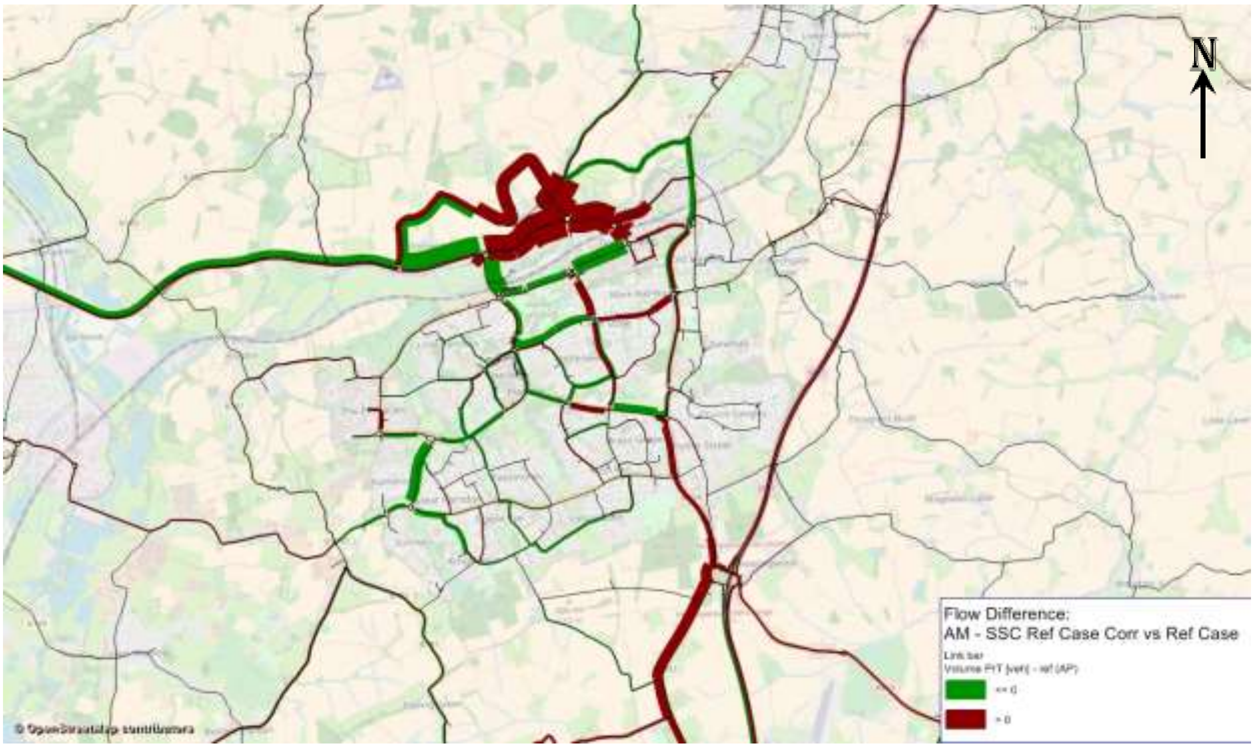
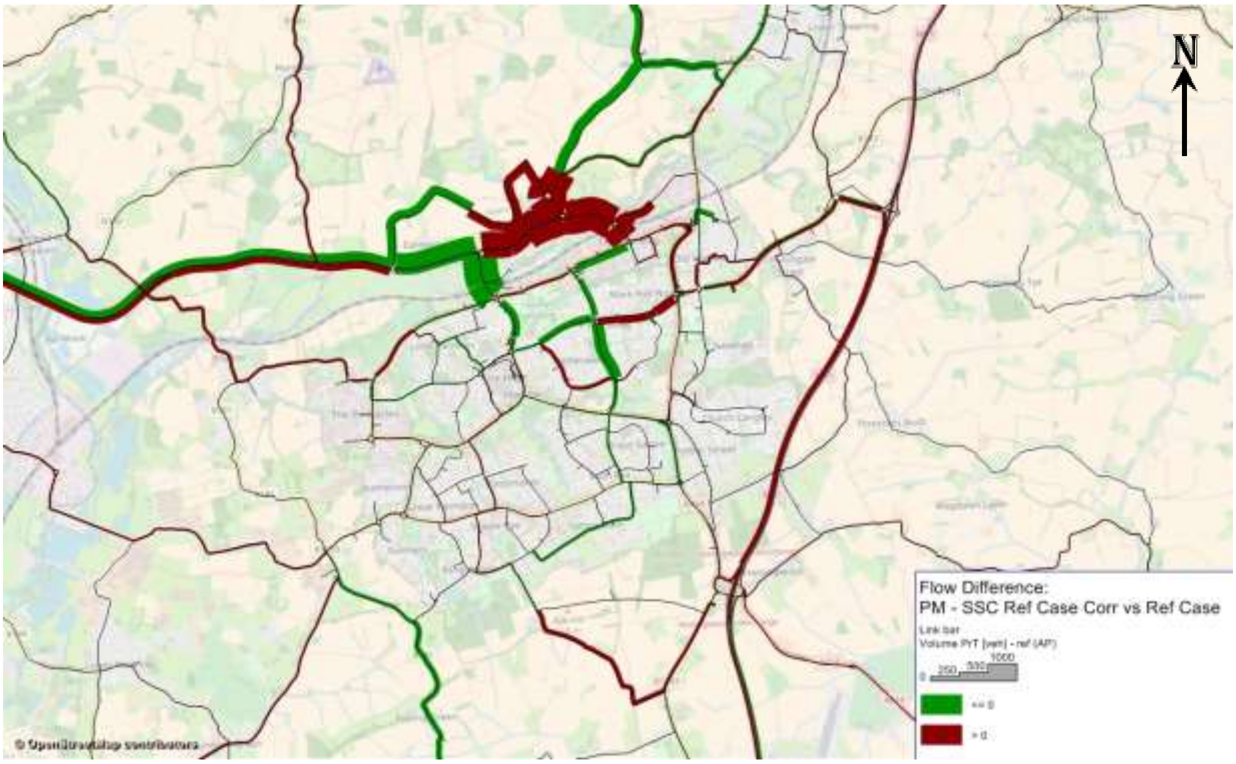


Figure 4-6 presents the evening peak flow differences before and after the construction of the SSC and the addition of the bus lanes in Fifth Avenue with standard sustainable travel assumptions.

In the PM peak hour it appears that the reduced capacity on the Eastwick to Burnt Mill section of the A414 as a result of the bus lanes would be likely to lead to higher levels of reassignment than without the bus lanes. This would affect the A414 west of Harlow, and lead to more traffic using the M11 J7-J7a section.

Within Harlow, there would likely be some local reassignment of trips from Howard Way, and redistribution of trips beyond the south of Harlow

Figure 4-6: Flow Differences – Reference Case with SSC and Bus Lane v. Reference Case (PM peak) S21 vs E1



4.4 Intermediate Sustainability Scenarios

Table 4-6 presents the morning peak hour network statistics with intermediate sustainable mode share travel assumptions. This shows that the application of greater sustainability assumptions for local trips does not necessarily lead to an equivalent reduction in trips on the local network due to wider reassignment of trips on the model network making use of freed up capacity on the Harlow network. This is demonstrated by the change in trips between the SSC Ref Case Corr and SSC ImSust Corr trips, which reduce by around 3%. Also, the higher internalisation for SSC ImSust Corr High Int has no subsequent reduction in trips within Harlow, as there would be more local trips on the local network as a consequence of changing destinations of trips from further afield to within Harlow itself.

Comparing the intermediate sustainable travel scenario statistics with the reference case, both with the SSC in place, shows a reduction of 13% in total vehicle time but only a 1% reduction in total vehicle miles. However, the average network speed would be likely to increase by 14% with greater sustainable travel uptake, and by 16% with more internalisation of trips, over the SSC Ref Case Corr scenario..

Table 4-6: Intermediate Sustainability Scenarios - Network Statistics for wider Harlow area (AM peak)

Scenario	Total Number of Trips	Total Vehicle Time (veh*hr)	Total Vehicle Miles (veh*miles)	Average Network Speed (miles/hr)
Base (2014)	21,175	1,700	54,610	31.3
SSC Ref Case Corr (2033) S21	31,800	3,150	78,690	25.0
SSC ImSust Corr (2033) S21B	30,850	2,700	77,990	28.6
SSC ImSust Corr HighInt (2033) S21LB	30,850	2,700	78,380	29.1

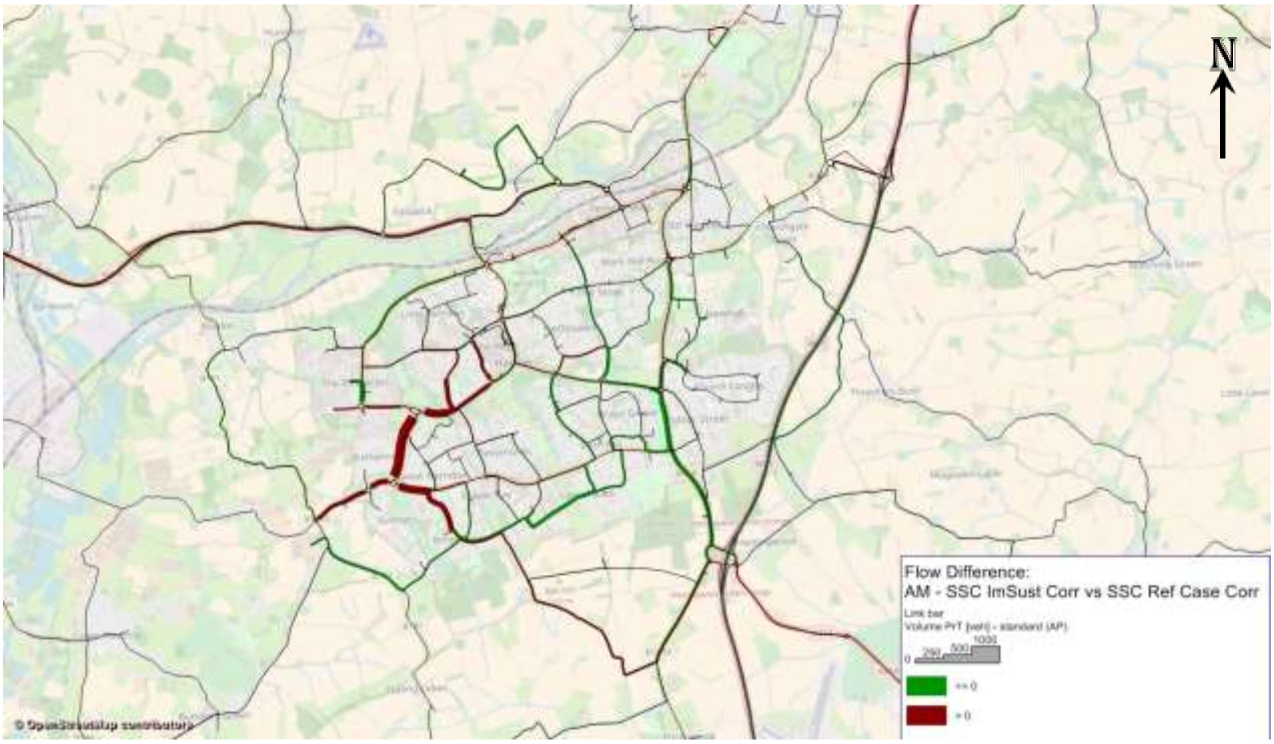
Table 4-7 presents the equivalent network statistics for the evening peak period. This shows that improved sustainable travel would also be likely to result in a 3% reduction in total trips on the Harlow network. The time and distance travelled would be likely to reduce by 6% and 2% respectively, while the network speed would increase by around 4%. If higher levels of trip internalisation are assumed this appears to have slight positive impacts on the network statistics in this time period.

Table 4-7: Intermediate Sustainability Scenarios - Network Statistics for wider Harlow area (PM peak)

Scenario	Total Number of Trips	Total Vehicle Time (veh*hr)	Total Vehicle Miles (veh*miles)	Average Network Speed (miles/hr)
Base (2014)	21,375	1,800	56,240	31.3
SSC Ref Case Corr (2033) S21	30,775	2,700	76,630	28.4
SSC ImSust Corr (2033) S21B	29,750	2,500	75,120	29.7
SSC ImSust Corr HighInt (2033) S21LB	29,700	2,500	74,910	29.8

Figure 4-7 shows the modelled changes in flows in the morning peak when comparing the reference case scenario with SSC and sustainable travel corridor in place and with the intermediate sustainable travel assumptions on the same network. As would be expected from the summary statistics set out in Table 4-6, the localised sustainable travel change assumptions are seen to have an overall positive impact on the local Harlow network. Although it should still be noted that there are some routeing issues in the model, such as some traffic routeing through the Gilston site.

Figure 4-7: Flow Differences – Intermediate Sustainability Scenario v. Reference Case (with SSC and Bus Lane, AM peak) S21B vs S21



However, the figure indicates an increase in traffic in the south west of Harlow. This is likely to be the result of the freeing up of capacity in this area due to the localised trip reductions from sustainable travel changes applied to the larger strategic development sites in this area. Before intermediate sustainable travel assumptions are applied, traffic coming from the Kingsmoor area is likely to use minor roads, Ployters Road and Abercrombie Way, to go to Harlow. With more sustainable travel, traffic is likely to reassign to use the A1169 Katherine’s Way. In addition, without any sustainable travel assumptions applied, traffic coming from the Snaresbrook area would be likely to use the M11 and the A414 London Road to go north. However, after the reduced trip rates have been applied to represent more sustainable travel, traffic reassigns to use the M11, Rye Hill Road, Paringdon Road and A1169 Katherine’s Way.

Figure 4-8 shows the modelled changes in flows in the evening peak when comparing the reference case scenario and the scenario in which intermediate sustainable travel assumptions have been applied on the network with the SSC and the improved sustainable travel corridor. As in the morning peak, the localised sustainable travel change assumptions have a positive impact on wider Harlow as illustrated by the extent of green coloured links representing a reduction in traffic flows.

However, the figure indicates an increase in traffic on A414 westbound, north of Harlow, which may attract more traffic, resulting from the freeing up of its capacity due to the localised trip reductions from travel changes related to the strategic development sites. Before the sustainability improvements, traffic coming from the north uses routes through Harlow and other parallel routes, B194, B194 Nazeing Road, A10 and M25, to go west, while after the sustainability improvements traffic reassigns to use the A414. However, as mentioned previously we should interpret this cautiously due to route choice issues around the Gilston site.

Figure 4-8: Flow Differences – Intermediate Sustainability Scenario v. Reference Case (with SSC and Bus Lane, PM peak) S21B vs S21

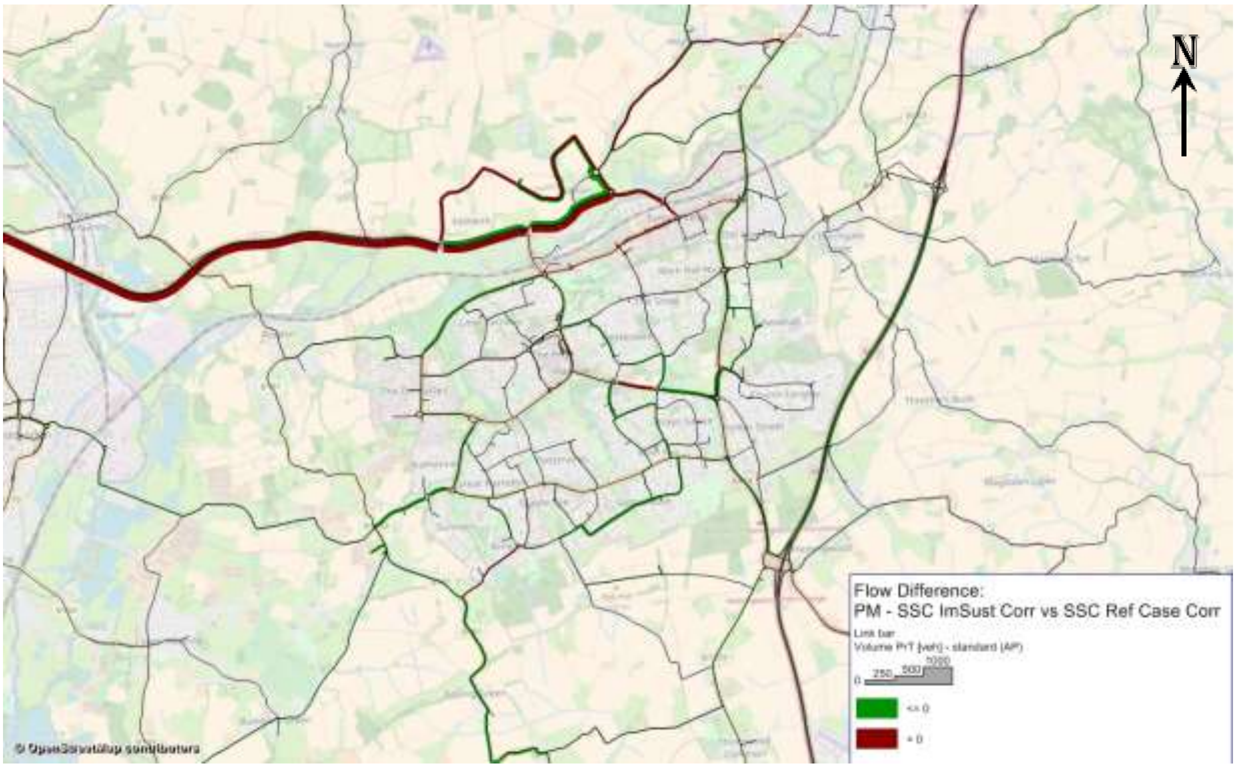


Figure 4-9 shows the modelled changes in flows in the morning peak when comparing the reference case scenario with the scenario with higher internalisation. As above, the sustainable travel change assumptions have a positive impact on wider Harlow.

The travel pattern is similar to the travel pattern in the intermediate sustainability scenario without the additional internal trips, which can be seen by comparing Figure 4-9 with Figure 4-7.

As in the intermediate sustainable travel scenario, the figure indicates an increase in traffic in Paringdon Road and A1169 Katherine's Way, which may attract more traffic especially coming from the Kingsmoor area and the M11, resulting from the freeing up of capacity due to localised trip reductions from travel change related to the strategic development sites. Again caution should be used due to routeing variability in the model.

Figure 4-9: Flow Differences – Intermediate Sustainability Scenario with Higher Internalisation v. Reference Case (with SSC and Bus Lane, AM peak) S21LB vs S21

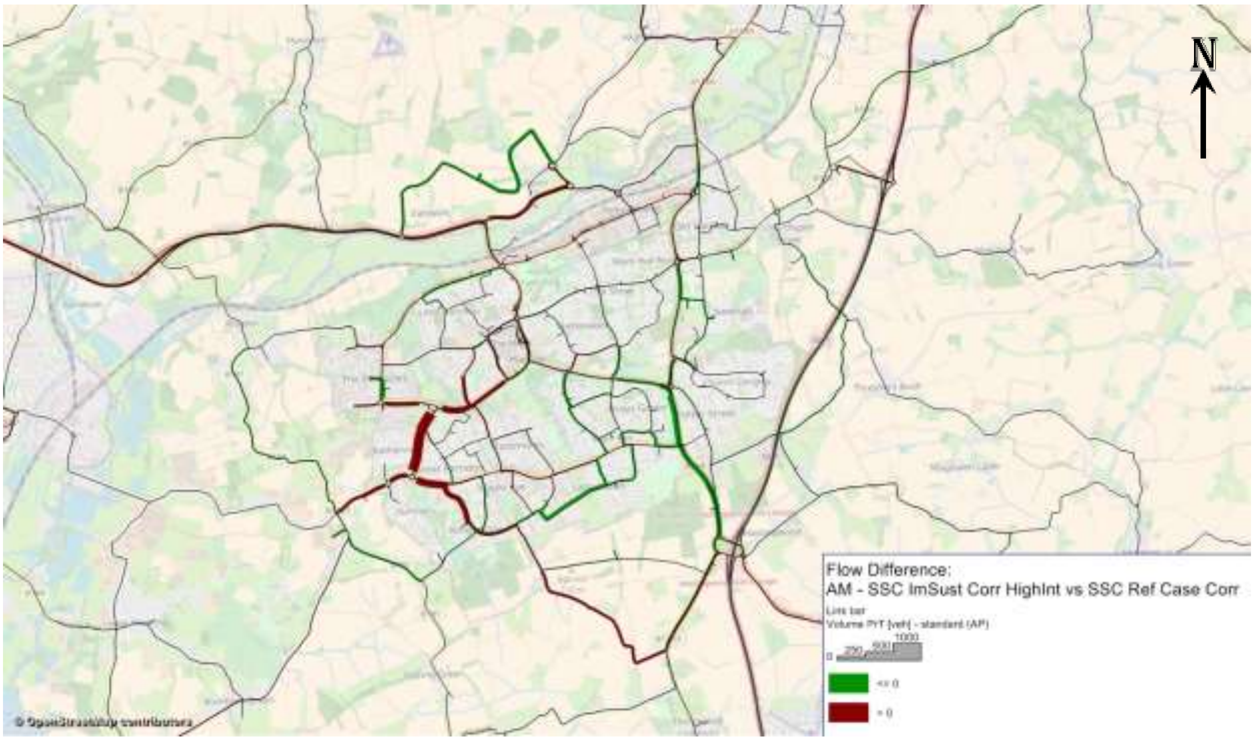
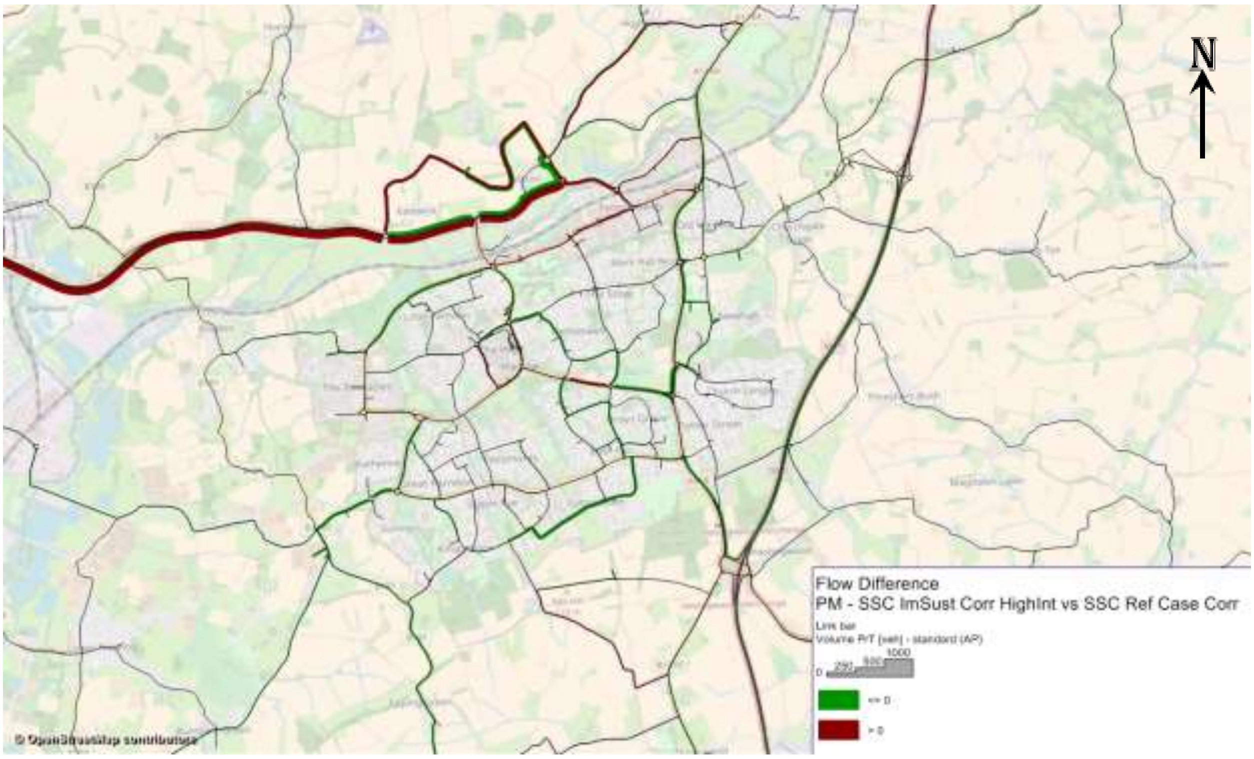


Figure 4-10 shows the modelled changes in flows in the evening peak when comparing the reference case scenario with a higher level of internalisation. As in the morning peak, the sustainable travel change assumptions have a positive impact on wider Harlow. The travel pattern is similar to the travel pattern in the intermediate sustainability scenario without the additional internal trips.

Figure 4-10: Flow Differences – Intermediate Sustainability Scenario with Higher Internalisation v. Reference Case (with SSC and Bus Lane, PM peak) S21LB vs S21



4.5 Summary

This chapter has reviewed the impact of applying sustainable travel assumptions in the Harlow transport model. Several scenarios have been run in order to test different levels of additional sustainable transport, as well as the impact of redistribution of traffic, increasing local commuting trips and decreasing external commuting trips, as it is likely that more people will live and work locally. The tested scenarios that are presented in this chapter are:

- Reference case: standard sustainable travel assumptions on the reference network
- Reference case scenario with the SSC: standard sustainable travel assumptions on the reference network with the SSC
- Reference case scenario with the SSC and improved sustainable travel corridor: standard sustainable travel assumptions on the reference network with the SSC and improved sustainable travel corridor
- Intermediate sustainability scenario with the SSC and improved sustainable travel corridor: intermediate travel assumptions on the reference network with the SSC and improved sustainable travel corridor
- Intermediate sustainability scenario with a higher level of internal trips, the SSC and improved sustainable travel corridor

Using standard sustainable travel assumptions, both in the morning and evening peak, the construction of the SSC is likely to result in a reduction in traffic along the A414 (north of Harlow), Fifth Avenue, A414 Edinburgh Way and on sections of First Avenue, as traffic reassigns to use the new crossing and other parallel routes.

As would be reasonable to expect, applying the intermediate sustainable travel assumptions results in an overall reduction in traffic in the wider Harlow area. When reduced trip rates have been applied to represent more sustainable travel, the total number of trips, total vehicle time and total vehicle miles are likely to decrease, while the average network speed is likely to increase. With a higher level of internal trips assumed within the town, the total number of trips, total vehicle time and total vehicle miles are likely to decrease further very slightly, while the average network speed would increase slightly.

While the sustainable travel change assumptions are likely to have an overall positive impact on wider Harlow, both in AM and PM peaks, the modelling has identified some localised exceptions. Notably, traffic may increase in the south west because the sustainable travel assumptions reduce the number of trips expected to be generated from the larger strategic sites in this area, which is likely to create spare capacity on certain routes and, hence, affect route choice.

It should be noted that this study has not included the traffic management measures identified in TN6, which seeks to encourage traffic onto more appropriate routes and away from less suitable residential areas, particularly along A1169 Southern Way. Further work outside of this study is ongoing to identify ways to improve the capacity of A1025 Second Avenue which will further encourage use of this route in preference to parallel routes.

In the evening peak, the modelling indicates that traffic may increase on the A414 westbound, north of Harlow, again as a result of network capacity being freed up.

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5. Journey Time Analysis

This section presents the assessment of journey times along five routes through the local road network. The selected routes are the following:

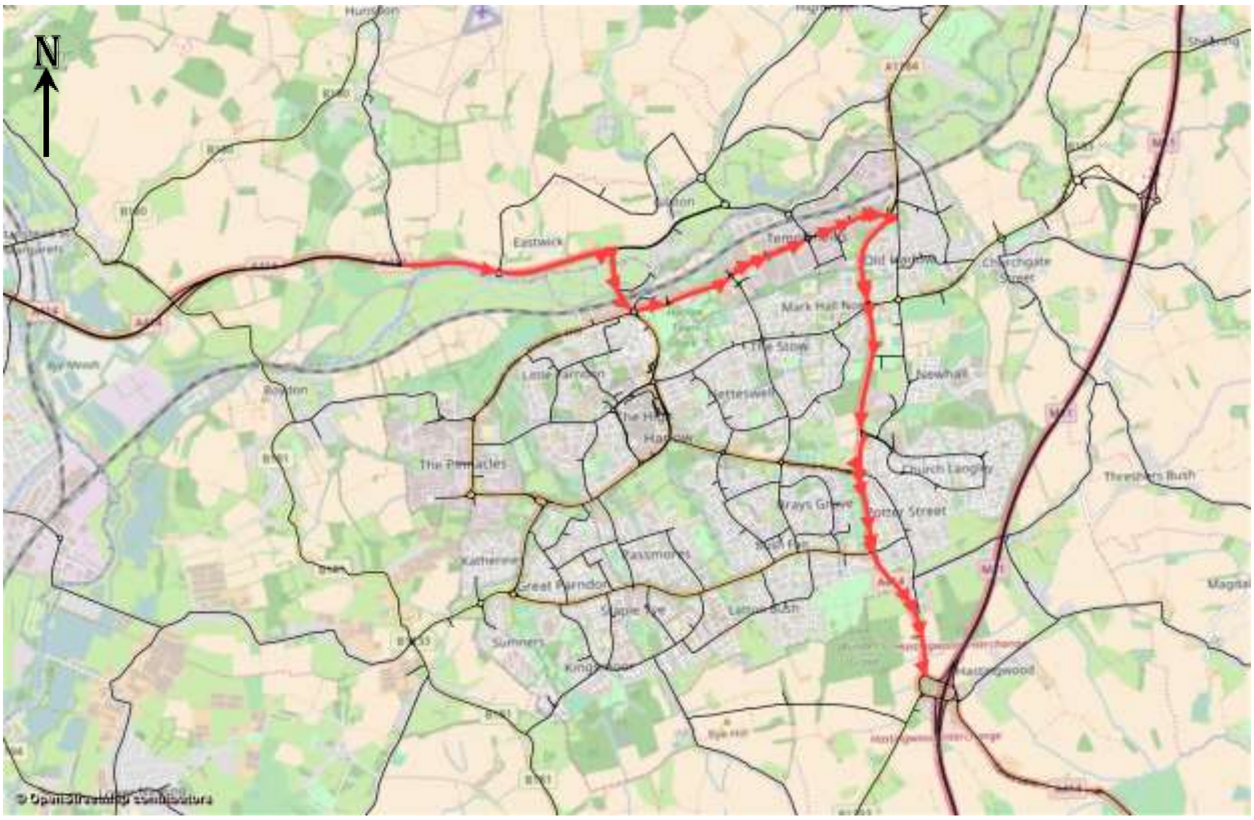
- A414 to J7 via A414 Fifth Avenue, A414 Edinburgh Way and A414 (see section 5.1);
- A414 to J7a via A414 Fifth Avenue, A1019 Fifth Avenue, A1025 Second Avenue and A414 (see section 5.2);
- A414 to J7 via Eastwick Road, Second Stort Crossing (SSC), A414 Edinburgh Way and A414 (see section 5.3);
- Fourth Avenue to J7a via First Avenue and B183 (see section 5.4); and
- A1025 Third Avenue to B1133 Water Lane via A1169 Katherine's Way (see section 5.5).

All the analysis in this section is of the morning peak hour, partly to reduce reporting but also because there is more traffic on the network during this time period and so presents a worst case for each scenario. It should be expected that the journey times reported here will not be directly comparable with journey times reported in Technical Note 3, since there have been some changes to the network, as described in Chapter 2 and a different planning scenario was used. This is considered acceptable as the purpose of the modelling is to compare between sustainable travel scenarios and not with results from previous technical notes.

5.1 A414 to J7 via A414 Fifth Avenue, A414 Edinburgh Way, and A414

The signed, primary route through Harlow is along the A414 to M11 J7 via A414 Fifth Avenue, A414 Edinburgh Way and the Harlow Bypass, as shown in Figure 5-1.

Figure 5-1: A414 to J7 via A414 Fifth Avenue, A414 Edinburgh Way, and A414 route (9.80 km)



5.1.1 Southbound

The journey time data southbound is shown in Table 5-1 and graphically in Figure 5-2; in the morning peak journeys in this direction are slightly quicker than the reverse direction in all scenarios.

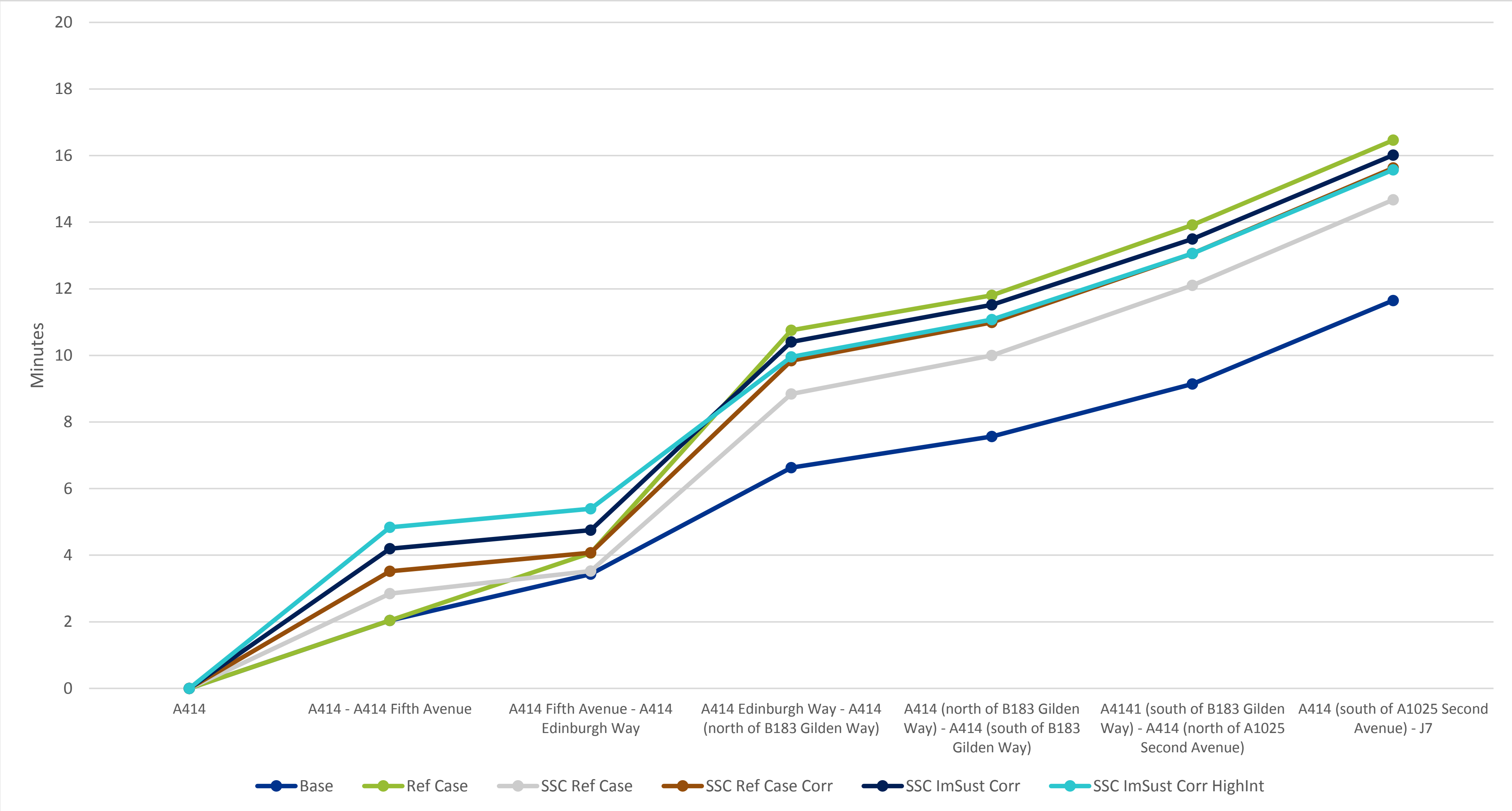
Without either the SSC or sustainable travel changes, journey times would be expected to increase by around 40% between 2014 and 2033. The construction of the SSC is likely to result in a reduction in travel time on this route in 2033 of approximately 11% assuming standard sustainability assumptions. This is likely to result from reduced traffic flows along the route as traffic reassigns to use the new crossing. The addition of the sustainable corridor would result in slightly longer travel times but would still be some 5% faster than without either the SSC or corridor improvements.

With both the SSC and intermediate sustainable travel assumptions, travel time is likely to be slightly longer due to delays at the A414 / Eastwick Road / Fifth Avenue roundabout; it should be noted that the configuration used in the modelling of this junction may not be optimal and it is expected that any such delays would be mitigated through detailed design process for the Gilston development.

Table 5-1: Total journey (minutes) for A414 to J7 via A414 Fifth Avenue, A414 Edinburgh Way, and A414 route (9.80 km)

	Base (2014)	Ref Case (2033)	SSC Ref Case (2033)	SSC Ref Case Corr (2033)	SSC ImSust Corr (2033)	SSC ImSust Corr HighInt (2033)
A414	0.00	0.00	0.00	0.00	0.00	0.00
A414 - A414 Fifth Avenue	2.04	2.04	2.85	3.52	4.20	4.84
A414 Fifth Avenue - A414 Edinburgh Way	3.43	4.06	3.53	4.07	4.76	5.40
A414 Edinburgh Way - A414 (north of B183 Gilden Way)	6.63	10.75	8.84	9.84	10.41	9.95
A414 (north of B183 Gilden Way) - A414 (south of B183 Gilden Way)	7.57	11.81	10.00	10.99	11.52	11.08
A4141 (south of B183 Gilden Way) - A414 (north of A1025 Second Avenue)	9.14	13.92	12.11	13.06	13.49	13.06
A414 (south of A1025 Second Avenue) - J7	**11.65**	**16.46**	**14.67**	**15.63**	**16.01**	**15.57**

Figure 5-2: Comparison of journey times for A414 to J7 via A414 Fifth Avenue, A414 Edinburgh Way, and A414 route



5.1.2 Northbound

The journey time data northbound is shown in Table 5-2 and graphically in Figure 5-3. This is the peak direction of travel in the morning peak, and it can be seen that journey times are higher in all scenarios than for the southbound direction.

Like the southbound direction the construction of the SSC is likely to result in a reduction in travel time on this route, of approximately 3% without any sustainability improvements, which is lower than for the southbound savings. This disparity is probably due to the weight of traffic on this route in this direction, and on the parallel alternative roads. With the addition of bus lanes on the north-south corridor, this is likely to result in a slight increase in travel time on the north-south route of approximately 2%. However, with the intermediate sustainable travel assumptions applied and a higher level of internal trips assumed, the travel time would be likely to reduce by 3% over the reference case scenario.

Table 5-2: Total journey (minutes) for J7 to A414 via A414, A414 Edinburgh Way, and A414 Fifth Avenue route (9.80 km)

	Base (2014)	Ref Case (2033)	SSC Ref Case (2033)	SSC Ref Case Corr (2033)	SSC ImSust Corr (2033)	SSC ImSust Corr HighInt (2033)
J7	0.00	0.00	0.00	0.00	0.00	0.00
J7 - A414 (south ofA1025 Second Avenue)	2.95	2.66	2.71	2.77	2.68	2.67
A414 (north ofA1025 Second Avenue) - A414(south of B183 Gilden Way)	4.76	7.10	7.14	7.38	6.79	6.76
A414(north of B183 Gilden Way) - A414 (south of A414 Edinburgh Way)	5.68	7.99	8.03	8.27	7.69	7.65
A414 - A414 Edinburgh Way	9.67	15.26	14.73	15.09	14.26	14.52
A414 Edinburgh Way - A414 Fifth Avenue	10.71	15.95	15.42	15.78	14.95	15.21
A414 Fifth Avenue - A414	**12.83**	**17.34**	**16.82**	**17.18**	**16.36**	**16.62**

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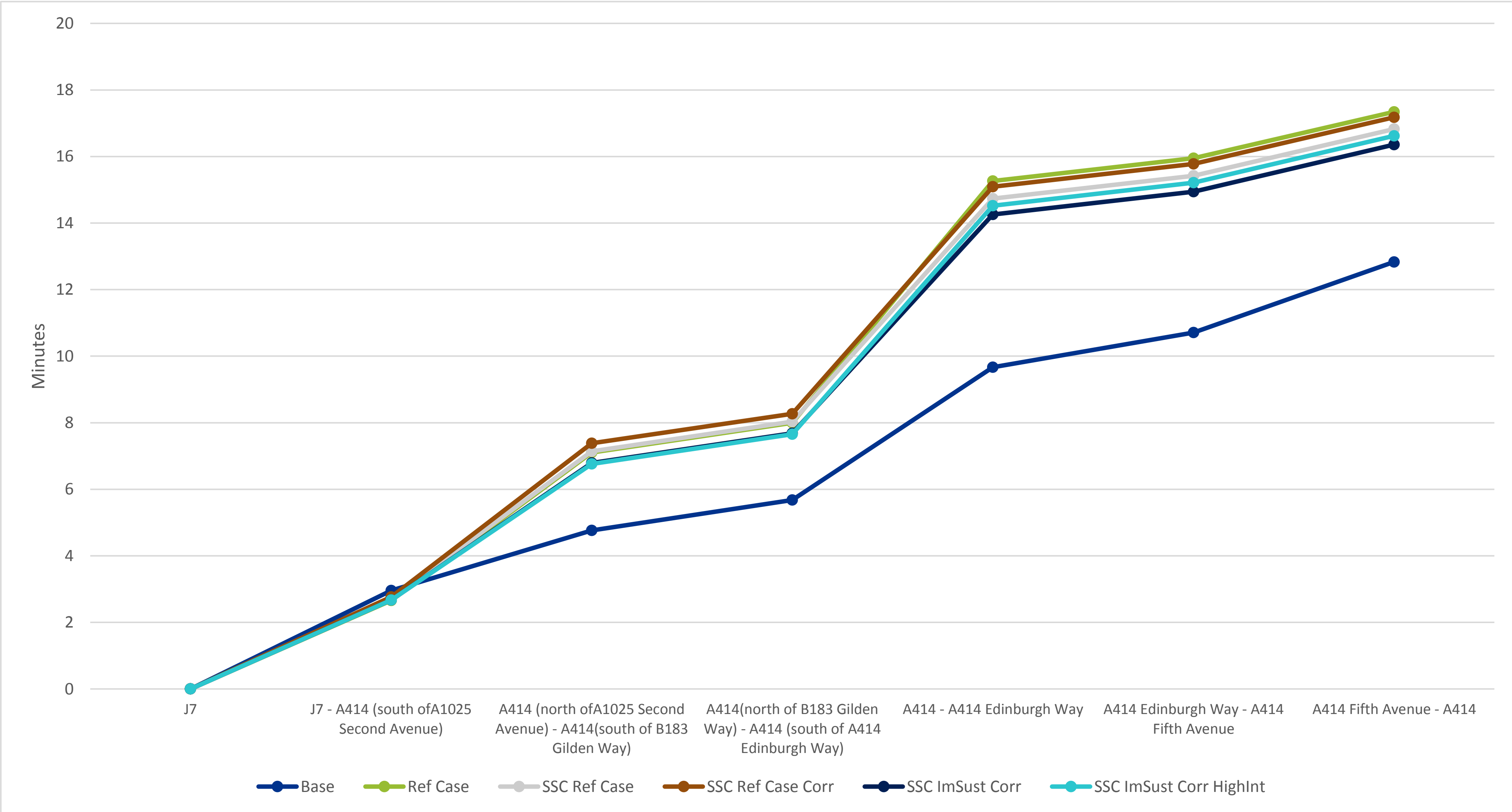
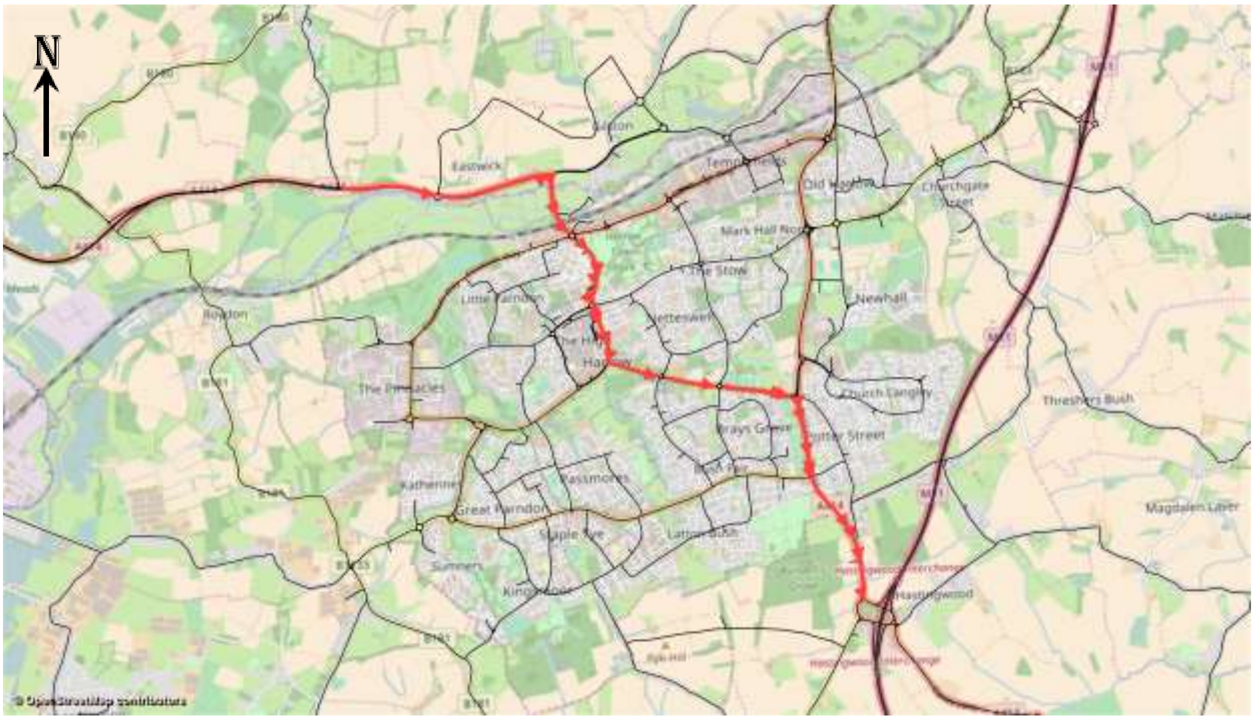
Figure 5-3: Comparison of journey times for J7 to A414 via A414, A414 Edinburgh Way, and A414 Fifth Avenue route



5.2 A414 to J7 via A414 Fifth Avenue, A1019 Fifth Avenue, A1025 Second Avenue and A414

The A414 to J7 via A414 Fifth Avenue, A1019 Fifth Avenue, A1025 Second Avenue and A414 route is illustrated in Figure 5-4. The peak direction of travel on this route is northbound in the morning. In TN2, it was concluded that this was the result of more traffic arriving from J7 rather than from the west of Harlow, with J7a in place, which is the case for all the sustainability tests.

Figure 5-4: A414 to J7 via A414 Fifth Avenue, A1019 Fifth Avenue, A1025 Second Avenue and A414 route (8.11 km)



5.2.1 Southbound

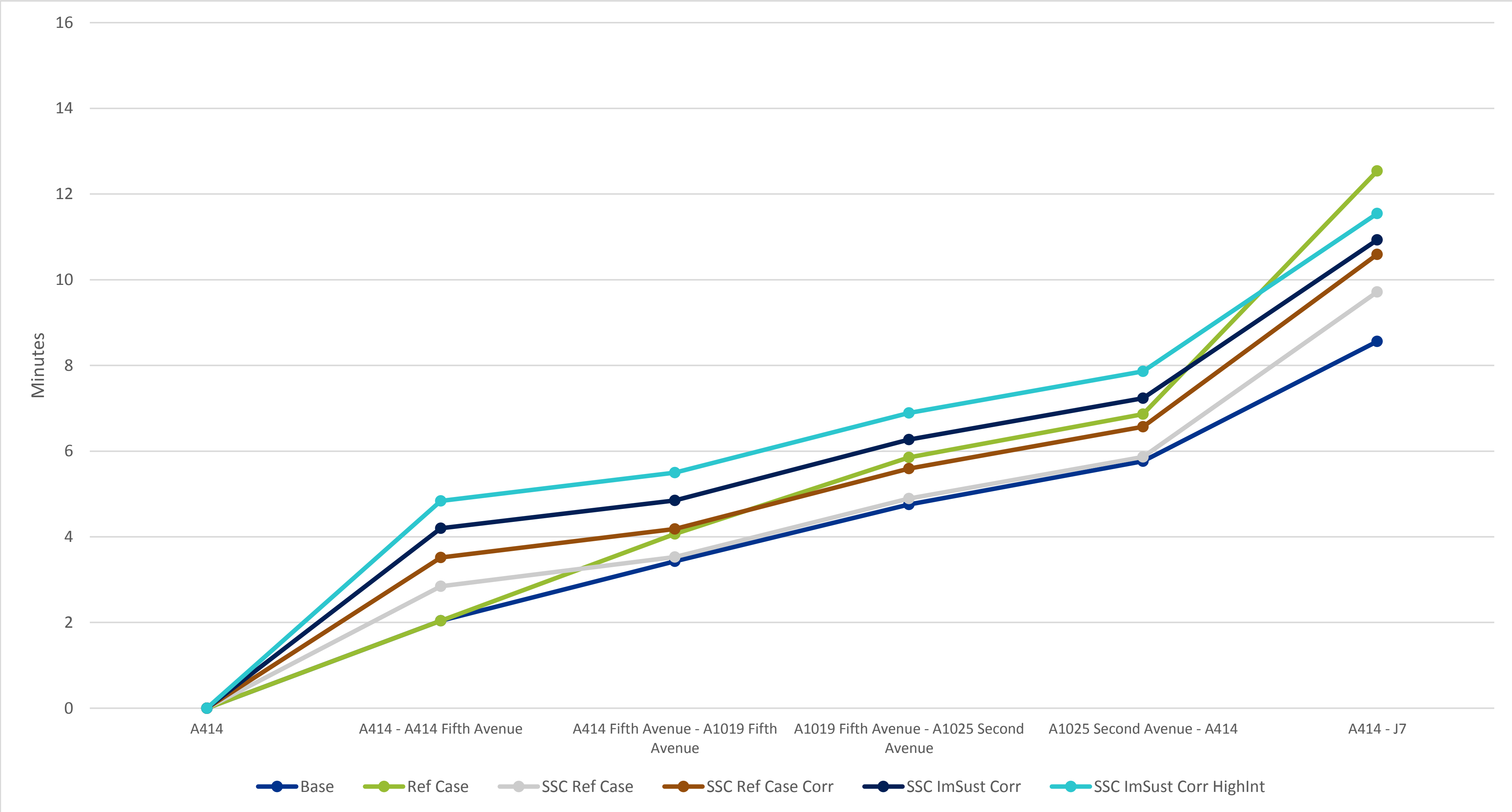
The journey time data southbound is shown in Table 5-3 and graphically in Figure 5-5.

The construction of the SSC is likely to result in a reduction in travel times on this route of approximately 23% without any sustainability improvements. This results from reduced traffic flows along the route as traffic reassigns to use the new crossing and other parallel routes. With the addition of bus lanes on the north-south corridor, this is likely to result in an increase in travel times on the route of approximately 9%. After applying the intermediate sustainable travel assumptions, travel time is likely to slightly increase due to increased turning delays at the A414 / Eastwick Road / Fifth Avenue roundabout as it has been explained in 5.1.1.

Table 5-3: Total journey (minutes) for A414 to J7 via A414 Fifth Avenue, A1019 Fifth Avenue, A1025 Second Avenue and A414 route (8.11 km)

	Base (2014)	Ref Case (2033)	SSC Ref Case (2033)	SSC Ref Case Corr (2033)	SSC ImSust Corr (2033)	SSC ImSust Corr HighInt (2033)
A414	0.00	0.00	0.00	0.00	0.00	0.00
A414 - A414 Fifth Avenue	2.04	2.04	2.85	3.52	4.20	4.84
A414 Fifth Avenue - A1019 Fifth Avenue	3.43	4.06	3.53	4.18	4.85	5.50
A1019 Fifth Avenue - A1025 Second Avenue	4.75	5.85	4.90	5.59	6.27	6.89
A1025 Second Avenue - A414	5.77	6.87	5.86	6.57	7.24	7.86
A414 - J7	**8.56**	**12.54**	**9.72**	**10.59**	**10.93**	**11.55**

Figure 5-5: Comparison of journey times for A414 to J7 via A414 Fifth Avenue, A1019 Fifth Avenue, A1025 Second Avenue and A414 route



5.2.2 Northbound

The northbound journey time for each scenario is shown in . This is the peak direction of travel in the morning peak, and it can be seen that journey times are higher for all scenarios than in the southbound direction.

Like the southbound direction the construction of the SSC is likely to result in a reduction in travel time on this route, of approximately 8% using standard sustainable travel assumptions, which is lower than for the southtbound savings. This disparity is probably due to the weight of traffic on this route in this direction, and on the parallel alternative roads. With the addition of bus lanes on the north-south corridor, this is likely to result in an increase in travel time on the northbound route of approximately 8%. However, with the intermediate sustainable travel assumptions applied and a higher level of internal trips assumed within the town the travel time would be likely to reduce by 8% over the reference case scenario.

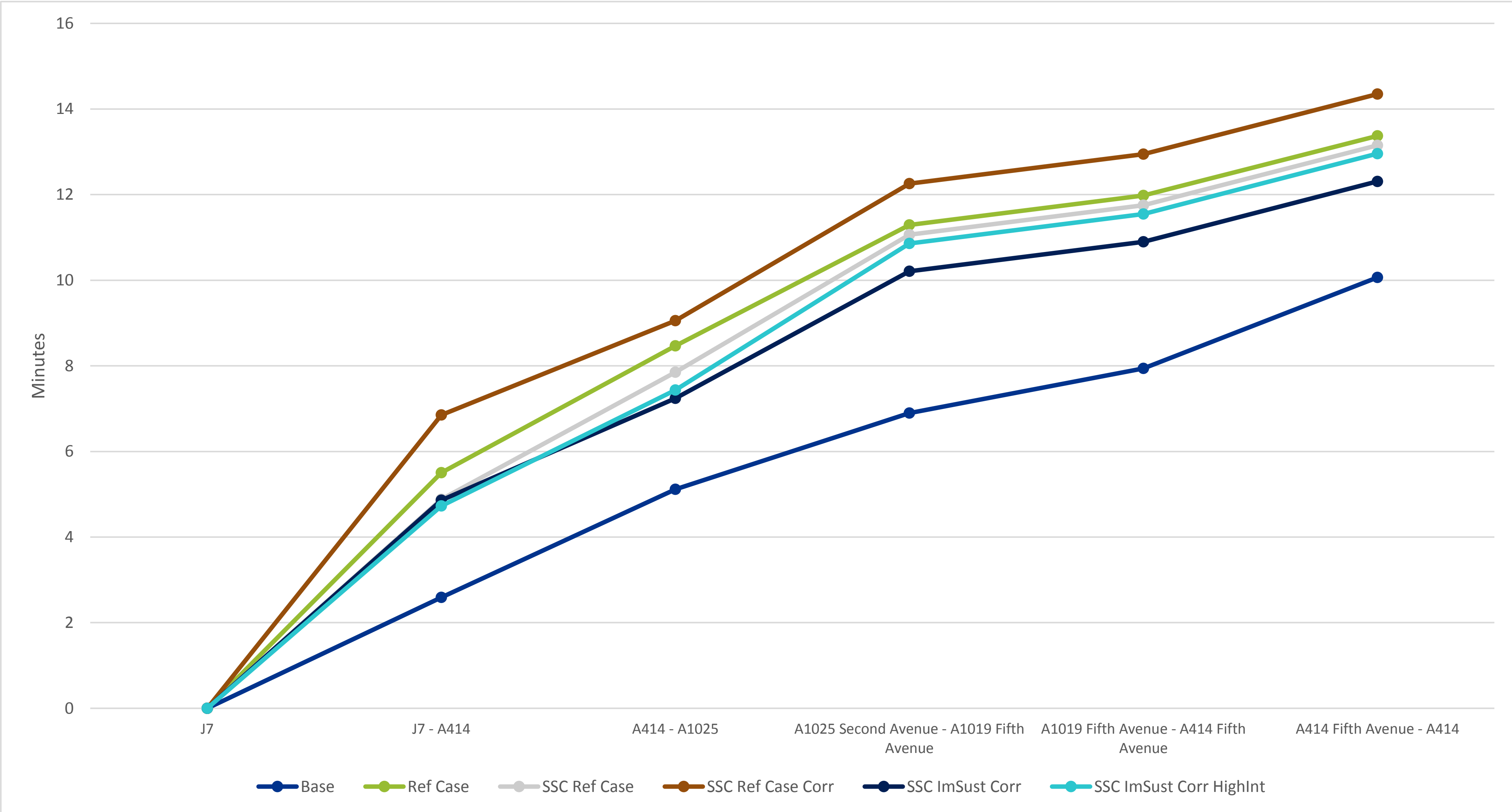
Table 5-4 and graphically in Figure 5-6. This is the peak direction of travel in the morning peak, and it can be seen that journey times are higher for all scenarios than in the southbound direction.

Like the southbound direction the construction of the SSC is likely to result in a reduction in travel time on this route, of approximately 8% using standard sustainable travel assumptions, which is lower than for the southtbound savings. This disparity is probably due to the weight of traffic on this route in this direction, and on the parallel alternative roads. With the addition of bus lanes on the north-south corridor, this is likely to result in an increase in travel time on the northbound route of approximately 8%. However, with the intermediate sustainable travel assumptions applied and a higher level of internal trips assumed within the town the travel time would be likely to reduce by 8% over the reference case scenario.

Table 5-4: Total journey (minutes) for J7 to A414 via A414, A1025 Second Avenue, A1019 Fifth Avenue and A414 Fifth Avenue route (8.11 km)

	Base (2014)	Ref Case (2033)	SSC Ref Case (2033)	SSC Ref Case Corr (2033)	SSC ImSust Corr (2033)	SSC ImSust Corr HighInt (2033)
J7	0.00	0.00	0.00	0.00	0.00	0.00
J7 - A414	2.59	5.50	4.88	6.85	4.86	4.73
A414 - A1025	5.12	8.46	7.85	9.06	7.24	7.43
A1025 Second Avenue - A1019 Fifth Avenue	6.90	11.29	11.06	12.26	10.21	10.86
A1019 Fifth Avenue - A414 Fifth Avenue	7.94	11.98	11.75	12.95	10.90	11.55
A414 Fifth Avenue - A414	**10.06**	**13.37**	**13.15**	**14.35**	**12.31**	**12.96**

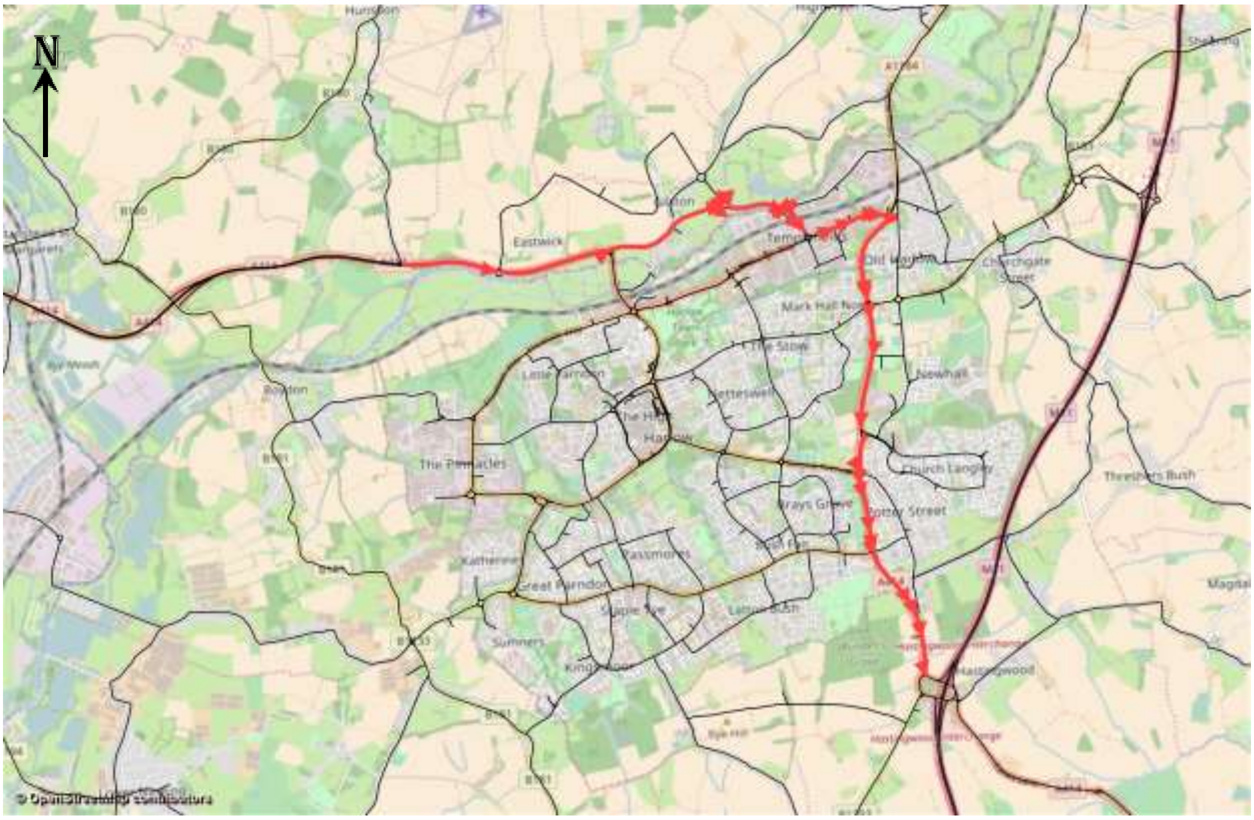
Figure 5-6: Comparison of journey times for J7 to A414 via A414, A1025 Second Avenue, A1019 Fifth Avenue and A414 Fifth Avenue route



5.3 A414 to J7 via Eastwick Road, SSC, A414 Edinburgh Way, and A414

The A414 to J7 via Eastwick Road, SSC, A414 Edinburgh Way and A414 route is shown in Figure 5-1. This is the longest route between Eastwick and the motorway.

Figure 5-7: A414 to J7 via Eastwick Road, SSC, A414 Edinburgh Way, and A414 route (9.87 km)



5.3.1 Southbound

The southbound journey times are shown in Table 5-1 and graphically in Figure 5-2.

As shown in Table 5-5, the addition of bus lanes on the north-south corridor is likely to result in an increase in travel times on the southbound route of approximately 11%. With the intermediate sustainable travel assumptions, travel time remains almost the same due to increased turning delays at the A414 / Eastwick Road / Fifth Avenue roundabout as explained in 5.1.1. However, with a higher level of internal trips assumed the travel time would be likely to reduce by 3% over the reference case scenario.

Table 5-5: Total journey (minutes) for A414 to J7 via A414 Eastwick Road, SSC, Edinburgh Way, and A414 route (9.87 km)

	Base (2014)	SSC Ref Case (2033)	SSC Ref Case Corr (2033)	SSC ImSust Corr (2033)	SSC ImSust Corr HighInt (2033)
A414	n/a	0.00	0.00	0.00	0.00
A4141 - Second Sort Crossing	n/a	2.85	3.52	4.20	4.84
Second Sort Crossing - A414 Edinburg Way	n/a	7.99	9.60	9.81	9.33
A414 Edinburg Way - A414 (north of B183 Gilden Way)	n/a	9.14	10.75	10.93	10.45
A414 (south of B183 Gilden Way) - A414 (north of A1025 Second Avenue)	n/a	11.25	12.82	12.90	12.44
A414 (south of A1025 Second Avenue) - J7	n/a	**13.82**	**15.39**	**15.42**	**14.95**

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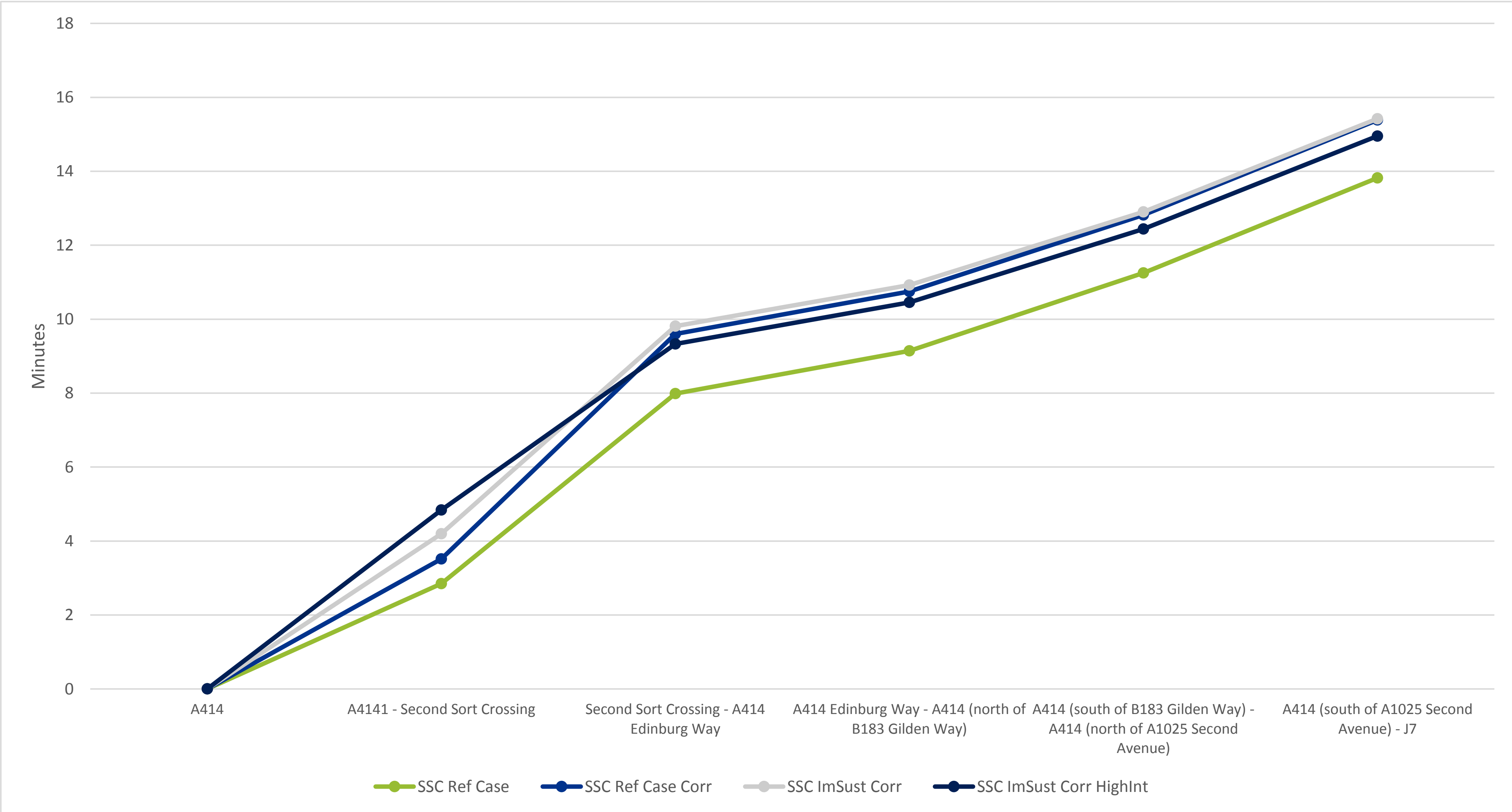
Figure 5-8: Comparison of journey times for A414 to J7 via Eastwick Road, SSC, A414 Edinburgh Way, and A414 route



5.3.2 Northbound

The journey time data northbound is shown in This is the peak direction of travel in the morning peak, and it can be seen that journey times are higher for all scenarios than in the southbound direction.

Like the southbound direction the addition of bus lanes on the north-south corridor is likely to result in an increase in travel times on the northbound route of approximately 4%. However, with the intermediate sustainable travel assumptions applied and a higher level of internal trips assumed within the town, the travel time would be likely to reduce by 1% over the reference case scenario.

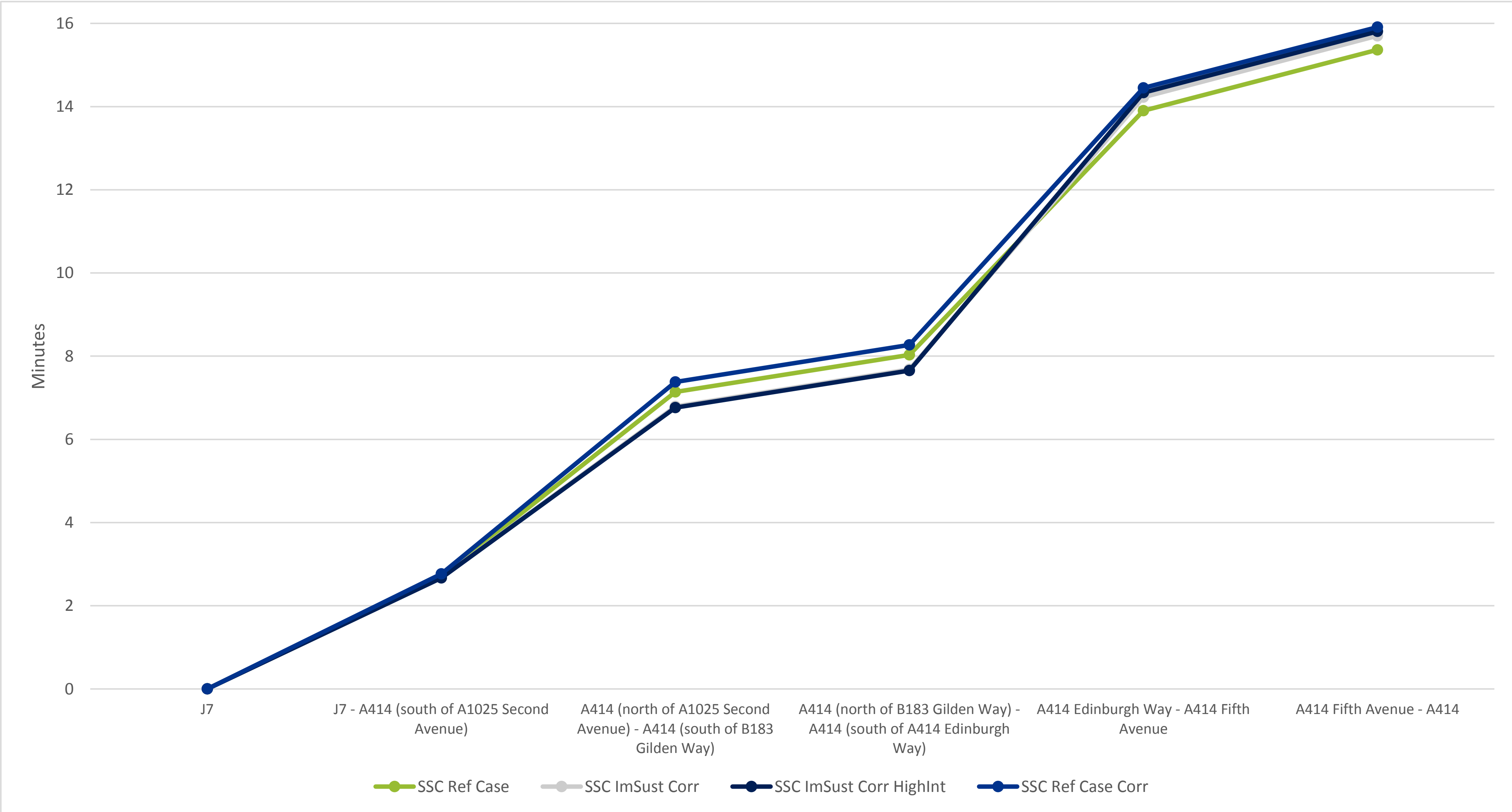
Table 5-6 and graphically in Figure 5-9. This is the peak direction of travel in the morning peak, and it can be seen that journey times are higher for all scenarios than in the southbound direction.

Like the southbound direction the addition of bus lanes on the north-south corridor is likely to result in an increase in travel times on the northbound route of approximately 4%. However, with the intermediate sustainable travel assumptions applied and a higher level of internal trips assumed within the town, the travel time would be likely to reduce by 1% over the reference case scenario.

Table 5-6: Total journey (minutes) for J7 to A414 via A414, A414 Edinburgh Way, SSC, and Eastwick Road route (9.87 km)

	Base (2014)	SSC Ref Case (2033)	SSC Ref Case Corr (2033)	SSC ImSust Corr (2033)	SSC ImSust Corr HighInt (2033)
J7	n/a	0.00	0.00	0.00	0.00
J7 - A414 (south of A1025 Second Avenue)	n/a	2.71	2.77	2.68	2.67
A414 (north of A1025 Second Avenue) - A414 (south of B183 Gilden Way)	n/a	7.14	7.38	6.79	6.76
A414 (north of B183 Gilden Way) - A414 (south of A414 Edinburgh Way)	n/a	8.03	8.27	7.69	7.65
A414 Edinburgh Way - A414 Fifth Avenue	n/a	13.90	14.45	14.23	14.33
A414 Fifth Avenue - A414	n/a	**15.36**	**15.91**	**15.70**	**15.81**

Figure 5-9: Comparison of journey times for J7 to A414 via A414, A414 Edinburgh Way, SSC, and Eastwick Road route



5.4 Fourth Avenue to J7a via First Avenue, and B183

The Fourth Avenue to J7 via First Avenue and B183 route is shown in Figure 5-10. This route comprises part of the proposed east-west sustainable corridor, and already includes bus priority measures in the form of sections of bus lanes along First Avenue, mainly westbound, but also some eastbound. Committed developments in the east, including the Enterprise Zone and New Hall, as well as the new strategic site at East Harlow, will deliver additional sustainable travel infrastructure to connect to this route.

The peak direction of travel on this route in the AM peak hour is westbound, from the M11 towards the town centre and The Pinnacles, so it would be expected that journey times would be shorter in the eastbound direction in the AM peak.

Figure 5-10: Fourth Avenue to J7a via First Avenue, and B183 route (7.23 km)

5.4.1 Eastbound

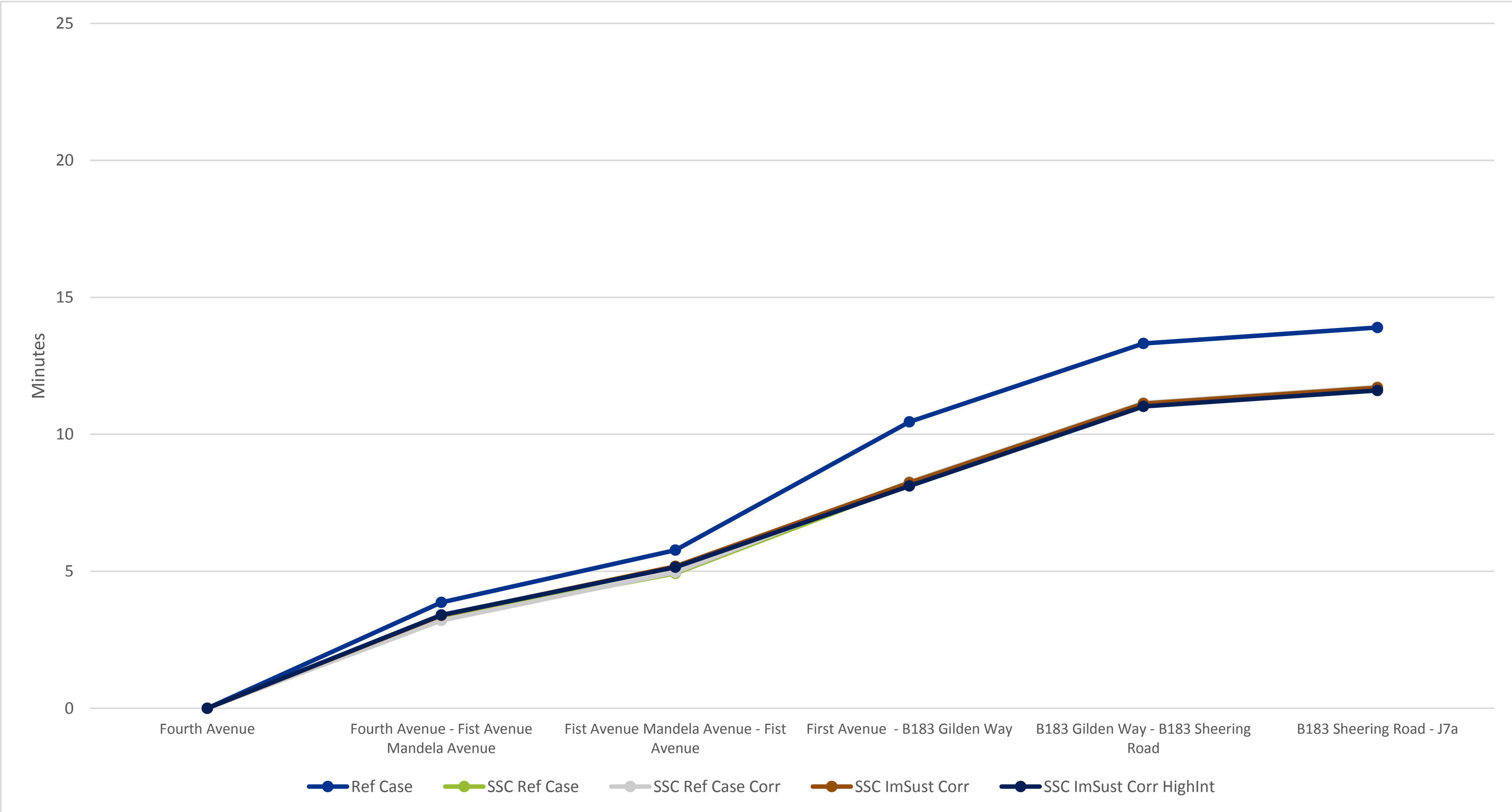
The journey time data eastbound is shown in Table 5-7 and graphically in Figure 5-11.

Table 5-7: Total journey (minutes) Fourth Avenue to J7a via First Avenue, and B183 route (7.23 km)

	Base (2014)	Ref Case (2033)	SSC Ref Case (2033)	SSC Ref Case Corr (2033)	SSC ImSust Corr (2033)	SSC ImSust Corr HighInt (2033)
Fourth Avenue	n/a	0.00	0.00	0.00	0.00	0.00
Fourth Avenue - Fist Avenue Mandela Avenue	n/a	3.86	3.32	3.21	3.39	3.40
Fist Avenue Mandela Avenue - Fist Avenue	n/a	5.77	4.92	4.97	5.18	5.15
First Avenue - B183 Gilden Way	n/a	10.45	8.18	8.27	8.23	8.11
B183 Gilden Way - B183 Sheering Road	n/a	13.32	11.07	11.15	11.12	11.02
B183 Sheering Road - J7a	n/a	**13.90**	**11.65**	**11.73**	**11.70**	**11.60**

The construction of the SSC is likely to result in a reduction in travel times on this route of approximately 16% without any sustainability improvements. This is likely to result from reduced traffic flows along the route as traffic reassigns to use the new crossing and other parallel routes. With the addition of bus lanes on the north-south corridor, this is likely to result in a further reduction in travel time of approximately 1%. With the intermediate travel assumptions applied and a higher level of internal trips assumed the travel time would be likely to reduce by 1%, over the reference case scenario.

Figure 5-11: Comparison of journey times for Fourth Avenue to J7a via First Avenue, and B183 route



5.4.2 Westbound

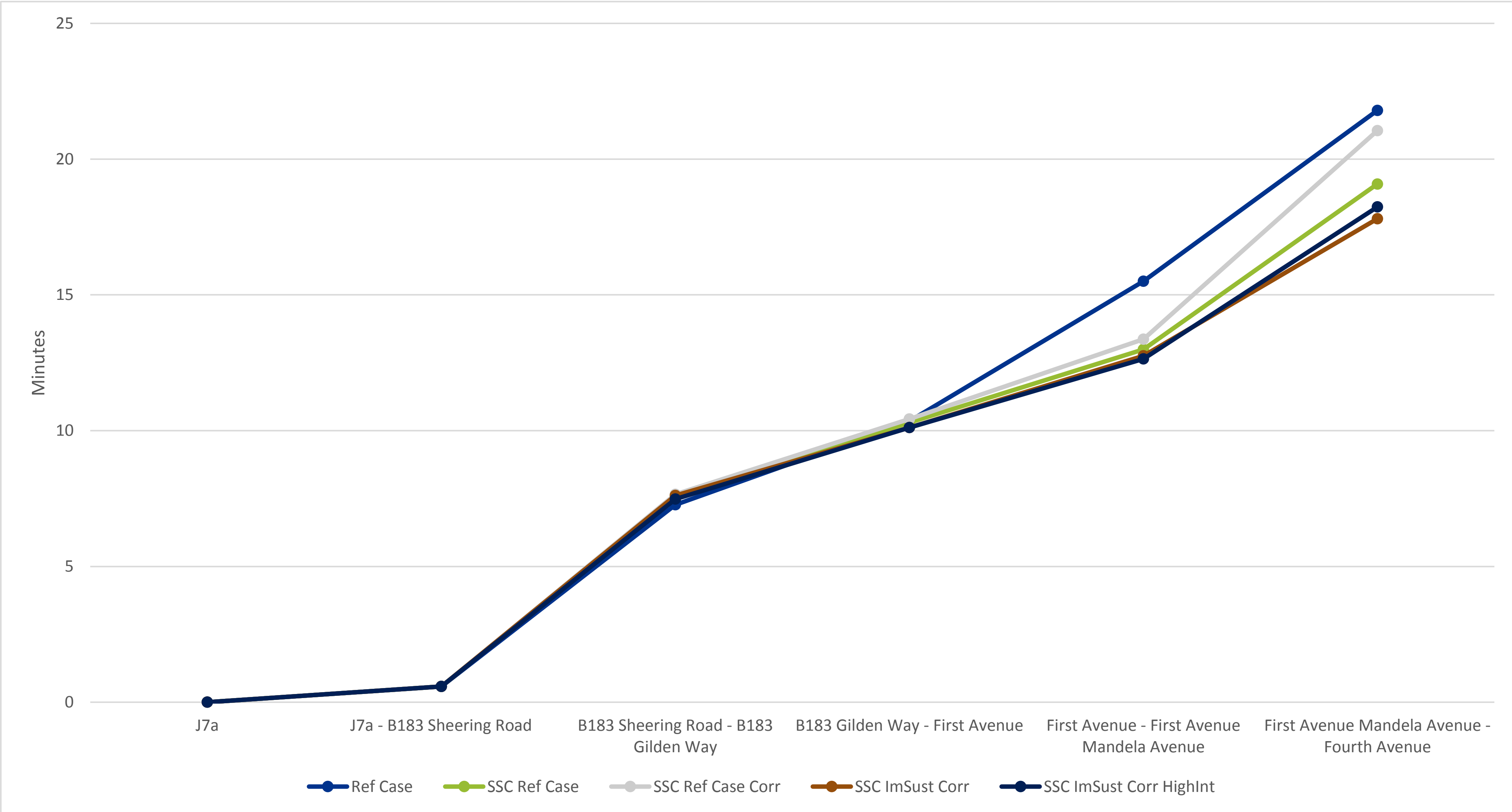
The journey time data westbound is shown in Table 5-8 and graphically in Figure 5-12. As previously stated, this is the peak direction of travel in the morning peak, and it can be seen that journey times are higher for all scenarios than in the eastbound direction.

Table 5-8: Total journey times (minutes) for J7a to Fourth Avenue via B183, and First Avenue route (7.23 km)

	Base (2014)	Ref Case (2033)	SSC Ref Case (2033)	SSC Ref Case Corr (2033)	SSC ImSust Corr (2033)	SSC ImSust Corr HighInt (2033)
J7a	n/a	0.00	0.00	0.00	0.00	0.00
J7a - B183 Sheering Road	n/a	0.58	0.58	0.58	0.58	0.58
B183 Sheering Road - B183 Gilden Way	n/a	7.27	7.57	7.66	7.61	7.48
B183 Gilden Way - First Avenue	n/a	10.35	10.30	10.43	10.11	10.12
First Avenue - First Avenue Mandela Avenue	n/a	15.51	13.00	13.37	12.76	12.64
First Avenue Mandela Avenue - Fourth Avenue	n/a	**21.79**	**19.08**	**21.05**	**17.80**	**18.24**

Like the eastbound direction the construction of the SSC is likely to result in a reduction in travel times on this route, of approximately 12% using standard sustainable travel assumptions, which is lower than for the eastbound savings. This disparity is probably due to the weight of traffic on this route in this direction, and on the parallel alternative roads. The addition of bus lanes on the north-south corridor is likely to result in an increase in travel time on this route of approximately 10%. With a higher level of internal trips assumed within the town travel time is likely to reduce by 13%, giving a total journey time saving of more than 2.5 minutes, over the reference case scenario.

Figure 5-12: Comparison of journey times for J7a to Fourth Avenue via B183, and First Avenue route



5.5 A1025 Third Avenue to B1133 Water Lane via A1169 Katherine's Way

The A1025 Third Avenue to B1133 Water Lane via A1169 Katherine's Way route is shown in Figure 5-13.

Figure 5-13: A1025 Third Avenue to B1133 Water Lane via A1169 Katherine's Way route (3.26 km)

5.5.1 Southbound

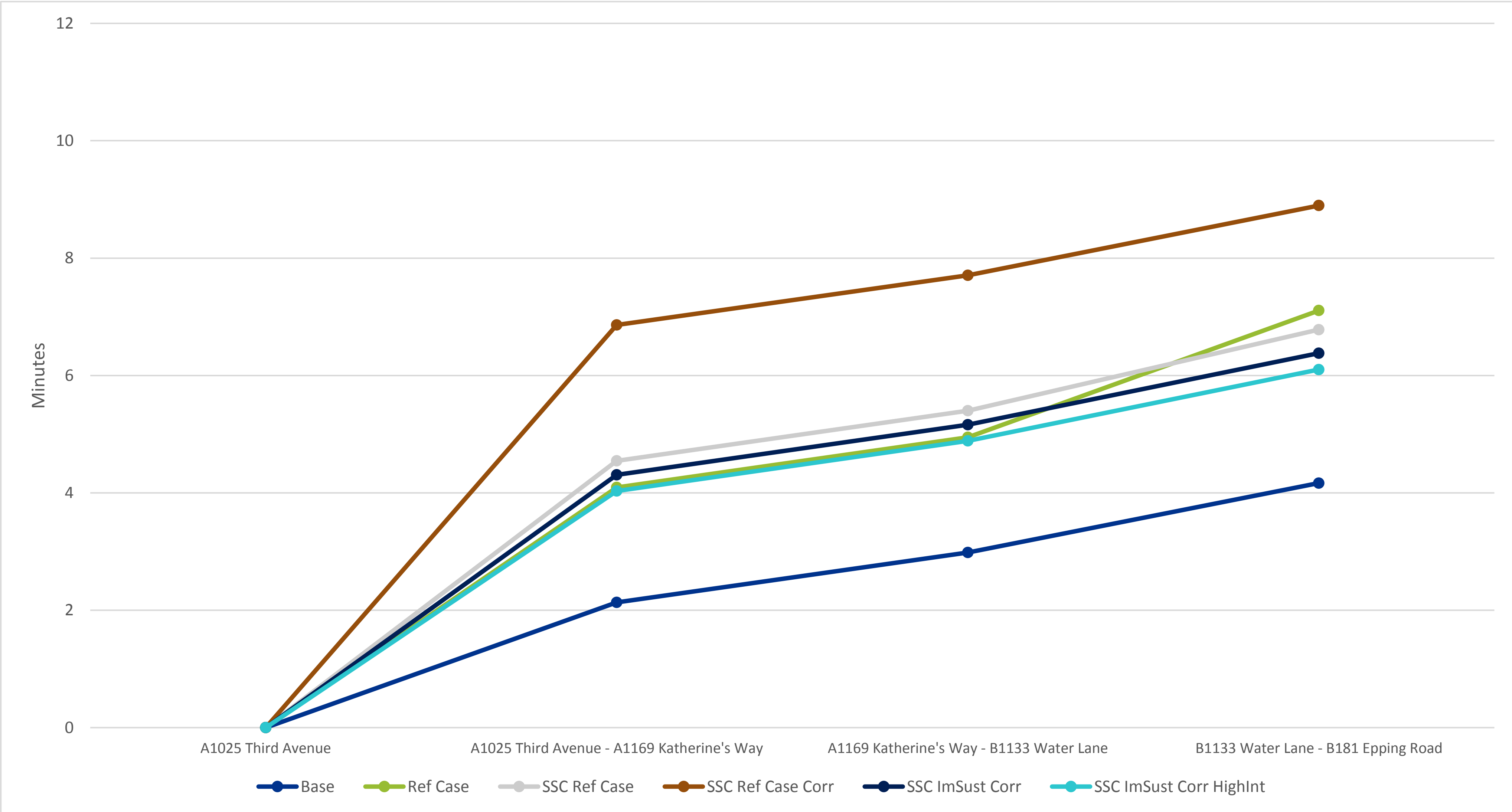
The journey time data southbound is shown in Table 5-9 and graphically in Figure 5-14.

The construction of the SSC is likely to result in a reduction in travel times on this route of approximately 5% without any sustainability improvements. This is likely to result from reduced traffic flows along the route as traffic reassigns to use the new crossing and other parallel routes. However, the addition of bus lanes on the north-south corridor is likely to result in an increase in travel times on the southbound route of approximately 31%. Applying intermediate sustainable travel assumptions and a higher level of internal trips within the town, the travel time would be likely to reduce by 31% over the reference case scenario.

Table 5-9: Total journey (minutes) for A1025 Third Avenue to B1133 Water Lane via A1169 Katherine's Way route (3.26 km)

	Base (2014)	Ref Case (2033)	SSC Ref Case (2033)	SSC Ref Case Corr (2033)	SSC ImSust Corr (2033)	SSC ImSust Corr HighInt (2033)
A1025 Third Avenue	0.00	0.00	0.00	0.00	0.00	0.00
A1025 Third Avenue - A1169 Katherine's Way	2.13	4.09	4.54	6.86	4.31	4.03
A1169 Katherine's Way - B1133 Water Lane	2.98	4.95	5.40	7.71	5.16	4.89
B1133 Water Lane - B181 Epping Road	**4.17**	**7.11**	**6.78**	**8.90**	**6.38**	**6.10**

Figure 5-14: Comparison of journey times for A1025 Third Avenue to B1133 Water Lane via A1169 Katherine's Way route



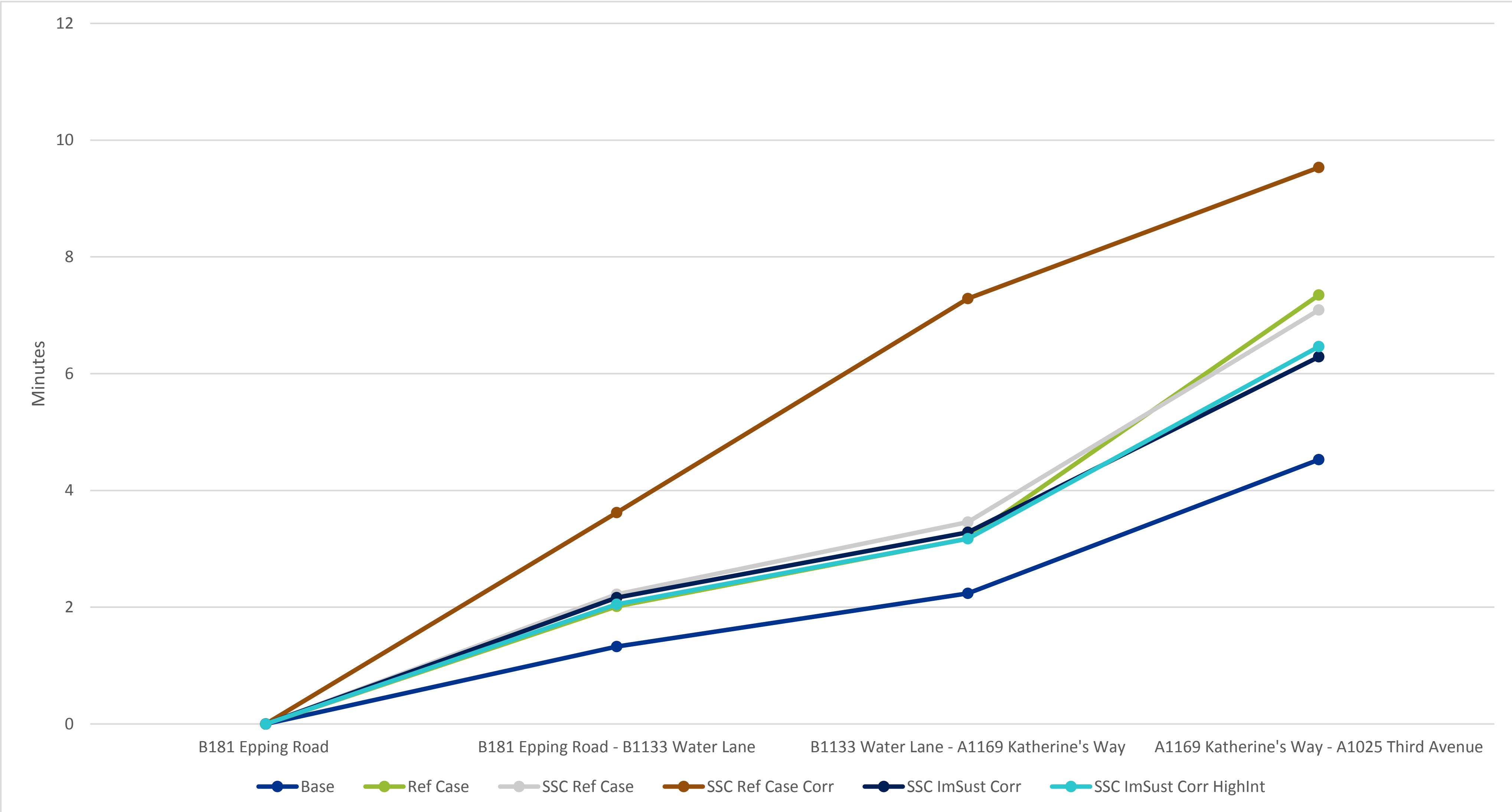
5.5.2 Northbound

The journey time of B1133 Water Lane to A1025 Third Avenue via A1169 Katherine's Way route for each scenario is shown in Table 5-10 and graphically in Figure 5-15. Like the southbound direction, the construction of the SSC is likely to result in a reduction in travel times on this route, of approximately 3% using standard sustainable travel assumptions, which is lower than for the southbound savings. This disparity is probably due to the weight of traffic on this route in this direction, and on the parallel alternative roads. With the addition of bus lanes on the north-south corridor, this is likely to result in a slight increase in travel time on the route of approximately 34%. However, with the intermediate sustainable travel assumptions and a higher level of internal trips, the travel time would be likely to reduce by 32%, giving a total journey time saving of approximately 2.8 minutes over the reference case scenario.

Table 5-10: Total journey (minutes) for B1133 Water Lane to A1025 Third Avenue via A1169 Katherine's Way route (3.26 km)

	Base (2014)	Ref Case (2033)	SSC Ref Case (2033)	SSC Ref Case Corr (2033)	SSC ImSust Corr (2033)	SSC ImSust Corr HighInt (2033)
B181 Epping Road	0.00	0.00	0.00	0.00	0.00	0.00
B181 Epping Road - B1133 Water Lane	1.32	2.01	2.22	3.62	2.17	2.05
B1133 Water Lane - A1169 Katherine's Way	2.24	3.18	3.46	7.29	3.28	3.17
A1169 Katherine's Way - A1025 Third Avenue	**4.53**	**7.35**	**7.09**	**9.53**	**6.29**	**6.46**

Figure 5-15: Comparison of journey times for B1133 Water Lane to A1025 Third Avenue via A1169 Katherine's Way route



5.6 Comparison of Routes

Figure 5-16 illustrates the three routes between the A414 in the northwest and J7 in the southwest that are compared in this section. The first route follows the A414 throughout, i.e. Fifth Avenue, Edinburgh Way and the Harlow Bypass; the second route is via A414 Fifth Avenue, A1019 Fifth Avenue, A1025 Second Avenue and part of the Harlow Bypass, and the third route is via Eastwick Road, SSC and A414 Edinburgh Way and also part of the Harlow Bypass. The length of each route is presented in Table 5-11, where it can be seen that route 2 is around a mile shorter than the other two routes, which will contribute to it being seen as more attractive to some drivers as a through route.

Figure 5-16: The three routes from A414 to J7

Table 5-11: Length of the three routes from A414 to J7

	Length (miles)
Route 1 (via A414 Fifth Avenue and A414 Edinburgh Way)	6.1
Route 2 (via A414 Fifth Avenue, A1019 Fifth Avenue and A1025 Second Avenue)	5.1
Route 3 (Eastwick Road, SSC and A414 Edinburgh Way)	6.2

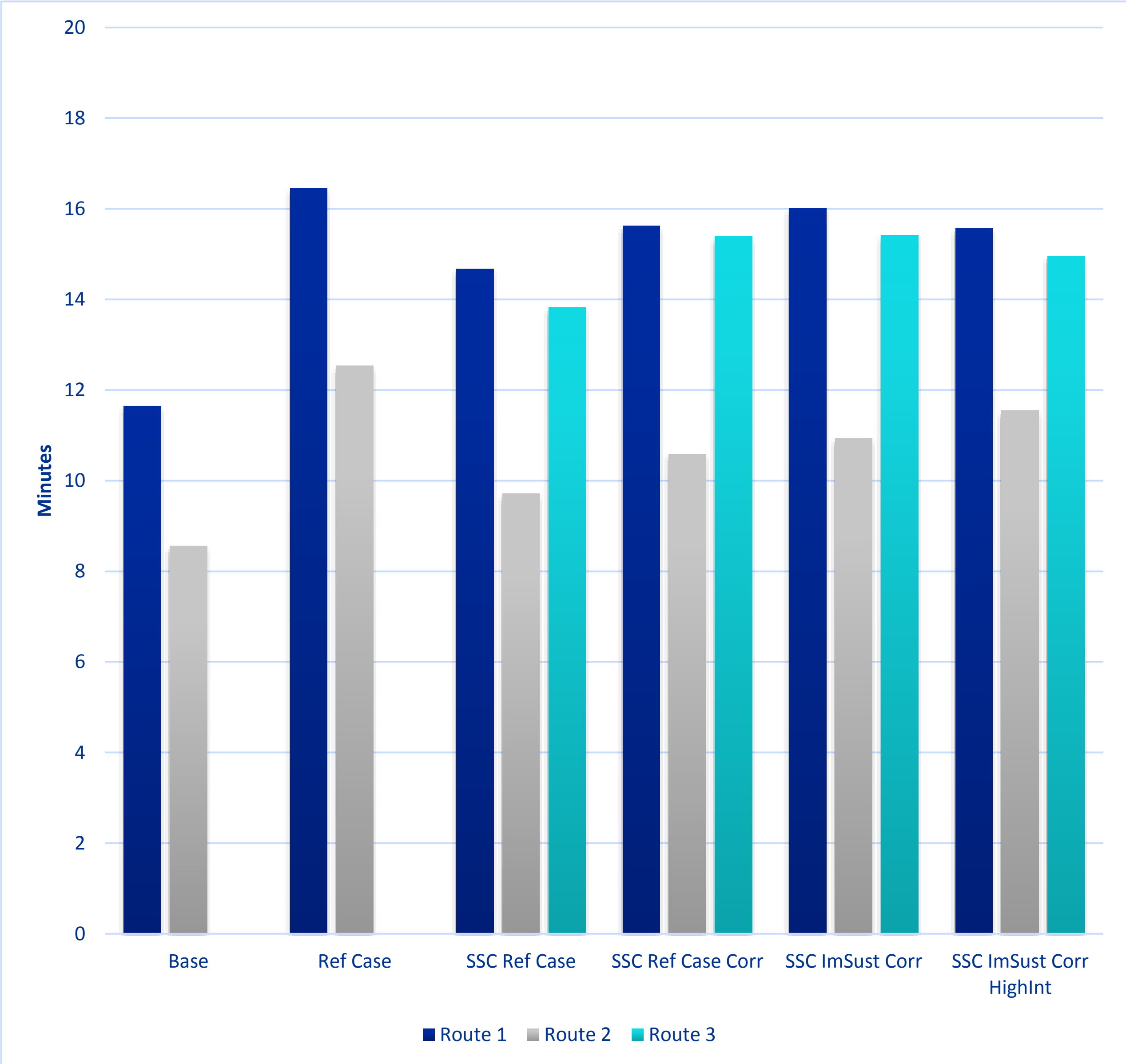
5.6.1 Southbound

Table 5-12 and Figure 5-17 compares the total journey times across these three routes for the different scenarios. Route 2, via A414 Fifth Avenue, A1019 Fifth Avenue and A1025 Second Avenue, is the fastest route in all scenarios, while Route 1, via A414 Fifth Avenue and A414 Edinburgh Way, is the slowest. Routes 3, via Eastwick Road, SSC and A414 Edinburgh Way, and Route 1 have similar total southbound journey times, with Route 3 being slightly faster.

Table 5-12: Southbound – Total Journey Time Comparison of the Three Routes from A414 to J7

	Base	Ref Case	SSC Ref Case	SSC Ref Case Corr	SSC ImSust Corr	SSC ImSust Corr HighInt
Route 1	11.65	16.46	14.67	15.63	16.01	15.57
Route 2	8.56	12.54	9.72	10.59	10.93	11.55
Route 3	n/a	n/a	13.82	15.39	15.42	14.95

Figure 5-17: Southbound – Travel Time Comparison of the Three Routes from A414 to J7



5.6.2 Northbound

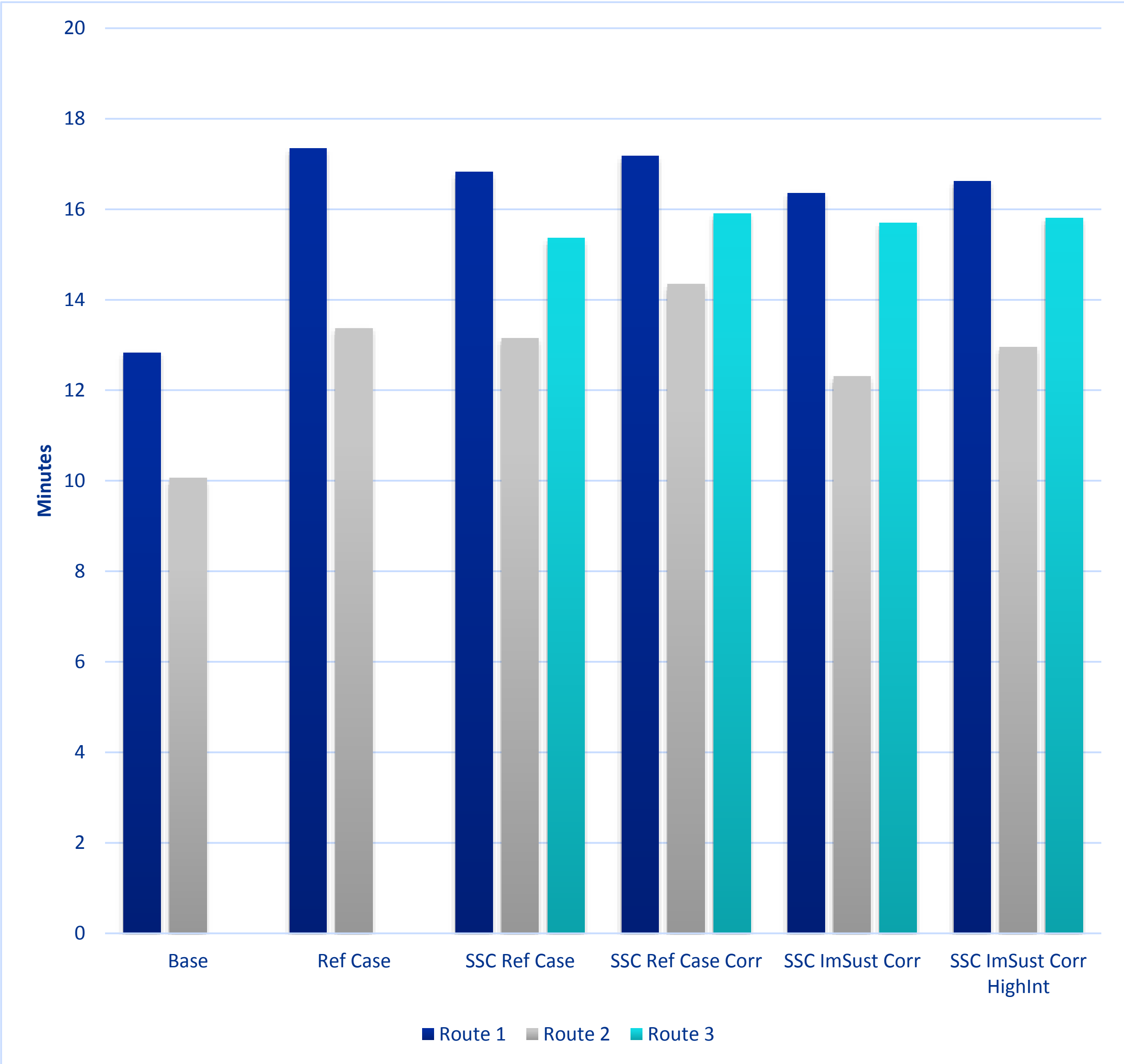
Figure 5-18Table 5-13 and Figure 5-18 present the total journey time comparison of the three routes from A414 to J7 for the different scenarios. Similar to the southbound pattern, Route1, via A414 Fifth Avenue and A414 Edinburgh Way, has the slowest total journey time. Route 2, via A414 Fifth Avenue, A1019 Fifth Avenue and A1025 Second Avenue, is the fastest route, followed by Route 3, via Eastwick Road, SSC and A414 Edinburgh Way.

Table 5-13: Northbound – Total Journey Time Comparison of the Three Routes from A414 to J7

	Base	Ref Case	SSC Ref Case	SSC Ref Case Corr	SSC ImSust Corr	SSC ImSust Corr HighInt
Route 1	12.83	17.34	16.82	17.18	16.36	16.62
Route 2	10.06	13.37	13.15	14.35	12.31	12.96

Route 3	n/a	n/a	15.36	15.91	15.70	15.81

Figure 5-18: Northbound – Travel Time Comparison of the Three Routes from A414 to J7



6. Case for investment in sustainable travel

6.1 Introduction

This Technical Note 7 set out to explore the likely effects of increasing use of sustainable transport, assuming certain measures were in place. This is to help inform priorities for local transport planning in wider Harlow, and may also influence design choices at development sites. Accordingly, Chapter 3 identified possible additional sustainable transport measures, focussed on the key sustainable corridors, and derived mid and high level assumptions on the number of car trips. These were called intermediate and ambitious sustainable travel assumptions.

As shown in Table 3-3 there has been little change in sustainable modes share between 2001 and 2011. The project team met with public transport and cycling experts at ECC to gain a wider understanding of possible reasons for this and to discuss the potential for greater travel by sustainable modes. In addition, we considered how sustainable travel corridors could encourage mode shift.

Between 2001-2011 bus lanes were introduced on sections of First Avenue. Analysis of Census data at the MSOA level shows that bus use for journeys to work did increase by around 10% for those living in the vicinity of First Avenue. Some of the possible barriers to more extensive use that were identified included gaps in the bus lane network and insufficient direct connections to Harlow rail station, which is a key destination.

Accordingly, it is proposed that the north-south and east-west sustainable travel corridors could be enhanced in Harlow. This could include measures to:

- Address gaps in the current bus lane network
- Create a new green link joining Third Avenue and Southern Way for the sole use of buses, cyclists and pedestrians
- Create bus lane spurs off the main corridors to link to strategic development sites
- Ensure design of strategic development sites addresses connectivity and accessibility for bus services
- Seed-fund bus services to new developments until services are commercially viable
- Continue to improve bus information and integrated information systems
- Improve services to the bus station and incorporate bus priority measures on the A414 between Eastwick and Burnt Mill roundabouts.

Meanwhile Section 3.2 identified only a small change to cycling and walking levels between 2001 and 2011, the ECC Cycling Strategy (2016) sets a target to double cycle use in Essex. The strategy identifies three strands of work to achieve this:

- Enabling (advocating, funding and best practice design)
- Promoting (events and local initiatives)
- Providing (coherent cycle networks, continental style facilities and cycle training)

Since the proportion of cycling to work trips was 3% in 2011 this only implies 6% of working residents would be cycling going forward. However, the DfT promoted national Propensity to Cycle Tool (www.pct.bike) identifies a ‘Go Dutch’ scenario in which 17% of all journeys within Harlow could be by bicycle. Although it should be noted that substantial increases in cycling can decrease the amount of walking journeys.

Based on the potential of the new Cycling Strategy combined with the proposed sustainable transport corridors (including the new green link between Third Avenue and Southern Way) and appropriate links to strategic development sites – the garden communities assumed levels for active modes within the hinterland was applied to trips within wider Harlow as either an ambitious upper-level target at those development sites with good potential, or at intermediate levels, as set out in Table 3-4, and illustrated in Figure 3-1. (Although it should be noted that active mode assumptions were only applied for trips with origins and destinations within wider Harlow to avoid over estimating any mode shift.)

Chapters 4 and 5 indicated how reducing the number of single-occupancy vehicle trips could help to reduce network congestion. This type of evidence can be used to develop a broad case for greater investment in sustainable travel based on:

- Highways impact benefits
- Enabling more new development than otherwise possible
- Creating new income streams

6.2 Supporting development

Without changing the way that people travel it could be considered that the options for accommodating the impact of growth within the wider Harlow area would depend on:

- Highway improvements alone to accommodate growth,
- Accepting increased highway network congestion and journey time variability, or
- Reducing development size

While the modelling reported incorporated some highway schemes that are considered essential, there are also other highway schemes that have been recognised as being required, and vehicle routeing could be further influenced by signals optimisation, signals phasing changes, signing strategies, and other traffic management measures. However, it is considered that the level of growth proposed within wider Harlow is such that it would not be possible to improve the local highway capacity sufficiently to accommodate the likely levels of traffic, without achieving a significant modal shift. Therefore, pursuing highway improvements alone to meet expected travel demand from developments and background growth, without mode shift, may require major capacity upgrades and new infrastructure, such as a full Northern Bypass of Harlow. However, such capacity upgrades and infrastructure are expensive and, as the modelling has established, liable to encourage more non-local vehicle trips on the local road network, thus undermining possible sustainable travel benefits. Furthermore, not delivering sustainable mode shift would be contrary to both environmental and public health objectives.

Doing nothing to address the likely highway impacts of new development and background growth is unacceptable on a number of levels, including environmental, health, traffic management and economic prosperity impacts. Therefore, without greater investment in sustainable travel the size of developments may need to be reduced.

In the previous chapter it was shown how traffic pressures at key problem locations would be likely to be relieved were intermediate sustainable travel to be achieved. Taking this as a comparison point, it could be argued that the same level of relief could also be achieved simply by reducing the scale of the strategic developments. Figure 6-1 shows a graph relating the number of car trips which are estimated to be generated at the four larger, strategic development sites (as listed in Table 6-1) as their size increases, and the comparative effects of the three different levels of sustainable travel.

Figure 6-1: Number of trips in the AM peak hour based on different development sizes

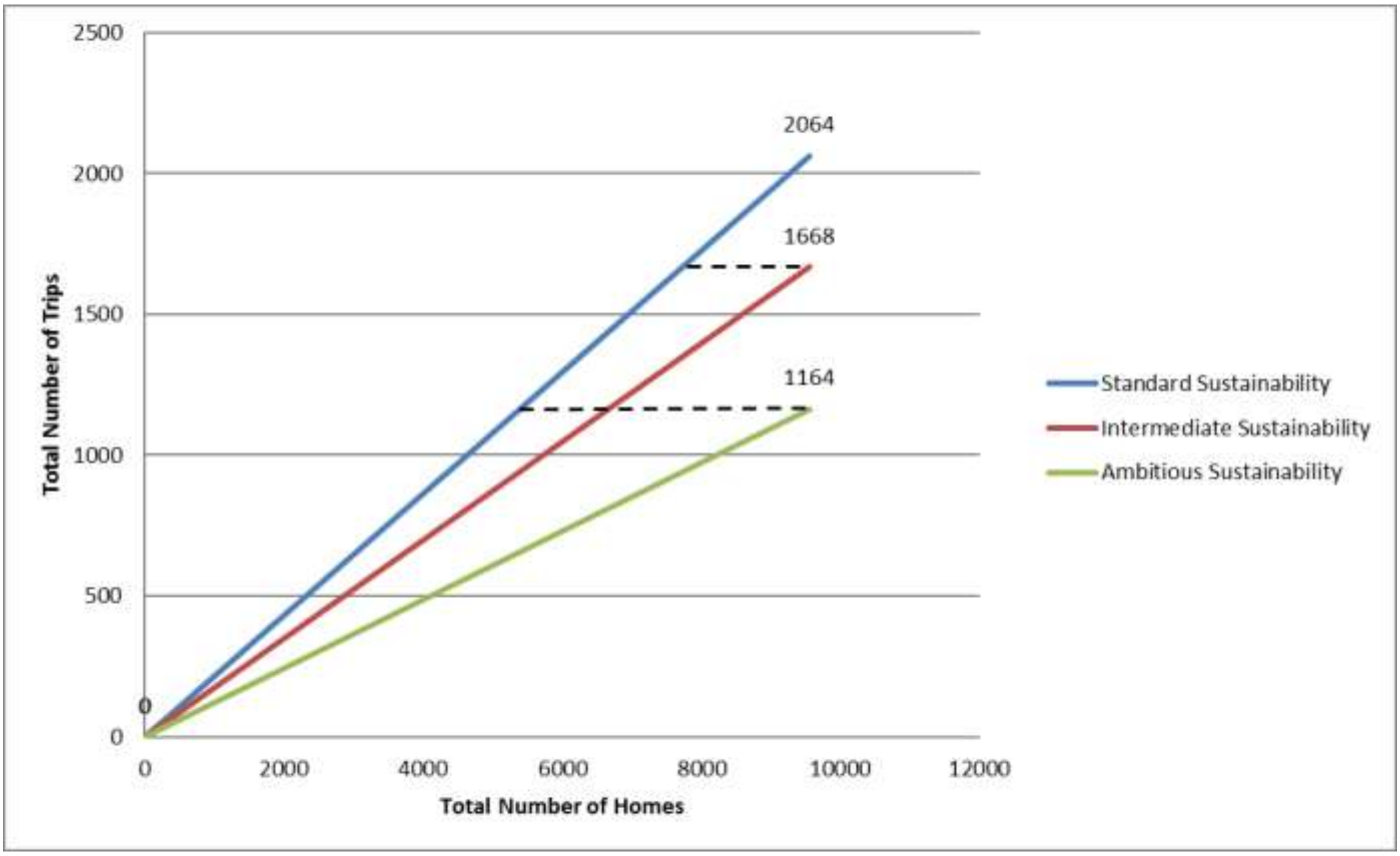


Table 6-1: Strategic Developments

Development	Number of Homes
Gilston	3,050
East Harlow (EFDC)	750
East Harlow (HDC)	2,600
West Katherine's & Sumners	2,100
Latton Priory	1,050
Total	**9,550**

The dark blue line in Figure 6-1 shows the estimated number of vehicle trips in the AM peak period assuming standard sustainable travel, while the green line shows the number of trips with intermediate sustainable travel levels, and the light blue shows the ambitious sustainable travel levels of trips. The dotted horizontal line from the intermediate trips level indicates the approximate number of homes that would result in the same number of trips using standard sustainable travel assumptions, which would be approximately 7700 homes. The dotted line from the ambitious total indicates that the equivalent number of homes that would result if only standard sustainability were to be achieved would be approximately 5400 homes.

Given the requirement to deliver homes sustainably within the Strategic Housing Market Area, reducing the scale of development is not considered an acceptable option. This leads to a transport strategy that should be based on both reducing the need to travel and significantly increasing travel by sustainable modes within the garden town.

6.3 Initial sustainable transport schemes and interventions

At the time modelling the content of TN7 parallel work was commencing on the development of sustainable transport measures for the Harlow and Gilston Garden Town. This chapter concludes by setting out some of the key schemes and interventions which could be considered in order to deliver a step change in sustainable transport. For each measure an indication of the cost level and potential benefits is given (Table 6-2).

In general, policies and measures delivered commercially have low costs, reflecting organisational time and seed funding. Technological interventions such as information systems and signalling would be expected to be more costly. But the highest cost relates to major infrastructure changes. Subsidy support or bus services has been considered as a mid-range cost on the basis that at some point demand would increase to such a level that services become commercially viable.

Table 6-2: Appraisal of possible benefits

Type of measure	Measure	Description	Cost level	Possible benefits						
				Bus	Active modes	Travel time	Environ-ment	Place	Econo-my	Safety
Policy	Design guides, standards and policies	Encourage design of development to integrate into sustainable local transport network - enforce through planning conditions	Low	✓	✓	✓	✓	✓	✓	✓
Scheme	New green link between Third Avenue and Southern Way	New link to create a sustainable corridor. Only for use by buses and active modes	High	✓	✓	✓	✓	✓	✓	✓
Scheme	Bus lane on dualled Fifth Avenue	Bus lane on this link improves sustainable travel to Gilston. Cost assumes dualling funded separately	Low	✓	✓	✓	✓	✓	✓	✓
Scheme	Extension of cycle grid	Improving the density of the cycle network. Needs to be considered alongside all developments and highway schemes.	High		✓	✓	✓	✓	✓	✓
Scheme and service	Cycle hire	Introducing a cycle hire scheme	High		✓	✓	✓	✓	✓	✓
Scheme	Mapping and signage	Maps and signs to promote and support cycling and walking	Low		✓	✓	✓	✓	✓	✓
Scheme	Junction improvements	Complete bus lane network on sustainable transport corridors by prioritising buses at junctions	Medium	✓	✓	✓	✓	✓	✓	✓
Service	New bus services to larger development sites	Subsidised bus services required to service new sites and build up patronage.	Medium	✓		✓	✓	✓	✓	✓

Type of measure	Measure	Description	Cost level	Possible benefits						
				Bus	Active modes	Travel time	Environ-ment	Place	Econo-my	Safety
Service	Smart payment options	New ways of paying for bus travel including funding resident passes through service charges	Low	✓						
Service	Travel information systems	Advanced travel information systems which consider all modes and provide information for all transport operators (e.g. TfL trip planner)	Medium	✓	✓	✓				
Service	On demand public transport	Creation of smart on-demand public transport to service off-peak demand and off-corridor destinations	Low	✓		✓	✓			
Service	Sustainable travel campaigns	Sustainable travel campaigns and advertising to encourage and promote the benefits of local sustainable travel	Low	✓	✓	✓	✓	✓	✓	✓
Scheme	Second Stort Crossing	Provision of the SSC would enable one of the lanes on Fifth Avenue to be used for buses. Accordingly the scheme support wider objectives.	High	✓	✓	✓	✓	✓	✓	✓
Scheme	Full Northern Bypass	The creation of the full northern bypass, which includes the SSC, would improve the strategic connection to J7A M11.	High			✓			✓	

7. Conclusion

This report has reviewed the impact of greater levels of sustainable travel in wider Harlow on the LP developments based on the introduction of north-south and east-west sustainable travel corridors, increased and improved provision for walking and cycling, and travel planning. Several scenarios have been run in order to test different levels of uptake of sustainable transport, as well as the impact of redistribution of traffic (increasing local car commuting trips), as there will be greater encouragement for people to live and work locally.

The model has been run in 26 scenarios. However, only the scenarios using intermediate and standard (i.e. unadjusted) sustainable travel assumptions are reported on and compared in the main body of the report. These are:

1. Reference network using standard sustainable travel assumptions;
2. Reference network with Second Stort Crossing (SSC) using standard sustainable travel assumptions;
3. Reference network with SSC and improved sustainable travel corridor using standard sustainable travel assumptions;
4. Reference network with SSC and improved sustainable travel corridor using intermediate sustainable travel assumptions; and
5. Reference network with SSC and improved sustainable travel corridor using intermediate sustainable travel assumptions and higher internalisation of trips (representing people living and working closer at some new development sites).

Overall, the report finds that options (4) and (5) perform favourably compared to options (1) - (3), as indicated by reduced vehicle flows and increased vehicle speeds. There are exceptions which are primarily in locations where highway capacity improvements may still be required alongside sustainable transport measures. Nevertheless, within the capabilities and limitations of a strategic highway assignment model, a case for the benefits of investment in sustainable transport measures can be made.

In particular, the impact on specific corridors identified in previous technical notes were investigated, including: A414 Edinburgh Way, B183 Gilden Way, A1169 Katherine's Way, A1025 Third Avenue, A1025 Second Avenue and A1169 Southern Way. At most of these locations scenario (4) indicated improved average speed, and in all cases scenario (5) indicated improved speeds, over the Reference Case.

Hence the report concludes that investment in sustainable travel should be considered alongside highway improvements . It is shown that a package of investment designed around sustainable and active transport measures could significantly increase the amount of development that could be accommodated on the highway network. This would also improve travel choice for existing residents and contribute to environmental quality.

It should be noted though that these findings are derived from a strategic highway assignment model. While the model is appropriate to help to inform the approach to transport planning, further appraisal of sustainable transport measures and behavioural change will be required. Nevertheless, it is hoped that the report helps to broaden the options that will be considered for mitigating the impacts of developments on wider Harlow. This can be achieved through:

- Development of a sustainable, integrated transport strategy for wider Harlow; and
- Masterplanning and design of development sites to support sustainable travel across wider Harlow.

Abbreviations and Glossary

Abbreviation (if used)	Term	Definition
LP	Local Plan	-
OD	Origin-destination	-
TEMPro	Trip End Model Presentation Program	The Trip End Model Presentation Program (TEMPro) software allows users to view travel forecasts from the National Trip End Model (NTEM) datasets (see NTEM).
NTEM	National Trip End Model	The National Trip End Model (NTEM) model forecasts the growth in trip origin-destinations (or productions-attractions) up to 2051 for use in transport modelling. The forecasts take into account national projections of population, employment, housing, car ownership and trip rates.
WEEH	West Essex and East Hertfordshire	-
SHMA	Strategic Housing Market Area	-
SSC	Second Stort Crossing	-
-	Wider Harlow	Harlow town and its hinterland
EFDC	Epping Forest District Council	-
EHDC	East Hertfordshire District Council	-
LEP	Local Enterprise Partnership	-
NEGC	North Essex Garden Communities	-
TRICS	Trip Rate Information Computer System	-
MSOA	Middle (layer) super output area	-
PT	Public transport	-
-	Committed Scenario	In the Committed Scenario the network is the same with the other scenarios. However, the Committed Uncertainty Log has been used. The Committed Uncertainty Log includes the committed developments amounting to 7,216 homes in Harlow, which have a high level of certainty
UL	Uncertainty Log	The Uncertainty Log sets out emerging developments that have been proposed in the WEEH districts.
-	Ambitious sustainable travel assumptions	See Chapter 3
-	Intermediate Sustainable Travel Assumptions	See Chapter 3
Ref Case	-	Reference network using standard sustainable travel assumptions

Abbreviation (if used)	Term	Definition
SSC Ref Case	-	Reference network with Second Stort Crossing (SSC) using standard sustainable travel assumptions
SSC Ref Case Corr	-	Reference network with SSC and improved sustainable travel corridor using standard sustainable travel assumptions;
SSC ImSust Corr	-	Reference network with SSC and improved sustainable travel corridor using intermediate sustainable travel assumptions; and
SSC ImSust Corr HighInt	-	Reference network with SSC and improved sustainable travel corridor using intermediate sustainable travel assumptions and higher internalisation of trips (representing people living and working closer at some new development sites).

References

Technical Note 1: “WEEH Forecast Modelling Technical Report” March 2017, JACOBS

Technical Note 2: “Spatial Options A to E”, March 2017, JACOBS

Technical Note 3: “Stort Crossing/Northern Bypass Initial Testing”, September 2017, JACOBS

Technical Note 4: “Emerging Option”, April 2017, JACOBS

‘Harlow & Gilston Garden Town Expression of Interest’, October 2016

North Essex Garden Communities Movement and Access Study, May 2017, JACOBS

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UK plan for tackling roadside nitrogen dioxide concentrations, 2017, DEFRA and DfT

Appendices

These are available in a separate document.