Braintree Local Plan
Preferred Option Assessment
Highways/Transport Planning

March 2017

RINGWAY JACOBS
integrated expertise

Essex County Council

Document Control Sheet

Document prepared by:

Charles Freeman
Transport Planner

Transport Planning
Victoria House
Chelmsford
CM1 1JR

T 01245 342 618
E Charles.Freeman@essexhighways.org
W www.essex.gov.uk/highways

Report Title	Braintree Local Plan - Preferred Option Assessment
Project Title	Braintree Local Plan
Project Number	43TP001 - B3553R5D
Task Number	21
Status	Draft
Revision	3
Control Date	

Record of Issue

Issue	Status	Author	Date	Check	Date	Review	Date
1	Draft	C Freeman	02/11/16	C Jameson	03/11/16	T Kruger	07/11/15
2	Draft	C Freeman	25/11/16	T Kruger	25/11/16	C Jameson	29/11/16
3	Draft	C Freeman	07/03/17	C Jameson	09/03/17	C Jameson	09/03/17
4	Final Draft	C Freeman	15/03/17	C Jameson	20/03/17	C Jameson	20/03/17

Approved for Issue By	Date
T Kruger	21/03/2017

Distribution

Organisation	Contact	Number of Copies
Essex County Council	Alan Lindsay	1
Essex County Council	Kevin Fraser	1

Table of Contents

1. Introduction 2
1.1 Background 2
1.2 Key Junctions 2
1.3 Development Sites included in the Assessment 3
1.4 Site Characteristics 6
2. Ongoing Studies & Projects 9
2.1 A120 Braintree to Marks Tey Junction Improvements 9
2.2 A120 Braintree to A12 Route Options 9
2.3 A12 Widening between M25 and A12 J25. 9
2.4 Millennium Way Slip(s) 9
2.5 Braintree Branch Line 9
2.6 Braintree Integrated Transport Package 10
2.7 Braintree Cycling Action Plan 10
2.8 A131 Route Based Strategies 10
2.9 Garden Communities 11
2.10 Developer Schemes 11
3. Trip Generation 12
3.1 Trip Rates 12
3.2 Background Growth 13
3.3 Site Access 14
4. VISUM Network Assignment 17
4.1 Methodology 17
4.2 Trip Distribution 17
4.3 Trip Assignment 18
4.4 NTEM 6.2 and 7 Comparison 19
5. Junction Modelling 20
5.1 Methodology 20
5.2 Results 21
5.3 Sensitivity Testing: Garden Communities Growth 40
5.4 A12 J24 All Movements 40
6. Strategic Network Impact 44
6.1 A12 Slip Roads 44
6.2 A120 Slip Roads 48
6.3 A120 Junction Impacts 51
6.4 Sudbury Impacts 53
6.5 Great Dunmow Impacts 53
7. Mitigation 55
7.1 Junction Options 55
7.2 Public Transport 57
7.3 Cycling 60
7.4 Rail 61
7.5 Travel Planning 63
8. Conclusion 64

Figures

Figure 1.1: Preferred Option Development Sites 5
Figure 7.1: Why people do not take the train 62

Tables

Table 1.1: Preferred Option Development Sites 3
Table 1.2: Employment Split Assumptions 6
Table 1.3: Preferred Option Site Characteristics 6
Table 3.1: Trip Rates 12
Table 3.2: Site Access Assumptions 14
Table 5.2: A131 - London Road (including mitigation) results 21
Table 5.4: Aetheric Road results 22
Table 5.5: Broad Road results 23
Table 5.7: Church Lane - Bradford Street results 24
Table 5.8: Courtauld Road - Coggeshall Road results 25
Table 5.9: Cressing Road - Coggeshall Road results 26
Table 5.10: Cuckoo Way results 27
Table 5.11: Deanery Hill mitigation results 27
Table 5.16: Marks Farm results (not considering exit blocking) 28
Table 5.18: Panners Interchange results 29
Table 5.21: Springwood Drive (including mitigation) results (not considering exit blocking) 30
Table 5.1: A120 - Colne Road results 31
Table 5.3: A1124 - Church Hill results 32
Table 5.14: Head Street results 33
Table 5.15: Maldon Road - The Street results 34
Table 5.12: Feering Hill - Station Road results 35
Table 5.20: Rye Mill Lane results 36
Table 5.6: Chipping Hill results 37
Table 5.13: Gershwin Boulevard results 38
Table 5.17: Newland Street results 39
Table 5.19: Rickstones Road (developer mitigation) results 40
Table 5.22: Marks Farm (J24 All Moves) results 41
Table 5.23: A1124 - Church Hill (J24 All Moves & mitigation) results 41
Table 5.24: Feering Hill (J24 All Moves & mitigation) results 42
Table 5.25: Rye Mill Lane (J24 All Moves & mitigation) results 43
Table 6.1: A12 Slip Road Categories 44
Table 6.2: A12 Slip road development flows and difference without changes to A12 J24 AM 45
Table 6.3: A12 Slip road development flows and difference without changes to A12 J24 PM 46
Table 6.4: A12 Slip Road Category Differences 47
Table 6.5: A12 slip road development flows and difference with changes to A12 J24 AM 47
Table 6.6: A12 slip road development flows and difference with changes to A12 J24 PM 48
Table 6.7: A120 Slip Road Categories 48
Table 6.8: A120 Slip road development flows and difference without changes to A12 J24 AM 49
Table 6.9: A120 Slip road development flows and difference without changes to A12 J24 PM 50
Table 6.10: A120 Slip road development flows and difference with changes to A12 J24 AM 50
Table 6.11: A120 Slip road development flows and difference with changes to A12 J24 PM 51
Table 6.12: Development flows at M11 J8 and Stansted Airport 51
Table 6.13: Development flows at the A120 / A12 Marks Tey junction 52
Table 6.14: Development flows at Galleys Corner 52
Table 6.15: Development flows to and from Sudbury 53
Table 6.16: Development flows to and from Great Dunmow 53
Table 7.1: Summary of junction mitigation options 55

Executive Summary

Essex Highways Transport Planning team have been commissioned by Essex County Council (ECC) and Braintree District Council (BDC) to assess the likely transport impact of the Local Plan preferred option and identify possible mitigation measures.

BDC provided a list of sites to be modelled as their preferred option, including three variations in housing growth and associated employment at the Garden Communities. In the low growth scenario approximately 12,000 homes and 7,500 jobs are forecast to be created by 2033, whereas approximately 16,000 homes and 9,500 jobs are forecast to be created by 2033 in the high growth scenario.

To refine the work done as part of the assessment of interim proposals, the trip distribution used to assess the likely impact on the road network of these scenarios considered census journey to work trips, education trips (AM only) and other trip types separately. The development trip matrices created from these were then run through VISUM software, which assigned development traffic onto the road network. The traffic flows at each of the key junctions were extracted for each scenario from VISUM and added to the base flows at the key junctions also taking into account the forecast background growth.

The flows were then analysed in junction models in order to identify the key junctions which are forecast to be over capacity and, where possible, identify infrastructure mitigation measures at those key junctions. The assumed trip distribution has been investigated to identify the likely public transport and sustainable transport required and the potential for modal shift has been considered assuming sustainable transport measures were implemented.

The modelling suggests that it may be possible to successfully mitigate 8 of the 21 key junctions through infrastructure improvements, although two of these are dependent on the implementation of an all movements junction at J24 on the A12. Only one of the key junctions is forecast as being likely to be under capacity in 2033. A further 2 junctions are being studied by Highways England on the A120 for short term improvements prior to any possible new A120 route. For the remaining junctions it is likely that the most appropriate mitigation would be to improve sustainable transport connections. The Interim Assessment analysed trip rates and found that if there are increased levels of public transport provision, then car trip generation is likely to be reduced, thus lessening the impact of growth on road network. The modelling work undertaken during this stage of work, indicates that of the 21 key junctions, 11 are likely to be over capacity in 2033 as a result of background growth alone. Two of these can be mitigated, although one of the mitigation options relies on a new junction 24 on the A12.

Overall, the forecast levels of growth up to 2033, are likely to put the existing road network under considerable pressure with many of the key junctions failing to provide enough capacity and limited scope for capacity enhancements. However, it has been found in this stage of work, that there are potentially a number of aspects that can be considered to reduce the transport impact of the Local Plan and that the current forecast, particularly the high growth scenario (referred to in the report as Scenario 3), is likely to be a “worst case” scenario. Alongside this, a number of ongoing studies, including strategic infrastructure projects such as the A120 between Braintree and the A12, are seeking to address key transport issues within the District.

1. Introduction

1.1 Background

1. A report, "Braintree Local Plan – Options Assessment" was produced in February 2016 to describe the likely impact on the local transport network of six development options for the Braintree Local Plan. Further to that, an Interim Assessment, specifically focussed on the potential for mitigation of transport impact, was produced in June 2016. Following public consultation on the Local Plan, Braintree District Council (BDC) and Essex County Council (ECC) requested further work to consider the likely impact of the preferred option on the transport network and the demands it will place on the transport system.
2. This report outlines the impact of the preferred option on the transport network and also identifies possible mitigation options that may address the transport impact.

1.1.1 Objectives

- To test the likely impact, in transport terms, of the preferred option.
- To identify and test mitigation measures at key junctions including designs of infrastructure improvements with indicative costs.
- To identify possible options for sustainable transport access to the large development sites.
- To identify likely levels of improvement required in public transport provision and other sustainable modes of transport.
- To consider the wider impact of growth from neighbouring areas, as indicated in emerging Local Plans, where identified.

1.2 Key Junctions

3. A number of key junctions in the district that were likely to require modelling were identified through consultation with BDC and ECC. For the interim assessment, sixteen were identified and a further five were identified for this stage of work. The key junctions modelled are:

- A131 Head St / A1124 Hedingham Road / A1124 Colchester Road - Halstead
- B1024 Colne Road / A120 / Colne Road - Coggeshall
- Rye Mill Lane / B1024 / B1023 - Kelvedon
- B1018 Cressing Road / Rickstones Road / B1018 Braintree Road - Witham
- Chipping Hill / Avenue Road / The Avenue / Collingwood Road - Witham
- Collingwood Road / B1389 / Maldon Road - Witham
- B1389 / Gershwin Blvd / B1389 Hatfield Road – Witham
- B1137 The Street / B1019 Maldon Road / The Street – Hatfield Peverel
- A131 / London Road / B1053 London Road / A131 – Great Notley
- A131 / Cuckoo Way – Great Notley
- A131 / A120 / Pods Brook Road / A120 – Great Notley/Braintree
- Rayne Road / Springwood Drive / B1256 Rayne Road / Pods Brook Road - Braintree
- Rayne Road / Aetheric Road / Pierrefitte Way - Braintree
- B1053 Church Street / Bradford Street / B1053 Bradford Street - Braintree
- Panfield Road / Panfield Lane / Deanery Hill - Braintree
- A131 / Broad Road / A131 - Braintree
- B1256 Coggeshall Road / A131 / A120 / A131 – Braintree
- Deanery Hill / Panfield Lane – Braintree
- B1256 Coggeshall Road / Cressing Road – Braintree

- Courtauld Road / B1256 Coggeshall Road / Railway Street – Braintree
- Church Hill / A1124 / B1024 – Earls Colne
- B1024 Coggeshall Road / Feering Hill – Kelvedon

1.3 Development Sites included in the Assessment

4. It was agreed with BDC that sites of 25 houses or more, or multiple sites with a cumulative total of greater than 25 houses, were to be included in the assessment of the Preferred Option. Sites below this threshold are considered to have a sufficiently small impact not to require modelling. Sites included are outlined in Table 1.1 below and the location of the sites is shown on Figure 1.1. A further list of the sites with their respective housing and job numbers used in this modelling work can be found in Section 1.4.

Table 1.1: Preferred Option Development Sites

Site Reference	Site Location	Type
BCBG149	Braintree Football Club site, Clockhouse Way	Residential
BCBG550	Braintree Tennis Club/Former Chapel Hill Playing Field	Residential
BLAN114/115	Land east of Great Notley	Mixed
BOCN123	Land off Highfields Stile Farm, Braintree	Residential
BOCN127	Land off Elizabeth Lockhart Way, Braintree	Residential
BOCN132	Land East of Broad Road, Braintree	Mixed
BOCN137	Towerlands, Braintree	Mixed
BOCS138	West of Springwood Drive, Braintree	Employment
BOCS140	Site at Rayne Lodge Farm, North of Rayne Road, Braintree	Residential
BRAW153	Broomhills Industrial Estate, Braintree	Residential
BRSO152	Land adjacent Braintree Railway Station	Residential
BURE165/166	Land south of Cambridge Road, Bures	Residential
COGG506	Dutch Nursery West Street, Coggeshall	Mixed
COLE188	Land East of Halstead	Employment
CRESS201	Appletree Farm, Polecat Road, Cressing	Residential
EAR 1475	Monks Road, Earls Colne	Residential
EAR3H	Station Road, Earls Colne	Residential
EARC225	South of Halstead Road, Earls Colne	Residential
EARC2276	Earls Colne Airfield	Employment
EAST ST	East Street, Braintree	Residential
FEER230/232/233	Land south of Feering/West of A12	Mixed

Site Reference	Site Location	Type
FEER231	Land west of Marks Tey	Mixed
GNBN264	Land between London Road, Pods Brook and A120, Braintree	Residential
GOSF249	Land at Gosfield Airfield	Employment
GRNO260	South West of Great Notley	Employment
GRSA269	Land to the West of Braintree and Rayne	Mixed
HASA289	Land East of Cherry Tree Rise, Halstead	Residential
HASA295	The Old Wood Yard site Fenn Road, Halstead	Residential
HASA513	Central Park, Halstead	Residential
HAT 545	Stonepath Drive, Hatfield Peverel	Residential
HAT ARLA	Bury Lane, Hatfield Peverel	Residential
HATF314/315	Land at Woodend Farm, Witham	Residential
KELV335	Monks Farm land SE of Coggeshall Road, Kelvedon	Residential
PANF	North West Braintree	Mixed
RIVE360	Forest Road, Witham	Residential
RIVE362/363	North East of Eastways, Witham	Employment
RIVE364	Kelvedon Park (Rivenhall)	Employment
SIBH377	Former Tanners Dairy Prayors Hill, Sible Hedingham	Residential
WITC421	Gimsons, Witham	Residential
WITC423	Lodge Farm, Witham	Mixed
WITHN426/427	Land at Conrad Road, Witham	Residential
WITN425	Chipping Hill Industrial Estate, Witham	Residential
WITW 431	Land off Teign Drive, Witham	Residential

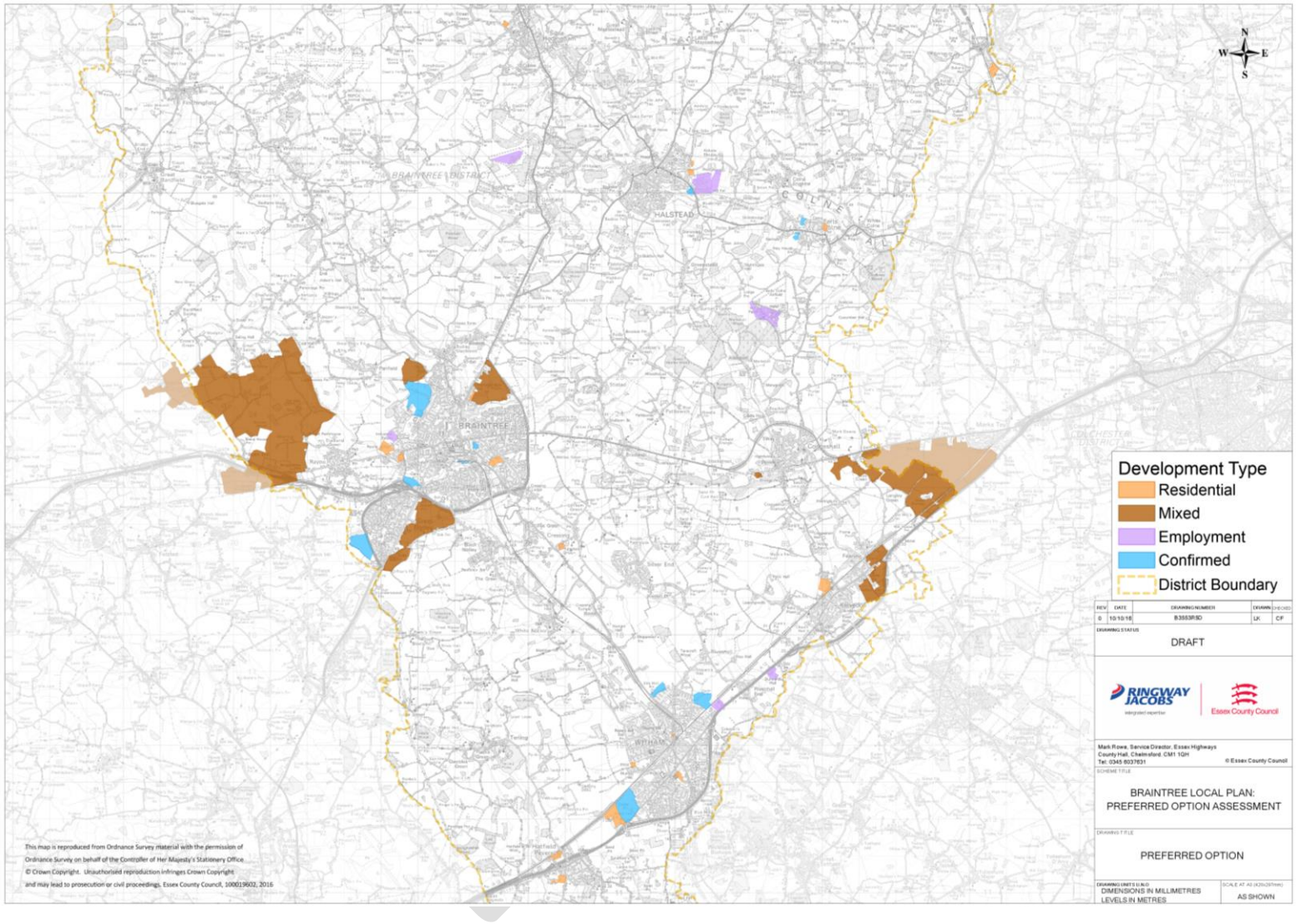

Figure 1.1: Preferred Option Development Sites

1.4 Site Characteristics

5. BDC provided most of the information for the proposals and outlined the envisaged number of houses, type of employment and size of the employment area. It was however required to supplement this information with further assumptions. The employment proportion of mixed sites was assumed to be 20% of the site area (based on data from the TRICS database). Furthermore, investigation undertaken as part of the option assessment indicated that the Gross Floor Area (GFA) of employment sites is commonly 30% of the full site land area and so this was applied throughout. The assumed split in type of employment are outlined in Table 1.2, below.

6. Where a school was included in the development, its size was calculated using the factor outlined in the 2011 Core Strategy of 0.2ha school land required per thousand people based on 2.36 people per household. Likewise for a hotel, size was estimated from an average size of hotels in similar areas (i.e. edge of town) and included in addition to any other types of employment.

Table 1.2: Employment Split Assumptions

Retail (Local Shops) – A1	Employment (Offices) – B1	Employment (Industrial Units) – B2	Employment (Warehousing) – B8
	20%	80%	
	20%	40%	40%
10%	20%	35%	35%

7. Table 1.3, below, outlines the makeup of the preferred option, in terms of housing and job numbers used in the modelling. BDC requested that sensitivity testing was undertaken on the two Garden Community Sites within the District. Therefore low, medium and high growth scenarios were developed, which vary both the number of houses and number of jobs for those sites (referenced FEER 231 & GRSA 269) that might be delivered by 2033.

Table 1.3: Preferred Option Site Characteristics

Site Reference	Number of Houses	Employment Type	Number of Jobs
BCBG149	75	-	-
BCBG550	95	-	-
BLAN114/115	2090	Retail (Local Shops) – A1 Employment (School) – D1	348
BOCN123	10	-	-
BOCN127	10	-	-
BOCN132	1000	Retail (Local Shops) – A1 Employment (Offices) – B1 Employment (Industrial Units) – B2 Employment (Warehousing) – B8 Employment (School) – D1	923
BOCN137	600	Retail (Local Shops) – A1 Employment (Offices) – B1	256
BOCS138	-	Employment (Offices) – B1 Employment (Industrial Units) – B2 Employment (Warehousing) – B8	400
BOCS140	136	-	-
BRAW153	70	-	-
BRSO152	100	-	-
BURE165/166	108	-	-
COGG506	30	Employment (Offices) – B1 Employment (Industrial Units) – B2	135

Site Reference	Number of Houses	Employment Type	Number of Jobs
COLE188	-	Employment (Offices) – B1 Employment (Industrial Units) – B2 Employment (Warehousing) – B8	550
CRESS201	70	-	-
EAR 1475	50	-	-
EAR3H	75	-	-
EARC225	75	-	-
EARC2276	-	Employment (Offices) – B1 Employment (Industrial Units) – B2 Employment (Warehousing) – B8	330
EAST ST	91	-	-
FEER230/232/233	1000	Retail (Food Superstore) – A1 Employment (Offices) – B1 Employment (Industrial Units) – B2 Employment (Warehousing) – B8 Employment (School) – D1	474
FEER231	Low: 1500 Medium: 2500 High: 3500	Retail (Local Shops) – A1 Employment (Offices) – B1 Employment (Industrial Units) – B2 Employment (Warehousing) – B8 Employment (School) – D1	Low: 769 Medium: 1281 High: 1794
GNBN264	215	-	-
GOSF249	-	Employment (Offices) – B1 Employment (Industrial Units) – B2 Employment (Warehousing) – B8	70
GRNO260	-	Employment (Offices) – B1 Employment (Industrial Units) – B2 Employment (Warehousing) – B8 Employment (Hotel) – C1	979
GRSA269	Low: 1500 Medium: 2500 High: 3500	Retail (Local Shops) – A1 Employment (Offices) – B1 Employment (Industrial Units) – B2 Employment (Warehousing) – B8 Employment (School) – D1	Low: 769 Medium: 1281 High: 1794
HASA289	24	-	-
HASA295	70	-	-
HASA513	103	-	-
HAT 545	80	-	-
HAT ARLA	170	-	-
HATF314/315	450	-	-
KELV335	200	-	-
PANF	600	Employment (Offices) – B1 Employment (Industrial Units) – B2 Employment (Warehousing) – B8	751
RIVE360	300	-	-

Site Reference	Number of Houses	Employment Type	Number of Jobs
RIVE362/363	-	Employment (Offices) – B1 Employment (Industrial Units) – B2 Employment (Warehousing) – B8	180
RIVE364	-	Employment (Specialist – linked to Essex Fire & Rescue) – B2	171
SIBH377	50	-	-
WITC421	40	-	-
WITC423	750	Employment (Enterprise Centre) – B1 Employment (School) – D1	380
WITHN426/427	150	-	-
WITN425	40	-	-
WITW 431	40	-	-
Total	Low: 11,967 Medium: 13,967 High: 15,967	-	Low: 7,484 Medium: 8,509 High: 9,534

8. Neighbouring authorities are only in the process of agreeing their local plan preferred options and so no decisions have been made as to which developments will be included. However, several locations near to the District boundary are known to be under consideration for inclusion. The following assumptions were made under the understanding that it could still be subject to revision as neighbouring local plans are developed:

    - 2000 homes (including a school) on the edge of Great Leighs;
    - 500 homes on the edge of Sudbury; and
    - 600 homes on the edge of Tiptree.

2. Ongoing Studies & Projects

9. There are a number of studies that are currently ongoing, which all have the aim of improving the transport network and transport provision in Braintree District and its wider connectivity. While these are acknowledged, it has not been possible to incorporate them fully into this work to date either due to their current status or the stage which they are at. It is important to note that some of these studies, in particular those relating to strategic routes such as the A12, A120 and the Braintree branch rail line, would be likely to overall have a significant positive effect on traffic and transport across the District in the plan period. Therefore, the results shown in this report are likely to reflect a "worst case" scenario in which there are no significant transport infrastructure changes during the plan period.

2.1 A120 Braintree to Marks Tey Junction Improvements

10. Highways England (HE) is currently investigating the potential for junction improvements to the A120 between Braintree and Marks Tey. Initial options for the Marks Farm roundabout and A120 – Colne Road junction have been produced. Two options have been taken forward for Marks Farm, which, in conjunction with the Millennium Way slips, should provide a significant reduction in journey time and queue length in 2031from the projected figures with the junction remaining as it currently is.

2.2 A120 Braintree to A12 Route Options

11. HE has asked ECC to lead on the feasibility work to determine options for a new A120 route between Braintree and the A12, with a preferred option to be determined by Summer 2017. A range of options have been sifted and identified potential routes, with further assessment of these is due to begin soon. Public consultation is likely to take place in the winter 2016/17. It is envisaged that ECC/HE will recommend the preferred route to Government for inclusion in the next Government Road Investment Strategy (RIS), which will run from 2020 to 2025. Increasing the capacity of the A120 has the potential to reduce traffic on local roads within Braintree town and congestion at key junctions on the existing A120 route.

2.3 A12 Widening between M25 and A12 J25.

12. HE are currently investigating widening the A12 to 3 lanes in each direction between the M25 and Junction 25 on the A12 at Marks Tey. The section between Chelmsford and Marks Tey has been identified in the RIS 1 document to be delivered first, with construction outlined to start by the end of 2020. The widening of the remainder of the route is to be included in "Road Period 2" with the aim to complete construction by the end of 2025.

2.4 Millennium Way Slip(s)

13. An option to alleviate some of the resulting congestion at the Galleys Corner junction on the A120 is to implement either one or two slip roads onto Millennium Way. This is considered to be a partial solution in the short term and is being developed by HE with the support of BDC and ECC. Modelling work, jointly commissioned by HE, ECC and BDC has indicated that in the short term these slips would provide significant relief to the Galleys Corner junction, in particular in the PM peak for eastbound traffic. A single slip, from the A120 EB to Millennium Way, was also shown to be likely to provide some relief to Galleys Corner. However it was noted that by 2031 even with the slips, both Galleys Corner and Marks Farm would still be operating at capacity.

2.5 Braintree Branch Line

14. Capacity improvements on the Braintree branch line, specifically the construction of a passing loop, were identified as an infrastructure requirement in the adopted Braintree Core Strategy (2011) to support growth in the whole District. Work is being undertaken to develop options for improving the line. It is expected, if improvements that facilitate a higher frequency of trains can be made, that this will help encourage more trips by train, which is of significance given the high number of car trips in to and out of Braintree town. This would likely alleviate the junctions on routes into Braintree from the south, particularly given the large number of people travelling between Witham / Chelmsford and Braintree. Therefore, demand at key junctions carrying traffic in and out of the town, such as the junctions on Pods Brook Road (Springwood Drive), Pierrefitte Way (London Road – Clare Road, Aetheric Road –

Pierrefitte Way), Notley Road (Notley Road – South Street) and the A120 (Panners Interchange, Galleys Corner), may reduce. The timescale for completion of work on the branch line is unknown.

2.6 Braintree Integrated Transport Package

15. A study was recently undertaken to establish a range of transport measures in Braintree town to be progressed through workshops, option identification, prioritisation and business case development. The key requirement of this integrated, multi-modal study was to ensure that a comprehensive evidence base was assembled to provide an understanding of the transport issues and opportunities in Braintree town in line with the District's Core Strategy.

16. One of the key elements of the study is to identify suitable schemes to prioritise for implementation in the short to medium term. It is the intention that those schemes that are taken forward will be funded through either the ECC capital budget, or the Local Highways Panels (LHP) funding, or the Local Growth Funding through the South East Local Enterprise Partnership (SE LEP) and/or through developer funding. These schemes have been identified by ECC on a longer list of schemes to be considered for funding by SE LEP when the next round of funding becomes available.

17. A range of options, including new cycle routes, junction improvements and access improvements to Braintree rail station, have undergone early investigation. Improvements to Springwood Drive, Town Centre Traffic Management measures and improving access to the rail station have been prioritised from this study and may form part of a potential ECC funding bid in future. The likely impact of these options will be assessed prior to a funding bid.

2.7 Braintree Cycling Action Plan

18. In line with the Essex Cycling Strategy, a Braintree Cycling Action Plan is being produced which will ultimately provide BDC with a strategy to progress a range of cycling proposals. This can then be used to incorporate into planning agreements, provide the LHP with cycling schemes and provide schemes for future funding bids.

19. The aims of the Cycling Action Plan are to:

    - Identify the current level of cycle demand within the district and how cycling levels can be increased;
    - Identify any cycle safety issues within the District;
    - Identify gaps in existing cycle provision, particularly relating to key routes;
    - Identify ways of closing the gaps in cycle provision and proposed cycle enhancements;
    - Create better cycle connectivity to Flitch Way, key employment areas, development zones and schools; and
    - Investigate ways of marketing existing and proposed cycle routes.

20. The provision of continuous cycle routes and a coherent cycle network will encourage people to make short trips by bicycle rather than by car. Potential Local Plan developments can then add to the cycle network, thus providing an even wider cycle network, encouraging both existing and future short trips to be made by bicycle.

2.8 A131 Route Based Strategies

21. Essex County Council (ECC) have commissioned a number of Route Based Strategies around the county. These include the A131 Braintree to Sudbury and the A130 / A131 Chelmsford to Braintree Route Based Strategies.

22. The key objectives of a Route Based Strategy is to identify options that will support economic growth through the introduction of measures focused on improving safety, reducing congestion, improving journey time reliability and increasing sustainable travel patterns. The options proposed in these Route Based Strategies are now being taken forward to an advanced design stage (Stage 3) and this work is expected to be completed later in 2017.

23. The A131 Braintree to Sudbury Route Based Strategy proposes a number of options. These include: improved signing, improved road surfacing at collision clusters along the route, improved bus provision and better crossing facilities within Halstead. Work is ongoing to refine these into specific options.

24. The A130 / A131 Chelmsford to Braintree Route Based Strategy also proposes to deliver a package of schemes to provide safety, vehicular and bus improvements to the Chelmsford to Braintree corridor. These include infrastructure improvements to three junctions (Broad Road, High Garrett, A131 – Head Street) to provide additional capacity, extension of the existing bus lanes to improve bus journey times and safety improvements. The business case for this scheme was approved in February 2017, with construction of improvements likely to start in late 2017.

2.9 Garden Communities

25. The Braintree Local Plan is proposing two new Garden Communities, which will deliver housing during the latter part of the plan period and provide for future growth beyond 2033. The areas of search include:

    - Colchester/Braintree Borders – to deliver up to 2,500 within the Plan period (as part of an overall total of between 15,000 and 20,000 homes); and
    - West of Braintree – to deliver up to 2,500 homes within the Plan period (as part of an overall total of between 10,000 and 13,000 homes).

26. Another new Garden Community is being proposed at the Tendring/Colchester border for between 7,000 and 9,000 homes.

27. Consultants have been appointed to prepare an overall Concept Framework to refine the areas of these new communities and identify the broad disposition of land uses; key landscape and site features; locations for proposed vehicular accesses and connectivity; and any existing features of significance (on and off site) such as key corridors/infrastructure. Alongside this, work is being undertaken to refine the likely traffic impacts of the new communities, including evaluating the potential public transport requirements during the plan period, the potential for the internalisation of trips, and the likely trip distribution.

2.10 Developer Schemes

28. Several developments that have recently submitted planning applications have included new roads as part of their mitigation.

29. It is noted that a development site in Kelvedon, between Inworth Road, the A12 and the B1024, has proposed a new link road between Inworth Road and the A12, in order to mitigate the impacts of their development. At this point in time, however, modelling suggests that the large proportion of traffic flows in / out of the development would be to / from the south and so the link road may not support these. The link itself has not yet been formally modelled, however, the VISUM development network model has been used to understand the forecast trip routing in the area. It is noted that if the A12 Junction 24 were improved to facilitate all movements and if it provided shorter journey times for journeys through Kelvedon to access the A12 at Junction 23, this would be likely to mitigate some of the impact.

3. Trip Generation

3.1 Trip Rates

30. In order to estimate the traffic flows generated by the developments within the Braintree Local Plan, trip rates have been estimated using the TRICS (Trip Rate Information Computer System) database. Trip rates have been ascertained for each of the development's land use sub-categories across residential, retail and employment sectors. Sites surveyed at weekends, or in Greater London, Wales, Scotland, Ireland & Northern Ireland, were not used.

31. TRICS is the UK and Ireland's national system of trip generation analysis, containing over 7150 directional transport surveys at over 110 types of development. TRICS was founded and is owned by six County Councils in the south of England, collectively the TRICS Consortium. Its annual collection programme, however, covers the whole of the UK and Ireland, across 17 defined regions.

32. Following the Options Assessment Stage of work and to ensure as much consistency as possible in the trip rates used across all Local Plan modelling work being undertaken on behalf of ECC, extensive analysis of the TRICS database was undertaken to generate the trip rates for this stage of work. Thorough analysis was undertaken as to whether the mean, median or 85th percentile from the samples should be used as the trip rate. The median was chosen as it was not influenced by the effect of outliers within the sample and more appropriate to use for wider effects than the 85th percentile, usually applied for single developments and more local impacts.

33. Each development was assigned a land-use type or, with mixed-use developments, a combination of land uses that would meet the site size as outlined in Table 1.3. Using the land-use assumptions and the trips rates shown in Table 3.1 below, the number of trips likely to be generated by each development was calculated. Trips rates are shown as the number of trips per house for Residential, and the number of trips per 100m2 GFA for Employment. Where noted as "N/A", it was not possible to calculate a trip rate due to no, or a very low numbers, in the samples.

34. An overall trip rate was calculated for arrivals and departures in AM (08:00-09:00) and PM (17:00-18:00) peak hours for all relevant land use sub-categories. Each development was assigned a location type in-line with those used in TRICS (Town Centre, Edge of Town Centre, Suburban Area, Edge of Town and Neighbourhood Centre). This allowed greater differentiation between developments based on their location. However, this also created the potential for low sample sizes. To overcome this, it was necessary to combine the residential land use sub-categories A (privately owned houses), B (affordable/local authority houses), C (privately owned flats) and D (affordable/local authority flats). It was also necessary to use an overall trip rate for shopping centre/local shops due to the restrictive sample size within TRICS.

Table 3.1: Trip Rates

Residential	08:00-09:00 Arrivals	08:00-09:00 Departures	17:00-18:00 Arrivals	17:00-18:00 Departures
Town Centre	0.024	0.083	0.094	0.070
Edge of Town Centre	0.096	0.233	0.196	0.161
Suburban Area	0.098	0.273	0.269	0.140
Edge of Town	0.139	0.333	0.322	0.154
Neighbourhood Centre	0.072	0.326	0.345	0.138
Local Shops - A1	**08:00-09:00 Arrivals**	**08:00-09:00 Departures**	**17:00-18:00 Arrivals**	**17:00-18:00 Departures**
Town Centre	N/A	N/A	N/A	N/A
Edge of Town Centre	11.421	10.864	16.992	16.992
Suburban Area	3.404	3.404	4.190	4.000
Edge of Town	4.778	4.667	9.000	9.333
Neighbourhood Centre	5.000	4.231	4.231	5.926

Employment (Office) - B1	08:00-09:00 Arrivals	08:00-09:00 Departures	17:00-18:00 Arrivals	17:00-18:00 Departures
Town Centre	0.500	0.049	0.071	0.518
Edge of Town Centre	1.809	0.247	0.236	1.760
Suburban Area	2.266	0.283	0.156	1.731
Edge of Town	1.476	0.140	0.071	1.421
Neighbourhood Centre	N/A	N/A	N/A	N/A
Employment (Industrial Unit) - B2	**08:00-09:00 Arr**	**08:00-09:00 Dep**	**17:00-18:00 Arr**	**17:00-18:00 Dep**
Town Centre	N/A	N/A	N/A	N/A
Edge of Town Centre	0.375	0.087	0.150	0.400
Suburban Area	0.611	0.091	0.074	0.595
Edge of Town	0.407	0.099	0.020	0.348
Neighbourhood Centre	0.321	0.000	0.000	0.161
Employment (Warehousing) - B8	**08:00-09:00 Arrivals**	**08:00-09:00 Departures**	**17:00-18:00 Arrivals**	**17:00-18:00 Departures**
Town Centre	N/A	N/A	N/A	N/A
Edge of Town Centre	0.117	0.055	0.063	0.208
Suburban Area	0.075	0.112	0.037	0.150
Edge of Town	0.114	0.068	0.043	0.083
Neighbourhood Centre	N/A	N/A	N/A	N/A
Employment (Hotel) - C1	**08:00-09:00 Arrivals**	**08:00-09:00 Departures**	**17:00-18:00 Arrivals**	**17:00-18:00 Departures**
Town Centre	0.206	0.800	0.426	0.219
Edge of Town Centre	0.322	0.728	0.468	0.205
Suburban Area	0.219	0.428	0.338	0.150
Edge of Town	0.534	0.583	0.436	0.294
Neighbourhood Centre	0.367	0.533	0.217	0.283
Employment (School) - D1	**08:00-09:00 Arrivals**	**08:00-09:00 Departures**	**17:00-18:00 Arrivals**	**17:00-18:00 Departures**
Town Centre	N/A	N/A	N/A	N/A
Edge of Town Centre	4.688	2.396	0.417	0.417
Suburban Area	2.219	1.392	0.153	0.320
Edge of Town	2.617	1.811	0.153	0.335
Neighbourhood Centre	2.851	2.171	0.199	0.442

3.2 Background Growth

35. Local Plans are also currently being developed by the neighbouring Districts and Boroughs of Colchester, Chelmsford, Maldon, Tendring and Uttlesford, and each are at different stages in the process. At this stage all authorities have confirmed their overall housing target for the period up to 2030 and beyond. A preferred spatial strategy for the distribution of this growth has been identified in emerging Local Plans for Colchester, Maldon and Tendring. Work is progressing in Chelmsford and Uttlesford to identify the preferred strategy for the distribution of their identified housing need, and is expected early in 2017. However, at present there is still uncertainty in the overall scale and distribution of this growth for some Districts and Boroughs. Consequently, currently, the best available traffic forecast information for these Districts and Boroughs comes from the Department for Transport's National Trip End Model (NTEM).

36. A comparison between the latest housing and employment forecasts for the District in TEMPro (NTEM 7) and the proposed Local Plan development has been undertaken and is shown in Appendix A. This comparison was undertaken to demonstrate how much growth authorities and planners would already be aware of from the existing Department for Transport (DfT) NTEM forecasts.

37. Background growth from neighbouring districts was estimated using TEMPro (NTEM 7, the newly released dataset). Using TEMPro's alternative assumptions tool, housing and job forecasts in Braintree District were set at the same level in 2033 as in the base year (2015), i.e. no growth in Braintree District. This enabled the calculation of trip end growth factors which only include growth from outside the District and changes in trip characteristics both within and outside the District i.e. increased car use.

38. Based on the location of each junction, the corresponding TEMPro zone was identified, along with whether the arms of the junction were classified as rural or urban roads1. Each junction arm was also defined as a Trunk, Principal or Minor road. Based on the combination of TEMPro zone, road classification and road type, traffic growth factors from 2015 to 2033 were calculated from the trip end growth factors using the National Transport Model (NTM) Road Traffic Forecasts 2015 (Scenario 1).

3.3 Site Access

39. Table 3.2, below, outlines the assumptions that were included in the modelling work in terms of access into the development sites, in order to load trips onto the network. The detailed access requirements will be determined at a later date through the consideration of individual planning applications and their Transport Assessments, and against adopted highway policy.

Table 3.2: Site Access Assumptions

Site Reference	Site Access
BCBG149	Site to have one access from Clockhouse Way.
BCBG550	Site to have an access from Clockhouse Way and also onto Millennium Way via Anglia Way.
BLAN114/115	Primary access to involve the closure of the westbound off-slip of the A120 and link road to feed into existing roundabout. Minor accesses onto London Road and Bakers Lane.
BOCN123	Site to be accessed through BOCN132.
BOCN127	Site to be accessed through BOCN132 and also have a minor access onto Elizabeth Lockhart Way.
BOCN132	Main access to be from a new roundabout on the A131 with a spinal link road through the development. Minor access through BOCN127 onto Broad Road via Elizabeth Lockhart Way.
BOCN137	Main access to be via a link road connecting to new link road being created as part of PANF development. Secondary access onto Deanery Hill.
BOCS138	Access onto Springwood Drive.
BOCS140	Access onto Rayne Road.
BRAW153	Access via existing road onto Pods Brook Road.
BRSO152	Access via through railway car park onto Station Approach or connecting into riverside development and onto St Johns Road.
BURE165/166	Access onto Cambridge Road.
COGG506	Access onto West Street.
COLE188	Access via existing industrial estate.
CRESS201	Access onto Polecat Road.

[1] https://www.gov.uk/government/publications/road-traffic-forecasts-2015

Site Reference	Site Access
EAR 1475	Access onto Monks Road.
EAR3H	Access onto Station Road.
EARC225	Access onto Halstead Road.
EARC2276	Access via existing route to employment site.
EAST ST	Access onto East Street.
FEER230/232/233	New link road through site to connect to Inworth Road and London Road.
FEER231	Access onto existing A120 only.
GNBN264	Access via London Road.
GOSF249	Access via existing employment area.
GRNO260	New link onto A131 Cuckoo Way roundabout, possible alterations to roundabout identified in 2011 Core Strategy to facilitate access.
GRSA269	No changes to existing A120 junction assumed. Development to connect to existing B1256.
HASA289	Access onto Cherry Tree Close.
HASA295	Access onto Fenn Road.
HASA513	Access onto Colchester Road.
HAT 545	Access onto Stonepath Drive.
HAT ARLA	Access onto Station Road.
HATF314/315	Access assumed to be through Lodge Farm development onto Gershwin Boulevard roundabout.
KELV335	Access onto Coggeshall Road.
PANF	New link road to be created. First phase connects to Panfield Lane, second phase creates a new roundabout at junction Panfield Lane and Churchill road. Assumed both phases will be complete in plan period. Site connects into Springwood Drive and Panfield Lane.
RIVE360	Access onto Forest Road.
RIVE362/363	Connection via an extension of Eastways.
RIVE364	Direct access onto A12 westbound carriageway.
SIBH377	Access onto Prayors Hill.
WITC421	Access onto River View.
WITC423	Creation of an additional arm on Gershwin Boulevard roundabout – access via link road to this roundabout.

Site Reference	Site Access
WITHN426/427	Access onto Conrad Road.
WITN425	Access onto Braintree Road.
WITW 431	Access onto Blunts Hall Road.

4. VISUM Network Assignment

4.1 Methodology

40. The VISUM network developed as part of the Options Assessment stage of work was again used for this stage of work. Where new links needed to be added, average speeds for weekdays in neutral months from the 2013/14 Trafficmaster analysis, were used. Where the sample size within this data was not sufficient, speeds were estimated based on similar roads in the District. Appendix B contains Trafficmaster plots (2013/14 and 2014/15) to provide an insight into the existing situation in the peak periods. Although they are not significantly different and the 2014/15 data was used to inform the current work, 2013/14 data is shown as that supported the interim assessment.

4.2 Trip Distribution

41. In order to refine the trip distribution used for the Options Assessment Stage of work, which was purely based on 2011 Census Journey to Work data, postcode data was obtained to provide the distribution of education trips for the AM peak and a gravity model was used to distribute other purpose trips i.e. non-commuting and non-education trips.

4.2.1 Journey to work distribution

42. The 2011 Census Journey to Work data was used to create the distribution of commuting trips. Development sites were assigned a VISUM zone of a similar nature, and the AM Peak distribution was based on the journey to work distribution of this zone. For example, developments that are an extension of an existing urban area were assigned the adjacent urban zone. A transposed journey to work distribution was used for PM Peak trips.

43. For the Garden Communities it was assumed that both sites would have a similar trip distribution to Braintree. However, separate work is ongoing to refine the trip generation and distribution of these sites and this could be incorporated at a later date. The new communities are being progressed following Garden City principles, which seek increased provision of integrated sustainable modes (walking, cycling and public transport), and the internalisation of trips. Consequently, the assumptions within the Local Plan modelling are likely to be a “worst case” scenario.

4.2.2 Education distribution (AM Peak)

44. In order to further refine the trip distribution, data was gathered on the number of car trips to schools and their origins. The data collected provides a more accurate distribution of education trips than the assumptions we had incorporated previously which were based on journey to work census data.

45. The inputs for the education model were taken from the 2011 census school data and 2016 school data, containing only schools that fall within Braintree District. The 2011 data included school postcodes, pupil postcodes and each pupil’s mode of travel. The 2016 data included school postcodes and pupil postcodes, but not each pupil’s mode of travel. Therefore, the likely method of travel for each pupil in 2016 had to be estimated from the 2011 data to determine an estimate for the number of car trips to school.

46. The 2011 and 2016 school data was cleaned to find missing or invalid postcodes and these were allocated a postcode dependent on potential typographical errors and map position. The 2016 data was split into individual schools, so that the same pupil postcode travelling to different schools was not incorrectly assigned as a car trip. Each school’s data was filtered to only pupil postcodes in 2011 associated with travel by car and where the same postcode appeared in the 2016 data for the same school, the assumption was made that any pupil in this postcode travelled by car to school.

47. Any 2016 pupil postcodes that did not match the 2011 postcodes were identified as unknown methods of travel. Using MapInfo to plot the 2016 unknowns and the 2011 data which included the method of travel, it was possible to identify any unknown trips that were likely to be car trips.

48. These 2016 pupil postcodes were added to the postcodes whose mode of travel was already identified to be car. This provided a total number of estimated car trips to schools in 2016.

49. Two schools did not have mode of travel data for 2011, so this method could not be applied to them. These two schools were both secondary schools, so instead the average percentage for secondary school pupils travelling to school by car was applied per zone. Further discretion was used to identify any trips that were unlikely to be made by any other mode than car and these were also included.

4.2.3 Gravity Model

50. The purpose of the Gravity model was to distribute other purpose trips. Other purpose trips in this context are all trips except commuting and education trips, i.e. business, personal business, leisure, and shopping trips. A tri-proportional gravity model was developed to produce a matrix of these types of development trips in the forecast year, 2033.

51. Forecast trip ends for Braintree District, disaggregated by origin and destination as well as by purpose for 2033, were taken from TEMPro (NTEM 6.2) and used to calculate the forecast proportion of other purpose trips in relation to all trips. This was then applied to the forecast development trip ends for all purposes to calculate the other purpose development trip ends and totals for the AM and PM peak periods. NTEM 6.2 was used because at the point of developing the gravity model NTEM 7 was not yet available.

52. A target trip length distribution for other purpose trips was derived from the DfT National Travel Survey data (2002-2013) for private car and van driver trips.

53. The gravity model was run with a starting matrix, based on the distances between zones taken from the network model, and run until it produced a matrix in which the development trip ends and target trip length distribution were matched.

4.3 Trip Assignment

54. The trips were assigned to the VISUM network using routes that currently have the shortest journey time. There were no capacity restrictions on the network, so the current speed on the link, taken from Trafficmaster, was the only determinant of route assignment. Several additions were made to the existing road network as detailed below.

4.3.1 Panfield Link

55. As part of the plans for the Panfield Lane site (referenced PANF) two new link roads have been proposed. The site is located north of Springwood Drive and so access will be provided through the end of Springwood Drive and a link to Panfield Lane has been proposed after 66 houses have been occupied (Phase 1). A link to the Panfield Lane – Churchill Road roundabout has also been proposed as part of Phase 2 and it is envisaged that the entire site will be developed by 2033, therefore the Phase 2 link has also been included in the VISUM model as proposed in the site plan (See Appendix C).

56. Due to the congested nature of the existing network, the introduction of the Panfield link in the model attracted considerable through traffic from both existing and development trips. Although the link is planned to reasonable high standards (7.3m limited direct access UAP3 standards), it is not anticipated that it will be used as a form of “bypass” and so capacity in the model was restricted on the new links to limit through traffic.

57. Despite this, the link still showed an effect on all the junctions in Braintree and so all the 2033 matrices had to be adjusted to allow for the impact of the link. This was done by distributing the 2011 census journey to work trips across the existing network and a network with the link included to identify the difference in flows at each junction. The base year flows were then adjusted accordingly to provide a basis from which to produce the 2033 matrices.

4.3.2 Millennium Way Slips

58. BDC in partnership with HE and ECC are considering proposals, developed by AECOM, to deliver the Millennium Way Slips to provide short term alleviation to the congestion problems at Galleys Corner on the A120. It has been assumed that both an on and off slip will be implemented within the Local Plan period. The same method used to assess the effect of the Panfield Link has also been used to understand the potential effect the Millennium Way slips might have on local junctions.

4.3.3 A12 J24 All Movements Test

59. In order to get an initial indication as to whether there could be a need for an all movements junction on the A12 at J24, a test was undertaken in VISUM to see how much development traffic this would attract. As with the Panfield Link a similar exercise was then undertaken to get an indication of the possible impact on base traffic. Only key junctions where the impact of the all movements junction was modelled to change by 10% or more on 2 or more movements, were modelled to understand the possible benefits an all movements junction might bring.

4.4 NTEM 6.2 and 7 Comparison

60. During the Options Assessment stage of work, TEMPro with NTEM 6.2 was used to estimate the background growth that would be generated by the surrounding Districts / Boroughs. In the interim the NTEM 7 dataset was issued and in order to understand whether there would be significant change in the junction modelling results if NTEM 7 was used during this stage, a comparison between the two versions was undertaken.

61. It was found that NTEM 7 forecasts a very similar level of growth in Essex as a whole for the Local Plan period. However there is some variation in the Districts / Boroughs with some being forecast to have significantly more traffic growth than was previously assumed and others less so. NTEM 7 has been used for this latest work.

5. Junction Modelling

5.1 Methodology

5.1.1 Junction Selection

62. Base models for all key junctions, listed in Section 1.2, were created using 2015 as the base year. Initially 16 junctions were selected to be modelled during the Options Assessment Stage. However, following confirmation of the preferred option, a further 5 junctions were included. A map of the key junctions can be found in Appendix D and the numbers relate to the corresponding section below (e.g. 1 = 6.2.1, A120 – Colne Road).

5.1.2 Background Growth

63. The growth factors, extracted from TEMPro as outlined in Section 3.2, were applied to the base flows on each arm of the junctions. A table of these results can be found in Appendix E. The development flows entering each key junction were then extracted from VISUM and added to the base flows which incorporated the background growth. The development flows from the VISUM model for each scenario, both AM and PM, can be found in Appendix F.

5.1.3 Modelling

64. Junctions 9 software was used to model both priority junctions using its PICADY tool and also roundabouts using its ARCADY tool.

65. In terms of model outputs, the performance and operation of a junction in PICADY/ARCADY is given by the duration of delay and Ratio of Flow to Capacity (RFC) for each approach arm. The guidance for the software considers a delay of 36 seconds to be unacceptable, however this is open to opinion and interpretation and various levels of delay will be met with differing degrees of acceptance. Generally, as the RFC approaches 1.0, the approach is said to be nearing capacity and any approach with an RFC above 1.0 exceeds the theoretical capacity and is likely to suffer from significant vehicle queues and delays. An RFC of between 0.85 and 1.0 is usually taken as an indication that an approach has reached its practical capacity and where vehicles will start to experience noticeable delay and congestion.

66. For all base models actual 15-minute observed flows were entered, except for signalised junctions where it is only possible to enter the data in hourly segments. However due to likely high demands and peak spreading, a flat hourly average data was entered in the forecast models.

67. The signalised junction options were assessed using LinSig V3.2.29. The software is used for the assessment and design of traffic signal junctions either individually or as a network comprised of a number of junctions. It is used by traffic engineers to construct a model of the junction or network which can then be used to assess different designs and methods of operation.

68. Three signalised junctions were included in the key junctions list and so were assessed using LinSig. In terms of model outputs, the performance and operation of a junction in LinSig is given by the length of delay per PCU (Passenger Car Unit) and percentage degree of saturation for each approach. Generally, as the degree of saturation approaches 100%, the approach is said to be nearing capacity and any approach with a degree of saturation above 100% exceeds the theoretical capacity and is likely to suffer from significant vehicle queues and delays. A degree of saturation of between 90% and 100% is usually taken as an indication that an approach has reached its practical capacity and where vehicles will start to experience noticeable delay and congestion.

69. The AM and PM peak hours were modelled for all scenarios. It was found from looking at the count data from across the District that the average AM and PM peak hours occur 08:00 – 09:00 and 1700 - 1800 respectively.

5.1.4 Sensitivity Testing: Extent of Garden Communities

70. As outlined in Section 1.4, three scenarios were assumed for growth of the proposed Garden Communities during the Local Plan period. These assumed that either 1,500, 2,500 or 3,500 homes would be built at each site along with associated levels of employment. So, these varying levels of

growth were tested in the junction models and the results from these tests are outlined in Section 5.2 below. An overall conclusion on the impact of higher growth at the Garden Communities is included in Section 5.3.

5.2 Results

71. The majority of the junction models used traffic flows obtained from traffic counts carried out in 2015 or 2016. Five models used older counts (2013 & 2014) and so DfT long term count data in the district was checked for any growth trends. It was found that there had been little recent historic growth to warrant adjustment of pre 2015 counts. Five new models were created for this stage of work as outlined in Section 1.2. All scenarios include the Panfield Link and Millennium Way slips and their subsequent impacts. The junction modelling results that include the all movements junction on the A12 at Junction 24 are shown in Section 5.4.

72. The results shown below, unless stated otherwise, assume the existing layouts of the junctions will not change by 2033. Where mitigation was found to be possible, these results have been included in this section and full details of all modelling results, including for the existing layout and various mitigation options tested can be found in Appendix G.

5.2.1 A131 – London Road, Great Notley

Junction arms:
A – A131 Great Notley Bypass
B – London Road north-east
C – London Road south-east
D – A131 Great Leighs Bypass

73. The results outlined in Table 5.1, below, include proposals to widen the A131 North approach and the North-East London Road Approach, which is shown in Appendix H. Modelling of the existing roundabout without mitigation indicates that the A131 North approach and the North-East London Road approach would be over capacity with the forecast Local Plan growth (see Appendix G).

Table 5.1: A131 - London Road (including mitigation) results

		A	B	C	D
AM					
Base Year 2015	RFC	0.36	0.57	0.16	0.29
	Delay (s)	2.3	5.8	4.6	2.0
Scenario 1 2033	RFC	0.54	0.81	0.24	0.69
	Delay (s)	2.8	13.1	7.9	4.6
Scenario 2 2033	RFC	0.56	0.82	0.25	0.70
	Delay (s)	2.9	14.0	8.2	4.8
Scenario 3 2033	RFC	0.57	0.83	0.25	0.71
	Delay (s)	3.0	15.0	8.5	5.0
PM					
Base Year 2015	RFC	0.39	0.31	0.22	0.50
	Delay (s)	3.0	3.3	3.5	2.6
Scenario 1 2033	RFC	0.78	0.47	0.36	0.81
	Delay (s)	7.1	5.0	6.6	7.11
Scenario 2 2033	RFC	0.81	0.48	0.37	0.82
	Delay (s)	8.1	5.1	6.8	7.6
Scenario 3 2033	RFC	0.84	0.48	0.37	0.84
	Delay (s)	9.4	5.2	7.0	8.1

74. The modelling results indicate that additional capacity could be provided by implementing the proposed mitigation, although the junction would still be nearing capacity on the North-East London Road approach in the AM and both A131 approaches in the PM.

5.2.2 Aetheric Road – Pierrefitte Way, Braintree

Junction arms:
A – Aetheric Road
B – Rayne Road E
C – Pierrefitte Way
D – Rayne Road W

75. The results shown in the table below assume no change to the existing layout.

Table 5.2: Aetheric Road results

		A – BCD	B – ACD	C - AD	C – B	D -ABC
AM						
Base Year 2015	Deg. Of Sat	104.2	8.6	99.6	74.0	104.0
	Delay (s) / PCU	173.2	42.0	133.8	75.3	173.2
Scenario 1 2033	Deg. Of Sat	91.4	8.4	87.1	75.0	92.1
	Delay (s) / PCU	44.7	41.4	85.3	81.0	75.3
Scenario 2 2033	Deg. Of Sat	93.3	8.4	88.1	75.0	93.3
	Delay (s) / PCU	48.1	41.4	87.3	81.0	79.7
Scenario 3 2033	Deg. Of Sat	98.4	8.6	95.9	80.4	97.8
	Delay (s) / PCU	68.8	40.2	120.8	91.4	104.6
PM						
Base Year 2015	Deg. Of Sat	95.3	48.9	94.2	46.6	94.0
	Delay (s) / PCU	94.1	53.5	89.1	51.6	62.0
Scenario 1 2033	Deg. Of Sat	104.6	53.8	103.3	48.4	99.7
	Delay (s) / PCU	144.1	71.2	162.7	50.0	145.7
Scenario 2 2033	Deg. Of Sat	105.7	53.4	105.0	49.1	106.2
	Delay (s) / PCU	159.4	71.4	186.3	50.2	226.7
Scenario 3 2033	Deg. Of Sat	108.2	53.3	106.2	49.9	108.1
	Delay (s) / PCU	197.6	71.3	204.0	50.4	252.3

Degree of saturation expressed as a percentage.

76. The modelling of the Aetheric Road – Pierrefitte Way junction suggests that it is already at capacity in both the AM and PM peak hours. The Panfield Link is forecast to have a significant impact in the AM peak by reducing the amount of traffic making the right turn out of Aetheric Road to Rayne Road West. The modelling suggests that in the AM peak, this will bring the junction under practical capacity, which is likely to reduce the delays modelled in the current situation. A significant reduction in traffic entering from Rayne Road West in the PM peak is also expected. However, despite the impact of the link, this will not be sufficient to reduce demand at the junction to prevent delay with the junction near to, at or over capacity in all PM peak scenarios.

77. It should be noted that if the link were to be implemented but there was no Local Plan growth, the junction would be likely to perform better than is currently does with background growth alone. However the Local Plan growth is likely to bring the junction to capacity.

78. In the Interim Assessment, it was identified that the junction could potentially be mitigated through alterations to the layout and a ban of the right turn out of Rayne Road East. As work is currently ongoing,

as part of the Braintree ITP study, to look at improving the flow of traffic using a VISSIM model of Braintree town centre, this junction was not assessed for mitigation in this stage of work.

5.2.3 Broad Road, Braintree

Junction arms:
A – A131 North
B – A131 South
C – Broad Road

79. Broad Road is currently operating within capacity in both peaks, however the modelling indicated that it was likely to be overcapacity in 2033 as a result of Local Plan growth. Background growth alone is not modelled to put the junction over capacity (see Appendix G). Therefore, it has been proposed that a left turn slip lane is provided on each arm and the results of implementing such a change are outline in Table 5.3 below. The drawing of the proposed mitigation is shown in Appendix H. Alternative mitigation was proposed in the Interim Assessment, however due to differences in forecast traffic flows as a result of a change in Local Plan scenario, modelling suggests the mitigation proposed in this stage of work would be more likely to produce better results.

Table 5.3: Broad Road results

		A	B	C
AM				
Base Year 2015	RFC	0.74	0.51	0.38
	Delay (s)	8.6	4.9	5.6
Scenario 1 2033	RFC	0.44	0.66	0.36
	Delay (s)	4.0	6.2	6.7
Scenario 2 2033	RFC	0.46	0.71	0.39
	Delay (s)	4.2	7.3	7.3
Scenario 3 2033	RFC	0.49	0.77	0.41
	Delay (s)	4.5	9.3	8.1
PM				
Base Year 2015	RFC	0.54	0.51	0.61
	Delay (s)	5.2	4.2	9.9
Scenario 1 2033	RFC	0.28	0.50	0.92
	Delay (s)	3.5	3.4	38.3
Scenario 2 2033	RFC	0.28	0.51	0.95
	Delay (s)	3.6	3.5	47.2
Scenario 3 2033	RFC	0.28	0.52	0.97
	Delay (s)	3.6	3.5	57.0

80. The results suggest that the mitigation will provide sufficient capacity in 2033, however Broad Road is likely to be at or near capacity even if the proposed mitigation were to be implemented.

5.2.4 Church Lane – Bradford Street, Braintree

Junction arms:
A – B1053 Church Lane
B – Convent Hill
C – Bradford Street

81. The results shown in the table below assume no change to the existing layout.

Table 5.4: Church Lane - Bradford Street results

		A	B	C
AM				
Base Year 2015	RFC	0.80	1.00	0.62
	Delay (s)	23.9	69.9	8.7
Scenario 1 2033	RFC	0.67	OC	0.55
	Delay (s)	15.0	OC	8.9
Scenario 2 2033	RFC	0.69	OC	0.56
	Delay (s)	15.9	OC	9.1
Scenario 3 2033	RFC	0.71	OC	0.57
	Delay (s)	16.8	OC	9.4
PM				
Base Year 2015	RFC	0.99	0.56	0.93
	Delay (s)	78.2	8.8	32.6
Scenario 1 2033	RFC	OC	0.89	1.31
	Delay (s)	OC	35.9	824
Scenario 2 2033	RFC	OC	0.91	1.33
	Delay (s)	OC	40.8	875
Scenario 3 2033	RFC	OC	0.92	1.34
	Delay (s)	OC	46.3	921

N.B. OC (Over Capacity) is where RFC or Degree of Saturation has exceeded 1.40 and 140% respectively. Corresponding delay also marked as OC.

82. Church Lane is modelled to be operating at capacity in both the AM and PM peaks and so the addition of more traffic tips the junction well over capacity in 2033. Mitigation options were reviewed, but given the physical constraints at the junction and therefore the limited land available, no options have been deemed possible that might provide sufficient mitigation. As shown in Appendix G, this junction can be expected to be under pressure even with just background growth.

5.2.5 Courtauld Road – Coggeshall Road, Braintree

Junction arms:
1A – Courtauld Road north
1B – Link road north
1C – Coggeshall Road west
2A – Link road south
2B – Coggeshall Road east
2C – Courtauld Road south

83. The results in the table below assume no change to the existing layout. Signalising the junction has been considered, but it is considered that there is not enough space within the highway boundary to implement signals. As shown in Appendix G, this junction can be expected to be under pressure even with just background growth.

Table 5.5: Courtauld Road - Coggeshall Road results

		1A	1B	1C	2A	2B	2C
AM							
Base Year 2015	RFC	0.72	0.62	0.78	0.93	0.82	0.41
	Delay (s)	10.6	7.4	25.1	29.7	18.6	8.1
Scenario 1 2033	RFC	0.64	0.71	0.62	0.86	0.83	0.59
	Delay (s)	8.1	9.8	17.1	20.3	21.3	11.4
Scenario 2 2033	RFC	0.64	0.72	0.63	0.86	0.84	0.61
	Delay (s)	8.1	10.0	17.3	20.9	22.2	11.9
Scenario 3 2033	RFC	0.64	0.72	0.63	0.87	0.85	0.63
	Delay (s)	8.1	10.2	17.5	21.6	23.6	12.5
PM							
Base Year 2015	RFC	0.53	0.61	0.96	0.90	0.65	0.67
	Delay (s)	6.6	7.0	64.9	22.6	9.8	13.0
Scenario 1 2033	RFC	0.51	0.87	OC	0.79	0.84	0.89
	Delay (s)	6.1	20.0	OC	13.9	20.8	41.9
Scenario 2 2033	RFC	0.51	0.88	OC	0.79	0.84	0.92
	Delay (s)	6.1	20.8	OC	14.2	21.2	51.1
Scenario 3 2033	RFC	0.51	0.88	OC	0.79	0.84	0.94
	Delay (s)	6.1	21.4	OC	14.6	21.5	62.6

N.B. OC (Over Capacity) is where RFC or Degree of Saturation has exceeded 1.40 and 140% respectively. Corresponding delay also marked as OC.

84. The double mini-roundabout at the junction of Courtauld Road and Coggeshall Road in Braintree is currently operating near capacity in both peak periods. The modelling indicates that the junction is likely to remain near capacity in the AM peak in 2033 with some improvement to the capacity and delay on several arms, most notably on Coggeshall Road West. However, in the PM peak, the Coggeshall Road West approach is likely to exceed capacity, while the majority of other approaches are likely to be near to capacity and only the link road south is likely to noticeably improve.

85. Investigation into mitigation was undertaken, but the constrained nature of the junction means that it was considered that there were no options that could be taken forward in terms of infrastructure changes. It is also likely that background growth alone will put the junction over capacity (see Appendix G).

5.2.6 Cressing Road – Coggeshall Road, Braintree

Junction arms:
A – Coggeshall Road W
B – Coggeshall Road E
C – Cressing Road
D – Marlborough Road
EB Link – Eastbound Coggeshall Road Link
WB Link – Westbound Coggeshall Road Link

86. The results in the table below assume no change to the existing layout. Mitigating the existing junction by changing the layout to a double mini-roundabout was considered, however it was deemed this would not be possible from an engineering perspective.

Table 5.6: Cressing Road - Coggeshall Road results

		A - BCD	WB Link	EB Link	D - ABC	B - ACD	C - ABD
AM							
Base Year 2015	Deg. Of Sat	36.5	80.5	40.6	97.5	100.2	100.2
	Delay (s) / PCU	9.4	30.5	6.6	135.0	87.9	149.5
Scenario 1 2033	Deg. Of Sat	57.2	81.2	49.4	OC	OC	53.9
	Delay (s) / PCU	11.2	38.7	10.3	OC	OC	44.9
Scenario 2 2033	Deg. Of Sat	60.0	78.4	52.0	OC	OC	54.1
	Delay (s) / PCU	11.4	37.9	11.1	OC	OC	45.0
Scenario 3 2033	Deg. Of Sat	56.0	72.8	50.2	138.2	139.9	72.1
	Delay (s) / PCU	9.5	24.8	10.6	636.4	601.7	73.2
PM							
Base Year 2015	Deg. Of Sat	73.0	49.8	70.2	49.5	117.0	117.6
	Delay (s) / PCU	16.6	26.5	11.2	60.9	325.8	351.5
Scenario 1 2033	Deg. Of Sat	79.9	37.4	77.5	71.1	OC	OC
	Delay (s) / PCU	13.5	11.3	12.5	76.6	OC	OC
Scenario 2 2033	Deg. Of Sat	81.9	36.4	79.3	73.0	OC	OC
	Delay (s) / PCU	14.3	9.7	13.0	78.9	OC	OC
Scenario 3 2033	Deg. Of Sat	80.3	45.1	73.3	99.0	OC	OC
	Delay (s) / PCU	17.5	31.6	10.9	211.1	OC	OC

N.B. OC (Over Capacity) is where RFC or Degree of Saturation has exceeded 1.40 and 140% respectively. Corresponding delay also marked as OC. Degree of Saturation expressed as a percentage

87. Cressing Road – Coggeshall Road signalised junction is currently operating near or at capacity. Aside from new development traffic by 2033, even just background growth, is likely to lead to the junction being well over capacity. Therefore mitigation options were investigated, including alterations to the current signals and a double mini-roundabout. Both options were modelled, but the results indicated that neither would improve capacity at the junction (see Appendix G).

5.2.7 Cuckoo Way, Great Notley

Junction arms:
A – A131 north
B – Cuckoo Way
C – A131 south
D – New arm for development

88. The 2011 Core Strategy suggested that the addition of a new arm to this junction to allow access to a new development site would require left in and left out slips. However during this stage of work, it was found that the junction would likely to be over capacity without mitigation and also with the implementation of the previously suggested left turn slips, as a result of Local Plan growth on top of the background growth (see Appendix G). It is therefore suggested that both A131 approaches are widened to mitigate the forecast increase in traffic flows.

89. As there is no design for the addition of a new arm to the junction, it has been assumed that the access would be a reasonable standard with 4m lane width and an 8m entry to the roundabout. The results of the suggested mitigation are shown in Table 5.7 below.

Table 5.7: Cuckoo Way results

		A	B	C	D
AM					
Base Year 2015	RFC	0.31	0.31	0.53	N/A
	Delay (s)	2.1	3.1	4.8	N/A
Scenario 1 2033	RFC	0.75	0.65	0.92	0.18
	Delay (s)	5.6	10.3	19.7	9.6
Scenario 2 2033	RFC	0.78	0.68	0.95	0.20
	Delay (s)	6.4	11.7	28.2	10.3
Scenario 3 2033	RFC	0.80	0.71	0.98	0.21
	Delay (s)	7.4	13.4	42.2	10.9
PM					
Base Year 2015	RFC	0.37	0.31	0.51	N/A
	Delay (s)	2.2	2.9	4.3	N/A
Scenario 1 2033	RFC	0.73	0.54	0.60	0.40
	Delay (s)	4.9	7.89	4.3	7.9
Scenario 2 2033	RFC	0.77	0.58	0.64	0.42
	Delay (s)	5.9	9.0	4.7	8.57
Scenario 3 2033	RFC	0.81	0.62	0.67	0.44
	Delay (s)	7.2	10.5	5.2	9.2

90. The results indicate that the junction will operate within capacity in 2033 if the proposed mitigation were to be implemented. The A131 south, however, is likely to be near capacity in the AM peak.

5.2.8 Deanery Hill, Braintree

Junction arms:
A – Deanery Hill West
B – Deanery Hill East
C – Panfield Lane

91. The results shown in the table below assume the junction is altered from the existing priority layout to a signalised junction.

Table 5.8: Deanery Hill mitigation results

		A - BC	B - AC	C – AB
AM				
Scenario 1 2033	Deg. Of Sat	63.8	83	83.7
	Delay (s) / PCU	35.5	21	19.5
Scenario 2 2033	Deg. Of Sat	63.6	85.9	85.8
	Delay (s) / PCU	34.5	23.6	21.8
Scenario 3 2033	Deg. Of Sat	63.6	87.7	88
	Delay (s) / PCU	33.6	26.1	24.5
PM				
Scenario 1 2033	Deg. Of Sat	61.5	59.3	61.9
	Delay (s) / PCU	25.1	20.4	17.5
Scenario 2 2033	Deg. Of Sat	64.3	59.8	64.9
	Delay (s) / PCU	25.8	20.7	18.3
Scenario 3 2033	Deg. Of Sat	67.3	60.2	67.2
	Delay (s) / PCU	26.6	20.9	18.9

Degree of saturation expressed as a percentage

92. The modelling suggests that the existing priority junction operates well within capacity and is also not likely to be overcapacity with background growth alone; the results of which can be found in Appendix G. With the significant development proposed in the area, the modelling suggests that the existing priority junction would be over capacity in 2033. Therefore mitigation options, including a mini-roundabout and signalising the junction have been investigated. The results of this investigation indicated that signalising the junction would be most likely to provide sufficient capacity. The results are shown in Table 5.8 above, and the drawing of the proposed mitigation can be found in Appendix H.

5.2.9 Marks Farm, Braintree

Junction arms:
A – A131
B – A120 east
C – A120 south
D – Coggeshall Road

93. The results shown in the table below assume no change to the existing layout of the junction.

Table 5.9: Marks Farm results (not considering exit blocking)

		A	B	C	D
AM					
Base Year 2015	RFC	0.76	0.61	0.50	0.73
	Delay (s)	17.44	14.86	2.89	10.29
Scenario 1 2033	RFC	0.91	1.15	1.22	OC
	Delay (s)	38.85	330.60	659.14	OC
Scenario 2 2033	RFC	1.27	OC	1.36	OC
	Delay (s)	477.81	OC	1059.37	OC
Scenario 3 2033	RFC	1.31	OC	OC	OC
	Delay (s)	598.37	OC	OC	OC
PM					
Base Year 2015	RFC	0.73	0.54	0.73	0.97
	Delay (s)	16.53	9.42	5.36	44.27
Scenario 1 2033	RFC	0.90	1.15	1.22	OC
	Delay (s)	38.86	330.15	659.19	OC
Scenario 2 2033	RFC	OC	0.92	1.21	OC
	Delay (s)	OC	42.23	616.91	OC
Scenario 3 2033	RFC	OC	0.94	1.30	OC
	Delay (s)	OC	49.87	917.99	OC

N.B. OC (Over Capacity) is where RFC or Degree of Saturation has exceeded 1.40 and 140% respectively. Corresponding delay also marked as OC.

94. Modelling shows that Marks Farm roundabout currently operates under capacity in the AM peak and well under capacity in the PM peak. Background growth is likely to put pressure on the junction but the modelling suggests it will not on its own tip the junction over capacity. Therefore in the short term, Highways England are currently working on a solution to ease congestion at the junction with two options being taken forward in the design stage. These have been modelled in VISSIM by AECOM and it is understood that this has shown that either option, if implemented in conjunction with the Millennium Way slips, would significantly reduce queue lengths and journey times.

95. Although the junction modelling results show that the junction will be well over capacity in 2033, it is worth noting these could change with the introduction of a new or upgraded A120 Braintree to Marks Tey route, which has not been considered at this stage due to the lack of a confirmed preferred route / scheme. However the recent consultation material released, suggests that in 2026 traffic flows on the Coggeshall Road and two A120 approaches are likely to lower than compared to the forecast flow without a new A120 route, although there is likely to be an increase in the flow on the A131 approach.

It is not possible at this point in time to comment on the Marks Farm roundabout performance in 2033 if the new A120 route were to be implemented.

96. As the junctions were assessed in isolation, based on current traffic flow, the junction could be shown to operate under capacity, however wider network issues, e.g. exit blocking, in this instance from Galleys Corner, anecdotally cause most of the problems at the junction. It is often the case that it is not the specific junction where congestion is evident that is the problem, but rather wider issues that affect the junction.

5.2.10 Panners Interchange, Braintree / Great Notley

Junction arms:
1A – Pods Brook
1B – A131 (link)
1C – A120 west
2A – A131 (link)
2B – A120 east
2C – B1256
2D – A131 south

97. The results shown in the table below assume no change to the existing junction layout.

Table 5.10: Panners Interchange results

		1A	1B	1C	2A	2B	2C	2D
AM								
Base Year 2015	RFC	0.99	0.39	0.75	0.86	1.01	1.00	0.33
	Delay (s)	74.17	2.66	13.18	11.00	64.44	64.03	3.40
Scenario 1 2033	RFC	OC	0.68	1.08	0.61	1.03	OC	0.76
	Delay (s)	OC	5.02	163.98	4.93	134.29	OC	7.58
Scenario 2 2033	RFC	OC	0.67	1.07	0.61	1.04	OC	0.76
	Delay (s)	OC	4.99	158.11	4.97	164.22	OC	7.61
Scenario 3 2033	RFC	OC	0.67	1.07	0.61	1.05	OC	0.77
	Delay (s)	OC	4.98	156.55	5.02	189.15	OC	7.62
PM								
Base Year 2015	RFC	0.56	0.26	0.97	0.87	0.28	0.16	0.24
	Delay (s)	5.19	2.08	36.89	10.40	5.86	3.35	1.70
Scenario 1 2033	RFC	1.10	0.54	OC	0.73	0.84	0.44	0.46
	Delay (s)	248.30	3.36	OC	6.07	26.15	8.78	2.54
Scenario 2 2033	RFC	1.10	0.54	OC	0.73	0.86	0.44	0.47
	Delay (s)	251.69	3.35	OC	6.16	28.12	9.05	2.56
Scenario 3 2033	RFC	1.10	0.54	OC	0.74	0.87	0.45	0.47
	Delay (s)	252.87	3.35	OC	6.24	30.46	9.41	2.58

N.B. OC (Over Capacity) is where RFC or Degree of Saturation has exceeded 1.40 and 140% respectively. Corresponding delay also marked as OC.

98. Panners Interchange currently appears to operate well within capacity in both the AM and PM peaks, however it should be noted that it is affected by congestion in the PM peak on Pods Brook Road and the A120 eastbound which occurs as a result of wider network issues and could not be included in the modelling. Modelling suggests that background growth alone will put the junction near to or at capacity but not quite over capacity (see Appendix G).

99. In 2033, the modelling indicates that demand at the junction will exceed capacity. Mitigation measures have been tested, but were found to be unlikely to sufficiently mitigate the junction even in the short term. As with Marks Farm, it is also possible the traffic flows at the junction will be affected by the introduction of a new/upgraded A120 route. As shown in Appendix G, this junction can be expected to be under pressure even with just background growth.

5.2.11 Springwood Drive, Braintree

Junction arms:
A – Springwood Drive north
B – Rayne Road east
C – Pods Brook Road south
D – Rayne Road west

100. Extensive investigation into mitigation for Springwood Drive has been undertaken and it has been determined that the solution most likely to provide sufficient improvement at the junction, when looked at in isolation, would be an enlarged roundabout. The results of this option are shown in Table 5.11. A slip road from the Springwood Drive to Rayne Road East was also shown to work, however through further engineering investigation and VISSIM testing, it was determined the enlarged roundabout is the preferred option.

101. However, exit blocking is a huge problem at this junction and this is not modelled when looking at the junction in isolation. The Braintree ITP Study is currently looking at improving traffic flows through the use of a VISSIM model of Braintree town centre. This may provide solutions to resolve the exit blocking that currently occurs from Rayne Road East. Assuming it is possible to remove the exit blocking, the enlarged roundabout would then become a viable option. If the exit blocking cannot be resolved, it is unlikely that enlarged roundabout option would be effective.

Table 5.11: Springwood Drive (including mitigation) results (not considering exit blocking)

		A	B	C	D
AM					
Base Year 2015	RFC	0.20	0.51	0.49	0.36
	Delay (s)	3.9	4.3	3.8	4.8
Scenario 1 2033	RFC	0.72	0.80	0.75	0.55
	Delay (s)	12	14.3	7.7	9
Scenario 2 2033	RFC	0.75	0.82	0.77	0.56
	Delay (s)	13.4	16	8.4	9.5
Scenario 3 2033	RFC	0.77	0.83	0.79	0.58
	Delay (s)	14.4	16.9	9.1	10.3
PM					
Base Year 2015	RFC	0.50	0.34	0.31	0.20
	Delay (s)	5	3.6	2.7	3.2
Scenario 1 2033	RFC	0.63	0.49	0.64	0.32
	Delay (s)	7.1	4.9	5.6	5.3
Scenario 2 2033	RFC	0.65	0.49	0.66	0.33
	Delay (s)	7.3	5	6.1	5.6
Scenario 3 2033	RFC	0.66	0.50	0.70	0.34
	Delay (s)	7.6	5	6.7	5.9

102. Modelling indicates that Springwood Drive currently operates under capacity in both peaks, however exit blocking does occur due to congestion on Rayne Road East in the PM peak which impacts on the amount of traffic that can exit from Springwood Drive and those turning right from Pods Brook Road. Even with background growth the junction is likely to operate within capacity, although it may exacerbate the exit blocking issue.

103. The junction is forecast to be over capacity in 2033 if mitigation is not provided. However the results in the table above, indicate that an enlarged roundabout option would provide sufficient mitigation in 2033. Although it should be noted, that if exit blocking still occurs, the mitigation may not be effective.

5.2.12 A120 – Colne Road, Coggeshall

Junction arms:
A – A120 East

B – Colne Road South
C – A120 West
D – Colne Road North

104. The results shown in the table below, assume no change to the existing junction layout.

Table 5.12: A120 - Colne Road results

		B-C	B-AD	A-D	D-A	D-BC	C-B
AM							
Base Year	RFC	0.23	0.51	0.33	0.30	0.79	0.24
	Delay (s)	13.2	23.2	11.0	22.8	38. 7	13.3
Scenario 1	RFC	OC	OC	OC	OC	OC	OC
	Delay (s)	OC	OC	OC	OC	OC	OC
Scenario 2	RFC	OC	OC	OC	OC	OC	OC
	Delay (s)	OC	OC	OC	OC	OC	OC
Scenario 3	RFC	OC	OC	OC	OC	OC	OC
	Delay (s)	OC	OC	OC	OC	OC	OC
PM							
Base Year	RFC	0.20	0.50	0.20	0.30	0.63	0.09
	Delay (s)	11.4	19.8	11.7	14.4	24.9	8.9
Scenario 1	RFC	OC	OC	OC	OC	OC	OC
	Delay (s)	OC	OC	OC	OC	OC	OC
Scenario 2	RFC	OC	OC	OC	OC	OC	OC
	Delay (s)	OC	OC	OC	OC	OC	OC
Scenario 3	RFC	OC	OC	OC	OC	OC	OC
	Delay (s)	OC	OC	OC	OC	OC	OC

N.B. OC (Over Capacity) is where RFC or Degree of Saturation has exceeded 1.40 and 140% respectively. Corresponding delay also marked as OC.

105. The results indicate that the junction will be operating over capacity in 2033. Mitigation for this junction was not investigated as it is anticipated that a new A120 route would significantly alleviate pressure at this junction and short term mitigation is unlikely to be cost effective. Highways England (HE) have, however, prepared some outline designs for improvements to this junction but it is not known whether these will provide any short term capacity benefits or when they may be implemented. As shown in Appendix G, this junction can be expected to be under pressure even with just background growth.

5.2.13 A1124 – Church Hill, Earls Colne

Junction arms:
A – A1124 Church Hill
B – Upper Holt Street
C – Coggeshall Road
D – Bypass

106. The results outlined in Table 5.13, below, are the results of the proposed mitigation, a drawing of which can be found in Appendix H. The initial modelling indicated that the current mini-roundabout would be over capacity in 2033 as a result of background growth alone, further exacerbated by Local Plan development. If however, the junction were to be signalised then this would provide some mitigation as outlined by the results below. Although it is likely that the junction will be at or over capacity in 2033 depending on the level of growth at the Garden Communities. It should be noted that the implementation of an all-movements junction on the A12 at Junction 24, may provide additional mitigation, further improving the performance of a signalised junction. The results of which can be seen in Section 5.4.2.

Table 5.13: A1124 - Church Hill results

		A - BC	B - A	C - AB	D - C
AM					
Scenario 1	Deg. Of Sat	91.0	87.4	87.9	34.5
	Delay / PCU	39.8	60.0	61.9	4.5
Scenario 2	Deg. Of Sat	95.1	95.9	92.4	35.7
	Delay / PCU	49.8	93.2	71.8	3.8
Scenario 3	Deg. Of Sat	98.9	100.7	100.9	36.9
	Delay / PCU	69.7	132.1	125.0	3.2
PM					
Scenario 1	Deg. Of Sat	110.7	107.6	108.6	9.8
	Delay / PCU	221.4	197.2	190.6	3.3
Scenario 2	Deg. Of Sat	114.8	111.5	112.6	10.5
	Delay / PCU	280.7	249.5	247.5	3.2
Scenario 3	Deg. Of Sat	117.3	116.9	116.6	11.1
	Delay / PCU	324.6	318.8	301.4	3.0

Degree of saturation expressed as a percentage

107. The modelling results indicate that the junction is likely to be at capacity in 2033 even with improvements. The improvements modelled would be likely, however, to provide some short term relief and would be likely to accommodate the majority of the Local Plan growth.

5.2.14 Head Street, Halstead

Junction arms:
1A – A131 Head Street (link)
1B – Parsonage Street
1C – A131 Market Hill
1D – A1124 Hedingham Road
2A – A131 Head Street
2B – A1124 Colchester Road
2C – A131 Head Street (link)

108. The results shown in the table below assume no change to the existing layout of the junction.

Table 5.14: Head Street results

		1A	1B	1C	1D	2A	2B	2C
AM								
Base Year 2015	RFC	1.02	0.94	0.78	0.98	1.35	0.84	0.61
	Delay (s)	54.6	55.5	14.2	45.1	333.7	26.2	14.82
Scenario 1 2033	RFC	1.12	OC	1.20	OC	1.21	0.97	0.83
	Delay (s)	331.8	OC	576	OC	606	99.2	19.72
Scenario 2 2033	RFC	1.12	OC	1.27	OC	1.23	0.99	0.84
	Delay (s)	331.1	OC	802	OC	676	114.2	20.82
Scenario 3 2033	RFC	1.12	OC	1.34	OC	1.25	1.01	0.85
	Delay (s)	331	OC	1035	OC	740	132	22.0
PM								
Base Year 2015	RFC	1.02	0.98	0.92	1.00	OC	1.03	0.76
	Delay (s)	56.6	79.3	36.0	67.5	OC	100.1	26.60
Scenario 1 2033	RFC	1.06	OC	1.30	1.30	1.32	OC	1.07
	Delay (s)	180.6	OC	908	899	928	OC	173.8
Scenario 2 2033	RFC	1.05	OC	1.33	1.35	1.34	OC	1.07
	Delay (s)	179.6	OC	988	1050	1006	OC	169.6
Scenario 3 2033	RFC	1.05	OC	1.35	1.39	1.36	OC	1.06
	Delay (s)	178.4	OC	1066	1203	1085	OC	1661

N.B. OC (Over Capacity) is where RFC or Degree of Saturation has exceeded 1.40 and 140% respectively. Corresponding delay also marked as OC.

109. The junction is currently modelled to be operating at capacity and so in 2033 the increased traffic flows will further exacerbate the existing congestion issues within Halstead. Mitigation was investigated during the Options Assessment stage and no options were found to successfully address the impact of growth. There will be a significant need to encourage modal shift measures such as improving public transport and cycling, which are being considered by the A131 Braintree to Sudbury Route Based Strategy and Braintree Cycling Action Plan in order to accommodate the effects of the proposed development. As shown in Appendix G, this junction can be expected to be under pressure even with just background growth.

110. There has previously been a suggestion that a Halstead Bypass (A131) is required. This is a longer term proposal aimed at supporting the integrity of the A131 Primary Route, which runs from Chelmsford to Sudbury catering for longer distance traffic travelling from mid Essex and south Suffolk, and in combination with other Primary Routes, such as the A130 and A134 connects the A12 with the A14. As a result of combining the A131 route with other road improvements (such as the A120 at Braintree), Halstead will be the only remaining town that the A131 has to pass through.

111. The New Anglia Local Transport Body has agreed funding to develop the business case for a Sudbury Western By-Pass, which will enable the progression of design work, together with traffic modelling and environmental assessment. The delivery of this scheme and other planned infrastructure improvements in the area is likely to have a significant impact on traffic flows in the area.

112. The Halstead bypass scheme was first developed and protected from development in the 1990s. Whilst the scheme has not come forward in the intervening time, it remains a priority for ECC and it is likely that growth on the corridor from North Chelmsford, Braintree and at Sudbury will result in a need to commence development work on the scheme during the plan period.

5.2.15 Maldon Road – The Street, Hatfield Peverel

Junction arms:
A – The Street east
B – B1019 Maldon Road
C – The Street west

113. The results shown in the table below assume no change to the existing layout.

Table 5.15: Maldon Road - The Street results

		A	B	C
AM				
Base Year 2015	RFC	0.57	0.86	0.55
	Delay (s)	9.9	26.4	7.9
Scenario 1 2033	RFC	0.77	0.44	1.38
	Delay (s)	29.5	8.7	1158
Scenario 2 2033	RFC	0.79	0.45	1.40
	Delay (s)	32.1	8.9	1204
Scenario 3 2033	RFC	0.81	0.46	OC
	Delay (s)	34.78	9.16	OC
PM				
Base Year 2015	RFC	0.56	0.75	0.90
	Delay (s)	10.22	16.48	30.29
Scenario 1 2033	RFC	0.71	1.03	1.06
	Delay (s)	15.00	169.28	187
Scenario 2 2033	RFC	0.83	1.06	1.07
	Delay (s)	16.10	225.85	220
Scenario 3 2033	RFC	0.75	1.09	1.08
	Delay (s)	17.26	287.21	253

N.B. OC (Over Capacity) is where RFC or Degree of Saturation has exceeded 1.40 and 140% respectively. Corresponding delay also marked as OC.

114. Maldon Road – The Street currently operates under capacity, although modelling shows that Maldon Road approach does operate near capacity in both peaks and is likely to be over capacity, particularly in the AM peak in 2033. Mitigation was found to not be possible at this junction in both this work and the Maldon Local Plan work. As shown in Appendix G, this junction can be expected to be under pressure even with just background growth.

115. It was agreed by all parties at the Maldon Local Plan examination that issues at this junction relate largely to long term concerns about the impact of growth across the region, and not specifically the Maldon Local Plan. Upgrades to the A12, identified in the Road Building Strategy (2014) regarding potential widening to 3 lanes of the A12, would be likely to improve its reliability and ensure a limited level of queuing at the junction. In addition the public transport improvements proposed to support the Maldon District Council (MDC) Local Plan are being progressed through the emerging planning applications including local and wider public transport connections. Significant localised improvements are limited given minimal land availability between development and roadway; the character of the locality, and proximity to the A12 slip lanes reducing the opportunity for increased signal timings. The work undertaken for Braintree Local Plan supports the findings from the MDC Local Plan work.

116. In Hatfield Peverel itself, BDC is proposing to allocate a brownfield former industrial site as a residential site within the Local Plan. The site is directly adjacent to the station and therefore should encourage the use of rail services. The closure of the industrial use is also likely to decrease the number of HGV movements in the village, which have a noise, pollution and safety impact on the village.

5.2.16 Feering Hill – Station Road, Kelvedon

Junction arms:
A – Feering Hill
B – Swan Street
C – B1024 High Street
D – B1024 Coggeshall Road

117. The results shown in the table below assume no change to the existing layout.

Table 5.16: Feering Hill - Station Road results

		B-ACD	A-BCD	D-ABC	C-ABD
AM					
Base Year 2015	RFC	0.18	0.40	0.78	0.03
	Delay (s)	12.3	8.3	37.6	8.6
Scenario 1 2033	RFC	OC	0.35	OC	0.09
	Delay (s)	OC	6.7	OC	12.2
Scenario 2 2033	RFC	OC	0.35	OC	0.10
	Delay (s)	OC	6.5	OC	12.9
Scenario 3 2033	RFC	OC	0.34	OC	0.10
	Delay (s)	OC	6.3	OC	13.6
PM					
Base Year 2015	RFC	0.09	0.15	0.59	0.05
	Delay (s)	9.7	7.7	21.3	8.7
Scenario 1 2033	RFC	0.47	0.50	OC	0.11
	Delay (s)	56.7	9.8	OC	8.9
Scenario 2 2033	RFC	0.41	0.47	OC	0.10
	Delay (s)	45.4	9.5	OC	8.8
Scenario 3 2033	RFC	0.38	0.45	OC	0.10
	Delay (s)	39.6	9.3	OC	8.8

N.B. OC (Over Capacity) is where RFC or Degree of Saturation has exceeded 1.40 and 140% respectively. Corresponding delay also marked as OC.

118. Feering Hill – Station Road junction currently operates within capacity. Additional traffic flows added by 2033 are, however, likely to cause the junction to exceed capacity. Similarly background growth alone is likely to put the junction near to capacity. An all-movements junction on the A12 at Junction 24 may alleviate the junction significantly, but the modelling indicates that further widening of the Coggeshall Road approach would be required to bring that arm under capacity; the results of which are shown in Section 5.4.3.

5.2.17 Rye Mill Lane, Kelvedon

Junction arms:
A – London Road
B – Inworth Road
C – Feering Hill
D – Rye Mill Lane

119. The results shown in the table below suggest that the existing crossroads is unlikely to provide sufficient capacity and without a new junction on the A12 it is unlikely to be possible to mitigate the impacts through infrastructure changes alone.

Table 5.17: Rye Mill Lane results

		B-C	B-AD	A-D	D-A	D-BC	C-B
AM							
Base Year 2015	RFC	1.07	1.05	0.03	0.07	0.05	0.41
	Delay (s)	239	211	7.23	8.01	14.89	13.40
Scenario 1 2033	RFC	OC	OC	0.04	0.20	0.75	0.72
	Delay (s)	OC	OC	10.72	27.25	286	39.62
Scenario 2 2033	RFC	OC	OC	0.04	OC	OC	0.77
	Delay (s)	OC	OC	11.01	OC	OC	50
Scenario 3 2033	RFC	OC	OC	0.04	OC	OC	0.83
	Delay (s)	OC	OC	11.41	OC	OC	68
PM							
Base Year 2015	RFC	0.99	1.02	0.06	0.04	0.04	0.40
	Delay (s)	170.30	146.16	7.27	6.79	14.79	11.43
Scenario 1 2033	RFC	OC	OC	0.07	0.05	0.17	0.83
	Delay (s)	OC	OC	9.54	9.37	38.47	50.34
Scenario 2 2033	RFC	OC	OC	0.07	0.05	0.16	0.83
	Delay (s)	OC	OC	9.33	9.13	34.98	51.07
Scenario 3 2033	RFC	0.50	0.74	0.06	0.03	0.03	0.30
	Delay (s)	23.28	41.23	6.89	6.40	14.82	10.16

N.B. OC (Over Capacity) is where RFC or Degree of Saturation has exceeded 1.40 and 140% respectively. Corresponding delay also marked as OC.

120. As the junction is already at capacity, as shown in the table above, any additional traffic is likely to further exacerbate the current situation. Therefore background growth alone is likely to add further capacity issues at this junction even without the additional Local Plan growth that is forecast.

5.2.18 Chipping Hill, Witham

Junction Arms:
A – Braintree Road/Chipping Hill
B – The Avenue
C – Collingwood Road

121. The results shown in the table below assume no change to the existing layout.

Table 5.18: Chipping Hill results

		A	B	C
AM				
Base Year 2015	RFC	0.99	0.82	0.54
	Delay (s)	74.1	30.9	9.8
Scenario 1 2033	RFC	1.30	1.40	0.85
	Delay (s)	927	1245	31.5
Scenario 2 2033	RFC	1.33	OC	0.87
	Delay (s)	1022.3	OC	36.2
Scenario 3 2033	RFC	1.36	OC	0.89
	Delay (s)	1118	OC	42.2
PM				
Base Year 2015	RFC	0.80	0.96	0.67
	Delay (s)	14.7	64.4	13.9
Scenario 1 2033	RFC	0.96	1.31	0.59
	Delay (s)	56.3	838	11.7
Scenario 2 2033	RFC	0.97	1.34	0.60
	Delay (s)	68.3	919	11.8
Scenario 3 2033	RFC	0.99	1.36	0.60
	Delay (s)	82.7	997.7	11.9

N.B. OC (Over Capacity) is where RFC or Degree of Saturation has exceeded 1.40 and 140% respectively. Corresponding delay also marked as OC.

122. The VISUM assignment showed significant re-routing of development traffic to avoid the Newland Street, Collingwood Road junction. As a result trips used The Grove and then continued along The Avenue, instead of Collingwood Road and likewise in the opposite direction. While this is plausible, it has been assumed that 50% of trips would not re-route in this way as Collingwood Road is the main route into Witham from Maldon and therefore 50% of trips were removed from The Avenue and added to Collingwood Road. 50% of the trips from Chipping Hill to the Avenue have also been reassigned to Collingwood Road. This consequently impacts on the signalised junction at Newland Street / Collingwood Road and so has been taken into account as described in Section 5.2.20.

123. Chipping Hill is currently modelled as operating near to capacity in both the AM and PM peaks. In 2033, all scenarios are likely to lead to Chipping Hill and the Avenue being over capacity. Mitigating measures were tested, but no option was shown to provide sufficient mitigation, even in the short term. As shown in Appendix G, this junction can be expected to be under pressure even with just background growth.

5.2.19 Gershwin Boulevard, Witham

Junction arms:
A – Hatfield Road north-east
B – Gershwin Boulevard
C – Hatfield Road south-east
D – New arm

124. The junction has been modelled using the design provided in the planning application for the Lodge Farm development and the results are shown in Table 5.19 below.

Table 5.19: Gershwin Boulevard results

		A	B	C	D
AM					
Base Year 2015	RFC	0.49	0.34	0.44	-
	Delay (s)	4.5	4.5	4.4	-
Scenario 1 2033	RFC	0.77	0.55	0.55	0.50
	Delay (s)	10.1	9.8	5.4	7.9
Scenario 2 2033	RFC	0.77	0.56	0.55	0.50
	Delay (s)	10.4	10.0	5.4	8.0
Scenario 3 2033	RFC	0.78	0.56	0.56	0.50
	Delay (s)	10.6	10.2	5.5	8.1
PM					
Base Year 2015	RFC	0.37	0.23	0.70	-
	Delay (s)	3.7	3.3	7.3	-
Scenario 1 2033	RFC	0.48	0.63	0.68	0.39
	Delay (s)	4.4	8.4	7.3	7.1
Scenario 2 2033	RFC	0.48	0.65	0.69	0.40
	Delay (s)	4.5	9.0	7.4	7.2
Scenario 3 2033	RFC	0.49	0.67	0.69	0.41
	Delay (s)	4.5	9.5	7.4	7.3

125. The results suggest that Gershwin Boulevard will operate within capacity in 2033.

5.2.20 Newland Street, Witham

Junction Arms:
A – Newland Street North-East
B – Maldon Road
C – Newland Street South-West
D – Collingwood Road

126. The results shown in the table below assume no change to the existing junction layout.

Table 5.20: Newland Street results

		C – A	C – B	Link SW – BC	B – CA	Link NE – DA	A – CD	D - AC
AM								
Base Year 2015	Deg. Of Sat	40.6	26.2	33.9	73.2	43.4	36.6	58.3
	Delay (s)	36.3	38.1	4.0	55.2	6.1	38.7	47.3
Scenario 1 2033	Deg. Of Sat	56.2	44.2	35.1	94.3	59.4	OC	OC
	Delay (s)	25.9	35.8	4.0	180.2	8.1	OC	OC
Scenario 2 2033	Deg. Of Sat	56.5	45.3	35.7	102.8	60.4	OC	OC
	Delay (s)	26.0	36.9	3.7	248.7	8.6	OC	OC
Scenario 3 2033	Deg. Of Sat	56.8	46.1	36.6	111.2	61.0	OC	OC
	Delay (s)	26.0	37.7	3.8	341.8	8.8	OC	OC
								PM
Base Year 2015	Deg. Of Sat	47.2	76.9	61.6	80.2	43.5	82.3	102.3
	Delay (s)	36.5	91.4	6.8	64.8	6.8	55.0	159.5
Scenario 1 2033	Deg. Of Sat	75.1	73.3	49.6	107.0	75.4	OC	OC
	Delay (s)	40.4	66.2	3.3	294.8	12.9	OC	OC
Scenario 2 2033	Deg. Of Sat	75.5	74.3	49.8	108.6	75.8	OC	OC
	Delay (s)	40.6	67.7	3.2	313.8	13.1	OC	OC
Scenario 3 2033	Deg. Of Sat	75.7	75.5	50.2	109.5	76.1	OC	OC
	Delay (s)	40.8	69.7	3.1	323.5	13.2	OC	OC

N.B. OC (Over Capacity) is where RFC or Degree of Saturation has exceeded 1.40 and 140% respectively. Corresponding delay also marked as OC. Degree of Saturation expressed as a percentage.

127. The VISUM assignment showed significant re-routing to avoid this junction when travelling from Maldon Road, with traffic diverting via The Grove. Although plausible, especially if the junction is overcapacity, it is not reasonable to assume that all vehicles would re-route in this way as Maldon Road is the primary route into Witham from Maldon and so 50% of the vehicles have been reassigned through the junction from Maldon Road. Similarly it was found that in the model all traffic accessing the Maltings Lane development and areas in the south of Witham would travel down the A12 and use Junction 20B to double back and access Witham from the south. While this is also plausible as it is a quicker route, it is not considered reasonable that all traffic would do this and so 50% of traffic making this movement, was reassigned to use Junction 22 and travel through Witham from the north. This has subsequently also been taken into account in Section 6, below.

128. In the current AM peak, the signalised junction is modelled to operate under capacity. It, however, nears capacity during the current PM peak on some arms and exceeds capacity on the Collingwood Road arm.

129. In the future year, the junction is forecast to exceed capacity. A change making Maldon Road exit only was proposed. This however is unlikely to provide sufficient capacity, and therefore tackling reduction of car trip generation through encouraging modal shift is likely to be the most effective form of mitigation. As shown in Appendix G, this junction can be expected to be under pressure even with just background growth.

5.2.21 Rickstones Road, Witham

1A – Rickstones Road
1B – B1018 Braintree Road (link)
1C – B1018 Cressing Road
2A – B1018 Braintree Road (link)
2B – Cypress Road
2C – B1018 Braintree Road south

130. The results in Table 5.21 below have been modelled using the geometries provided in the Transport Assessment for the Forest Road development in Witham for their proposed mitigation of changing the existing southern mini-roundabout into a priority junction.

Table 5.21: Rickstones Road (developer mitigation) results

		1A	1B	1C	2B – 2C	2B – 2A	2C – 2A,2B
AM							
Base Year	RFC	0.50	0.77	1.21	0.46	0.31	0.16
	Delay (s)	10.76	14.14	496.66	17.94	50.67	9.98
Scenario 1 2033	RFC	0.54	0.99	OC	OC	OC	OC
	Delay (s)	12.17	72.23	OC	OC	OC	OC
Scenario 2 2033	RFC	0.55	1.02	OC	OC	OC	OC
	Delay (s)	12.32	97.07	OC	OC	OC	OC
Scenario 3 2033	RFC	0.56	1.05	OC	OC	OC	OC
	Delay (s)	12.53	128.03	OC	OC	OC	OC
PM							
Base Year	RFC	0.40	0.89	1.06	0.23	0.27	0.30
	Delay (s)	7.56	23.6	93.68	9.63	37.06	9.09
Scenario 1 2033	RFC	0.36	0.98	OC	OC	OC	OC
	Delay (s)	7.79	59.94	OC	OC	OC	OC
Scenario 2 2033	RFC	0.37	0.99	OC	OC	OC	OC
	Delay (s)	7.83	68.71	OC	OC	OC	OC
Scenario 3 2033	RFC	0.37	1.00	OC	OC	OC	OC
	Delay (s)	7.89	82.89	OC	OC	OC	OC

N.B. OC (Over Capacity) is where RFC or Degree of Saturation has exceeded 1.40 and 140% respectively. Corresponding delay also marked as OC.

131. The Rickstones Road double mini-roundabout is currently modelled to operate near to capacity in both peak periods and the developer modelling of their proposed mitigation indicates that the junction is likely to be near capacity again in 2021. The results in the table above demonstrate that the developer proposals are unlikely to suffice long term and demand at the junction is likely to far exceed capacity. A signalised option was tested, but was unable to provide sufficient capacity. It is therefore not likely that it will be possible to mitigate this junction in the long term and a focus on encouraging modal shift will be required. As shown in Appendix G, this junction can be expected to be under pressure even with just background growth.

5.3 Sensitivity Testing: Garden Communities Growth

132. The results outlined in the tables above indicate that varying the levels of growth at each of the Garden Communities are unlikely to have a significant difference on the capacity of the junctions listed in Section 5.2. Increasing the growth does, at the majority of junctions, increase the traffic flows, but there are no significant differences between scenarios. The likely impact on trunk slip roads is considered below in Chapter 6.

5.4 A12 J24 All Movements

133. It was acknowledged during the Options Assessment stage of work that trips generated by development in and around Kelvedon would be likely to use the High Street in order to access the A12 at Junction 23 for southbound trips out of Kelvedon and northbound trips into the development. Therefore it was requested that an option which permitted all movements at Junction 24 was tested in order to understand the implications for the other local junctions.

5.4.1 Marks Farm, Braintree

Junction arms:
A – A131 north
B – A120 east
C – A120 south
D – Coggeshall Road west

134. The results shown in the table below assume no change to the existing junction layout.

Table 5.22: Marks Farm (J24 All Moves) results

		A	B	C	D
AM					
Base Year 2015	RFC	0.76	0.61	0.50	0.73
	Delay (s)	17.4	14.9	2.9	10.3
Scenario 1 2033	RFC	0.83	1.14	0.99	OC
	Delay (s)	24.2	317.9	50.4	OC
Scenario 2 2033	RFC	0.87	1.26	1.10	OC
	Delay (s)	29.9	638.3	301.7	OC
Scenario 3 2033	RFC	0.90	1.39	1.22	OC
	Delay (s)	37.1	978.5	645	OC
PM					
Base Year 2015	RFC	0.73	0.54	0.73	0.97
	Delay (s)	16.5	9.4	5.4	44.3
Scenario 1 2033	RFC	OC	0.93	0.95	OC
	Delay (s)	OC	46.8	27.3	OC
Scenario 2 2033	RFC	OC	0.93	1.13	OC
	Delay (s)	OC	47.0	128.4	OC
Scenario 3 2033	RFC	OC	0.95	1.13	OC
	Delay (s)	OC	55.5	376.3	OC

N.B. OC (Over Capacity) is where RFC has exceeded 1.40. Corresponding delay also marked as OC.

135. The results in Table 5.22 indicate that the implementation of a new junction on the A12 is likely to lead to the junction being over capacity in 2033, despite some reduction in traffic flows.

5.4.2 A1124 – Church Hill, Earls Colne

Junction arms:
A – A1124 Church Hill
B – Upper Holt Street
C – Coggeshall Road
D – Bypass

Table 5.23: A1124 - Church Hill (J24 All Moves & mitigation) results

		A - BC	B - A	C - AB	D - C
AM					
Scenario 1 2033	Deg. Of Sat	67.4	44.7	65.7	37.3
	Delay (s)	13.6	18.1	32.9	3.6
Scenario 2 2033	Deg. Of Sat	71.6	44.8	71.7	38.3
	Delay (s)	14.5	18.1	35.1	3.6
Scenario 3 2033	Deg. Of Sat	76.9	45.8	75.4	39.2
	Delay (s)	16.7	18.9	36.0	3.4
PM					
Scenario 1 2033	Deg. Of Sat	97.1	86.5	97.0	11.1
	Delay (s)	62.0	53.9	50.1	3.4
Scenario 2 2033	Deg. Of Sat	101.8	90.0	101.1	11.9
	Delay (s)	103.3	62.3	81.5	3.3
Scenario 3 2033	Deg. Of Sat	107.1	90.1	106.7	12.6
	Delay (s)	177.3	62.7	162.1	2.9

Degree of saturation expressed as a percentage.

136. The results of the modelling suggest that an all movement junction would be likely to lead to lower traffic flows to this junction than without an all movement junction, thus allowing the signalised option

to work better than if it was not implemented as shown in Table 5.23. However, the modelling suggests that the junction is likely to be near or at capacity in the PM peak.

5.4.3 Feering Hill – Station Road, Kelvedon

Junction arms:
A – Feering Hill
B – Swan Street
C – B1024 High Street
D – B1024 Coggeshall Road

137. The results shown in the table below are assuming an all movements junction on the A12 is implemented at J24 and that the entry from Coggeshall Road is widened to one lane plus flare. It shows the junction is expected to operate reasonably well in Scenario 1 but under more pressure in Scenarios 2 and 3.

Table 5.24: Feering Hill (J24 All Moves & mitigation) results

		B-ACD	A-BCD	D-AB	D-BC	C-ABD
AM						
Base Year 2015	RFC	0.18	0.40	0.78	N/A	0.03
	Delay (s)	12.3	8.33	37.6	N/A	8.6
Scenario 1 2033	RFC	0.21	0.29	0.81	0.89	0.08
	Delay (s)	17.8	6.0	82.6	90.0	12.32
Scenario 2 2033	RFC	0.23	0.23	0.95	0.94	0.08
	Delay (s)	20.0	5.9	150.8	122.7	13.11
Scenario 3 2033	RFC	0.26	0.28	0.98	0.96	0.09
	Delay (s)	22.8	5.7	181.0	153.0	14.0
PM						
Base Year 2015	RFC	0.09	0.15	0.59	N/A	0.05
	Delay (s)	9.7	7.7	21.3	N/A	8.7
Scenario 1 2033	RFC	0.15	0.41	0.43	0.53	0.08
	Delay (s)	10.57	8.77	13.57	22.97	8.57
Scenario 2 2033	RFC	0.15	0.39	0.42	0.52	0.08
	Delay (s)	10.44	8.54	13.24	22.4	8.5
Scenario 3 2033	RFC	0.15	0.37	0.41	0.52	0.08
	Delay (s)	10.4	8.4	13.0	22.0	8.4

5.4.4 Rye Mill Lane, Kelvedon

Junction Arms:
1A – London Road NE
1B – London Road SW Link
1C – Rye Mill Lane
2A – London Road NE Link
2B – Inworth Road
2C – London Road SW

138. The results shown in Table 5.25 below, assume that an all movements junction will be implemented at J24 and that the junction will be mitigated through the implementation of a double mini-roundabout (See Appendix H).

Table 5.25: Rye Mill Lane (J24 All Moves & mitigation) results

		1A	1B	1C	2A	2B	2C
AM							
Scenario 1 2033	RFC	0.93	0.66	0.11	0.78	1.07	0.09
	Delay (s)	40.4	13.8	8.2	14.1	258.3	6.2
Scenario 2 2033	RFC	1.02	0.71	0.11	0.85	1.16	0.09
	Delay (s)	106.7	16.47	8.6	20.7	484.8	6.5
Scenario 3 2033	RFC	1.12	0.73	0.11	0.91	1.26	0.09
	Delay (s)	273.0	16.6	8.5	33.1	708.2	6.6
PM							
Scenario 1 2033	RFC	0.80	0.44	0.05	0.72	0.59	0.19
	Delay (s)	17.2	8.42	6.8	11.4	12.0	5.7
Scenario 2 2033	RFC	0.80	0.44	0.05	0.72	0.59	0.19
	Delay (s)	17.2	8.4	6.8	11.3	11.7	5.7
Scenario 3 2033	RFC	0.80	0.44	0.05	0.72	0.58	0.18
	Delay (s)	17.5	8.4	6.8	11.4	11.6	5.6

139. The results shown in Table 5.25 above indicate that the junction is likely to operate near or at capacity, particularly in the AM peak even with the implementation of mitigation and a new junction on the A12.

5.4.5 A12 J24 All Moves Impacts Summary

140. The junction modelling results indicate that an all movements junction on the A12 at Junction 24 to the north of Kelvedon, along with other infrastructure mitigation measures, would significantly alleviate the impacts of Local Plan development in Kelvedon. It is also likely to have wider benefits on the A12, particularly for Junction 23, where the traffic flows accessing the junction are likely to decrease.

6. Strategic Network Impact

141. It was identified that the impact on the following A12 and A120 slips, along with the A120 / M11 junction, A120 / A12 junction and Galleys Corner would be assessed:

- A12 J24 On-slip / Off-slip (Kelvedon);
- A12 J23 On-slip / Off-slip (Kelvedon);
- A12 J22 On-slip / Off-slip (Witham);
- A12 J21 On-slip / Off-slip (Witham);
- A12 J20B On-slip / Off-slip (Hatfield Peverel); and
- A12 J20A On-slip/ Off-slip (Hatfield Peverel).

- A120 / B1256 On-slip (Rayne);
- A120/ Pods Brook Road B1246 On-slip/ Off-slip (Great Notley);
- A120/ A131 On-slip/ Off-slip (Great Notley); and
- A120/ London Road On-slip/ Off-slip (Great Notley).

142. The impact in terms of flow has been assessed for on- and off-slips in the six scenarios under consideration as shown in the sections to follow. However due to a lack of availability of either slip road or mainline TRADS/traffic data required to undertake the analysis, the following could not be assessed in detail in terms of capacity and design standards:

- A12 J20A On-slip

6.1 A12 Slip Roads

143. In order to assess the suitability of the A12 and A120 slips to serve the development traffic that may use them, the method outlined in the Design Manual for Roads and Bridges (DMRB)2 was used to find the existing design category of the slip road and then to estimate what category of slip road would be required firstly in 2033 without (w/o) the development flows and then with the level of development flows shown in each scenario. There are 8 merge and 5 diverge slip road design categories, A-H/E, with A being the simplest most suitable for low mainline/slip traffic flows and H/E being the most complex suitable for high mainline/slip traffic flows. In Table 6.1, below, where a change is likely to be required from the existing layout the cell is highlighted in light orange. The slip road design category is shown.

6.1.1 Assessment results without changes to A12 J24

Table 6.1: A12 Slip Road Categories

Slip		Existing Layout	2033 w/o development	Scenario		
				1	2	3
AM	A12 J24 ON	A	E	A or D	A or D	B
	A12 J24 OFF	A	C	C	C	C
	A12 J23 ON	B	E	E	E	E
	A12 J23 OFF	A	A	C	C	C
	A12 J22 ON	B	A or D	A or D	A or D	E
	A12 J22 OFF	B	C	A	A	A
	A12 J21 ON	B	E	E	E	E
	A12 J21 OFF	A	C	C	C	C

[2] http://www.standardsforhighways.co.uk/ha/standards/dmrb/vol6/section2/td2206.pdf, chapter 2, page 10

Slip		Existing Layout	2033 w/o development	Scenario		
				1	2	3
	A12 J20B ON	B	A or D	B	B	B
	A12 J20B OFF	A	A	A	C	C
	A12 J20A OFF	C	A	A	A	A
PM	A12 J24 ON	A	A or D	A or D	A or D	A or D
	A12 J24 OFF	A	C	C	C	C
	A12 J23 ON	B	A or D	A or D	E	E
	A12 J23 OFF	A	A	A	A	A
	A12 J22 ON	B	E	E	E	E
	A12 J22 OFF	B	A	C	C	C
	A12 J21 ON	B	B	E	E	E
	A12 J21 OFF	A	C	B	B	B
	A12 J20B ON	B	E	E	E	B
	A12 J20B OFF	A	A	A	A	A
	A12 J20A OFF	C	C	A	A	A

Orange highlight- where change in slip design is likely required
Red- where change in slip design is likely required in all scenarios

144. Table 6.1 indicates that the A12 slip roads are likely to be impacted by varying levels of growth in the Garden Communities, with the most slip roads likely to be sub-standard if Scenario 3 were to be realised. Although it should be noted that around two thirds of the slip roads are modelled to be likely to be sub-standard due to background growth alone, as shown in the 2033 without development column.

145. The A12 J24 Off-slip, A12 J23 On-slip, A12 J22 On and Off-slip and A12 J20A Off-slip show a required change in all AM scenarios, whilst the A12 J24 Off-slip, J23 On-slip, J22 On and Off-slip, and the A12 J21 Off-slip show a required change in all PM scenarios. Therefore the A12 J24 Off-slip, J23 On-slip, J22 On and Off-slips, and the J21 Off-slip are likely to require an alteration regardless of which scenario occurs, as indicated from the table above.

Table 6.2: A12 Slip road development flows and difference without changes to A12 J24 AM

Slip	2033 w/o development	Scenario					
		1		2		3	
		Slip Flow	Increase	Slip Flow	Increase	Slip Flow	Increase
A12 J24 ON	503	713	210	758	255	799	296
A12 J24 OFF	392	468	76	468	76	467	75
A12 J23 ON	555	1062	507	1132	577	1201	**646**
A12 J23 OFF	435	678	243	670	235	665	230
A12 J22 ON	379	480	101	492	113	505	126
A12 J22 OFF	922	1102	180	1123	201	1144	222
A12 J21 ON	875	1008	133	1012	137	1015	140

Slip	2033 w/o development	Scenario					
		1		2		3	
		Slip Flow	Increase	Slip Flow	Increase	Slip Flow	Increase
A12 J21 OFF	756	940	184	946	190	952	196
A12 J20B ON	475	700	225	714	239	728	253
A12 J20B OFF	405	600	195	615	210	631	226
A12 J20A OFF	318	333	15	334	16	335	17

Red- highest flow
Bold largest increase in slip flow

Table 6.3: A12 Slip road development flows and difference without changes to A12 J24 PM

Slip	2033 w/o development	Scenario					
		1		2		3	
		Slip Flow	Increase	Slip Flow	Increase	Slip Flow	Increase
A12 J24 ON	537	592	55	591	54	590	53
A12 J24 OFF	466	539	73	537	71	536	70
A12 J23 ON	372	556	184	547	175	540	168
A12 J23 OFF	456	690	234	677	221	666	210
A12 J22 ON	985	1174	189	1189	204	1204	219
A12 J22 OFF	447	617	170	630	183	643	196
A12 J21 ON	722	900	178	913	191	925	203
A12 J21 OFF	1106	1321	215	1327	221	1334	228
A12 J20B ON	460	755	295	779	319	803	343
A12 J20B OFF	451	755	304	776	325	797	**346**
A12 J20A OFF	378	383	5	383	5	383	5

Red- highest flow
***Bold** largest increase*

146. Table 6.2 and Table 6.3 show the likely flows that will use the A12 slip roads without changing A12 J24, and the difference between forecast 2033 flows excluding development flows and forecast 2033 flows including the development trips.

147. In the AM peak period, Scenario 3 will lead to the largest increase in flows on the majority of the slip roads assessed, whilst Scenario 2 will have the least impact on slip flows, In the PM peak period, Scenario 3 will lead to the largest increases on the slip flows between Junction 20A to 22, whilst Scenario 1 will lead to the largest increases on slip flows between Junctions 23 and 24. Scenario 2 will have the least impact on slip flows. This indicates that the varying levels of growth at the Garden Communities will have differing impacts but in general, as the Garden Communities grow, the impacts will increase.

148. The largest modelled increase in flows during the AM peak period is observed at A12 J23 On-slip (+646 vehicles) in Scenario 3, whilst the largest increase in flows during the PM peak period is observed at A12 J20B Off-slip (+346 vehicles) in Scenario 3.

6.1.2 Assessment results with changes to A12 J24

Table 6.4: A12 Slip Road Category Differences

	Slip	Existing layout	2033 w/o development	Scenario					
				Kelvedon junction Existing			With Kelvedon junction All Moves		
				1	2	3	1	2	3
AM	A12 J23 ON	B	E	E	E	E	B	E	E
	A12 J23 OFF	B	A	C	C	C	A	A	A
PM	A12 J24 OFF	A	C	C	C	C	A	A	A
	A12 J23 ON	B	A or D	A or D	E	E	E	E	E
	A12 J22 ON	A	E	E	E	E	E	F	F
	A12 J20B OFF	A	A	A	A	A	A	A	C

Orange highlight- where change in slip design is likely required
Red - where change in slip design is likely required in all scenarios

149. The differences in flow category of slips between the scenarios with and without changing A12 J24 are shown in Table 6.4 above. This table shows that there are likely to be additional alterations required with a change to A12 J24 e.g. A12 J22 On-slip (scenarios 2 & 3), and A12 J20B Off-slip (Scenario 3) in the PM peak period. The table above suggests that if these improvements were made to junction 24, fewer of the slip roads at other junctions are likely to be sub-standard. It should also be noted, that if there was no change to junction 24, the majority of the slip roads shown in the table above are likely to be sub-standard as a result of background growth alone.

Table 6.5: A12 slip road development flows and difference with changes to A12 J24 AM

Slip	2033 w/o development	Scenario					
		1		2		3	
		Slip Flow	Increase	Slip Flow	Increase	Slip Flow	Increase
A12 J24 ON	503	713	210	758	255	799	296
A12 J24 OFF	392	468	76	468	76	467	75
A12 J23 ON	555	964	409	1039	484	1114	**559**
A12 J23 OFF	435	533	98	533	98	534	99
A12 J22 ON	379	486	107	498	119	511	132
A12 J22 OFF	922	1102	180	1123	201	1144	222
A12 J21 ON	875	1008	133	1012	137	1015	140
A12 J21 OFF	756	940	184	946	190	952	196
A12 J20B ON	475	701	226	714	239	728	253
A12 J20B OFF	405	600	195	615	210	631	226
A12 J20A OFF	318	333	15	334	16	335	17

Red- highest flow
***Bold** largest increase*

Table 6.6: A12 slip road development flows and difference with changes to A12 J24 PM

Slip	2033 w/o development	Scenario					
		1		2		3	
		Slip Flow	Increase	Slip Flow	Increase	Slip Flow	Increase
A12 J24 ON	537	592	55	591	54	590	53
A12 J24 OFF	466	539	73	537	71	536	70
A12 J23 ON	372	406	34	407	35	407	35
A12 J23 OFF	456	473	17	475	19	477	21
A12 J22 ON	985	1203	218	1215	230	1228	243
A12 J22 OFF	447	639	192	649	202	659	212
A12 J21 ON	722	900	178	912	190	925	203
A12 J21 OFF	1106	1323	217	1330	224	1336	230
A12 J20B ON	460	766	306	790	330	813	**353**
A12 J20B OFF	451	761	310	782	331	803	352
A12 J20A OFF	378	383	5	383	5	383	5

Red- highest flow
***Bold** largest increase*

150. Table 6.5 and Table 6.6 show the development flows that are likely to use the A12 slip roads in the scenarios with changing A12 J24, and the difference between forecast 2033 flows excluding development flows and forecast 2033 flows including the development trips.

151. In the AM and PM peak periods, the high level of growth at the Garden Communities (Scenario 3) will lead to the largest increase in flows on the majority of slip roads assessed (except at A12 J24 Off-slip in both AM and PM peak periods, and A12 J24 On-slip and A12 J23 On-slip in the PM peak period), whilst overall, low growth (Scenario 1) will have a lesser impact on slip flows than the other scenarios.

152. The largest modelled increase in flows during the AM peak period is observed at A12 J23 on-slip (+559 vehicles) in Scenario 3, which is lower than Scenario 3 without change to A12 J24 (+646 vehicles).

153. The largest modelled increase in flows during the PM peak period is observed at A12 J20B On-slip (+353 vehicles) in Scenario 3, which is higher than Scenario 3 without change to A12 J24 (+346 vehicles).

6.2 A120 Slip Roads

6.2.1 Assessment results without changes to A12 J24

Table 6.7: A120 Slip Road Categories

Slip		Existing Layout	2033 w/o development	Scenario		
				1	2	3
AM	A120 B1256 ON	B	E	B	F	F
	A120 Pods Brook Rd B1256 ON	B	E	E	A or D	B
	A120 Pods Brook Rd B1256 OFF	A	A	A	A	A
	A120 A131 ON	B	B	F	C	F

Slip		Existing Layout	2033 w/o development	Scenario		
				1	2	3
	A120 A131 OFF	A	A	A	C	C
	A120 London Road ON	A	E	A or D	E	E
	A120 London Road OFF	A	A	A	C	A
PM	A120 B1256 ON	B	A or D	E	F	G
	A120 Pods Brook Rd B1256 ON	B	E	A or D	A or D	A or D
	A120 Pods Brook Rd B1256 OFF	A	A	A	A	D
	A120 A131 ON	B	E	A or D	E	E
	A120 A131 OFF	A	A	A	A	A
	A120 London Road ON	A	A or D	A or D	A or D	A or D
	A120 London Road OFF	A	A	A	C	A

Orange highlight- where change in slip design is likely required
Red - where change in slip design is likely required in all scenarios

154. Table 6.7 indicates that development lower Garden Community growth (Scenario 1) is likely to have the least impact on the A120 slip roads in terms of changes to junction design category, while scenarios 2 and 3 are likely to have the most impact (require the most changes). However it should be noted that around half the slip roads are modelled to be likely to be sub-standard as a result of background growth alone, not just Local Plan growth.

155. The A120 A131 On-slip show a required change in all AM scenarios, whilst the A120 B1256 On-slip, A120 Pods Brook Road B1256 On-slip, and the A120 A131 On-slip show a required change in all PM scenarios. Therefore, the A120 A131 On-slip is likely to require an alteration regardless of the levels of growth in the Garden Communities and without a change to A12 J24, as required change is indicated in both AM and PM peak scenarios.

Table 6.8: A120 Slip road development flows and difference without changes to A12 J24 AM

Slip	2033 w/o development	Scenarios					
		1		2		3	
		Slip Flow	Increase	Slip Flow	Increase	Slip Flow	Increase
A120 B1256 ON	356	1069	713	1468	1112	1864	**1508**
A120 Pods Brook Rd B1256 ON	386	939	553	955	569	972	586
A120 Pods Brook Rd B1256 OFF	315	801	486	957	642	1106	791
A120 A131 ON	943	1288	345	1381	438	1455	512
A120 A131 OFF	585	955	370	970	385	982	397
A120 London Road ON	248	670	422	684	436	699	451
A120 London Road OFF	275	275	0	275	0	275	0

Red- highest flow
***Bold** largest increase*

Table 6.9: A120 Slip road development flows and difference without changes to A12 J24 PM

Slip	2033 w/o development	Scenarios					
		1		2		3	
		Slip Flow	Increase	Slip Flow	Increase	Slip Flow	Increase
A120 B1256 ON	345	970	625	1324	979	1664	**1319**
A120 Pods Brook Rd B1256 ON	425	498	73	507	82	515	90
A120 Pods Brook Rd B1256 OFF	734	1376	642	1597	863	1801	1067
A120 A131 ON	394	620	226	703	309	784	390
A120 A131 OFF	269	740	471	746	477	755	486
A120 London Road ON	124	143	19	145	21	148	24
A120 London Road OFF	323	323	0	323	0	323	0

Red- highest flow
***Bold** largest increase*

156. Table 6.8 and Table 6.9 show the development flows that have been forecast to use the A120 slip roads in the scenarios without changing A12 J24 in the AM and PM peak periods respectively. Scenario 3 is likely to lead to the largest increase in flows on all of the A120 slip roads assessed (except A120 London Off-slip, where there is no change occurring) during both AM and PM peak periods.

157. The largest modelled increase in flows during the AM and PM peak periods is observed at the A120 B1256 On-slip near Rayne (+1508 vehicles in AM peak and +1319 vehicles in PM peak).

6.2.2 Assessment results with changes to A12 J24

158. The differences in flow category of slips between the scenarios with and without changing A12 J24 suggests that there would be no change as a result of any alteration to A12 J24 to all the slips considered.

Table 6.10: A120 Slip road development flows and difference with changes to A12 J24 AM

Slip	2033 w/o development	Scenario					
		1		2		3	
		Slip Flow	Change	Slip Flow	Change	Slip Flow	Change
A120 B1256 ON	356	1069	713	1468	1112	1864	**1508**
A120 Pods Brook Rd B1256 ON	386	939	553	955	569	972	586
A120 Pods Brook Rd B1256 OFF	315	801	486	957	642	1106	791
A120 A131 ON	943	1288	345	1381	438	1455	512
A120 A131 OFF	585	955	370	970	385	982	397
A120 London Road ON	248	669	421	684	436	699	451
A120 London Road OFF	275	275	0	275	0	275	0

Red- highest flow
***Bold** largest increase*

Table 6.11: A120 Slip road development flows and difference with changes to A12 J24 PM

Slip	2033 w/o development	Scenario					
		1		2		3	
		Slip Flow	Increase	Slip Flow	Increase	Slip Flow	Increase
A120 B1256 ON	345	970	625	1324	979	1664	**1319**
A120 Pods Brook Rd B1256 ON	425	496	71	505	80	514	89
A120 Pods Brook Rd B1256 OFF	734	1376	642	1597	863	1801	1067
A120 A131 ON	394	620	226	703	309	784	390
A120 A131 OFF	269	739	470	746	477	755	486
A120 London Road ON	124	262	138	267	143	271	147
A120 London Road OFF	323	323	0	323	0	323	0

Red- highest flow
***Bold** largest increase*

159. Table 6.10 and Table 6.11 show the development flows that may use the A120 slip roads, and the difference between forecast 2033 flows excluding development flows and forecast 2033 flows including the development trips.

160. In both peak periods, high growth at the Garden Communities (Scenario 3) is likely to lead to the largest increase in flows on the all the slip roads assessed (except at A120 London Road Off-slip, where there is no change), whilst low growth (Scenario 1) will have the least impact on slip flows.

161. The largest increase in flows during the AM and PM peak periods is observed at A120 B1256 On-slip (+1508 and +1319 vehicles respectively) in Scenario 3 with a change to A12 J24 (also the case for Scenario 3 without a change to A12 J24), whilst the largest increase in flows during the PM peak period is observed at A12 J20B Off-slip (+346 vehicles) in Scenario 3 with changing A12 J24 (also the case for Scenario 3 without a change to A12 J24).

6.3 A120 Junction Impacts

162. The tables below outline the Local Plan development flows that have been forecast to use the M11 / A120, A120 / A12 and Galleys Corner junctions in each scenario. These flows may be subject to change depending on the outcome of the Garden Communities work.

Table 6.12: Development flows at M11 J8 and Stansted Airport

	Direction	Scenario					
		Kelvedon junction Existing			With Kelvedon junction All Moves		
		1	2	3	1	2	3
AM	To M11	440	513	585	440	513	585
	From M11	322	367	412	322	367	412
PM	To M11	270	315	360	270	315	360
	From M11	335	391	448	335	391	448
AM	To Stansted airport	147	182	218	147	182	218
	From Stansted airport	73	85	97	73	85	97

PM	To Stansted airport	94	115	136	94	115	136
	From Stansted airport	134	166	198	134	166	198

163. The assessment suggests that the varying levels of growth at the Garden Communities will impact on the flows towards the M11 and Stansted Airport. This is shown by the fact that the low growth scenario (Scenario 1) is likely to have the least impact on the M11 / A120 junction, and on the Stansted Airport junction in both peak periods in terms of volume of traffic flows heading to and from the junction. There is no observed difference between the scenarios with and without a change to A12 J24, and therefore the change to the junction is unlikely to have an impact on flows to and from the M11 and Stansted Airport.

Table 6.13: Development flows at the A120 / A12 Marks Tey junction

	Direction	Scenario					
		Kelvedon junction Existing			With Kelvedon junction All Moves		
		1	2	3	1	2	3
AM	A12 NB	353	378	403	351	376	401
	A12 SB	135	136	136	135	136	136
	From A120	37	61	85	37	61	85
PM	A12 NB	186	186	184	146	146	146
	A12 SB	176	179	181	176	179	181
	From A120	127	168	209	127	168	209

Red- higher flows between existing junction and all moves junction

164. As with the M11, the A120 / A12 junction at Marks Tey will be influenced by the levels of growth at the Garden Communities. Likewise there is potential that the assumptions on which these flows are based may change depending on the outcome of ongoing work looking at the Garden Communities in more detail. Scenario 1 is likely to have the least impact on the A120 / A12 junction in both peak periods in terms of volume of traffic heading through the junction and coming from the A120. Scenario 3 is likely to have the most impact on the A120 / A12 junction in both peak periods.

165. The flows for each link are likely to be slightly higher on the A12 NB in both peak periods and the A120 in the PM peak period in the scenarios without changing A12 J24 compared to the scenarios with a change (except for Scenario 3 in PM peak period where flows are the same).

Table 6.14: Development flows at Galleys Corner

	Entering From	Scenario					
		Kelvedon junction Existing			With Kelvedon junction All Moves		
		1	2	3	1	2	3
AM	A131	438	624	813	438	624	813
	Long Green	80	87	92	76	83	88
	B1018	40	45	50	39	44	49
	A120	1411	1686	1964	1410	1685	1964
	Cressing Rd	182	217	251	180	215	249
PM	A131	1351	1593	1837	1344	1586	1830
	Long Green	562	599	632	531	562	590
	B1018	175	186	197	78	87	97

	A120	410	580	753	523	694	868
	Cressing Rd	128	148	169	127	147	167

Red- higher flows between existing junction and all moves junction

166. Lower levels of growth at the Garden Communities is likely to have less impact on Galleys Corner in both peak periods in terms of volume of traffic entering the junction from each arm for both scenarios with and without changing A12 J24. Improvements at A12 J24 may lead to decreases in AM and PM peak period flows on each arm, except on the A120 in the PM peak period, where there is an increase of 113-115 vehicles.

6.4 Sudbury Impacts

Table 6.15: Development flows to and from Sudbury

Direction	Scenario					
	Kelvedon junction Existing			With Kelvedon junction All Moves		
	1	2	3	1	2	3
To Sudbury (AM)	57	60	63	57	60	63
From Sudbury (AM)	107	110	114	107	110	114
To Sudbury (PM)	110	105	101	106	101	97
From Sudbury (PM)	78	83	89	78	83	89

167. It is not anticipated that the different levels of growth at the Garden Communities will significantly alter traffic flows to or from Sudbury as shown in the table above. However Scenario 1 with and without changing A12 J24 is likely to have the lowest traffic flows to and from Sudbury in both peak periods, while Scenario 2 is likely to have the highest flows overall. Changing A12 J24 is likely to lead to a small decrease in flows to Sudbury during the PM peak period, however there is no forecast change in flows to and from Sudbury in the AM peak period.

6.5 Great Dunmow Impacts

Table 6.16: Development flows to and from Great Dunmow

Direction	Scenario					
	Kelvedon junction Existing			With Kelvedon junction All Moves		
	1	2	3	1	2	3
To Gt Dunmow (AM)	74	124	173	74	124	173
From Gt Dunmow (AM)	37	62	87	37	62	87
To Gt Dunmow (PM)	41	68	95	41	68	95
From Gt Dunmow (PM)	57	95	133	57	95	133

168. Table 6.16 indicates that flows towards Great Dunmow are likely to be affected by the level of growth at the West Braintree Garden Community. The modelling however suggests that the flows towards Great Dunmow are likely to be relatively low. It should be noted that the ongoing Garden Communities work may refine the trip distribution which may alter the forecast flows towards Great Dunmow. The modelling also suggests that allowing all movements at the junction on the A12 at Kelvedon is unlikely to have any impact on the flows towards Great Dunmow.

7. Mitigation

7.1 Junction Options

Table 7.1: Summary of junction mitigation options

Junction	Forecast over capacity in 2033? (Y/N)	Are mitigation proposals required? (Y/N)	What mitigation has been considered?	Suggested Mitigation
A120 – Colne Road, Coggeshall	Y	Y	Highways England are working on options for this junction. It will also be affected by any new A120 route.	N/A
A131 – London Road, Great Notley	Y	Y	Option 1: Widening of A131 North approach and London Road North-East approach	Option 1
A1124 – Church Hill, Earls Colne	Y	Y	Option 1: Signalisation of the junction	Option 1
Aetheric Road, Braintree	Y	Y	Options to improve junction are limited but are the subject of a separate study. Reduced car trip generation through e.g. modal shift will be required	Possible improvements to be confirmed Modal shift measures
Broad Road, Braintree	Y	Y	Option 1: Free flow left slip from A131N outside of highway boundary. Option 2: Free flow left slip from A131N inside highway boundary and relocation of roundabout. Option 3: Signalisation of junction with free flow left slip from A131N. Option 4: Free flow left slip from A131N and relocation of roundabout. Free flow left slip from A131S to Broad Road. Separation of lanes to create a free flow straight ahead from Broad Road to A131N.	Option 4
Chipping Hill, Witham	Y	Y	Option 1: Signalisation of the junction. Option 2: Creation of a standard roundabout.	Modal shift measures
Church Lane, Braintree	Y	Y	Option 1: Signalisation of the junction.	Modal shift measures

Junction	Forecast over capacity in 2033? (Y/N)	Are mitigation proposals required? (Y/N)	What mitigation has been considered?	Suggested Mitigation
Courtauld Road – Coggeshall Road, Braintree	Y	Y	No possible infrastructure mitigation could be identified at this junction. Reduced car trip generation through e.g. modal shift will be required.	Modal shift measures
Cressing Road – Coggeshall Road, Braintree	Y	Y	Option 1: Double-mini roundabout (short term). Option 2: Alterations to phasing of signals.	Reduced car trip generation through e.g. modal shift will be required. as limited space for implementation of Option 1 and the current phasing of the signals cannot be optimised further.
Cuckoo Way, Great Notley	Y	Y	Option 1: Widening of both A131 approaches	Option 1
Deanery Hill, Braintree	Y	Y	Option 1: Mini-roundabout Option 2: Signalised junction	Option 2
Feering Hill, Kelvedon	Y	Y	Option 1: Widening of Coggeshall Road approach	Option 1, but assumes all movements possible at A12 J24.
Gershwin Boulevard, Witham	N	N	Mitigation is being provided as part of a planning application in south Witham.	N/A
Head Street, Halstead	Y	Y	No possible infrastructure mitigation could be identified at this junction. A bypass or modal shift measures are required.	Modal shift measures
Maldon Road – The Street, Hatfield Peverel	Y	Y	Limited infrastructure mitigation could be identified at this junction. A bypass or modal shift measures are required.	Modal shift measures – improved passenger transport links. A12 improvements.
Marks Farm, Braintree	Y	Y	Highways England are working on options for this junction. It will also be affected by any new A120 route.	N/A

Junction	Forecast over capacity in 2033? (Y/N)	Are mitigation proposals required? (Y/N)	What mitigation has been considered?	Suggested Mitigation
Newland Street, Witham	Y	Y	Option 1: Optimisation of signal timings. Option 2: Ban of all movements from Maldon Road.	Options 1 and 2 Modal shift measures
Panners Interchange, Braintree / Great Notley	Y	Y	Option 1: Widening of Pods Brook Road and A120 eastbound off slip to 2 lanes. Option 2: Signalisation of A120 Eastbound off-slip approach, south – north link approach & A120 westbound off-slip approach.	Modal shift measures
Rickstones Road, Witham	Y	Y	Mitigation being provided by Forest Road developer. Option 1: Signalisation of junction	Modal shift measures
Rye Mill Lane, Kelvedon	Y	Y	Option 1: Signalisation of the junction. Option 2: Creation of a double-mini roundabout junction.	Option 1, but assumes all movements possible at A12 J24.
Springwood Drive, Braintree	Y	Y	Option 1: Enlarged roundabout Option 2: NE slip lane Option 3: Signalised crossroads	Option 1

7.2 Public Transport

7.2.1 Existing Situation

169. A number of operators currently provide the bus services in the Braintree District. Maps of the bus route frequencies in the District for the AM and PM peaks can be seen in Appendix J. Overall, there are seven bus operators who run services in Braintree District. Days of operation and service frequency vary greatly between these services. Bus infrastructure varies in design and quality which is a result of management by different parties, with no single authority responsible for all bus infrastructure in the District.

170. Around 85% of bus services in Essex are commercially operated. It is however lower in Braintree District with Essex County Council funding the majority of evening and weekend services. Most recently many of the rural services have been replaced by Demand Responsive Services with the aim of increasing the number of passengers using public transport and giving residents more transport opportunities, which in turn will allow older rural residents to remain in their homes for longer and more employment and education opportunities for all.

171. ECC's passenger transport team have identified existing issues as: decreasing passenger numbers, a lack of service frequency reducing the potential to create a modal shift, increasing levels of congestion impacting on the running and reliability of bus services, the cost of running the services, and a lack of an integrated public transport service.

172. The two main improvements that the ECC passenger transport team would like to see are: a better use of resources to integrate all services into one in order to reduce the costs of running / supporting the existing services; and reduced congestion in order to improve the reliability of bus services.

173. In order to encourage a modal shift away from car, thereby reducing the number of car trips, there need to be suitable alternative methods of travel. A table outlining the potential for the proposed developments to link to existing bus routes can be found in Appendix I. To achieve a reduction in congestion / modal shift, emphasis needs to be placed on improving sustainable travel modes, i.e. making viable public transport routes that operate smoothly, potentially having priority over private car travel, thus making public transport / sustainable travel a more appealing method of travel.

7.2.2 Impact of site location

174. The likely potential for each of the sites included in the previous stage of work to facilitate public transport services, walking and cycling was assessed in the "Braintree Local Plan: Note on Sustainable Transport Accessibility Assessment".

175. This demonstrated that sites in Witham and Braintree would have a high potential for encouraging use of sustainable transport, while larger Garden Settlements would have a high future potential for encouraging use of sustainable transport, but in the existing situation their potential would be very low. With regard to the Garden Settlements, careful consideration will need to be given as to how sustainable transport can be encouraged in the early stages of their development. Sites around the smaller villages, Silver End, Rayne, Kelvedon and/ Halstead, would have a low existing and low future potential for sustainable transport provision, unless the development is substantial enough to support a bus service. Particularly relative small employment sites away from existing larger communities make public transport provision challenging.

176. It is expected that larger development sites (+1000 homes) should be served by bus services, particularly in areas that are extensions of existing urban areas, to reduce the number of car trips generated. A map showing the key potential bus links can be found in Appendix K which indicates where potential new bus routes ought to be considered based on the assumed trip distribution. ECC need to seek to collaborate with developers and bus operators to ensure new or enhanced services are incorporated into any discussions for new infrastructure and developer contributions on larger development sites are agreed at the planning application stage.

7.2.3 Strategic routes

177. The Interim Assessment stage of work, using the previous trip distribution identified a number of the key corridors and potential car trip movements. A similar exercise has been carried out during this stage of work using the refined trip distribution and also focussing more on specific development sites. As noted above sites of over 1000 homes would be expected to be served by a regular bus service and so these have been investigated in particular. However the cumulative impact of sites has also been investigated along with short distance trips that could be replaced if there was a regular bus.

178. Through analysis of the assumed trip distribution it is clear that there will be increased pressure on many of the existing strategic roads (A131, A120 and A12). The Garden Communities work, in particular, is likely to focus on making public transport improvements to these corridors along with identifying other key links.

7.2.3.1 Links from existing settlements

179. Many of the trips from Braintree were found to be heading towards the M11 / Stansted, Witham, Chelmsford and Colchester. As Witham and Chelmsford are both on the existing rail line, emphasis should be placed on improving the rail link and access to / from the rail stations. The area will benefit from improved bus services to the rail stations. Braintree rail station is currently the focus of a separate station access study which is likely to provide recommendations for improving access.

180. Developments around Great Notley would also be expected to generate a number of short trips around the developments and into Braintree. There is currently a good level of cycle infrastructure provision and there are regular bus services to and from Great Notley. Further infrastructure and services would support the developments and encourage sustainable travel in the area.

181. Likewise in Hatfield Peverel, the assumed trip distribution suggests that the majority of trips will head northbound on the A12. Widening of the A12 will help support these trips, however links to the rail station should be explored. Options to improve accessibility to the rail station have been assessed in the "Hatfield Peverel Station Access" report (March 2016) which found that utilising bus services to the station is currently not an attractive option due to the distance from the nearest bus stop to the station. It is noted that the closure of the Arla Foods factory, and now proposed development site, may provide an opportunity to expand the station car park. This could free up space in the existing car park to allow buses to serve the station from the south. Although services from the north would likely be restricted by the railway bridge, this is less of an issue as there are few settlements or proposed developments north of Hatfield Peverel that would require bus access via this route.

182. The modelling suggests that trips from Halstead will likely be distributed towards Braintree and Colchester. There are no rail services and there are congestion issues along the routes to both towns. The route between Braintree and Halstead is being assessed as part of the A131 Braintree to Sudbury Route Based Strategy. Bus services between these locations will help provide an alternative for existing car trips and also reduce the potential for increased congestion from the development trips. However the Route Based Strategy, although under review, has found limited options for improvement without significant cost attached.

183. The majority of trips to / from Halstead are likely to be generated as a result of the industrial estate in the east and any extension of this. It was found that there would likely be some trips from this area to Witham via Coggeshall and the A120 / Colne Road junction. The limited capacity at this junction of the minor arms would probably not make it a feasible bus route due to the likely delay and so if demand develops for such a route, consideration will need to be given to improvements at the A120 / Colne Road junction to facilitate bus services or an alternative route between the two settlements.

184. Modelling indicates that trips to / from Kelvedon have a wide trip distribution with many heading towards Braintree, the A12 south (Witham, Chelmsford), and some on the A12 north (Marks Tey / Colchester). The majority of these destinations are on the rail line and so access to the rail station can be improved with the introduction of a local circular bus service in order to encourage sustainable travel to the station. It is known that there are issues with station users parking on the High Street – in order to mitigate this, parking restrictions could be considered and enforced and alternative measures, such as a bus service provided. Expanding the car park at the station would likely further worsen congestion problems in the area, by attracting more car trips and reduce the likelihood of a bus service being well used.

7.2.4 Impact of improved bus services

185. There are few studies that have looked at the impact of improving bus services. However, the University of Leeds conducted a study in conjunction with the Institute for Transport Studies, which looked at the link between Buses and Economic Growth. The study estimated that 360,000 people are in a better, more productive job than they could otherwise access, and 30,000 people would not be in the UK labour market without bus services.

186. The study identified that bus services provide access to education and training, especially for deprived areas and supports the vitality of urban centres by providing access to retail and leisure facilities.

187. 20% of those interviewed as part of the study stated that they had not applied for or had turned down a job due to the lack of a suitable bus service between their origin and the job.

188. However the study did note that fares and journey times were key factors in the decision making process as to whether or not one ought to utilise the bus as a method of travel.

189. It can therefore be concluded from the few studies that have been undertaken that improving the bus services will likely reduce the number of car trips and bring economic benefits, however this will be dependent on journey times, journey time reliability and fares.

190. However, there have been some studies into the effect of soft measures to improve bus usage which have had positive impacts. A case study in Brighton implemented multiple soft measures including one-stop travel information shops covering all modes in the town centre and at the railway station, a colour-coded bus network, phone-based travel enquiry service, leaflets to promote bus access for leisure walks in the surrounding rural area, large, free-standing, real-time information displays 3m away from

bus shelters intended to attract motorists attention, and a very simple ticketing system with a flat fare of £1 for any trip. Over 10 years, this saw a 50% increase in bus patronage. Another study found the most significant soft measures on influencing modal shift were air conditioning, CCTV recording, and having a smooth journey. Greener Journeys, a coalition of bus companies and other interested parties, have found through their studies in targeting drivers to switch modes to taking the bus that a community radio was very effective in changing attitudes. However, in terms of the most cost-effective soft bus improvements, the best measure was service simplification, followed by effective promotion and high quality signage and information. There was a general consensus across multiple studies that emphasised the need to implement multiple strategies and sustain them.

191. Combining bus and cycle improvements can also bring benefits as demonstrated in Brighton when the Lewes Road corridor was transformed to include a dedicated bus lane with a widened cycle lane, floating bus stops with cycle lanes passing behind to remove conflict and additional pedestrian and cycle crossing facilities after receiving funding from the Local Sustainable Transport Fund (LSTF). This delivered a sustained increase in cycling by 13% and bus use by 9% in 2 years, as well as reducing general traffic on Lewes Road by 15%. An example of the effect soft factors can have is when Next, the fashion retailer, ran activities for staff at the Head Office and Gedding Road sites to encourage more sustainable travel, including taking pledges and a daily £1 travel voucher to redeem in Next staff shops. Of the 4,200 staff in these offices, 28% now travel sustainably every day. Another case study of soft measures is from a small scale pilot study in Gloucester which utilised individualised marketing achieved a 9% reduction in car use. The Department for Transport is now piloting fourteen more studies using this approach.

7.3 Cycling

7.3.1 Existing Situation

192. Both Braintree and Witham have some existing cycle infrastructure, however it is largely sporadic with few clearly defined routes. Therefore the existing situation does not encourage or support short local trips by bicycle, while cycle access to the rail stations within the District is limited with only Braintree having a clearly defined route from the west along Flitch Way.

193. However none of the other main settlements within the District have any cycling infrastructure, and at this point in time, the Draft District Cycling Action Plan only includes proposals for Halstead, not Hatfield Peverel or Kelvedon. Given that it has been noted that access to the rail stations by sustainable means ought to be improved, consideration should be given to providing cycle links to these stations.

194. Cycling levels in the District are around the mid-point for Essex, and the propensity to cycle within the District is reasonable, thus suggesting that it is possible that improved cycling facilities and encouragement of cycling will lead to a great uptake in the number of people cycling.

7.3.2 Impact of site location

195. As with the potential for bus services within the development sites, a number of the sites lend themselves to connecting with existing cycle infrastructure / proposed cycle infrastructure in order to develop a coherent and consistent cycle network within the towns and the District. All development sites would be expected to include cycle infrastructure, whilst larger development sites would likely have a number of internal short trips that can be made by bicycle. A map showing the potential links to existing and proposed cycle routes that developments could make is shown in Appendix L.

7.3.3 Impact of improved cycle facilities

196. A number of studies have been undertaken in order to assess the impact of improving cycling levels through the provision of infrastructure, promotion / marketing of cycling and cycle training. The majority of these studies have taken place between 2004 and 2009, with the two most prominent being; “The Effects of Smarter Choice Programmes in the Sustainable Travel Towns: Summary Report” by the DfT and; “Cycling Demonstration Towns Monitoring Project Report 2006 to 2009” by Cycling England. These studies took place in 8 different towns / cities in a variety of locations within the UK.

197. The studies found that cycling levels increased by between 3% and 55%, with an average increase of around 23% in each location over a 4 – 5 year period, whilst the percentage decrease in vehicle trips

was around -2.5% over the same period. Relative to the number of existing car trips to the number of existing cycle trips, -2.5% over the 4-5 years equates to a fairly significant number of vehicles.

198. The clear suggestion from these studies is that a targeted and integrated approach to improving levels of cycling leads to a positive result and modal shift. The Essex Cycle Strategy and the subsequent District Cycling Action Plans aim to provide this kind of approach which will help to boost cycling levels in the District.

199. As noted above, modelling suggests that many of the development trips are between locations with existing rail links and therefore improving access to / from the stations for sustainable transport modes could help to reduce the number of car trips. As a result, cycle access to all stations within the District should be improved.

7.3.3.1 Commuter Cycling

200. It is important to consider when encouraging people to cycle to work both the journey and the destination. The journey will mean investment in hard measures, including cycle paths, and reallocation of road space. The destination of cycle trips also will need to accommodate cyclists, such as secured bicycle parking, and showers. In a case study, Babcock International workplace in central Colchester developed a strong cycling community which is coordinated by a Cycle Champion. This has caused a rise in the proportion of employees cycling to work to 18% and also encouraged employees to car share resulting in 8% of employees travelling together.

201. Another influence on commuter cycling is ease of switching modes, namely cycling to the train station. Leeds and now Chelmsford have a CyclePoint which offers secure parking, repair facilities and most importantly located next to the train station. Although it is not suggested that all stations have cycle points, secure, easy to access and covered cycle parking is a determining factor in whether people choose to cycle to the rail stations or not.

7.3.3.2 Cycling to school

202. From the work undertaken to derive a trip distribution for education trips, it was clear, that while some schools have a very low modal share for car trips, others have a significant number of car trips. A way to change this, alongside improving public transport links, would be to improve cycle links, particularly to secondary schools but also primary schools as well.

203. The Pupil Level Annual School Census (PLASC) collects data from over 550 schools, primary and secondary, in Essex. This data showed that Braintree had a below average percentage share for public transport, car/taxi, car share and cycling. Braintree was above average for walking, and other methods of travel. A case study of measures to encourage sustainable travel within a school can be seen in Long Crendon School. Using multiple initiatives, including the election of a Junior Road Safety Office, footsteps training for Year 1 and promotion of ‘Park Away Days’, car use decreased from 33.3% in the academic year 2011/2012 to 15.3% in the academic year 2013/2014. 13% students also use ‘Park and ‘Stride’ now as well.

204. A local case study, is an initiative undertaken by the Tyrrells Primary School in Chelmsford, which included providing parking for bicycles and scooters, Dr Bike mechanics visiting the school and lobbying politicians to make areas around the school safer. The percentage of pupils cycling to school increased from 1% to 7% and the number walking to school increased from 9% to 59%. The percentage of those driving to school decreased from 38% to 29%.

205. More generally, Southend-on-Sea Borough Council piloted seven Bikeability Plus modules. The effect of this was the number of children cycling to school at least once a week doubled.

7.4 Rail

206. There is currently an ongoing study looking at options for improving the Braintree branch line. What has become clear from the previous stage modelling work, is that many car trips could potentially be made by rail.

207. However due to the current nature of the Braintree branch line (single track from Witham to Braintree), rail is not the most popular or feasible method of travel within the District due to the infrequency of the

trains. With the exception of Witham, this is a problem at all the stations within the District. Halstead has no rail links.

208. Furthermore any proposed Garden Settlements are unlikely to have rail links, due to the expense and land take associated with building new rail infrastructure. Therefore it will very important that there are good bus services and cycle facilities to / from these settlements and those that live there to work there are encouraged to use them. However, it is acknowledged that the West of Colchester Garden Settlement may have the potential to relocate the Marks Tey rail station in order to provide a rail connection and that work is ongoing looking at potential links to the Garden Communities.

209. The provision of an improved rail service from Braintree would also likely reduce the number of car trips to Witham rail station and potentially Beaulieu Park station. However it should be noted that any expansion in the car park at Witham or a car park of significant size at the proposed Beaulieu Park station near Chelmsford will only encourage car trips and will likely detract from the provision of bus services or cycle infrastructure.

7.4.1 Opportunities to improve train travel

210. A DfT report, "A strategy for improving sustainable transport" (2013) highlighted the key barriers to rail travel in the UK as shown in Figure 7.1 below. As shown in the pie chart, the main barriers are cost, time and inconvenience.

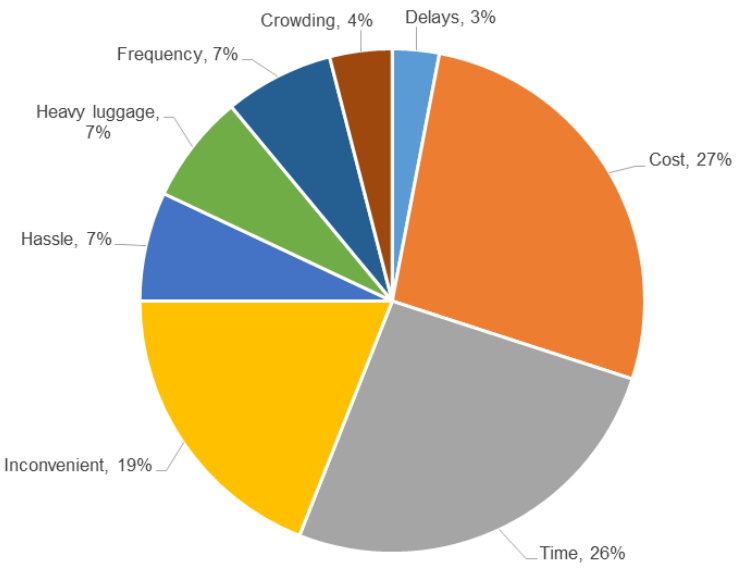

Figure 7.1: Why people do not take the train[3]

211. It is likely that a number of people in Braintree District, particularly those living near to the branch line stations, consider using the train as an inconvenience due to the low frequency of peak hour trains on the branch line and the lack of a direct link to Colchester / Stansted. Likewise it is cheaper for people to drive to key local employment centres such as Chelmsford.

212. Therefore consideration will need to be given to how people can be encouraged to take the train to work. A study is being undertaken looking at access to Braintree Station, which is likely to be completed in March 2017. Some of the preliminary findings are around improving the strategic links to the station, making train travel less of an "inconvenience" from Braintree.

[3] Department for Transport - Door to Door: A strategy for improving sustainable transport integration (March 2013)

7.5 Travel Planning

213. Essex County Council have recently published a `Sustainable Modes of Travel Strategy[4]',which outlines the steps ECC is taking to enable accessibility to places of employment and education for all, including other neighbourhood services such as retail and leisure; with the associated health, social and economic benefits to them and their communities.

214. The Strategy promotes the implementation of a number of travel plans, including: Workplace Travel Planning Initiatives, Residential Travel Planning; School, Hospital and Airport Travel Planning; Neighbourhood/Community Travel Plans; and Personalised Travel Planning (PTP). Such measures are implemented through Policy DM10 – Travel Plans, in the adopted Development Management Policies, which requires Travel Plans to be prepared on all new residential developments of 250 dwellings or more and non-residential proposals with 50 employees or more.

[4] Essex County Council. Sustainable Modes of Travel Strategy (August 2016).

8. Conclusion

215. Essex Highways Transport Planning team have been commissioned by Essex County Council (ECC) and Braintree District Council (BDC) to assess the likely transport impact of the Local Plan preferred option and identify possible mitigation measures. BDC provided a list of sites to be modelled as their preferred option, including three variations in housing growth and associated employment at the Garden Communities. In the low growth scenario approximately 12,000 homes and 7,500 jobs are forecast to be created by 2033, whereas approximately 16,000 homes and 9,500 jobs are forecast to be created by 2033 in the high growth scenario.

216. To refine the work done as part of the assessment of interim proposals, the trip distribution used to assess the likely impact on the road network of these scenarios considered census journey to work trips, education trips (AM only) and other trip types separately. The analysis was based on conventional, and likely robust, trip generation rates and modal choice for new developments which were added to forecast background growth and included background growth based on forecasts by the Department for Transport.

217. 21 key junctions were identified for more detailed assessment, including investigating the impact of possible improvements to the junctions to better accommodate growth in traffic. Without such mitigating measures only one of the junctions was shown to be able to accommodate 2033 forecast demand. It should be acknowledged however that 11 of the junctions are currently at capacity and are forecast to be over capacity in 2033 with background growth alone. Two of these junctions could be mitigated, although one of these relies on the implementation of an all movements junction at J24 on the A12. At a further six junctions it was possible to recommend specific improvements that will alleviate future forecast demand. One of these is also dependent on the implementation of an all movements junction at J24 on the A12. A further two junctions are being studied by Highways England on the A120 for short term improvements prior to any possible new A120 route. There is also ongoing work to refine trop generation characteristics of the proposed Garden Communities.

218. There are several other studies and planning underway and plans being developed that if it they comes to fruition will bring about capacity improvements to the network. This includes the A12 widening project, the A120 route study, proposals for additional slip roads on the A120 and an Integrated Transport Plan for Braintree.

219. It is clear that using conventional and accepted analysis of forecast trips, it will not be possible to accommodate the forecast vehicle trips on the network, despite even with significant junction improvements. In addition to infrastructure improvements, there will have to be significant interventions to reduce the demand for private car travel and improve public transport, cycling and walking provision and uptake.