South West Billericay Link Road

Supplementary Transport Modelling

December 2021

Document Control Sheet

Document prepared by:

Essex Highways
Floor 2, Seax House,
Victoria Road South,
Chelmsford,
Essex
CM1 1QH

T
E
W www.essex.gov.uk/highways

Table of revisions

Original Version Produced	25/10/2021	Draft for Comment	Issue 1
Reviewed	12/11/2021	Final	Issue 2
Minor Amendment	21/12/2021	Final	Issue 3

Distribution

Organisation	Contact	Number of Copies

Contents

Executive Summary

The Basildon Borough Council Local Plan makes provision for a 2km Link Road to the south west of Billericay, between A129 London Road and south east towards the junction of the B1007 Laindon Road, to secure housing growth in the town and alleviate the impact of traffic in the Billericay area. Following submission to the Secretary of State for examination in 2019, additional transport modelling and engineering studies have been completed. A public consultation on new evidence and proposed modifications to the Local Plan will take place in early 2022.

This Technical Note provides the outcomes of an updated assessment, using an improved modelling approach and data, to enhance the evidence base around the need for the Link Road, potential scale of the road and any complementary measures needed to mitigate the transport impacts of the Local Plan.

The concept of a Link Road has been explored in transport modelling terms throughout the preparation of the Local Plan evidence base using the most appropriate approach available at the time but, up until now, in the absence of a full dynamic highway assignment model to understand the full impacts. The recent delivery of Enhanced Essex Countywide Strategic Model (EECSM) has now made it possible to undertake dynamic assignment and has been used to provide an enhanced assessment of the scheme.

The key findings of the EECSM modelling assessment indicate:

- A Full Link Road is needed to mitigate new development in Billericay, as well as wider Local Plan growth.
- The conversion of Laindon Road to two-way is only likely to have localised impacts, but offers a complementary scheme that is needed to deliver additional benefit to the Full Link Road particularly at the A129 London Road / High Street / Sun Street junction.
- The Full Link Road is unlikely to have significant impacts beyond the A129/A176 corridor, in and around Billericay, but does offer some wider benefit by attracting traffic back on to the primary road network from lower classified rural routes.
- Other options have been investigated, over the course of this assessment and previous related work, including: a lower grade Development Only Link option; reversing Laindon Road and Sun Street one-ways; and isolated junction improvements on the A129/A176 corridor. These options are unlikely to deliver solutions to fully mitigate new development and wider Local Plan growth in Billericay to an acceptable level of traffic impact.

The outcomes have been compared with the wider parallel Basildon Local Plan Sensitivity Test (BLPST) work, assessing proposed modifications to the Local Plan, to maintain consistency and ensure any variations in outcome are considered. The two assessments rely on different data sources and modelling approaches and, consequently, EECSM does identify different reassignment patterns on the local highway network. However, both documents should be read together and similar conclusions are drawn from both

assessments supporting the need for the Full Link Road as well as the complementary conversion of Laindon Road to two-way to fully mitigate the impact of new development in Billericay and Local Plan growth.

The latest modelling is deemed appropriate for Local Plan testing and makes a case for a Full Link Road to the south west of Billericay. It is recommended that more detailed assessment is undertaken by site promoters, as development proposals are advanced in detail through the planning process, to fully understand the scale and form needed to serve different end users, including provision for public transport and active modes. EECSM could also be used to undertake further assessment if required.

1 Introduction

The Basildon Borough Council (BBC) Local Plan (LP) makes provision for a 2km Link Road to the south west of Billericay, between A129 London Road and south east towards the junction of the B1007 Laindon Road (indicative route shown in Figure 1) to secure housing growth in the town and alleviate the impact of traffic in the Billericay area. Following submission to the Secretary of State in 2019, the Basildon Borough Council (BBC) Local Plan (LP) has been subject to additional transport modelling and engineering studies. A public consultation on new evidence and proposed modifications to the LP will take place in early 2022. The LP makes provision for a 2km Link Road to the south west of Billericay, between A129 London Road and south east towards the junction of the B1007 Laindon Road (indicative route shown in Figure 1), to secure housing growth in the town and alleviate the impacts of LP growth in Billericay town centre.

Figure 1 Indicative Link Road Route

The concept of a link road has previously been tested through the Basildon LP Transport & Highways Impact Assessments (THIA Part 1 – 2017 & THIA Part 2 – 2018), as part of the supporting LP evidence, and was shown to mitigate the likely traffic impact of LP housing growth on the key A129/A176 corridor through the town. Since the initial THIA work, Essex Highways have undertaken more detailed design feasibility of the likely route and Essex County Council (ECC) and BBC have requested further evidence to confirm the overall need for infrastructure to support the promotion of the route in the LP and also help inform the eventual scale of design.

The Enhanced Essex Countywide Strategic Model (EECSM) (also known as the South Essex Model), developed from the Essex Countywide Strategic Model, has recently been made available and provides a more appropriate tool than the previous THIA spreadsheet-based approach, to assess the road more robustly under given scenarios and provide the required enhancement to the evidence base. This Technical Note summarises the outcomes of this assessment to better understand the need for infrastructure.

2 Background and Need for Assessment

The concept of a Link Road has been considered at different stages of the LP evidence base development and making best use of the information available at the time. Until recently, modelling assessments have been restricted to manual assumptions and undertaken in the absence of a dynamic highway assignment model to fully understand the impacts of different interventions.

Previous assessments, including BBC's commissioned High Level Development Framework (Pell Frischman – 2017) and the Part 1 & 2 THIAs (2017/18), have indicated that the introduction of a Link Road is likely to have a beneficial impact on the highway network in and around the A129/A176 corridor through Billericay. However, the assessments also indicated that the level of impact could be sensitive to the eventual scale of actual reassignment and the in-combination effects of other associated highway changes including proposals to remove the Laindon Road one-way restriction. This is considered the case for either a development only access (with limited through traffic) or a more strategic full Link Road (for through traffic and development access), of which, both options have not yet been fully tested to date in the absence of an appropriate modelling tool.

The passage of time, potential challenges to delivery, scale of mitigation needed and the availability of EECSM provide an opportunity for a more robust assessment of the scheme to be undertaken and better understand the need for infrastructure.

3 Related Studies

The potential need for a link road was initially identified in early testing of the LP including a Highway Mitigation Modelling Technical Note (2015) prepared by Jacobs on behalf of Essex Highways. The concept was explored further in the following work commissioned by BBC.

South West Billericay High Level Development Framework (2017) – Pell Frischmann

This is one of three high level development frameworks (HLDFs) prepared by Pell Frischmann for three strategic sites proposed to be allocated in the new LP. This included the South West Billericay development site (H17), with proposals for a significant level of housing and an integrated highway relief route to serve the new development and existing community. The South West Billericay HLDF made assumptions on the 2015 mitigation

modelling and outlined that, while emphasis shall be placed on encouraging more sustainable modes of transport, improvement to the infrastructure is needed to enable the proposed residential development at this location and ease the congestion in the town centre, guided by the approximate route identified in the Draft Local Plan, including:

- New relief road to form a south-western Billericay Link Road to accommodate growth in this location and to ease congestion through the town centre, linking the Laindon Road / Noak Hill roundabout with London Road
- The new relief road will also provide the capacity to accommodate future traffic associated with proposed developments and growth in the town centre
- New arm onto the existing A176/Laindon Road roundabout
- Relief road forms new junctions with Frithwood Lane and Tye Common Road (major changes to road geometry and priority)
- New signalised junction with A129 London Road
- Cycling and public transport improvements – facilitate modal shift towards active and sustainable transport.

The South West Billericay HLDF expanded on the initial Highway Mitigation Modelling (2015) and provided an initial case for the Link Road to serve the new development and existing community, however, this was ultimately based on early assumption-based modelling and required more detailed assessment.

Basildon Local Plan Transport & Highway Impact Assessment (THIA) Part 1 (2017) & Part 2 (2018) – Essex Highways / Jacobs

The Part 1 and Part 2 LP THIAs provided emerging highway assessments and associated options to mitigate the Draft and Publication LPs respectively. The work made use of a more refined modelling tool, compared to the initial Highway Mitigation Modelling (2015) using a Visum-assisted spreadsheet model to assign LP development traffic to the network. However, while this method provided an appropriate and proportionate approach to test the impacts of the LP, it was acknowledged that this wasn't a full highway assignment model and did not consider factors including traffic interactions, dynamic reassignment and individual driver behaviour. Assessment of significant infrastructure schemes, such as the Link Road, and their associated level of reassignment remained a high-level assumption-based approach.

The THIAs identified that junctions along the A129/A176 corridor were reaching and exceeding capacity in the forecast "Background Growth" scenario, where there was no LP growth, and consequently in the unmitigated LP scenario. Key junctions at capacity, in and around the Link Road network included:

- A129 London Road / High Street / Sun Street (THIA junction reference Bi5)
- A129 London Road / Tye Common Road / Western Road (THIA junction reference Bi7)
- A129 Southend Road / A176 (THIA junction reference Bi8)

The THIA approach estimated the level of traffic reassignment, using a combination of census and manual calculations, and used local junction modelling to test the Link Road and other associated mitigation including the removal of the Laindon Road one-way restriction and signalisation of the A129 London Road / High Street / Sun Street junction (shown in Figure 2). It should be noted that a signal layout design was not progressed further at the time and the concept was only tested in local junction modelling software. Further detailed design and feasibility work would be needed to address potential delivery challenges facing the scheme, including land take, building lines and utilities.

The outcomes of this work identified potential transport benefits through the implementation of all three schemes and indicated in the THIA Part 2 assessment that all three schemes, including an upgraded A129 Southend Road / A176 / Link Road junction, could be needed in-combination to mitigate the traffic impacts of the Publication LP.

Since the THIA work, a "Basildon Local Plan Sensitivity Test" assessment is currently being completed to undertake further transport modelling assessments and test higher levels of sustainable mode shift potential at LP development sites.

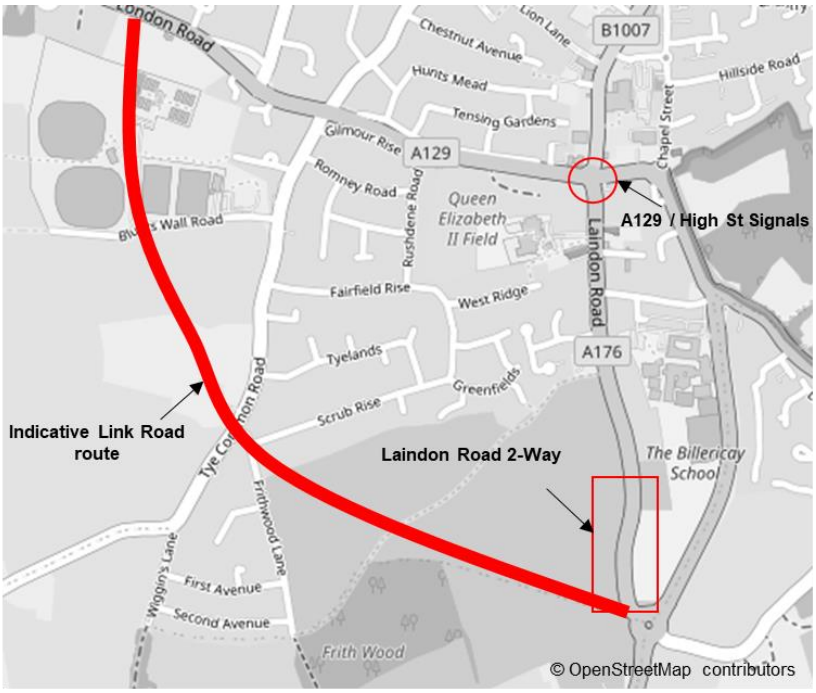


Figure 2 THIA Mitigation Options

Basildon Local Plan Sensitivity Test (BLPST 2021) – Essex Highways / Jacobs

The BLPST undertakes further transport modelling assessments to include increased levels of housing in Basildon town centre in comparison to the Publication LP and THIA assessments, alongside the assessment of further sustainable mode shift to public transport and active modes at LP development locations. While this parallel study focused

principally on the Basildon urban area, it also reviewed the wider implications of traffic flow changes in the Borough, including Billericay and Wickford. The BLPST is being concluded in parallel to this Technical Note and both documents should be read together once completed. The emerging outcomes of the BLPST indicate that the Link Road and the removal of the Laindon Road one-way restriction would still be required to mitigate the LP. However, the modelling indicates that the potential need to signalise the A129 London Road / High Street / Sun Street junction (Bi5), as identified in the THIA studies, is now unlikely to be needed. It also makes recommendations for an additional mitigation scheme at the B1007 Stock Road / Queens Park Avenue / Potash Road junction (Bi1) to the north of Billericay. These recommendations will be explored within the context of the Link Road in this Technical Note.

It should be noted that this work applies similar methodologies to the previous THIA work, using the same base data and Visum-assisted spreadsheet model, to assess the network.

Enhanced Essex Countywide Strategic Model (EECSM) – Essex Highways / Jacobs

In 2017 Essex Highways / Jacobs developed a countywide strategic transport model. In 2019 this model was enhanced to provide a more focused model for the South Essex region (EECSM) to support a range of strategies, Business Cases and studies, including Local Plans and A127 schemes to support air quality in BBC. The modelled network includes a sufficient level of detail (shown in Figure 3) and validates to an acceptable level in and around Billericay and along the key routes likely to be impacted by the Link Road. While it is acknowledged that the model is not fully validated at a junction turning count level, the quality of model functionality and validation represents a significant enhancement to the approach used in the earlier THIA work and parallel BLPST to provide a more accurate and robust simulation of how and where traffic will reassign given different network interventions.

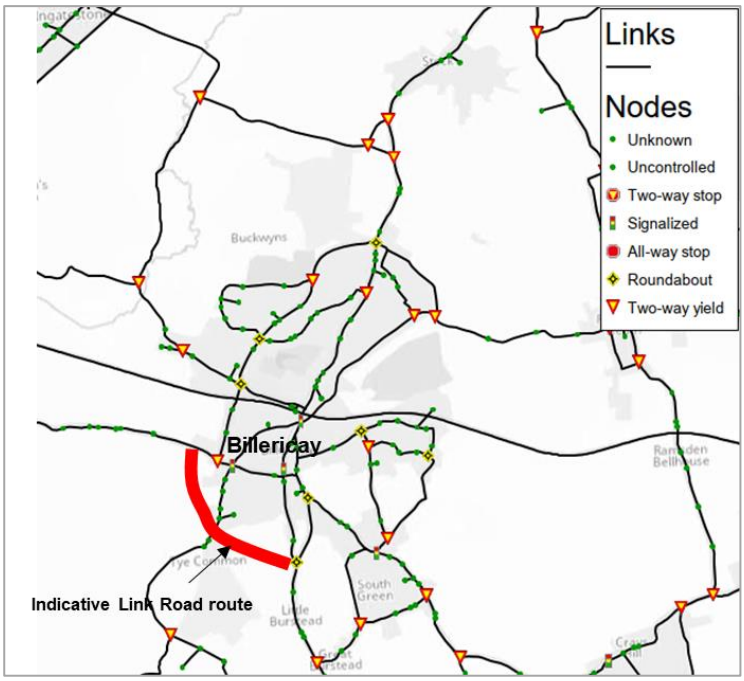


Figure 3 EECSM Billericay Network Detail and Indicative Link Road

It should be noted that EECSM is built from a different base year to the THIA and BLPST study, and is likely to produce different outputs. Full details of the model construction, calibration and validation are included in the Local Model Validation Report (LMVR)[1].

4 Modelling Approach

EECSM has been used to undertake this assessment, producing journey time analysis along key routes, and will provide the principal outputs to assess the network performance of different scenarios. It should be noted, while local junctions in the town centre have been coded into the model to a good standard for strategic modelling purposes, individual junction turning movements have not been fully validated and the reassignment outputs of the model will therefore be reviewed alongside observed turning counts and the outputs of the ongoing parallel BLPST study to inform local junction modelling. Given the different modelling approaches being used to inform the BLPST and this Technical Note, there are likely to be differences between the two sets of data. Where there are differences these will be considered within the context of how different assumptions have been applied the overall need for a Link Road.

The proposed approach is deemed proportionate and appropriate for LP testing and evidence purposes. It is recommended that a more detailed assessment is undertaken by site promoters once development proposals, e.g., end use, access points, masterplan and sustainable transport strategies, have advanced in detail through the planning process.

[1] Local Model Validation Report Enhanced Essex Countywide Model – Essex Highways October 2020

Study Area

The study area provisionally includes the wider BBC area to explore any unexpected significant reassignment patterns that could affect the network as a whole and the emerging outcomes of the BLPST, including the need for further mitigation at the B1007 Stock Road / Queens Park Avenue / Potash Road junction (Bi1) to the north of Billericay. However, initial runs of the model indicate that significant reassignment is unlikely to happen beyond the principal study area, which focuses on the A129/A176 corridor in the immediate environs of the scheme and to the south of Billericay town centre. A Focused Study Area is shown in Figure 4.

Figure 4 Focused Study Area

Model Preparation & Data

The model includes a 2036 forecast year, which is deemed suitable to test the 2034 LP horizon year. This has been used to develop a "Background Growth" Reference Case (committed growth and network only) scenario, and different Do-Something Growth scenarios. Model preparation included the following steps:

- Inclusion of 'certain' committed development, provided by BBC, and adjusted TEMPro background growth factors. TEMPRo also includes an element of unadjusted growth in neighbouring authorities
- Inclusion of the latest LP development forecasts, provided by BBC, directly added in appropriate zones specifically in and around Billericay and the immediate environs of the Link Road including 4,180 homes at site allocations H16-H20 in Billericay and H9-

H10 immediately to the north of the A127 and Basildon urban area (details included in **Appendix A**)

- Inclusion of TRICS land use trip rates in EECSM applied to specific developments – noting trip rates are broadly consistent with historic work undertaken to support the LP but do not specifically include the potential sustainable mode shift assumptions currently applied in the parallel BLPST study as a robust case
- Inclusion of the wider LP growth in Basildon and Wickford, using adjusted TEMPro factors, over and above the reference case TEMPro, to reflect forecast LP housing and employment across the whole district
- Minor network checks against available Teletrac data to ensure the local highway and junctions are effectively replicating delay and journey times in the base
- Coding of potential network changes to be tested and appropriate zone connectors to represent access arrangements and loading points as accurately as possible
- Development of appropriate forecast matrices for the Reference Case and Do-Something assessments

Scenario Testing

The following scenarios have been agreed with ECC to demonstrate the likely traffic impacts and benefits of different types of Do Something (DS) Link Road layouts against both the Reference Case and an unmitigated Do Something (DS) LP growth scenario without the scheme in place:

- Reference Case 2036 – Committed and Background Growth Only + Current Network
- DS1 2036 Local Plan + Current Network
- DS3* 2036 Local Plan + Development Access Only Link
- DS4** 2036 Local Plan + Full Link Road

** DS3 presents a theoretical assessment, in the absence of any design, to reflect the implementation of a "development traffic only" route that would specifically provide a through route for development traffic directly served by the Link Road (allocations H17b-H17d) with limited or no access for wider background traffic. This would test whether a lower grade and traffic constrained route could deliver adequate mitigation without the need for a Full Link Road. Further design and masterplan assessment would be needed to determine whether this option is feasible and deliverable, given the challenges of tying in with Tye Common Road, traffic management and the prevention of 'rat-running'.*
*** DS4 Full Link Road has been coded based on latest design assumptions from the site promoter and ECC to provide a Primary Route (PR) 1 classified single carriageway with 50kph design speed. The existing (PR2) classified Tye Common Road will intersect with the mid-point of the new Link Road and be realigned to form the minor arms of a staggered junction.*

Further sensitivity tests have been undertaken to understand the isolated and additional performance of other associated local network adjustments being considered, including:

- DS5a: DS1 + Laindon Rd two-way

- DS5b: DS4 + Laindon Rd two-way
- DS6a: DS1 + Reversing Laindon Rd one-way
- DS6b: DS4 + reversing Laindon Rd one-way

Step 3 Model Outputs

EECSM has been used to provide a consistent point of assessment for the different scenarios against the Reference Case and also the DS1 scenarios to demonstrate the impact of different types of road and network changes using the following for each scenario:

- Change in traffic volumes on specific routes through the town centre between Laindon Road / A176, A129 London Road and relief road options
- Review of any possible wider/unforeseen network impacts
- Comparison of relative differences in journey times and delay on different routes

Step 4 Local Junction Modelling

The reassignment patterns and traffic flows from Step 3 have been compared to the parallel BLPST study and used to inform local junction modelling and analysis to identify any contrasting outcomes and check for consistency between both studies.

5 EECSM Modelling Outputs

The traffic flows and journey time data for the AM (0730-0830) and PM (1700-1800) peak hours have been extracted from EECSM to assess the network performance for each of the scenarios and subsequent sensitivity tests.

Journey times provide the principal indicator of network performance in EECSM and these have been used as the primary source of comparison to understand the impacts of the Link Road and whether it delivers an appropriate level of mitigation. Flow difference plots have been used to understand the likely level of demand for the Link Road and the likely changes in traffic flows and impacts on the local and wider network.

Wider Network Impacts

The comparison of the unmitigated LP (DS1) scenario with the LP and a Full Link Road (DS4) scenario has been used to understand the likely wider network implications of the proposed scheme, given this generated the highest change in flows across the scenarios.

The wider network DS1 v DS4 flow difference plots are included in **Appendix B**, and show that there are minor flow increases (red) and flow decreases (green) on the network beyond the A129 and A176 corridor approaches to Billericay generated by the introduction of the road. The key observations include:

- An additional 300~375 two-way vehicles attracted to the southern A176 Noak Hill Road in both peaks – this is principally traffic diverting from the parallel Tye Common Road

rural route to the primary route network as well as a minor general uplift due to increased capacity.

- An additional 100~260 two-way vehicles attracted to eastern A129 Southend Road corridor in both peaks – this is principally traffic between Wickford and Billericay diverting from the parallel Heath Road rural route to the north to the primary route network as well as a minor general uplift due to increased capacity provided by the Link Road and the resulting reduction in delays in the Sun Corner area of the town centre.
- An additional 170~190 two-way vehicles attracted to the western A129 Rayleigh Road across both peaks – this is principally traffic between Brentwood and Billericay diverting from the A128 to the A129 corridor to travel to/from the east towards Wickford or join the A127.

The wider traffic impacts of the Link Road are relatively minor (generally <30 two-way vehicle flows) on the wider Borough network. The principal impacts are generally local and focused on the three key approaches to Billericay and along the A129 / A176 corridor to the south of the town centre. The Focused Study Area (shown in Figure 4) is therefore considered appropriate for the purposes of this assessment.

Local Network Impacts

The EECSM analysis indicates that the DS4 Full Link Road option could generate two-way peak hour movements of up to 1600 vehicles per hour*. This is within the expected capacity for a single carriageway urban Primary Route (PR)1 with a 50kph design speed.

**This accounts for through-traffic diverting from the A129/A176 corridor, Tye Common Road, some wider trips and assumes all associated development traffic will use the road. Demand would be subject to the eventual masterplan and access points of the associated development.*

The comparison of DS1 “No Link Road” with DS4 “Full Link Road” flows has been used to understand the likely local network implications of the proposed Link Road. The Billericay local road network flow differences are shown in Figure 5 and indicates the following in the AM and PM peaks (highlighted in the blue box):

- a reduction of approximately 500~700 two-way vehicles per hour on the A129 corridor between Mountnessing Road and Sun Street Corner immediately to the south of Billericay
- a reduction of approximately 400~500 two-way vehicles per hour at the northern end of Tye Common Road
- a reduction of approximately 350 two-way vehicles per hour on the Laindon Road / Sun Street / Southend Road corridor
- there are also minor fluctuations of +/- 50~70 vehicle flows on local town centre routes, which are not considered material within the context of the scheme.

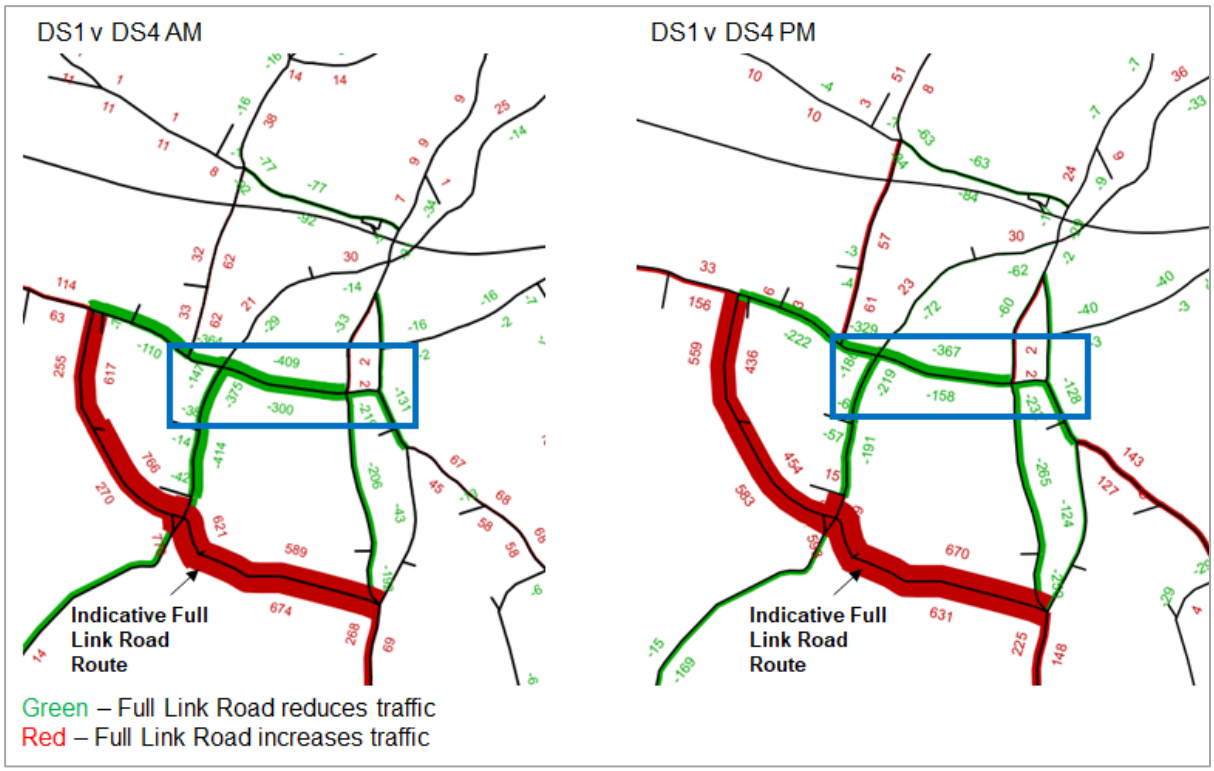


Figure 5 Local Impacts of Full Link Road v No Link Road

A subsequent comparison has been made between the DS1 “No Link Road” and DS3 “Development Access Only” flows, shown in Figure 6, to understand the local impacts of the Development Access Only Link option. The analysis shows a much lower impact with reductions of approximately 40~60 two-way vehicles per hour on the corresponding routes along the A129 corridor, Tye Common Road and the Laindon Road/Sun Street/Southend corridor. The eventual assignment of the associated development trips would be subject to the eventual masterplan, location of access points and what is achievable, given the potential traffic management challenges of providing a development traffic only link route. This could be explored further at the detailed planning stage once these design parameters are known.

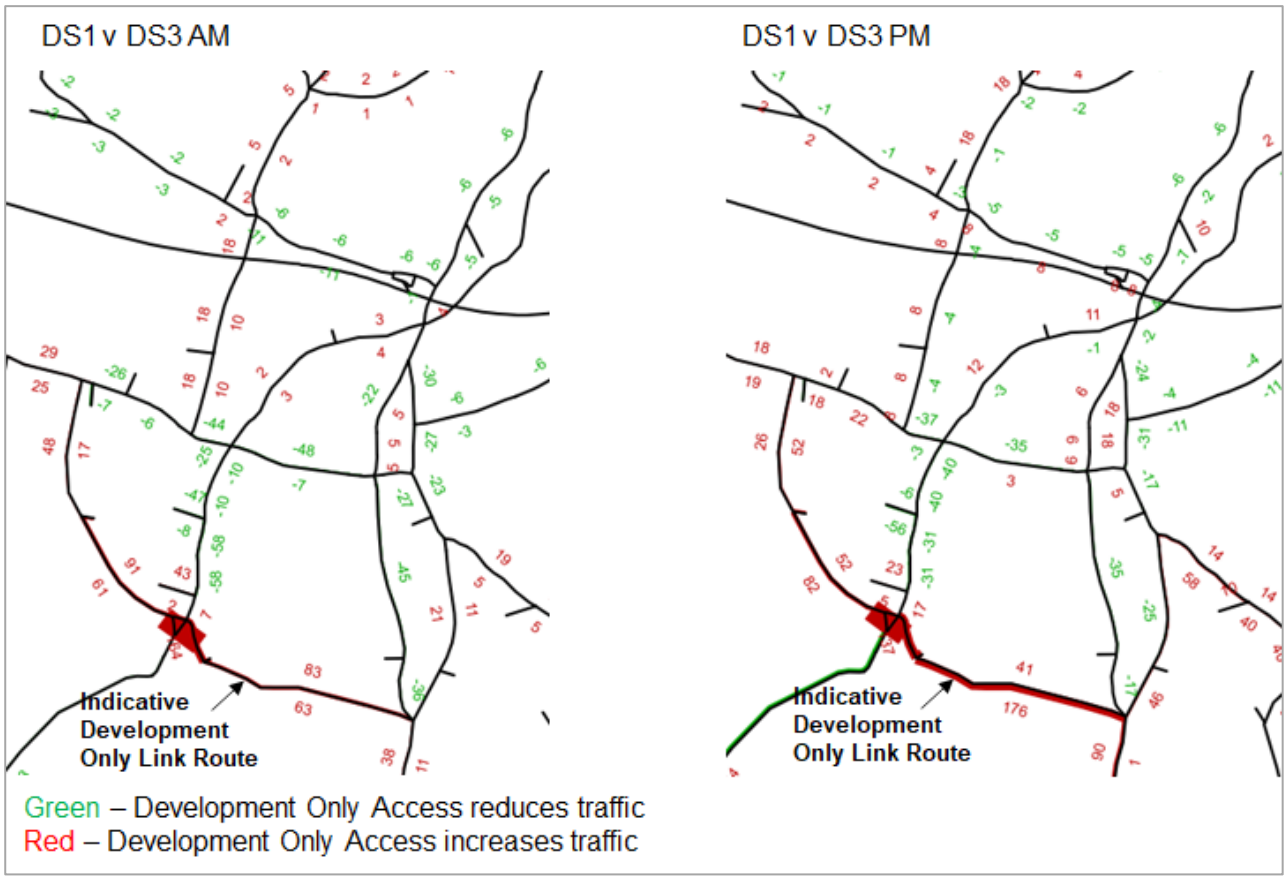


Figure 6 Local Impacts Development Only Access Link

Journey Time Analysis

The journey time analysis provides the primary source of comparison to understand whether the Link Road options mitigate the impacts of the LP to at least a similar level of network performance in the Reference Case or, ideally, more closely to the current base level of network performance.

The following journey time routes, shown in Figure 7, have been assessed to understand the network performance for each scenario in both directions through the Focused Study Area.

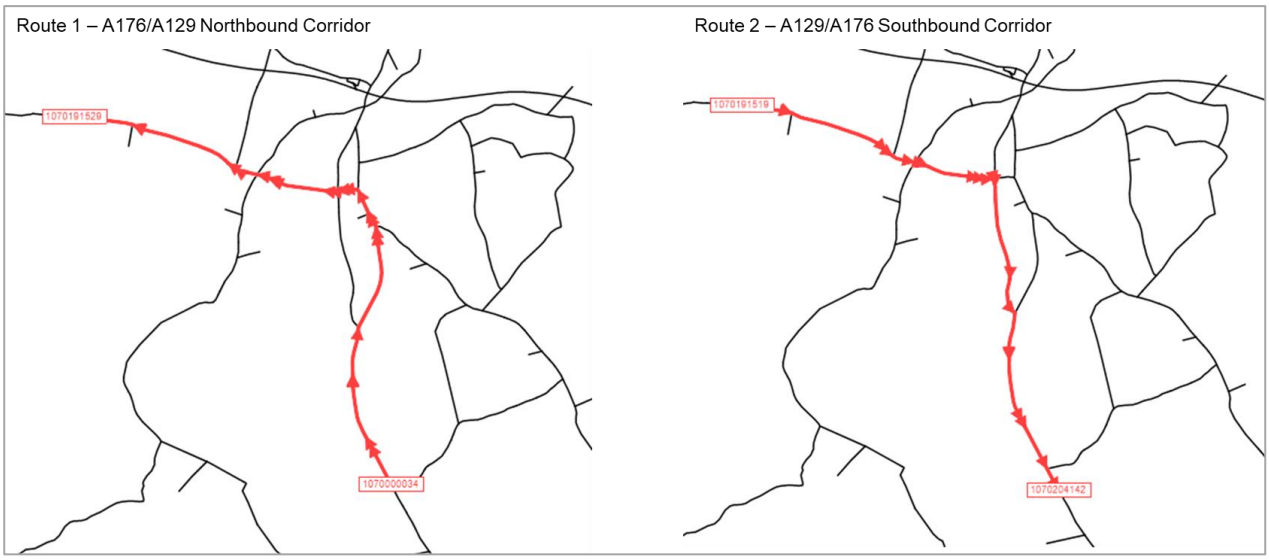


Figure 7 A129 / A176 Journey Time Routes

Figure 8 and Table 1 provide a summary of the different journey times in average minutes per vehicle for each route and scenario in the AM and PM peak hour periods.

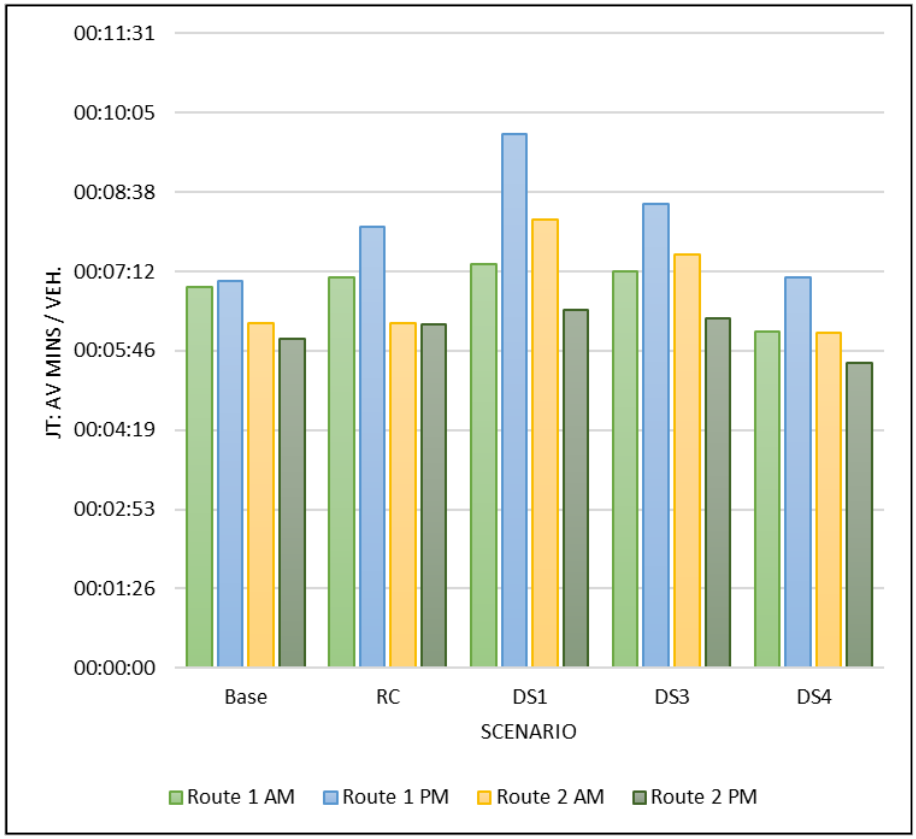


Figure 8 Journey Time Comparisons by Scenario (average mins per vehicle)

Table 1 Journey Time Comparisons by Scenario (average mins per vehicle)

	Route 1		Route 2	
	AM	PM	AM	PM
Base	00:06:54	00:07:02	00:06:15	00:05:59
RC	00:07:05	00:08:01	00:06:16	00:06:14
DS1	00:07:20	00:09:41	00:08:09	00:06:30
DS3	00:07:12	00:08:26	00:07:30	00:06:21
DS4	00:06:06	00:07:05	00:06:05	00:05:32

The journey time analysis indicates:

- The **Reference Case** would generally increase journey times in both directions, over the current situation, with the highest increase of ~1 min per veh on the Route 1 northbound movement in the PM.
- The unmitigated **LP (DS1)** scenario would have the greatest impact on the corridor across all movements and time periods. This includes journey time increases of up to 2 min 40 secs per veh over the current situation on the northbound Route 1 in the PM and ~1 min 55 secs per veh over the Reference Case on the southbound Route 2 in the AM.
- The **Full Link Road option (DS4)** would improve on the Reference Case by up to a minute and also generally improve on current journey times in both corridor directions and in both peak hour periods.
- The **Development Access Only Link option (DS3)** would reduce some of the impact of the DS1 LP growth on both routes and in both peak periods. However, the option would not fully mitigate the impacts and journey times would be higher than the Reference Case on all routes and would remain in excess of the current base conditions.

The Full Link Road (DS4) scenario is shown to provide access to the sites and to mitigate the impact of the LP growth along the key A129 / A176 corridor. Further analysis has been undertaken to understand the corresponding journey times on the new routes provided by the Full Link Road in DS4. Figure 9 shows the new Link Road Routes 4 and 5 and Table 2 compares the journey times in DS4 with the corresponding A129 / A176 routes for all scenarios.

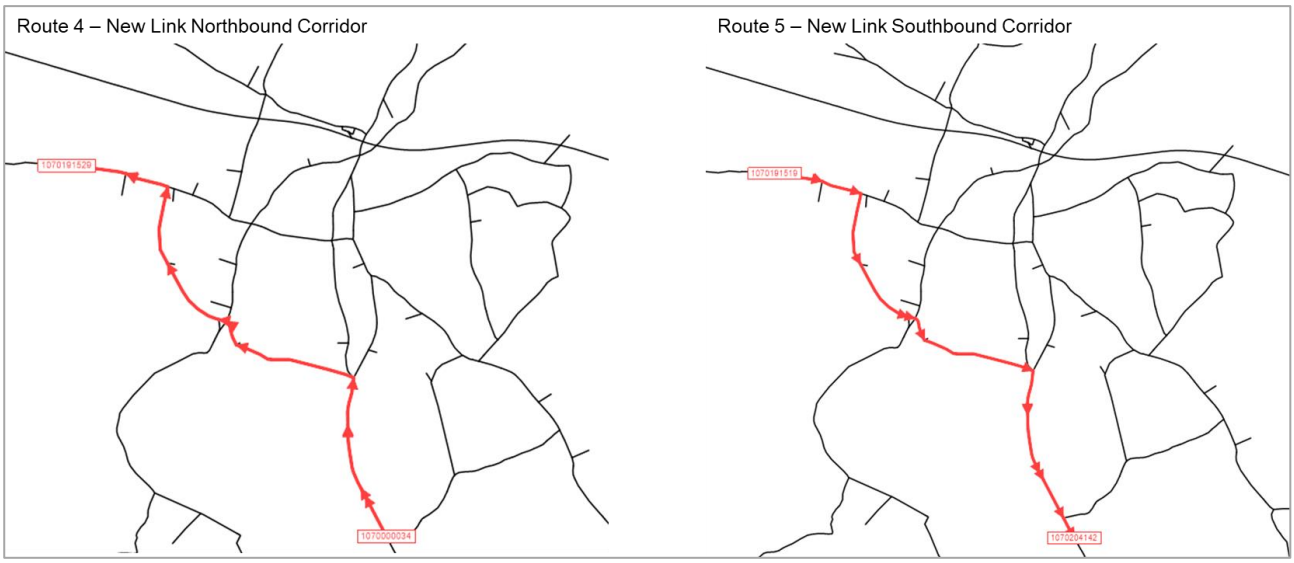


Figure 9 DS4 Link Road Journey Time Routes

Table 2 Journey Time Comparison of DS4 Route 4 and 5 (average mins per vehicle)

	Route 1		Route 2	
	AM	PM	AM	PM
Base	00:06:54	00:07:02	00:06:15	00:05:59
RC	00:07:05	00:08:01	00:06:16	00:06:14
DS1	00:07:20	00:09:41	00:08:09	00:06:30
DS3	00:07:12	00:08:26	00:07:30	00:06:21
DS4	00:06:06	00:07:05	00:06:05	00:05:32
	Route 4		**Route 5**	
DS4	00:05:21	00:06:05	00:06:05	00:05:18

The DS4 "Full Link Road" journey times on the new Link Road (Routes 4 and 5) and the existing A129/A176 corridor (Routes 1 and 2) generally improve on the corresponding routes along the A129 / A176 corridor in all the other scenarios, including the existing situation, and provides a more attractive route for through-traffic as well as associated LP development traffic.

Sensitivity Tests

Additional sensitivity tests have been undertaken to understand the impacts of implementing the following changes to the one-way restriction on the southern end of Laindon Road (shown on Figure 10):

- **DS5 Sensitivity Test** – remove one-way restriction on southern end of Laindon Road
- **DS6 Sensitivity Test** – reverse one-way restriction on southern end of Laindon Road to northbound only and complement with the necessary reversal of existing Sun Street

one-way to eastbound only, to allow the A129 / A176 corridor to continue to provide a through route.
*NB – both schemes are hypothetical for modelling purposes only at this stage and subject to design and feasibility.

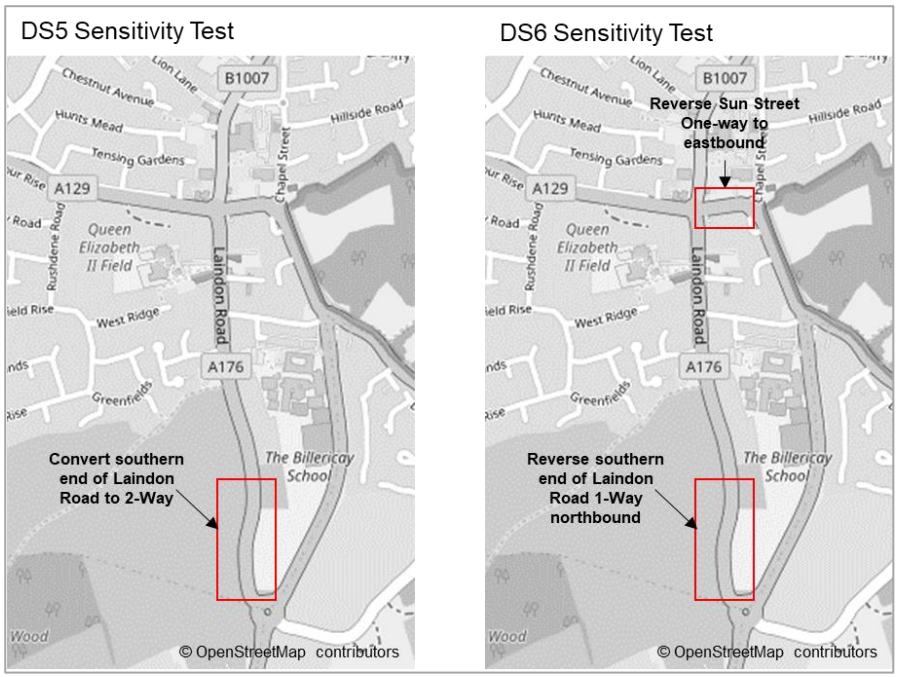


Figure 10 Laindon Road DS5 and DS6 Sensitivity Tests

The tests have been run in isolation (DS1) and in-combination with the Link Road (DS4) on the following basis:

- DS5a/DS6a use the unmitigated LP DS1 scenario to understand the isolated impacts and whether the schemes could replace the need for the Link Road
- DS5b/6b use the Full Link Road DS4 scenario to understand whether the schemes complement or counteract the benefits of the Link Road
- All tests have been conducted with the existing roundabout junction at A129 London Road / High Street / Sun Street (THIA junction reference Bi5) and not the signal option considered in the THIA

In the first instance the flow difference plots (included in **Appendix C**) for each scheme indicate the principal traffic changes are relatively confined to the existing Laindon Road, Sun Street and Southend Road sections of the network. Any transport benefits are likely to be localised to this area of the network rather than extensive. The journey time analysis uses Routes 1 & 2 (shown in Figures 7 & 9) and the following Route 6 (shown in Figure 11) to review the impacts of DS5a/b.

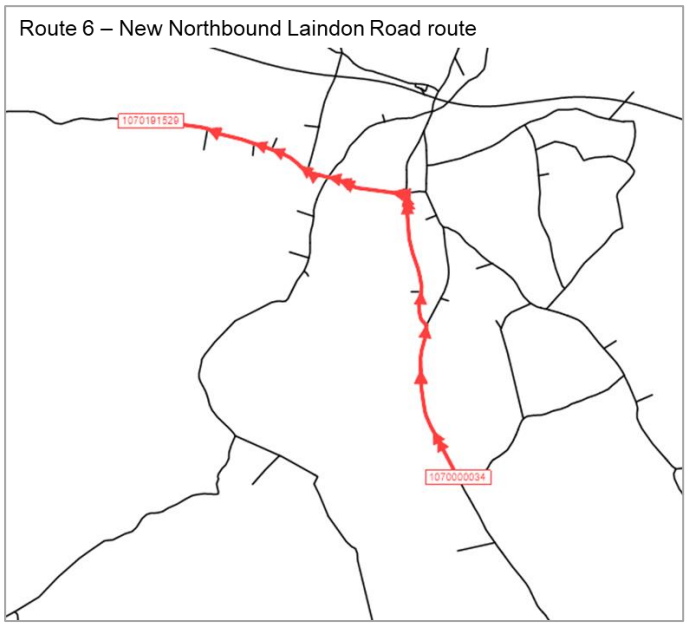


Figure 11 New Northbound Laindon Road Route

The results of the DS5a/b removal of Laindon Road one-way restriction are summarised in Table 3. The impacts of the change are likely to result in some journey time improvements, when compared to the respective DS1 and DS4 scenarios, on the existing northbound Route 1 and also the new Route 6 in both the DS5a/b tests. The new Route 6 is marginally slower than Route 1 (4~6 seconds) due to the need for northbound Laindon Road traffic having to yield to westbound Sun Street traffic at the A129 London Road / High Street / Sun Street.

The scheme shows no change in the DS5b Full Link Road test on the southbound Route 2 movement, however, the isolated DS5a results show that journey times are likely to increase on this route, which is likely to be a result of eastbound A129 traffic having to yield to increased traffic on the Laindon Road approach to the junction with A129 London Road / High Street / Sun Street.

The scheme is unlikely to be fully beneficial in isolation but could complement and provide further mitigation if delivered in-combination with the Full Link Road.

Table 3 Journey Time Comparison of DS5a/b Routes 1,2 & 6

	Route 1 NB		**Route 2 SB**	
	AM	PM	AM	PM
Base	00:06:54	00:07:02	00:06:15	00:05:59
RC	00:07:05	00:08:01	00:06:16	00:06:14
DS1	00:07:20	00:09:41	00:08:09	00:06:30
DS3	00:07:12	00:08:26	00:07:30	00:06:21

	Route 1 NB		Route 2 SB	
	AM	PM	AM	PM
DS4	00:06:06	00:07:05	00:06:05	00:05:32
DS5a	00:06:28	00:07:19	00:08:34	00:07:55
DS5b	00:05:48	00:06:37	00:06:06	00:05:29
	Route 6 NB			
DS5a	00:06:32	00:07:21		
DS5b	00:05:52	00:06:43		

The results of the DS6a/b reversal of Laindon Road and Sun Street one-way restrictions are summarised in Table 4. The scheme is likely to generate journey time increases on the new northbound Route 6 movement compared to the corresponding existing Route 1 in all other scenarios. This impact is likely to result from a high volume of A129 Southend Road westbound traffic rerouting south to the Laindon Road junction to then turn right and continue their journey north towards A129 London Road. Consideration could be given to converting Sun Street to two-way, however, this would require the removal of approximately 50% of the junction arm capacity and need to be considered within the context of the existing capacity constraints previously identified on this arm in the THIA.

The DS6a/b reversal of Laindon Road and Sun Street one-way restrictions are unlikely to provide any mitigation in isolation nor complement the operation of the Full Link Road and have not been assessed further.

Table 4 Journey Time Comparison of DS6a/b Routes 1 & 6

	Route 1 NB				
	AM	PM			
Base	00:06:54	00:07:02			
RC	00:07:05	00:08:01			
DS1	00:07:20	00:09:41			
DS3	00:07:12	00:08:26			
DS4	00:06:06	00:07:05		**Route 6 NB**	
DS5a	00:06:28	00:07:19	**DS6a**	00:09:12	00:09:56
DS5b	00:05:48	00:06:37	**DS6b**	00:08:43	00:10:00

Summary of EECSM Modelling Outputs

EECSM modelling outputs provide a comparison of the level of traffic reassignment and network performance of different highway interventions to determine how well they mitigate the impacts of the Basildon Local Plan. The key findings indicate:

- A Full Link Road would mitigate the LP impacts to improve on the Reference Case and generally reflect a similar level of network performance to current base conditions.

- A Full Link Road will need to be designed to accommodate at least 1,600* two-way vehicle movements per hour based on these modelling outputs
  **This accounts for through-traffic diverting from the A129/A176 corridor, Tye Common Road, some wider trips and assumes all associated development traffic will use the road. Demand would be subject to the eventual masterplan and access points of the associated development.*
- The conversion of Laindon Road to two-way is only likely to have localised impacts, but offers a complementary scheme that delivers additional benefit to the Full Link Road option.
- The Full Link Road is unlikely to have significant impacts beyond the A129/A176 corridor, in and around Billericay, but does offer some wider benefit by attracting traffic back on to the primary road network from lower classified rural routes.
- Other options have been investigated, including a lower grade Development Only Link option and reversing Laindon Road / Sun Street one-way restrictions, which are unlikely to deliver solutions which fully mitigate the LP growth in Billericay.
- The combination of reversing Laindon Road with the conversion of Sun Street to two-way has not been explicitly been considered at this stage, given the existing capacity constraints identified on the Sun Street arm in the THIA.
- The emerging BLPST outcomes advise that a new signal junction at A129 London Road / High Street / Sun Street (Bi5), as identified in the THIA, is no longer required and only the existing roundabout layout has been tested at this stage.

6 Junction Analysis

The primary objective of this modelling exercise was to provide an enhanced level of evidence to confirm the need for a new Link Road to the south west of Billericay and assess the likely level of reassignment and associated impacts. A secondary objective included the need to maintain a consistent approach with the parallel Basildon Local Plan Sensitivity Test (BLPST) work being undertaken to update the previous THIA evidence.

It is acknowledged that EECSM has been derived from different base data and is a more advanced modelling platform to that used for THIA and BLPST. Furthermore, EECSM has not been specifically validated at a junction turning count level and outputs to inform junction models should be treated with an element of caution. However, the flow outputs at key junctions in the Focused Study Area have been reviewed and provide a reasonable representation of the corresponding link flows at a local junction level for high-level comparison purposes with the emerging BLPST outputs.

Junction Flows

The AM and PM peak hour total flows at key junctions in the Focused Study area for the following corresponding scenarios in BLPST and EECSM have been compared, as summarised in Table 5:

- Reference Case / Background Growth Scenario (committed development only / no Local Plan)
- DS1 Local Plan growth with no transport mitigation
- DS3 Local Plan growth with Development Only Access (**EECSM only and for information**)
- DS4 Local Plan growth with Full Link Road only (**EECSM only and for information**)
- DS5b Local Plan growth with Full Link Road and Laindon Road two-way

Table 5 Comparison of EECSM and BLPST Key Junction Total Flows

		BLPST Junction Flows			EECSM Junction Flows					EECSM v BLPST % Difference		
Peak	**Junction**	**REF**	**DS1**	**DS5b**	**REF**	**DS1**	**DS3**	**DS4**	**DS5b**	**REF**	**DS1**	**DS5b**
AM	A129 London Road / Mountnessing Road	2237	2506	2152	2270	2428	2408	1963	1966	1%	-3%	-9%
	A129 London Road / Tye Common Road / Western Road	2375	2698	1622	2807	2972	2890	2133	2136	18%	10%	32%
	A129 London Road / High Street / Sun Street	2282	2461	1632	2348	2492	2411	1954	1988	3%	1%	22%
	A129 Sun Street / Chapel Street	1897	1980	859	1733	1864	1791	1506	1230	-9%	-6%	43%
	A129 Southend Road / A176	1820	1903	1123	1600	1747	1733	1619	1346	-12%	-8%	20%
		REF	**DS1**	**DS5b**	**REF**	**DS1**	**DS3**	**DS4**	**DS5b**	**REF**	**DS1**	**DS5b**
PM	A129 London Road / Mountnessing Road	2075	2232	1603	1994	2147	2131	1738	1740	-4%	-4%	9%
	A129 London Road / Tye Common Road / Western Road	2416	2645	970	2382	2547	2490	1801	1828	-1%	-4%	88%
	A129 London Road / High Street / Sun Street	2344	2555	1500	2085	2214	2178	1731	1755	-11%	-13%	17%
	A129 Sun Street / Chapel Street	1951	2007	1183	1553	1667	1633	1303	994	-20%	-17%	-16%
	A129 Southend Road / A176	2357	2413	1982	1467	1610	1625	1492	1202	-38%	-33%	-39%

As would be expected, given the range of data sources, the analysis indicates that flow differences fluctuate across junctions and time periods in the separate model outputs for the Reference Case and DS1 scenarios. The comparison generally shows EECSM flows are higher in the AM and BLPST flows are higher in the PM. There are some more notable differences around the A129 Sun Street / Chapel Street and A129 Southend Road / A176 in the PM peak and it is recommended that the higher BLPST outputs are regarded as a worse case at these locations for the PM.

The DS5b scenarios provide the key comparison between how the different modelling approaches have tested the in-combination reassignment impacts of the Full Link Road and Laindon Road scheme. EECSM anticipates that higher levels of traffic would generally need to be accommodated at the junctions on the current A129/A176 corridor in comparison to the BLPST findings. The analysis demonstrates one notable outlier in the PM, at the A129 London Road / Tye Common Road / Western Road, where EECSM flows are 88% higher than the BLPST assumptions. In this instance the BLPST reassignment methodology is potentially overestimating the level of reassignment at this particular location and the higher EECSM flows should be considered as a more realistic case given the enhanced modelling approach.

Notwithstanding this isolated variance between the two methodologies, the overall approaches do not necessarily mean reassignment has been overestimated in the BLPST or underestimated in EECSM and as discussed later, do not necessarily change the BLPST conclusions concerning junction operations. As such, the following factors also need to be considered when reviewing the outcomes of the two parallel studies:

- The modelling approaches have different base years, data sources and forecast years.
- EECSM is a dynamic highway assignment model and the BLPST relies on high-level evidence-based manual adjustments.
- EECSM has indicated that some additional traffic would be attracted to the A129/A176 corridor from wider rural routes given the extra capacity provided by the Link Road. This could not be calculated for the BLPST.

The key junctions in the Focused Study Area have been retested with the EECSM flows to understand any notable additional impacts and whether further mitigation needs to be considered over and above the BLPST outcomes.

Junction Modelling

The EECSM flows have been retested in the same Junctions 9 and LinSig models used for the BLPST and Tables 6 and 7 summarise the results for both studies. Results are presented as the ratio of flow to capacity (RFC) or degree of saturation (DoS) on the worst performing arm. A value of >1.00 is generally considered to be exceeding capacity and some form of physical mitigation is usually needed. However, remaining consistent with the BLPST work, and previously agreed with ECC, marginal capacity exceedances with values between 1.00 and 1.10, could be mitigated by other interventions. These could include more ambitious sustainable modal shift, peak spreading or increased homeworking, which should be considered prior to implementing costly highway improvements or overproviding highway capacity.

Table 6 BLPST Key Junction Assessments (RFCs/DoS)

Junction Location	REF CASE		DS5b	
	AM	PM	AM	PM
A129 London Road / High Street / Sun Street	1.23	1.41	0.69	0.66
A129 Sun Street / Chapel Street	0.85	0.89	0.4	0.65
A129 London Road / Tye Common Road / Western Road	1.65	1.58	0.83	0.49
A129 Southend Road / A176	0.84	1.11	0.46	1.06
A129 London Road / Mountnessing Road	0.89	1.14	0.76	0.3

Table 7 EECSM Key Junction Assessments (RFCs/DoS)

Junction Location	REF CASE		DS1		DS3		DS4		DS5b	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
A129 London Road / High Street / Sun Street	1.86	1.78	2.13	1.97	2.00	1.92	1.36	1.26	1.00	0.86
A129 Sun Street / Chapel Street	0.83	0.80	0.86	0.84	0.82	0.83	0.68	0.66	0.66	0.44
A129 London Road / Tye Common Road / Western Road	1.75	1.54	1.85	1.55	1.74	1.53	0.93	0.72	0.92	0.76
A129 Southend Road / A176	0.96	0.97	1.02	1.07	1.01	1.03	0.86	0.93	0.52	0.58
A129 London Road / Mountnessing Road	0.81	0.76	0.91	0.73	0.90	0.73	0.69	0.77	0.70	0.77

The overall outcomes are consistent across the two assessment approaches and demonstrate that the following junctions would either be approaching or over capacity in at

least the Reference Case and would be impacted further by the DS1 unmitigated LP growth:

- A129 London Road / High Street / Sun Street
- A129 London Road / Tye Common Road / Western Road
- A129 Southend Road / A176
- A129 London Road / Mountnessing Road (BLPST only)

The introduction of the DS4 Link Road in isolation (EECSM only) demonstrates that the impacts at most of the junctions, excluding A129 London Road / High Street / Sun Street, would be mitigated. This is principally achieved through the reassignment of through traffic and the removal of the majority of development traffic from the A129/A176 corridor through Billericay town centre. Without the Full Link Road, junction improvement schemes would be needed at each of the junctions listed above, noting however, that earlier assessments undertaken in the THIA (2017/18) work advised that isolated mitigation options at A129 London Road / High Street / Sun Street and A129 London Road / Tye Common Road / Western Road would be challenging to deliver and unlikely to achieve the full level of required mitigation that would be delivered by the Link Road.

The DS3 Development Access Only Link scenario would only remove some associated development trips from the town centre and, where possible, junction mitigation schemes would still be needed for:

- A129 London Road / High Street / Sun Street
- A129 London Road / Tye Common Road / Western Road
- A129 Southend Road / A176 (based on BLPST outputs)

The introduction of DS5b Laindon Road two-way demonstrates that this scheme is also needed to complement the DS4 Full Link Road and fully mitigate the impacts of the LP in Billericay without the need for additional physical junction improvements in the town centre. This is achieved by the localised rebalancing of traffic flows around the constrained A129 London Road / High Street / Sun Street junction.

The emerging BLPST does highlight that additional mitigation is likely to be required at the (Bi1) B1007 Stock Road / Queens Park Avenue / Potash Road junction to the north of Billericay and approximately 3km from the Focused Study Area. The conclusions drawn from the analysis of the EECSM wider network impacts (Section 5 and Appendix B) indicate that the Link Road will have a negligible impact on traffic flows in this area of the network and the recommendations of the BLPST for further mitigation at this junction should be followed.

The assessment has excluded modelling the A176 / Kennel Lane / Laindon Road junction, on the assumption that this would be upgraded to accommodate new Link Road arm and with an upgraded design with sufficient capacity to accommodate forecast growth.

7 Summary

The BBC LP makes provision for a 2km Link Road to the south west of Billericay, between A129 London Road and south east towards the junction of the B1007 Laindon Road to secure housing growth in the town and alleviate the impact of traffic growth in the Billericay area. This Technical Note provides the outcomes of an updated assessment, using an improved modelling approach and data, to enhance the evidence base around the need for the Link Road, potential scale of the road and any complementary measures needed to mitigate the transport impacts of the Local Plan.

The key findings of the EECSM modelling assessment indicate:

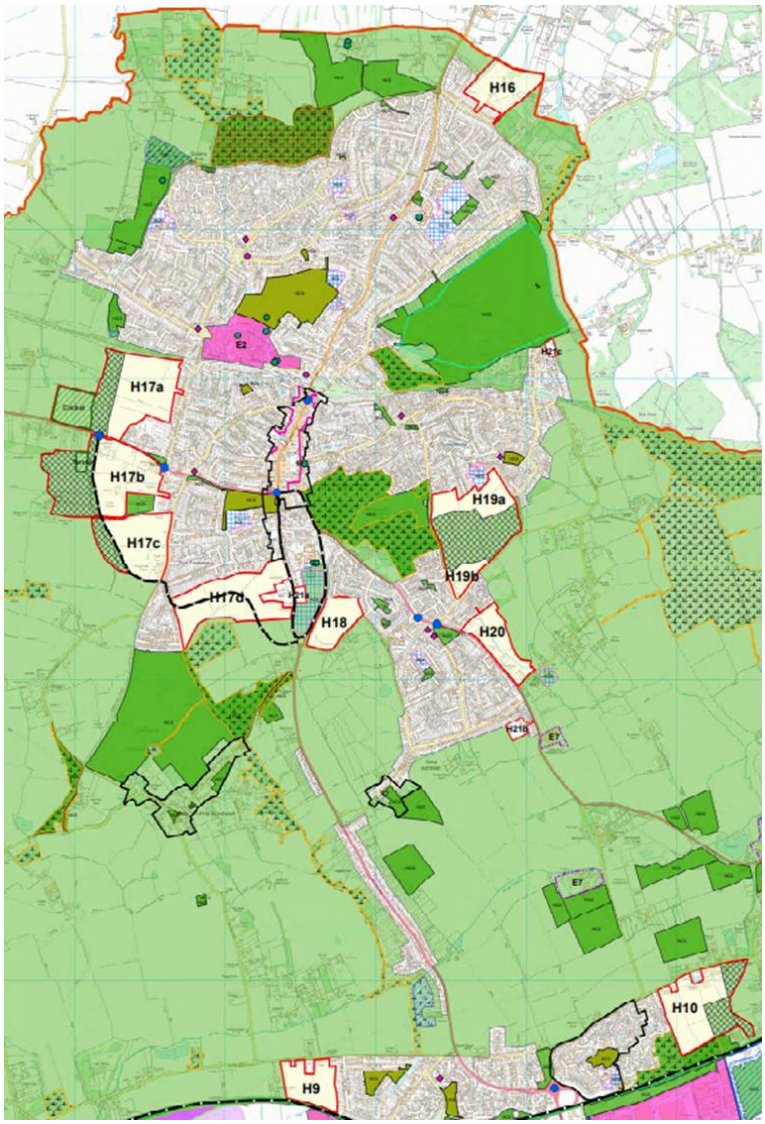
- A Full Link Road is needed to mitigate new development in Billericay, as well as wider Local Plan growth, to improve on the Reference Case traffic conditions and generally reflect a similar level of network performance to current traffic conditions.
- The conversion of Laindon Road to two-way is only likely to have localised impacts, but offers a complementary scheme that is needed to deliver additional benefit to the Full Link Road particularly at the A129 London Road / High Street / Sun Street junction.
- The Full Link Road is unlikely to have significant impacts beyond the A129/A176 corridor, in and around Billericay, but does offer some wider benefits by attracting traffic back on to the primary road network from lower classified rural routes.
- Other options have been investigated, over the course of this assessment and previous related work, including: a lower grade Development Only Access option; reversing Laindon Road and Sun Street one-ways; and isolated junction improvements on the A129/A176 corridor. These options are unlikely to deliver solutions to fully mitigate new development and wider Local Plan growth in Billericay to an acceptable level of traffic impact.

The outcomes have been compared with the wider parallel Basildon Local Plan Sensitivity Test (BLPST) work to maintain consistency and ensure any variations in outcome are considered. While both assessments rely on different data sources and modelling approaches, similar conclusions are drawn from both assessments and support the need for the Full Link Road as well as the complementary conversion of Laindon Road to two-way to fully mitigate the impact of the Local Plan.

The latest modelling is deemed appropriate for Local Plan testing and makes a case for a Full Link Road to the south west of Billericay. It is recommended that more detailed assessment is undertaken by site promoters, as development proposals are advanced in detail through the planning process, to fully understand the scale and form needed to serve different end users, including public transport and active modes. EECSM could also be used to undertake further assessment if required.

Appendices

Appendix A Specific Billericay and North Basildon Development Data



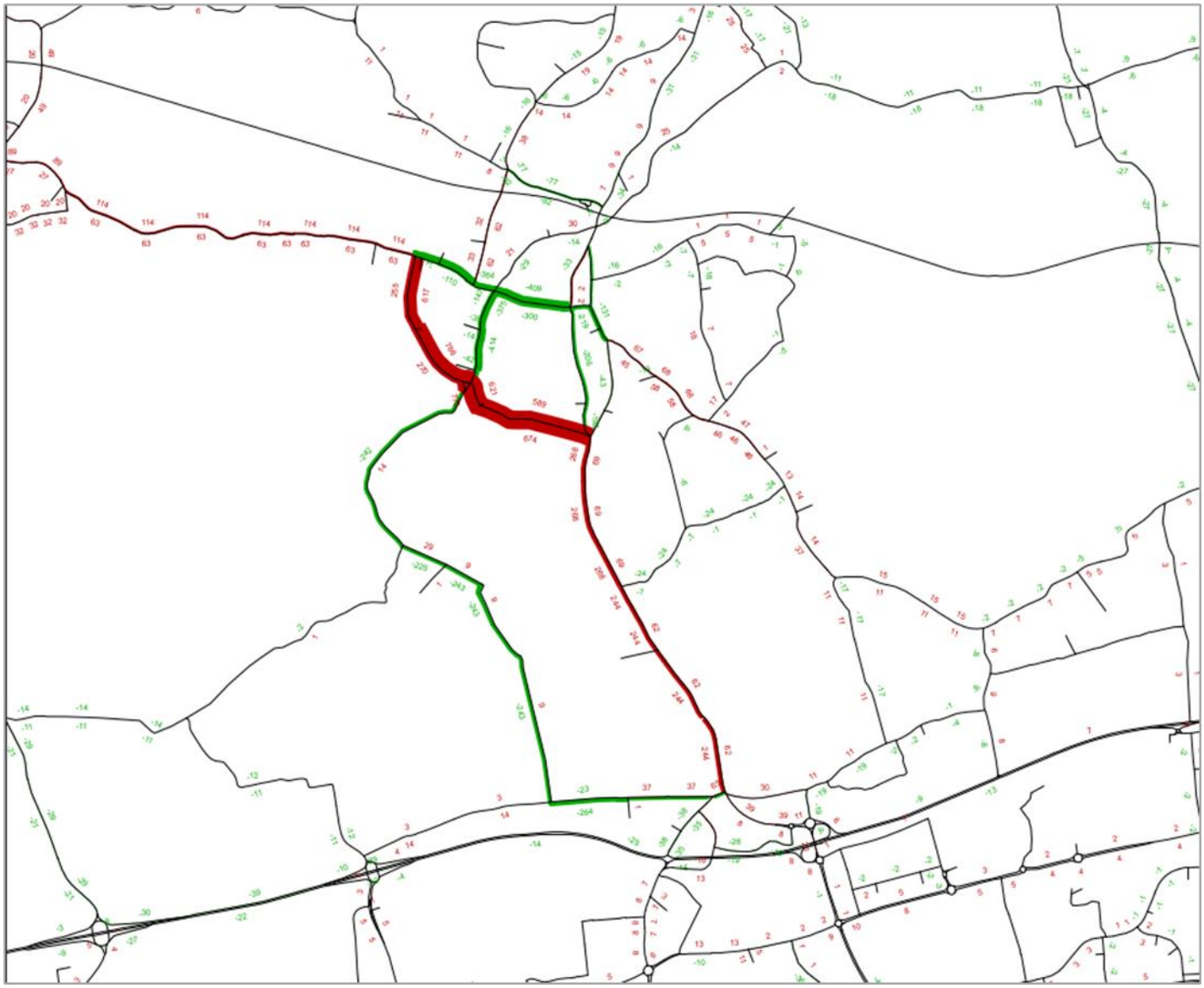
Source: Basildon Borough Revised Publication Local Plan Policies Map October 2018

Policy Number	Name of Allocation	Housing Number
H9	Land West of Steeple View, Laindon	245
H10	Land East of Noak Bridge, Basildon	400
H16	Land North East of Potash Road, Billericay	255
H17	South West Billericay	1,700
H18	Land South of Windmill Heights, Billericay	200
H19	Land East of Greens Farm Lane, Billericay	400
H20	Land East of Southend Road, Billericay	190

Source: Basildon Borough Revised Publication Local Plan 2014 – 2034 October 2018

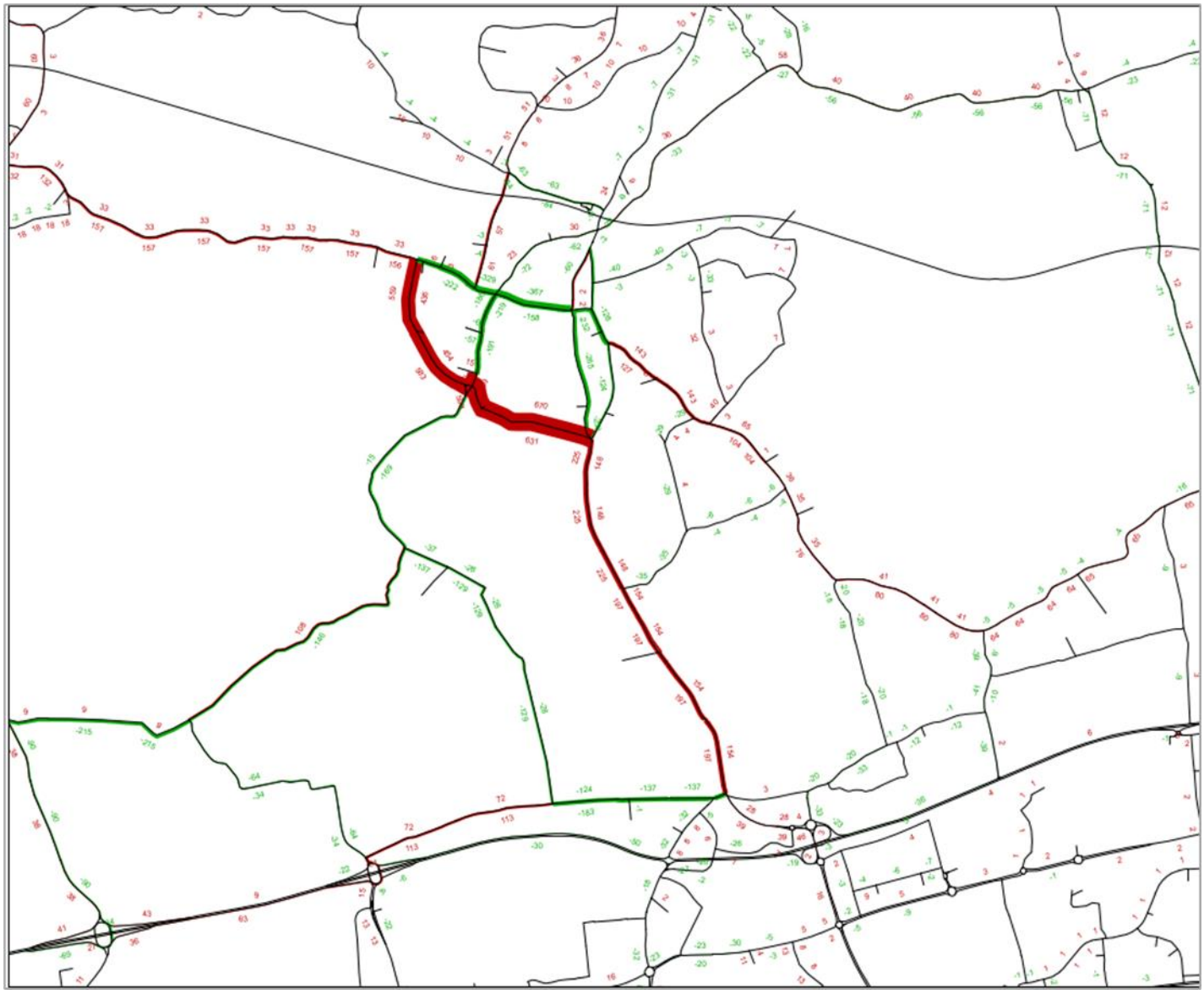
Appendix B Wider Network Impacts – DS1 v DS4 Flow Difference

AM – DS1 Unmitigated Local Plan v DS4 Full Link Road



Green – Full Link Road reduces traffic
Red – Full Link Road increases traffic

PM – DS1 Unmitigated Local Plan v DS4 Full Link Road

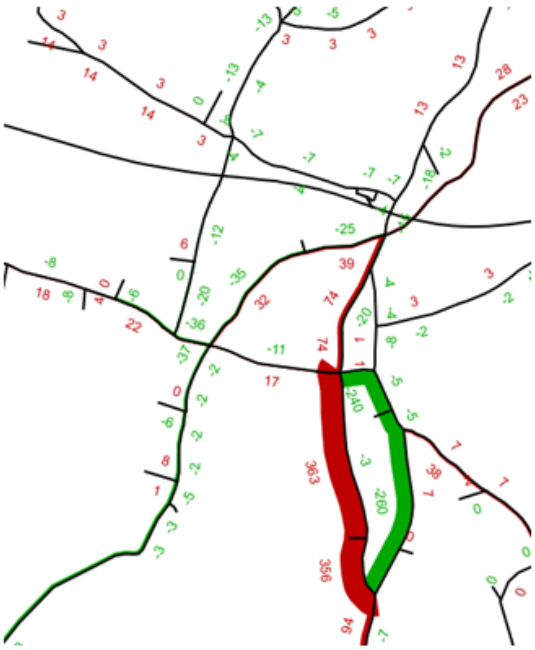


Green – Full Link Road reduces traffic
Red – Full Link Road increases traffic

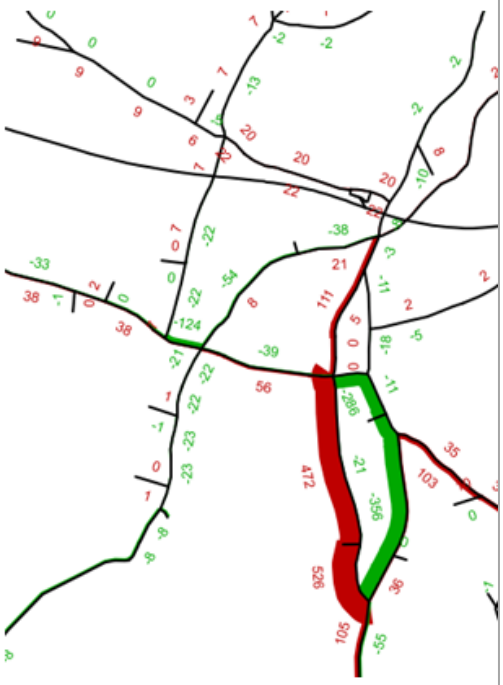
Appendix C Local Network Impacts – Sensitivity Tests

DS5a – Laindon Road Two-Way v Unmitigated Local Plan
DS5b – Laindon Road Two-Way v Full Link Road
DS6a – Reverse Laindon Road One-Way v Unmitigated Local Plan
DS6b – Laindon Road Two-Way v Full Link Road

DS5a v DS1 AM

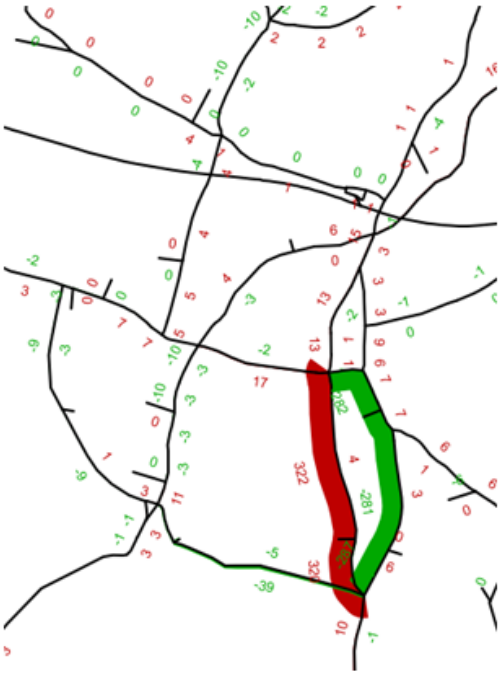


DS5a v DS1 PM

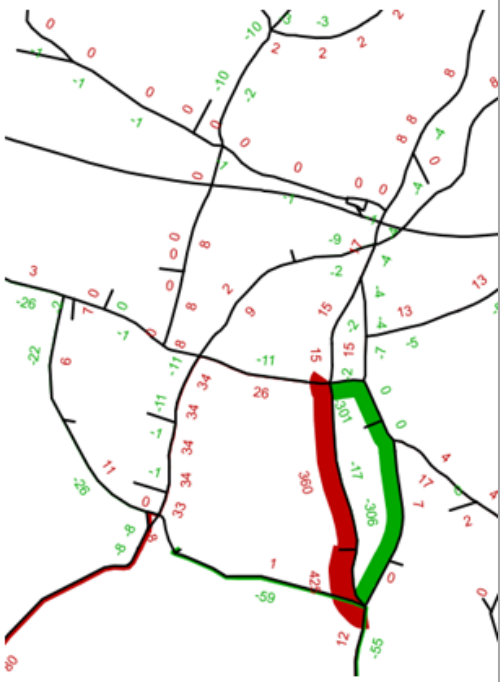


Green – Scheme reduces traffic
Red – Scheme increases traffic

DS5b v DS4 AM

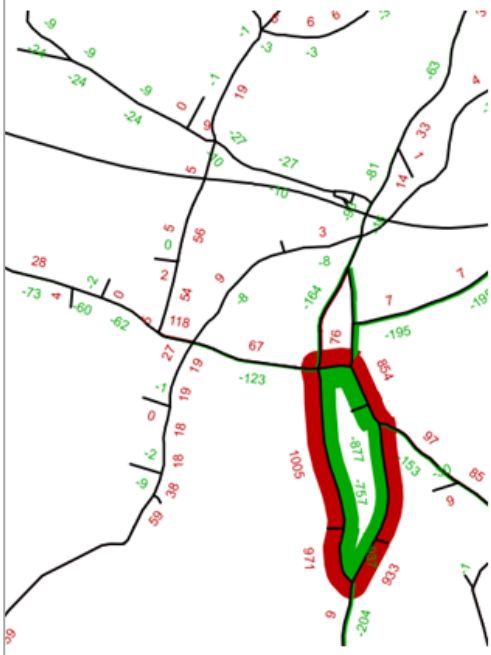


DS5b v DS4 PM

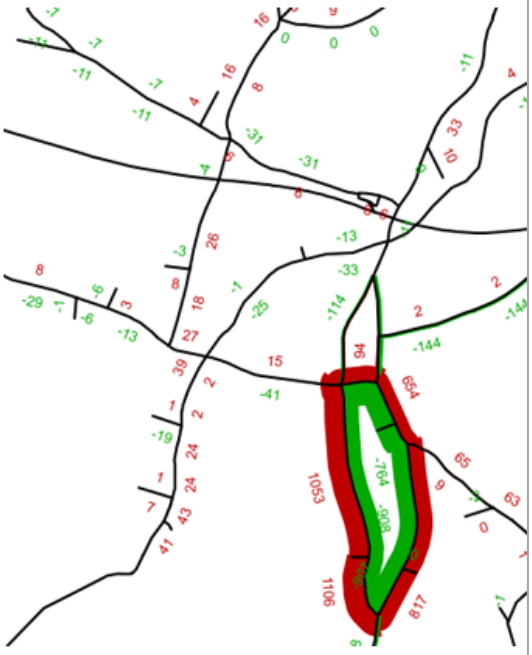


Green – Scheme reduces traffic
Red – Scheme increases traffic

DS6a v DS1 AM

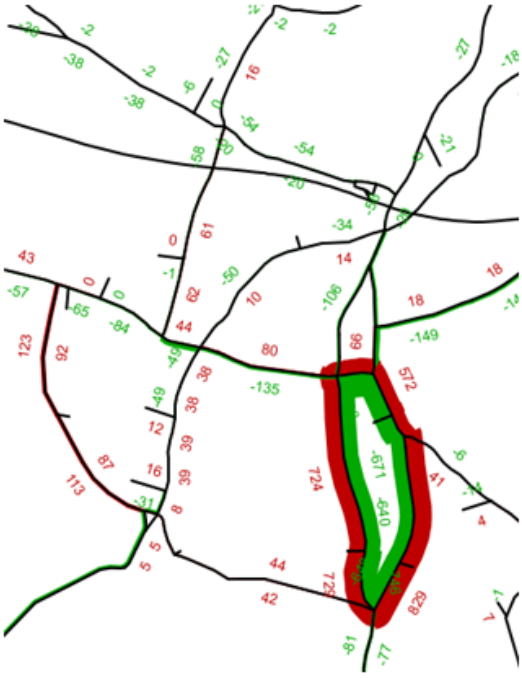


DS6a v DS1 PM

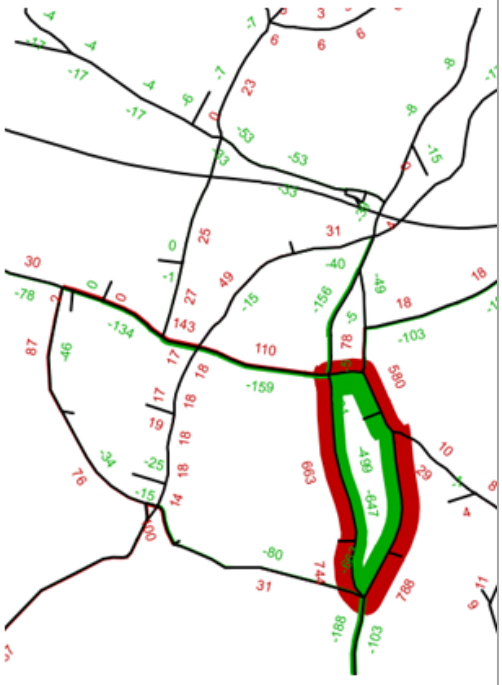


Green – Scheme reduces traffic
Red – Scheme increases traffic

DS6b v DS4 AM



DS6b v DS4 PM



Green – Scheme reduces traffic
Red – Scheme increases traffic