THIRD WAVE LOCAL AUTHORITIES – TARGETED FEASIBILITY STUDY TO DELIVER NITROGEN DIOXIDE CONCENTRATION COMPLIANCE IN THE SHORTEST POSSIBLE TIME

Local authorities covered	Blaby District Council

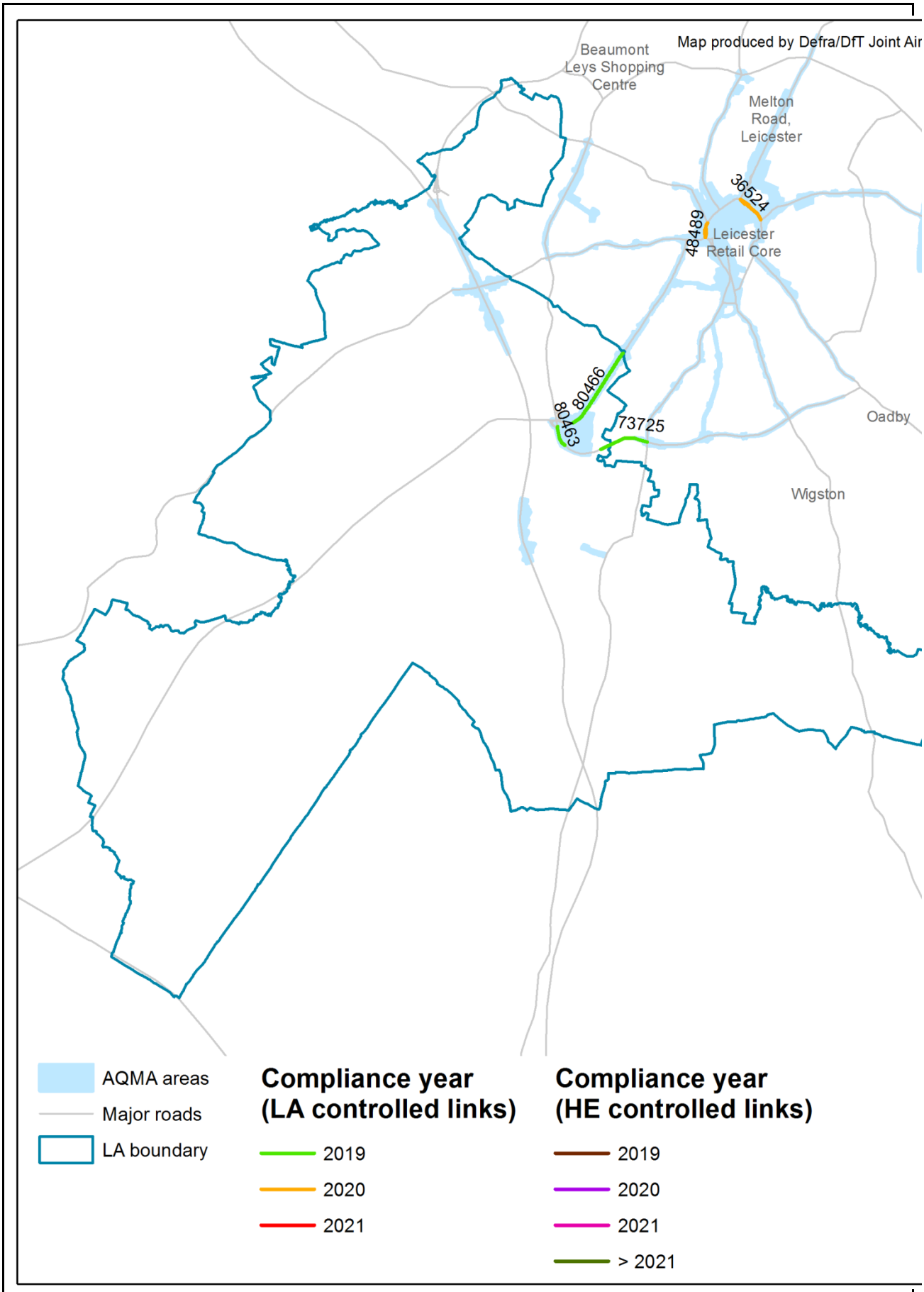
Further information on the content of each section is set out in the guidance.

Please note that changes Parts 1, 2 and 3 are tracked to ease consideration

Part 1: Understanding the problem

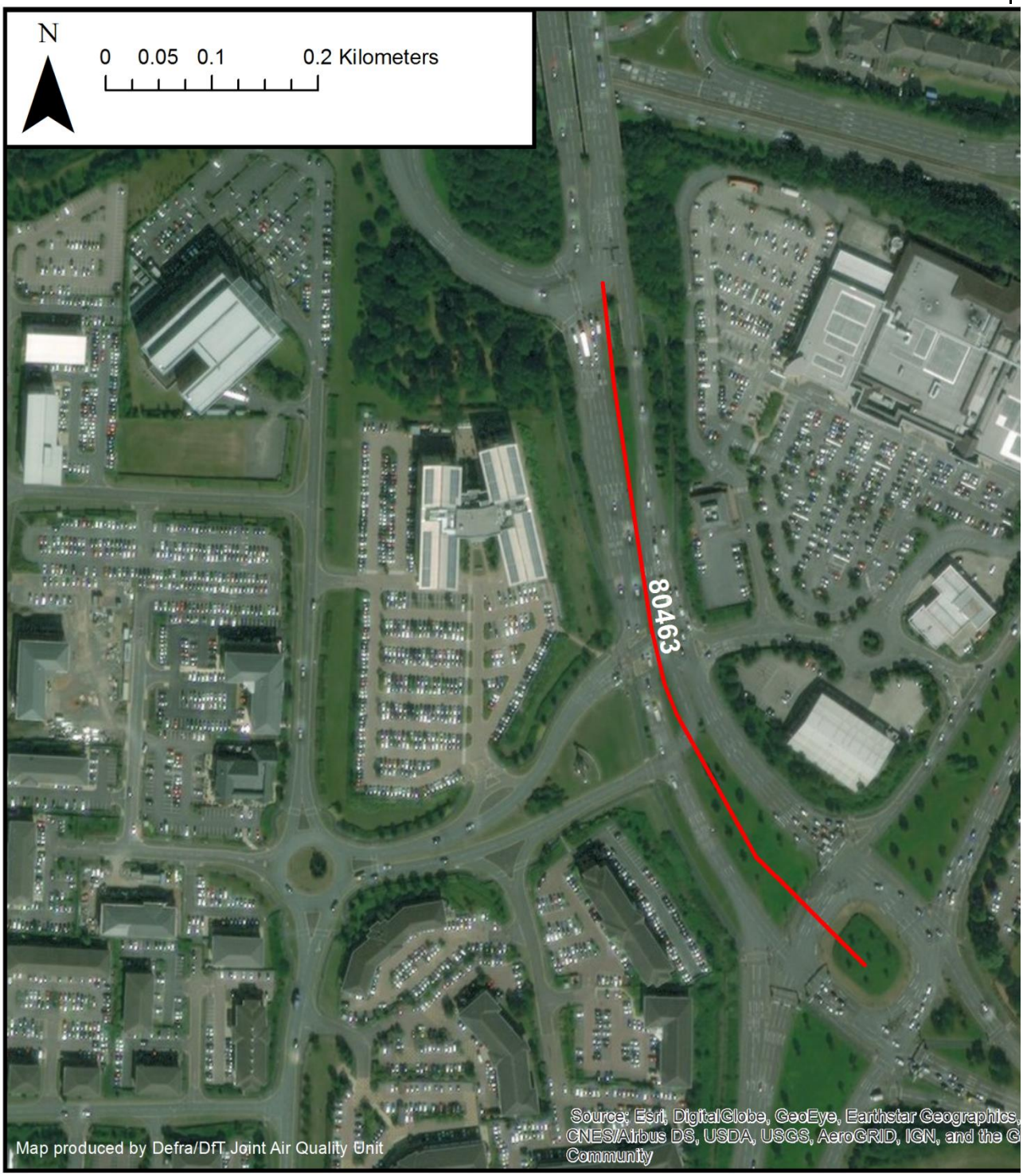
This section should set out background on the information about the road links projected to have exceedances in the PCM national model, in combination with source apportionment data, to provide a description of the severity of the NO2 exceedance and its possible sources and causes. It should set out the scale of the problem and the case for change. Maps and local data should be included. ***Each road link should be addressed in turn.***

There are 2 road links (census IDs 80463 and 80466) lying within our local authority area which are projected to have an exceedance. Both of these road links are managed by Leicestershire County Council and we have worked together on this feasibility study. A section of the A563 (census ID 73725) crosses into our local authority area from Leicester City. We have been working with Leicester City Council on measures that associated with that road link. Map 1 below shows these 3 links. We have worked very closely with colleagues at Leicestershire County Council, including the transportation strategy and the modelling teams. A supporting paper ('Blaby Air Quality Support Methodology Report, dated 20th July 2018, ref. 3851.102) was produced by them and this has been uploaded onto Huddle, together with a PowerPoint presentation In order to assist the interpretation of the outcomes of this Study, elements of the Methodology Report have been included into this template.


Map produced by Defra/DfT Joint Air
Beaumont Leys Shopping Centre
Melton Road, Leicester
36524
48489
Leicester Retail Core
80466
80463
73725
Oadby
Wigston
AQMA areas
Major roads
LA boundary
Compliance year (LA controlled links)
2019
2020
2021
Compliance year (HE controlled links)
2019
2020
2021
> 2021

Road link census ID 80463

This road link is a section of the A543 Leicester Outer Ring Road (ORR) originating from the junction with the B4114/A4560 to the A5460 junction which acts as a link road to Junction 21 of the M1 from the ORR and Leicester City. Please see map 2 below.



The road link passes between the Grove Park Triangle Retail Area, on the east and the Grove Park (a business development) on the west. The retail area gives rise to shopping related traffic. The business development gives rise to traffic flows which are more likely to have associated rush hour peaks. The PCM projections show the following NO_2 concentrations:

42 µg/m3 in 2018

40 µg/m3 in 2019;

38 µg/m3 in 2020;

36 µg/m3 in 2021.

This feasibility study aims to identify measures which could reduce the concentration of NO_2 on this road link as quickly as possible with the objective of bringing forward compliance in the shortest possible time, which could be achieved by reducing the NO_2 concentration in 2018 by at least 2 µg/m3. This link has not been declared as an AQMA due to the lacking of receptors relevant to LAQM.

The PCM gives the following as source apportionment for total NOx data for this road link: 6% Regional background, 6% Urban background (non-traffic), 18% Urban background (traffic), 26% Diesel cars, 6% Petrol cars, 16% Diesel LGVs, 0% Petrol LGVs, 11% HGVr, 9% HGVa, 2% Buses

There are 2 bus routes that use this road link:

- the number 40 Centrebus Circleline service, via the Grove Farm Triangle, hourly Mon-Sat daytime only
- the 203 Roberts Park and Ride Service which has its terminus to the south of Grove Park, every 15 mins Mon- Sat daytime only

Road link census ID 80466

This road link is a section of the A5460 Narborough Road South from its junction with the link road towards Junction 21 of the M1 to the boundary of Blaby District with Leicester City. Please see map 3 below.

The link is the former A46 and is an important spinal road to the City. It is a duel carriageway with no pedestrian access within its confines. However on either side of the duel carriageway is a two-way service road, with pavements fronting onto houses. At its southern end, there is a system of pedestrian and cycleways towards the Fosse Park Shopping Centre. At its northern end, there is a junction with Braunstone Lane, where there is a complex traffic controlled road layout, including traffic from the western service road. This junction can become a focus for congestion at peak hours, particularly with City-bound traffic. There is also a potential for congestion during large public events in the City (e.g. football matches).

The PCM projections show the following NO_2 concentrations:

41 µg/m3 in 2018

40 µg/m3 in 2019;

38 µg/m3 in 2020;

36 µg/m3 in 2021.

This feasibility study aims to identify measures which could reduce the concentration of NO_2 on this road link as quickly as possible with the objective of bringing forward compliance in the shortest possible time, which could be achieved by reducing the NO_2 concentration in 2018 by at least 1 µg/m3. This road link formed AQMA1, which was reduced in its extent in January 2018.

The PCM gives the following as source apportionment for total NOx data for this road link: 7% Regional background, 6% Urban background (non-traffic), 20% Urban background (traffic), 29% Diesel cars, 7% Petrol cars, 17% Diesel LGVs, 0% Petrol LGVs, 6% HGVr, 2% HGVa, 5% Buses.

There are a number of bus services that use this link:

- The 50 and 104 Arriva services, which use the service roads
- The X84, X55 Hinckley Bus and X6 Travel de Courcey services which use the main carriageway
- Frequency as follows:

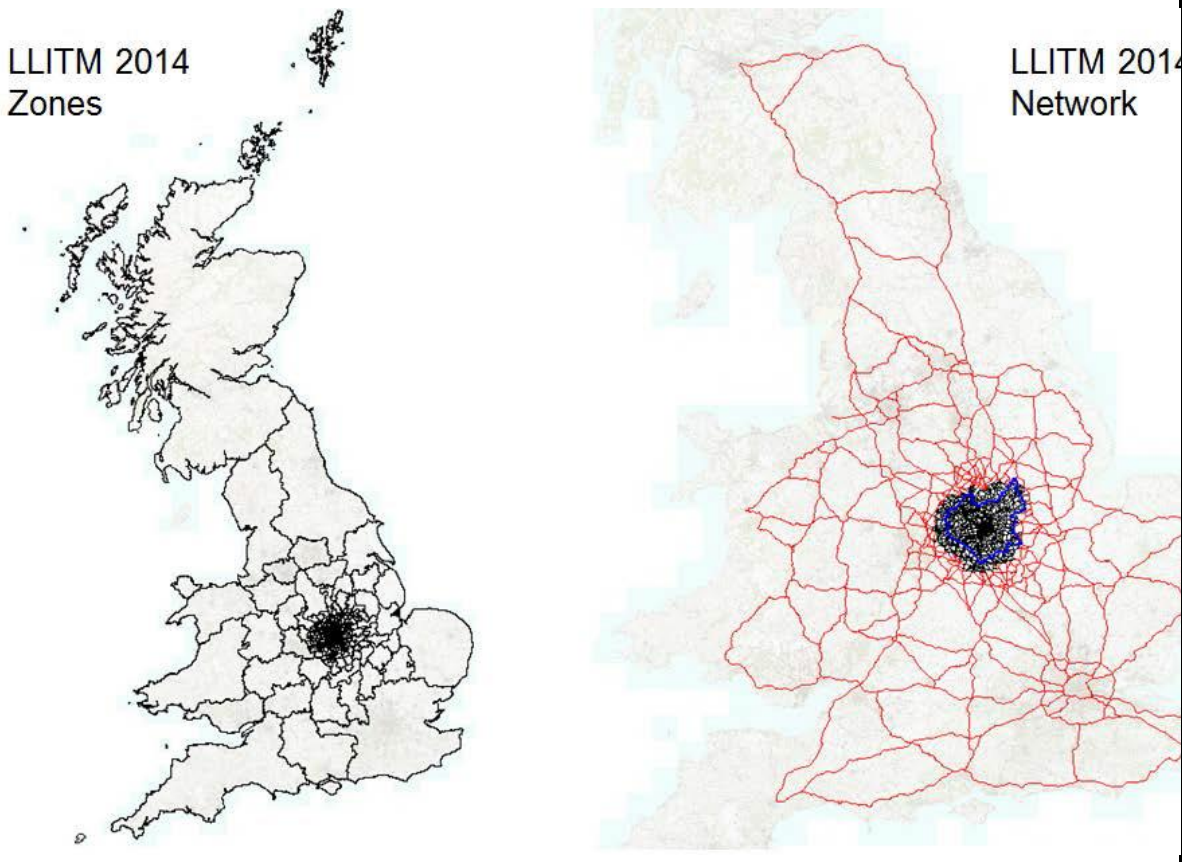
Narborough Road South – service roads					
Service	**Operator**	**Route**	**Frequency**		
			Mon – Sat Daytime	**Mon – Sat Evening**	**Sun**
50	Arriva	Leicester – Enderby - Narborough	20 mins	30 mins	30 mins
104	Arriva	Leicester – Braunstone – Fosse Park	15 mins	30 mins	30 mins
Narborough Road South – main carriageway					
X84	Hinckley Bus	Leicester – Rugby	Hourly	No service	No service
X55	Hinckley Bus	Leicester – Hinckley	Infrequent	No service	No service

X6	Travel de Courcey	Leicester – Coventry	Hourly Mon-Fri 90 mins Saturdays	No service	Infrequent

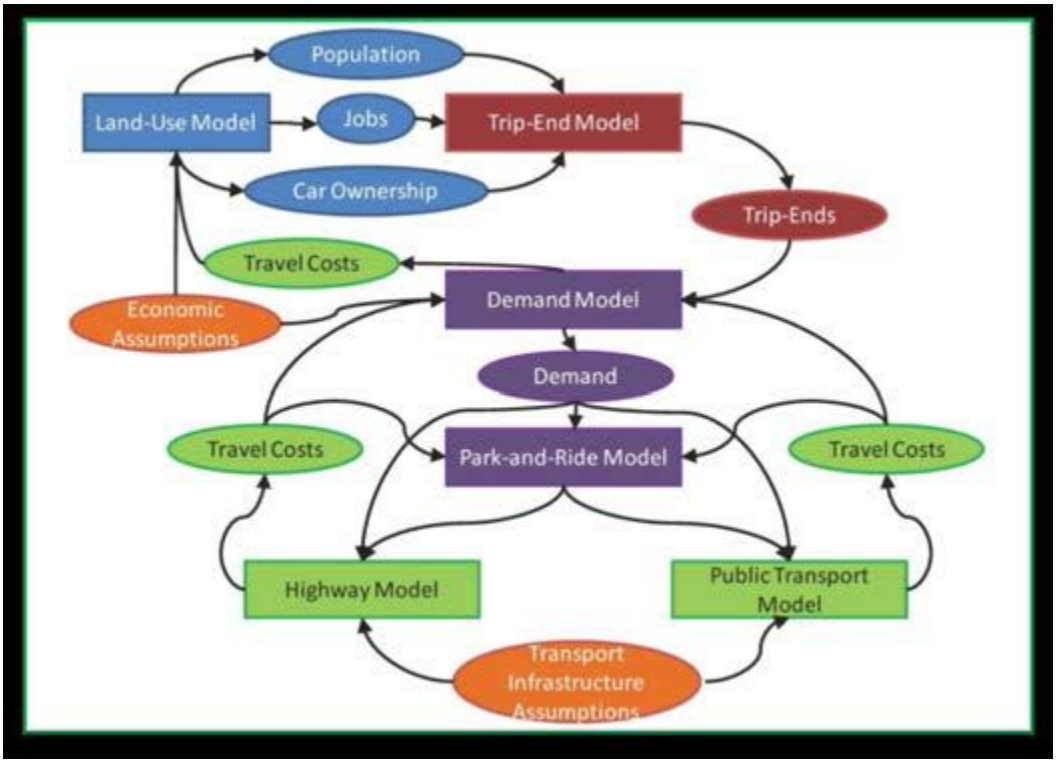
The LLITM Model

The Leicester & Leicestershire Integrated Transport Model (LLITM) is a county-wide transport and land-use model capable of meeting the rigorous demands by Government of sound transport evidence to support plans, policies and schemes. Although LLITM models Leicestershire in detail it does extend beyond the county boundary to capture those external trips affecting the county. The figure below shows the extents of the LLITM model in terms of its zones and network coverage. Although LLITM covers the whole country it is characterised by a diminishing level of model detail with distance from Leicestershire since the principal interest relates to those trips affecting the county's infrastructure.

Extent of LLITM Zones and Network.



Summary of the full LLITM suite of modules (below)



An overview of the key LLITM interactions (above)

In general terms the LLITM is comprised of a Land-Use model which generates total demand for travel. This total travel demand is then split by journey purpose, mode and time of day within the Demand model. These components of demand are then filtered down into the highway and public transport models which then route trips through the network. LLITM is constrained to NTEM 7.2 growth at the wider area but uses its more detailed land-use component to forecast demand within the county. Supplementing the fundamental process are various additional

modules enabling LLITM to output environmental, economic and enhanced land-use forecasts when required.

LLITM 2014 is WebTAG compliant and is comprised of a 2014 observed base year from which future forecasts are made up to 2051. The future year assumptions within LLITM follow WebTAG guidance and include developments and infrastructure which are committed, highly likely and likely. They represent what was known back in the autumn of 2015.

The land-use model provides forecasts for each year whilst the demand, highway and PT modules do so for 2016 and at 5 yearly intervals up to 2051.

For the purposes of the A5460/A563 assessment, core scenario output from a full LLITM run is extracted from the highway component only for the forecast year of 2016. Within the LLITM highway model 3 time periods, reflecting a typical working weekday, are used for the assessment representing:

• AM Peak hour (0800 to 0900hrs)

• PM Peak hour (1700 to 1800hrs)

• Inter-Peak hour representing a typical hour between 1000 to 1600hrs

Highway assignments have then been run, both with and without the scheme for the 2016 forecast year as it provides the closest proxy to 2018, and necessary output extracted for input into the EFT v8.0.1.a. The Emissions Factor Toolkit (EFT), as defined by DEFRA, allows users to calculate road vehicle pollutant emission rates for NOx, PM10, PM2.5 and CO2 for a specified: year; road type; vehicle speed, and vehicle fleet composition. The EFT was run in the 2018 year, with the basic road split assumed.

LLITM 2014 Modelling Process

Outline Approach

Given the demanding timescale a proportionate approach between rigor and pragmatism was taken when undertaking the modelling. This section provides an overview of the process including the necessary assumptions and any potential limitations.

The proportionate approach is summarised as follows:

1. Extract out LLITM Highway Core models for:

AM Inter Peak PM

2016 X X X

2. **DO NOTHING (DN)**: Review LLITM Core networks and fix any problems with the local network.

3. **DO SOMETHING (DS)**: Build A5460/A563 scheme network from the **DO NOTHING**.

4. Run preliminary 2016 **DO NOTHING** and **DO SOMETHING** highway assignments.

5. Identify the scheme's forecast Area Of Influence (AOI) by considering those network link flows changing by more than ±5% between **DO NOTHING** and **DO SOMETHING** assignments.

6. Re-visit the LLITM 2014 base year validation and report on the model fit with observation for

Link Flow and Journey Times within the AOI.

7. Output peak period traffic flows, cruise speed and HGV percentage for EFT input.

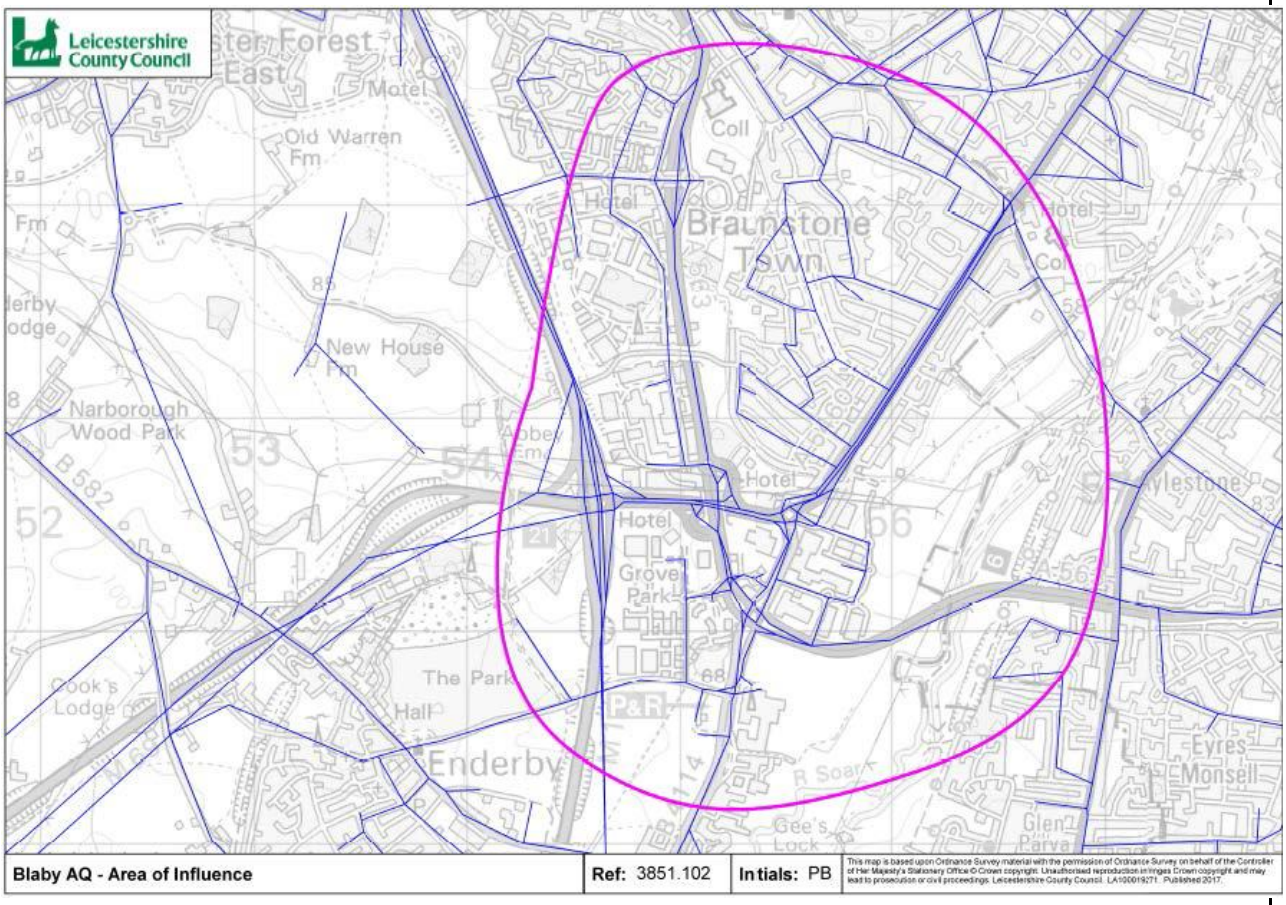
8. Calculate daily factors using observed data from multiple local fixed site traffic counters to estimate AADT, daily cruise speed and daily HGV percentage.

9. Run EFT v8.0.1.a for both DN and DS scenarios.

10. Analyse, refine and report as necessary.

Derivation of the Scheme Area of Influence (AoI)

There can be technical difficulties in producing meaningful reporting on single junction improvements when using an area wide model, such as LLITM, to assess the impact of a scheme whose influence relates to a modest part of its full extent. One approach to ameliorate this, and the one used here, is to identify the Area of Influence (AOI) of the scheme based on a comparison of modelled 'with and without' scheme forecast traffic flows. The AOI has been defined here by considering the links most likely to be effected by the proposed scheme, as well as including the DEFRA highlighted links and surrounding roads. The figure below shows the resulting scheme area of influence.



Model Validation

The LLITM 2014 base year model validation has been revisited and checked for the AoI in terms of link and journey time performance.

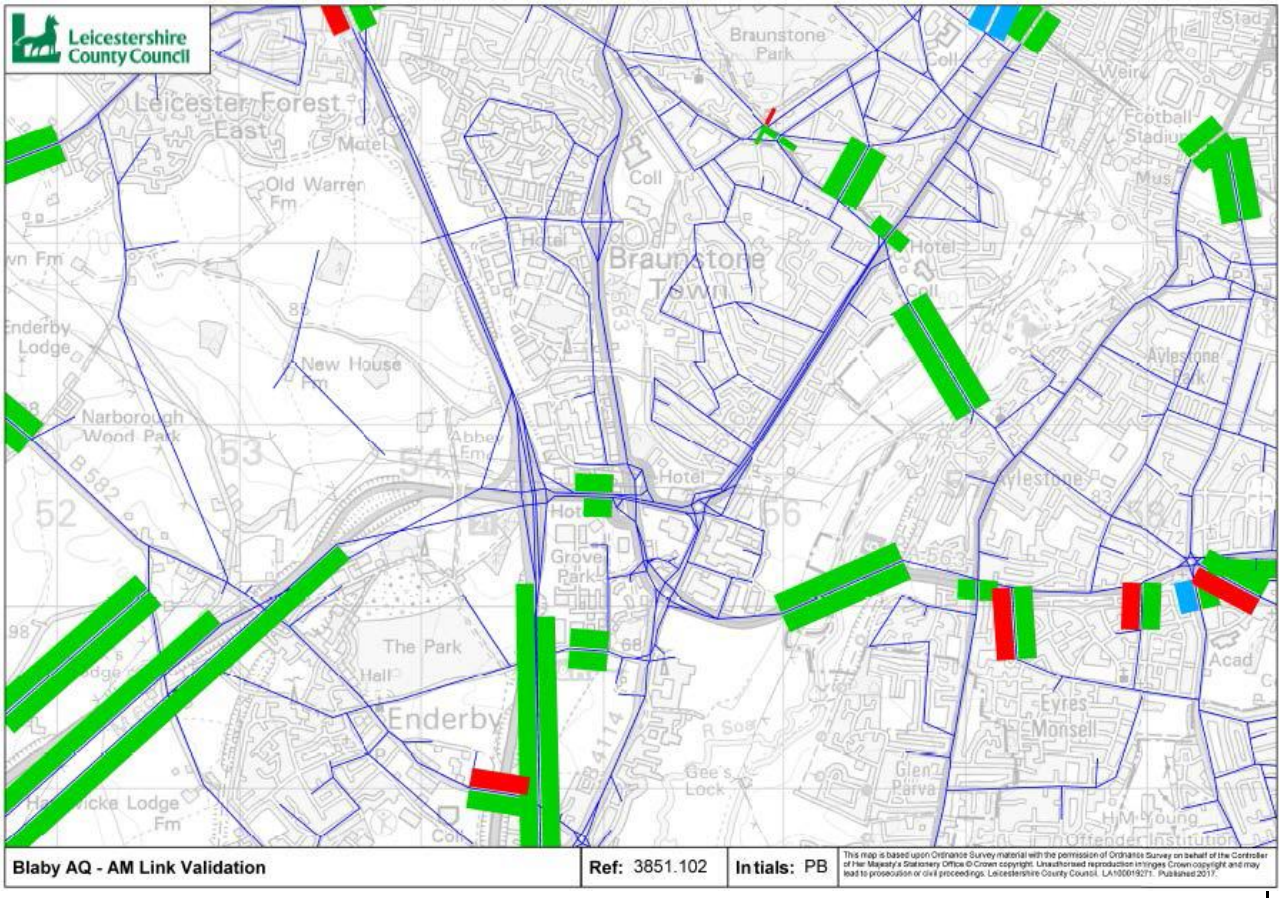
Link Validation:

A review of local observed flows and journey times in the vicinity of the A5460/A563 scheme area of influence (AoI) is presented below. The 3 figures and table show how LLITM 2014 performs with respect to WebTAG guidance on modelled versus observed link flows in the local area for AM, Inter-Peak and PM peak hours respectively.

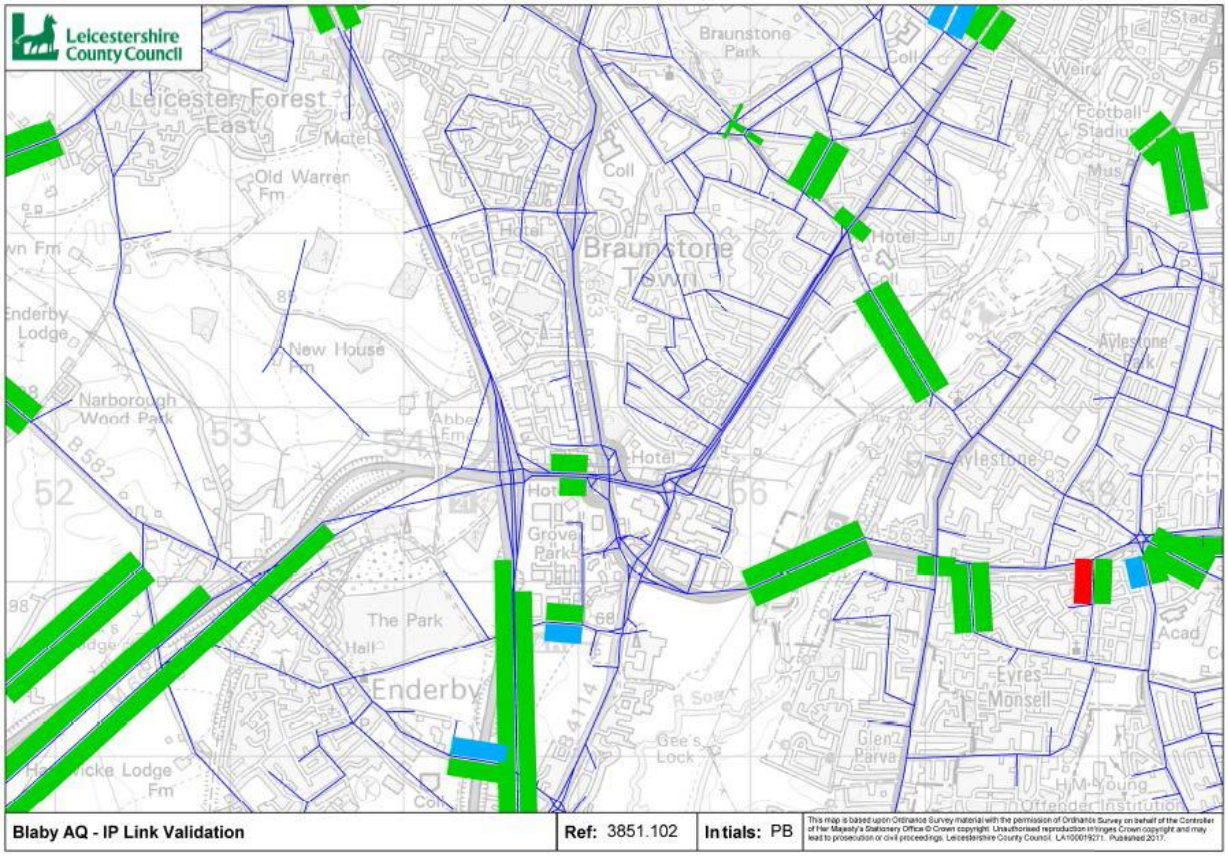
		AM	IP	PM
Number of Links	Pass	17	17	18
	Over Assigned	1	0	0
	Under Assigned	0	1	0
Percentage	Pass	94%	94%	100%
	Over Assigned	6%	0%	0%
	Under Assigned	0%	6%	0%

Table 4.1: Link Validation in the A5460/A563 AoI.

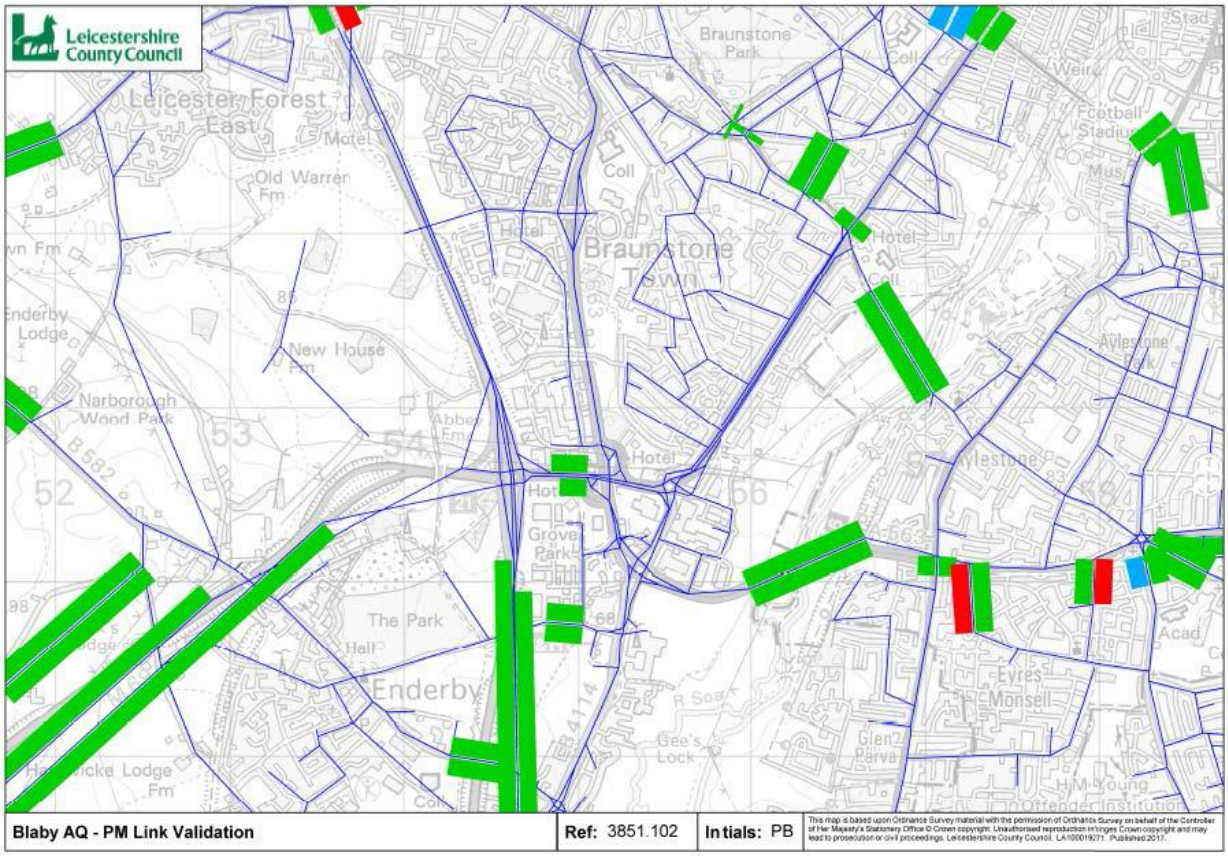
The link validation within the area of influence is very good and implies the model to be fit for purpose for this 'high level' appraisal.



A5460/A563 AoI – LLITM2014 AM Link Validation (0800-0900hrs)



A5460/A563 AoI – LLITM2014 IP Link Validation (1000-1600hrs).



A5460/A563 AoI – LLITM2014 PM Link Validation (1700-1800hrs)

Part 2: Developing a long list of measures for addressing the exceedances

This section should provide a long list of possible measures to be considered for each road link. Local authorities should consider the source apportionment set out in part 1.

There have been several measures directly related to the identified links that have been completed in the past 3 years:

Road link census ID 80463

- Soar Valley Way/ Grove Way minor junction improvement (additional lane and signal renewal);
- Work with Grove Park Businesses on Travel Plans providing advice and guidance (part of successful LTSF bid)

Road link census ID 80466

- Improvements to the junction at the southern end of the A5460 and introduction of SCOOT during the peak period and MOVA off peak (late 2014). This also included signalising the slip road from the A563 to the A5460;
- An upgrade of the signal communications in the Fosse Park area to a 'digital' platform (whilst not directly contributing to improved traffic flow it does improve our chances of managing the area more successfully)

New Measures

Road link census ID 80463

Part 1 shows that Diesel cars are the largest contributors to NOx concentrations on this road link. However it is difficult to identify measures that focus solely on this element and therefore measures that could reduce emissions from all cars on this link have been listed below:

Package of behavioural change based measures

- Promotion of cycling
- Promotion of walking
- Public cycle hire scheme
- Improve cycle network
- Increase uptake of lower emission vehicles. This could include the provision of a number of electric vehicle charging points on Grove Park and Grove Park Triangle.
- Work with local businesses to promote alternative commuting patterns, which may include increased usage of the existing Park and Ride site at Enderby
- Car and lift sharing schemes

Driver training/ECO driving aids

Package of traffic management measures

- Urban Traffic Control systems, signalling improvement, congestion management. Specifically, Introduction of MOVA technology at the existing A5460/A563 (westbound) signal junction.- to be more responsive to peak period traffic conditions and maximise throughput and reduce queuing (please see attached map)

- Reduction of speed limits
- Change road layouts

Road link census ID 80466

Part 1 shows that Diesel cars are the largest contributors to NOx concentrations on this road link. However it is difficult to identify measures that focus solely on this element and therefore measures that could reduce emissions from all cars on this link have been listed below Package of behavioural change based measures

Promotion of cycling Promotion of walking

- Public cycle hire scheme
- Improve cycle network
- Increase uptake of lower emission vehicles. . This could include the provision of a number of electric vehicle charging points on Grove Park and Grove Park Triangle.
- Work with local businesses to promote alternative commuting patterns, which may include increased usage of the existing Park and Ride site at Enderby
- Car and lift sharing schemes
- Driver training/ECO driving aids

Package of traffic management measures

- Urban Traffic Control systems, signalling improvement, congestion management Specifically, Introduction of MOVA technology at the existing A5460/A563 (westbound) signal junction.- to be more responsive to peak period traffic conditions and maximise throughput and reduce queuing (please see attached map)
-
- Reduction of speed limits, 20mph zones
- Change road layouts

Part 3: Assessing deliverability/feasibility and delivering a short list

For each of the measures identified in part 2, local authorities should set out an assessment of deliverability including how long it would take to deliver each measure and whether it is practicably feasible to deliver. Based on this assessment of deliverability and feasibility, the local authority should develop a short list of measures to take forward to part 4 of the report.

In this section we consider whether any of the measures included in the longlist in part 2 of this study are practically deliverable in time to be able to bring forward compliance on these road links. As discussed in part 1 above, these road links are projected to become compliant in 2019

so any measure would need to be deliverable by the end of 2018. In considering the measures in this part, we have continued to benefit from close dialogue with transport colleagues at Leicestershire County Council.

Measures rejected due to deliverability issues

Our longlist contained measures relating to reduction of vehicle speeds and the introduction of 20mph zones. The majority of the traffic on the 2 road links subject to this Study are on roads with a 50mph speed limit. As this is close to optimum traffic speeds for efficiency, there appears to be little benefit on emissions that would result from reducing those speed limits. At peak times, the problem is one of congestion and junction capacity, with associated standing or slow moving traffic. Such problems affect a larger area, see Scheme Area of Influence (AOI) shown in section 4.2 of the supporting document. Alterations to speed limits would not successfully address this aspect of the traffic problem. In any event, in order to change speed limits, the related traffic regulation procedures and signage is unlikely to be achievable before the end of 2018. For this reason, we have not included this measure on our shortlist.

Our longlist also included measures relating to changes in road layout. The traffic related problems on the links subject to this Study are not significantly related to poor road layouts, but congestion and junction capacity. Due to the associated design, funding, and construction considerations, it is highly unlikely that any road layouts could be implemented before the end of 2018. For this reason, we have not included this measure on our shortlist.

Shortlisted measures

We have included the remainder of the measures set out in our longlist above to take forward to part 4. The measures that are related to influencing behavioural change are to be considered together. These measures are considered to be viable, building on existing work in the vicinity funded by the Access Fund, and/or the approved project funded by Air Quality Grant. Those measures accord with the emerging local public health agenda. The exception to this is provision of EV charging points, which would need to be separately funded.

The signalling improvements have already been included in the County Council's schemes for implementation by the end of 2018.

Our shortlisted measures are therefore:

Package of behavioural change based measures

- Promotion of cycling
- Promotion of walking
- Public cycle hire scheme
- Improve cycle network
- Increase uptake of lower emission vehicles. . This could include the provision of a number of electric vehicle charging points on Grove Park and Grove Park Triangle. This could potentially be implemented before the end of 2018, subject to design and build considerations, and associated consents being obtained.
- Work with local businesses to promote alternative commuting patterns
- Car and lift sharing schemes

- Driver training/ECO driving aids

Package of traffic management measures

- The introduction of MOVA technology at the existing A5460/A563 (westbound) signal junction - to be more responsive to peak period traffic conditions and maximise throughput and reduce queuing. These improvements consisted of a signal upgrade from fixed timings to MOVA, No lane capacity increasing scheme can be carried out in the area due to lack of space in the Junction 21 vicinity.

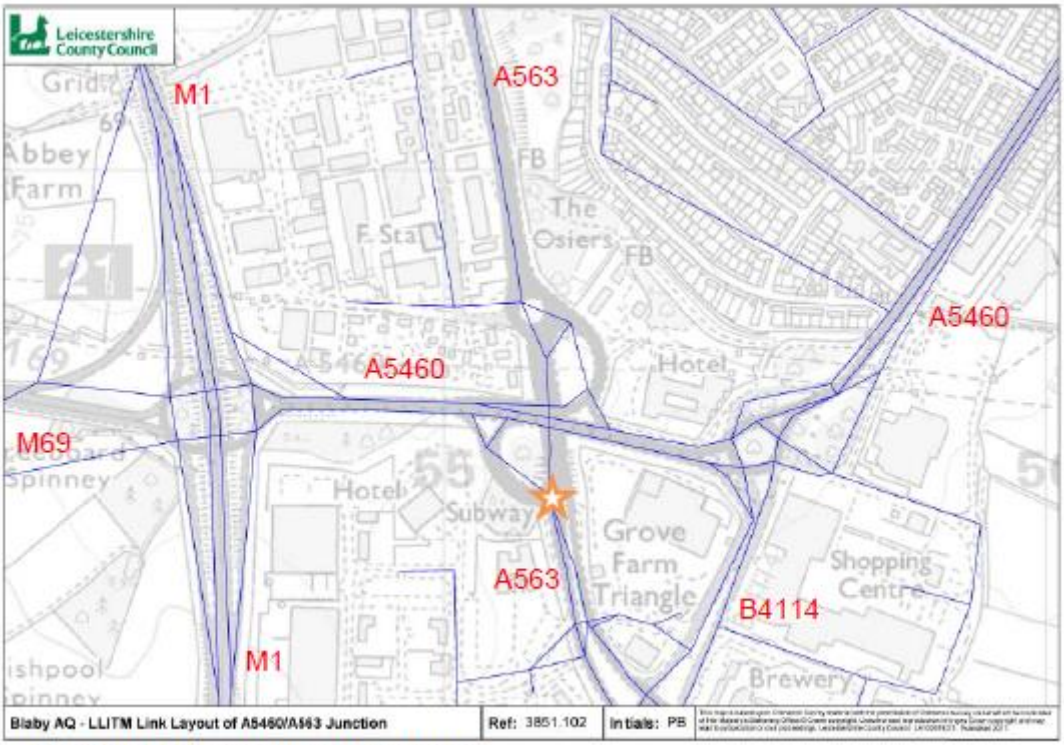


Figure 5.1: Alignment of A5460/A563 junction.

The surrounding Grove Farm Triangle area is a perennial problem for traffic management; both in terms of the very large demand for the area, as it is the gateway from Leicester City to the M1, and determining/implementing the most efficient way to manage this large demand.

Part 4: Evidencing the short listed measures to identify options that could bring forward compliance

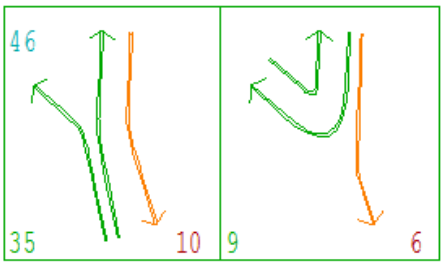
In this section, local authorities should set out the likely effectiveness of the shortlisted measures in bringing forward compliance. Local authorities should assess each option against the Primary Critical Success Factor.

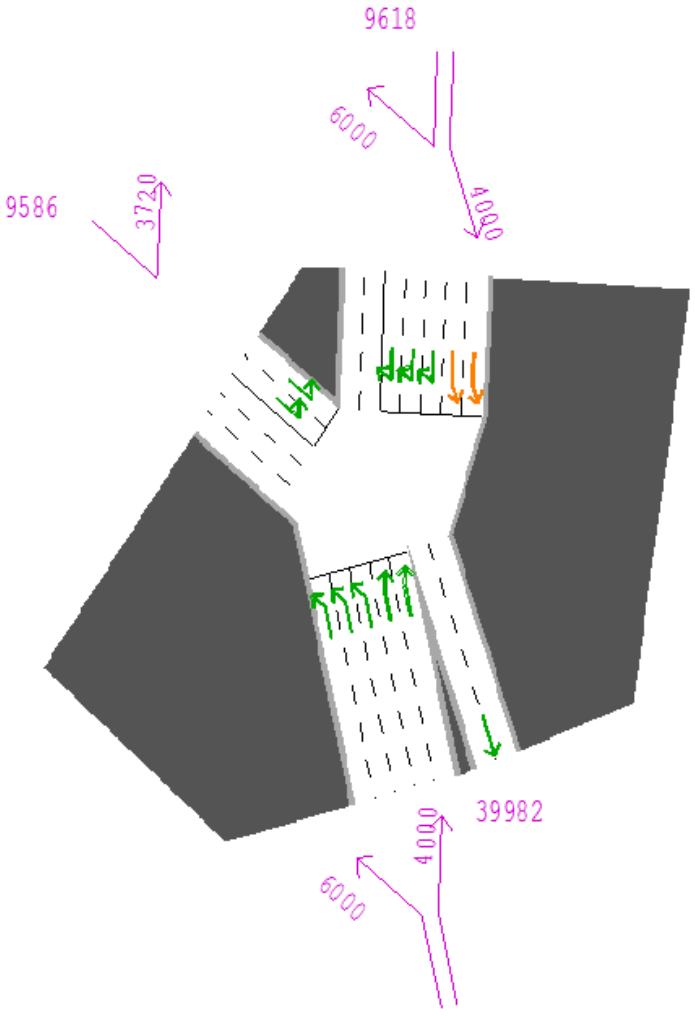
Traffic Management Measure

In terms of the signalling improvements that were cited above, Leicestershire County Council undertook modelling using LLITM The LLITM highway model cannot model the demand responsive nature of MOVA signals directly. As a consequence, and after consultation with colleagues, the application of a 10% improvement in junction capacity associated

with the instatement of MOVA control has been applied to the existing LLITM highway model.

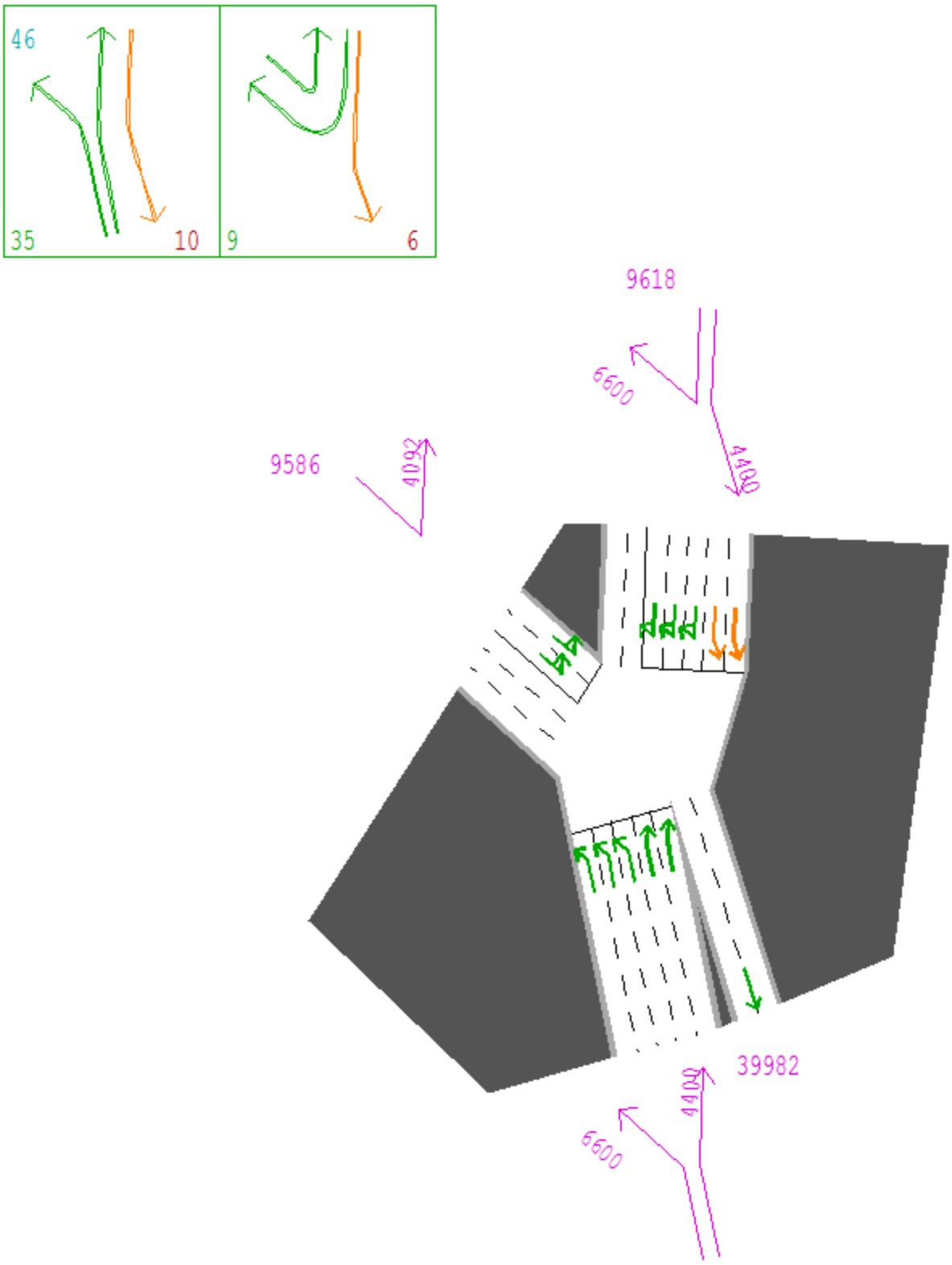
Below is the current layout of the A5460/A563 junction, with AM signal timings and stop-line capacity.





Current alignment of A5460/A563 junction

Below is the layout of the A5460/A563 AM with the capacity increases; note that the signal timings and junction layout has not changed as described and explained in the following section



Do Something alignment of A5460/A563 junction.

The same change is applied to the Inter-peak and PM model hours, the signal timings vary slightly, as shown in the table below. All timings have remained the same between the Do Nothing and Do Something.

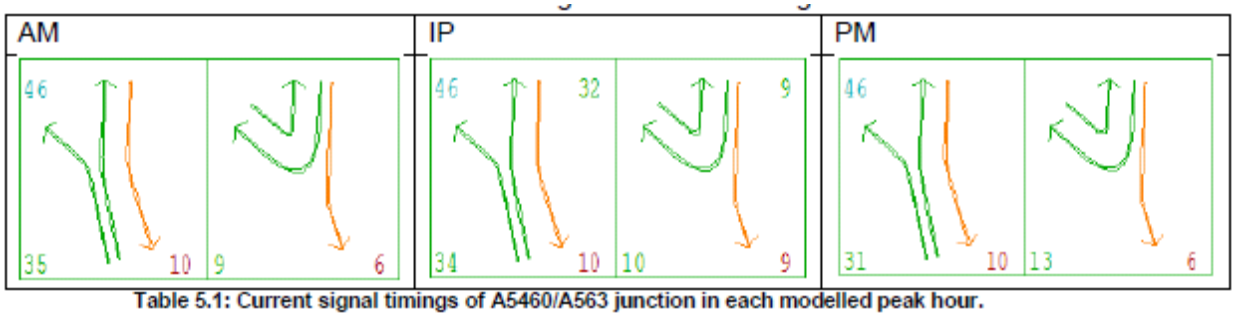
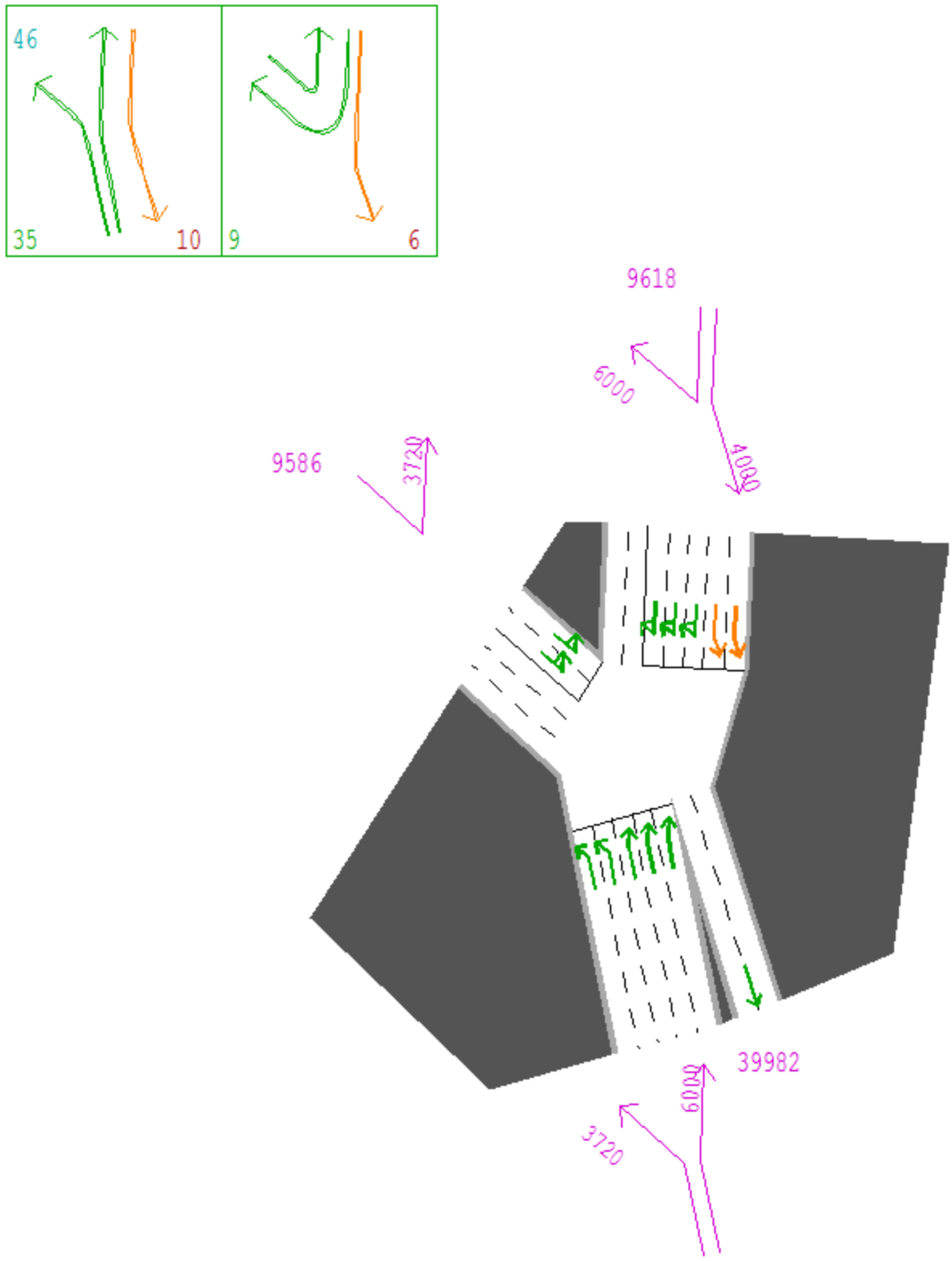


Table 5.1: Current signal timings of A5460/A563 junction in each modelled peak hour.

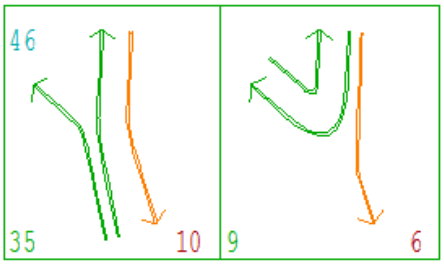
LLITM ‘Amended’ Core Scenario (Do Nothing)

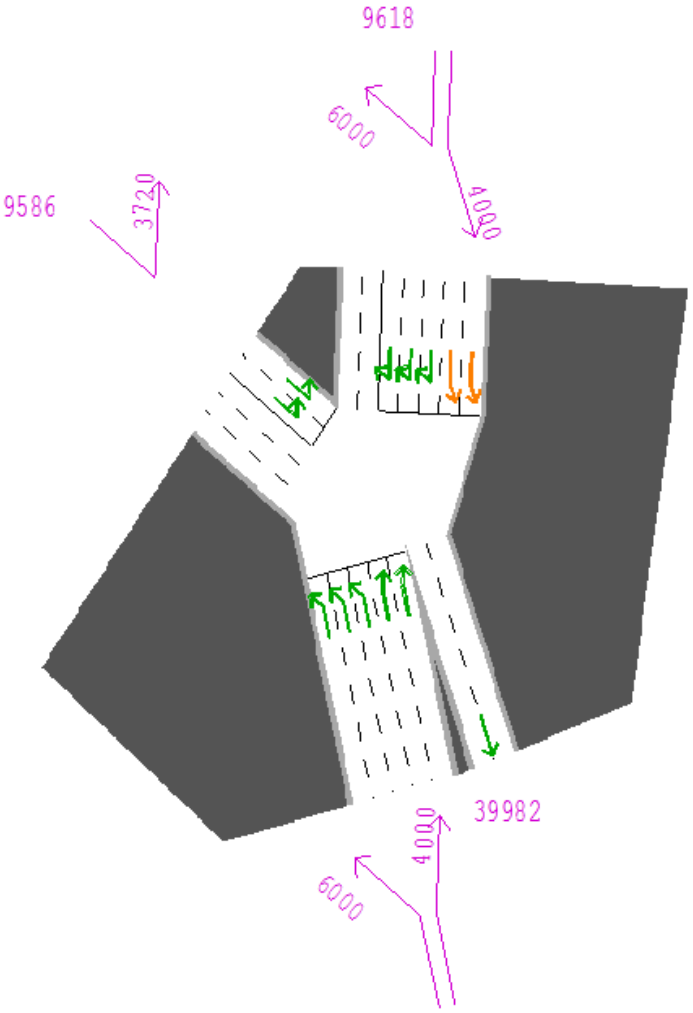
Even with the short timescale and the high level of the study, a quick network check was conducted looking at the surrounding junctions as well as the junction of interest. A network coding error was discovered on the A5460/A563 junction where three lanes were continuing on the A563 Lubbesthorpe Way Northbound and two lanes turning left towards the A5460, instead of two lanes continuing on the A563 and three lanes towards the A563. This change is highlighted below for the AM peak Nnote the capacity changes of the arm movements as a result of the amendment.

The “Do Nothing” scenario is where there is no scheme implementation; the “Do Something” is where the scheme changes have been made to the network.



Non-amended alignment of A5460/A563 junction.



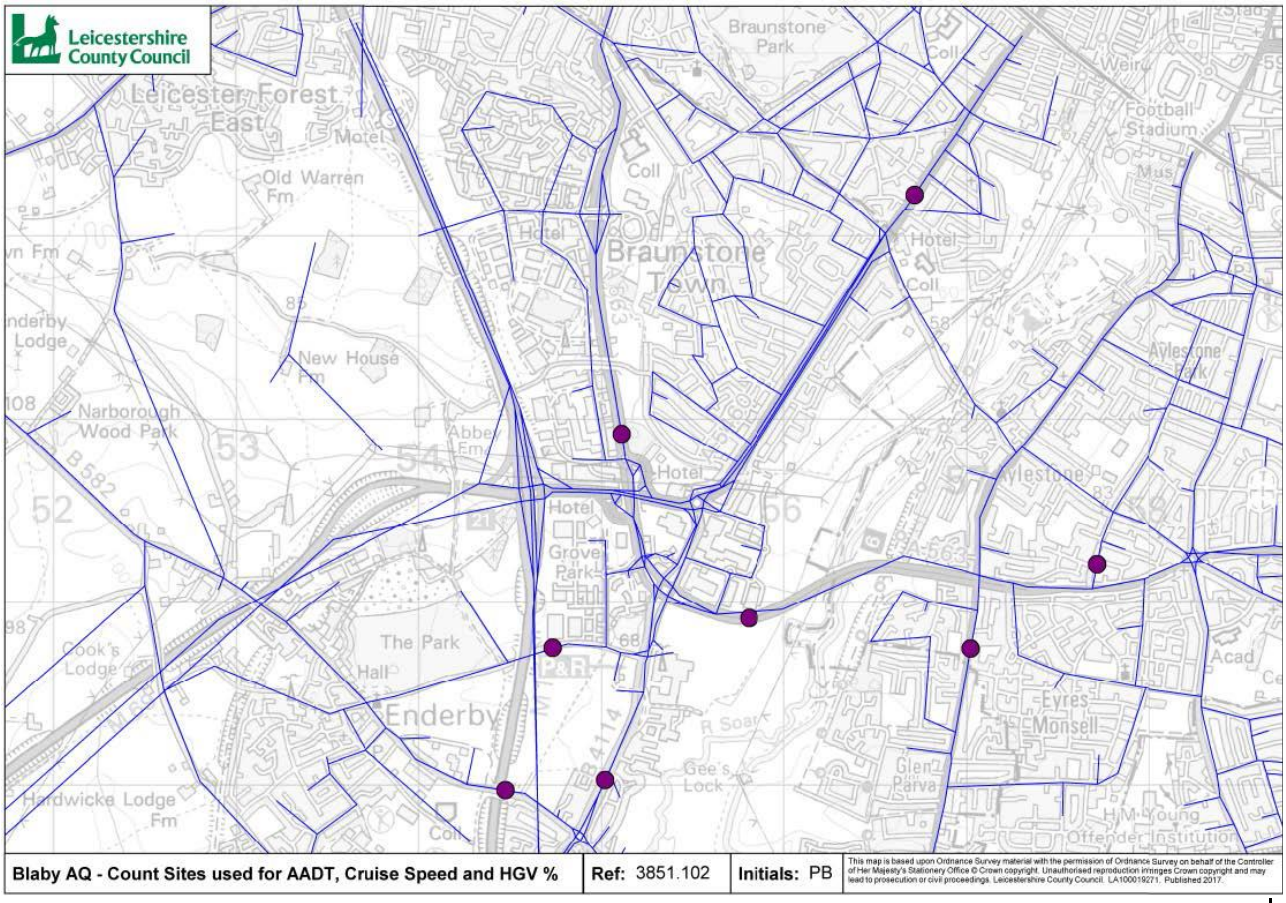


Amended alignment of A5460/A563 junction.

Assignment Results

Average Annual Daily Total (AADT)

In order to convert LLITM hourly flows to an AADT equivalent a relationship has been derived using observed counts from a number of fixed sites in the local area.



Count Sites.

The LLITM to AADT formulation has utilised the average flow profile obtained from the sites shown above. From this flow profile it is possible to identify the number of hours in a day that resemble a typical AM, IP and PM peak hour:

- 2 AM Peak
- 7 IP
- 3 PM Peak

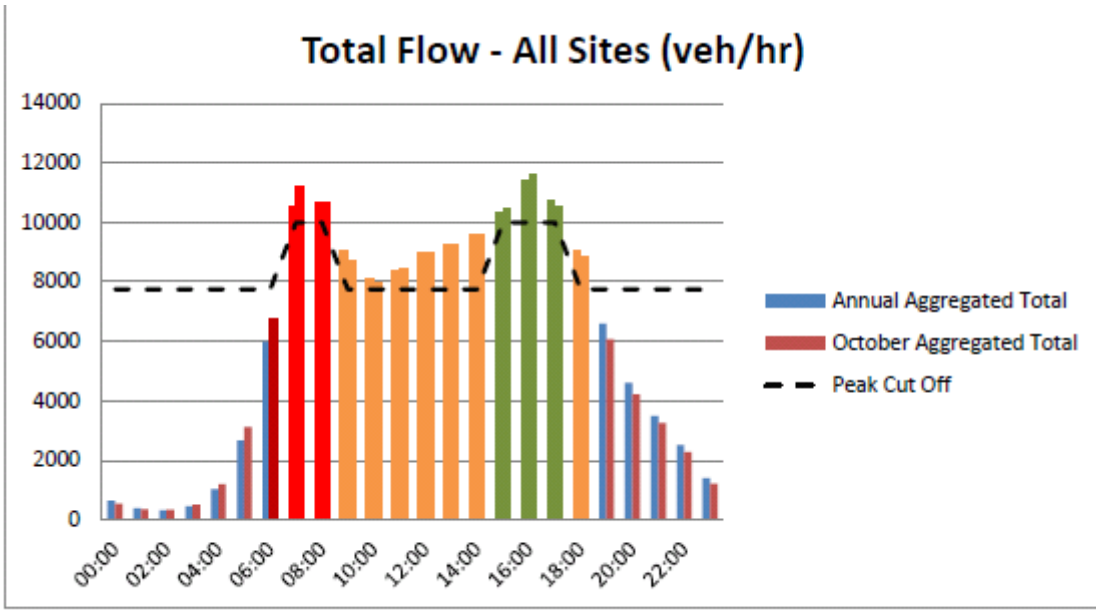


Figure 7.2: Hourly total flow profile

Using this information the following relationship, linking LLITM output to the derivation of AADT, has been derived. This formula is as follows,

$$AADT = 1.18 * (2 * AM + 7 * IP + 3 * PM)$$

The peak hour coefficients are used to multiply the modelled peak hour flows; then a scaling factor, in this case 1.18, is used to factor up our calculated flows to best represent the observed AADT. This methodology results in the following regression plot:

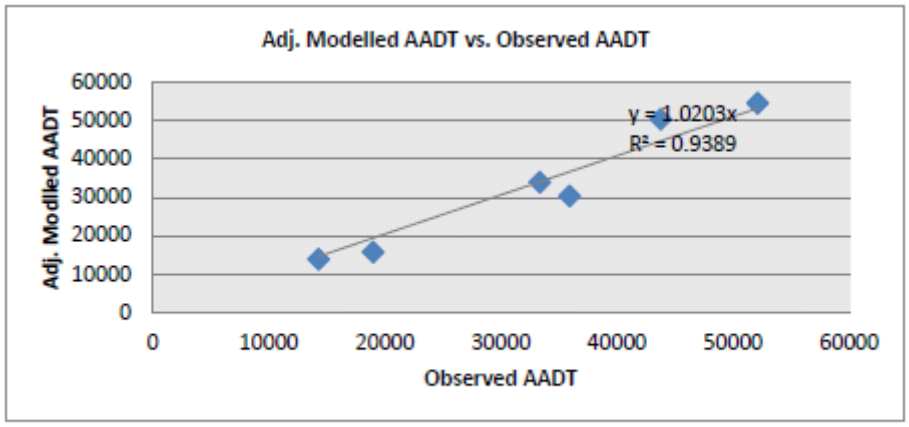
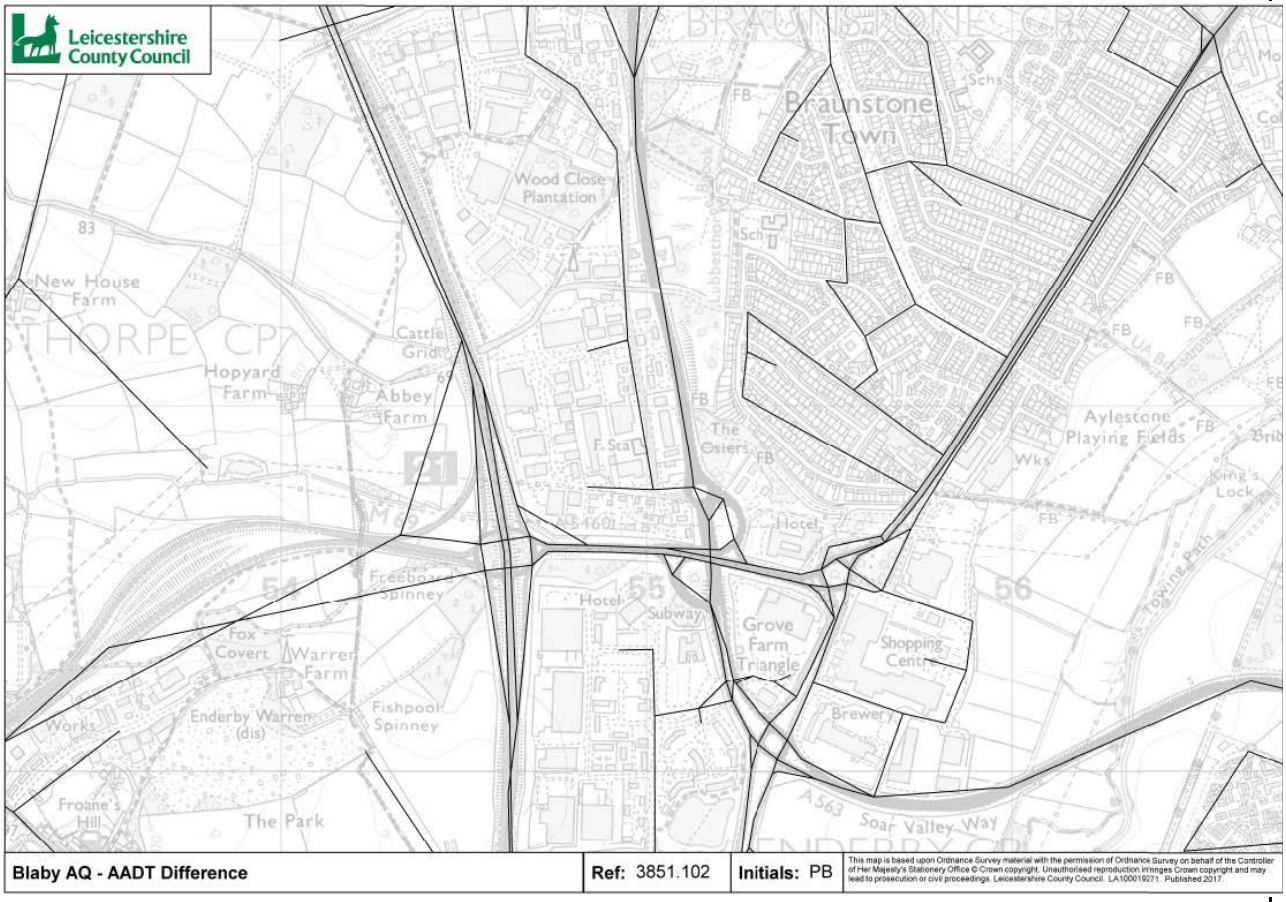


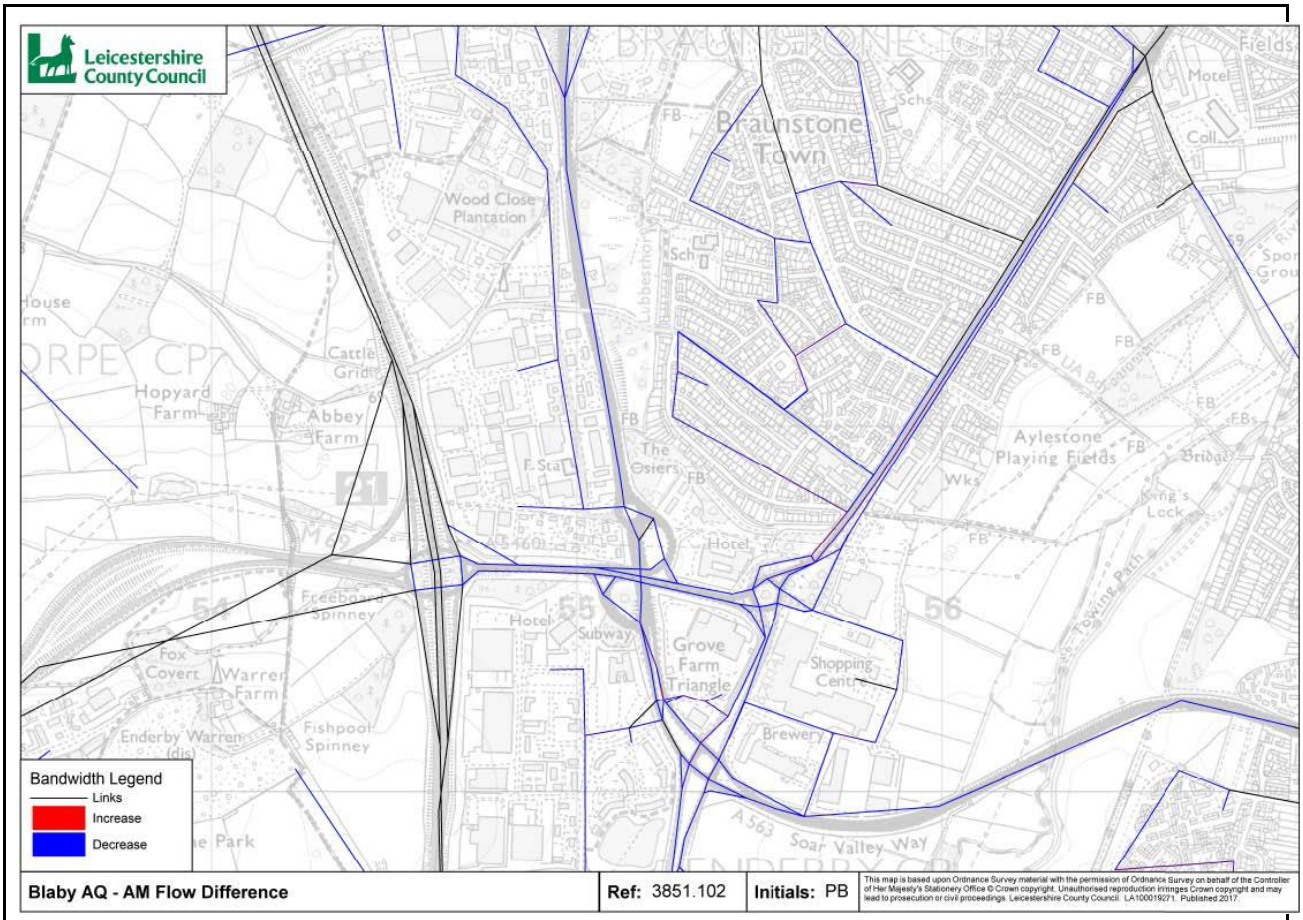
Figure 7.3: AADT Regression Plot.

This formula remained constant across the DN and DS scenario, which enabled both sets of results to be directly comparable. The AADT Difference (DS-DN) is shown below:

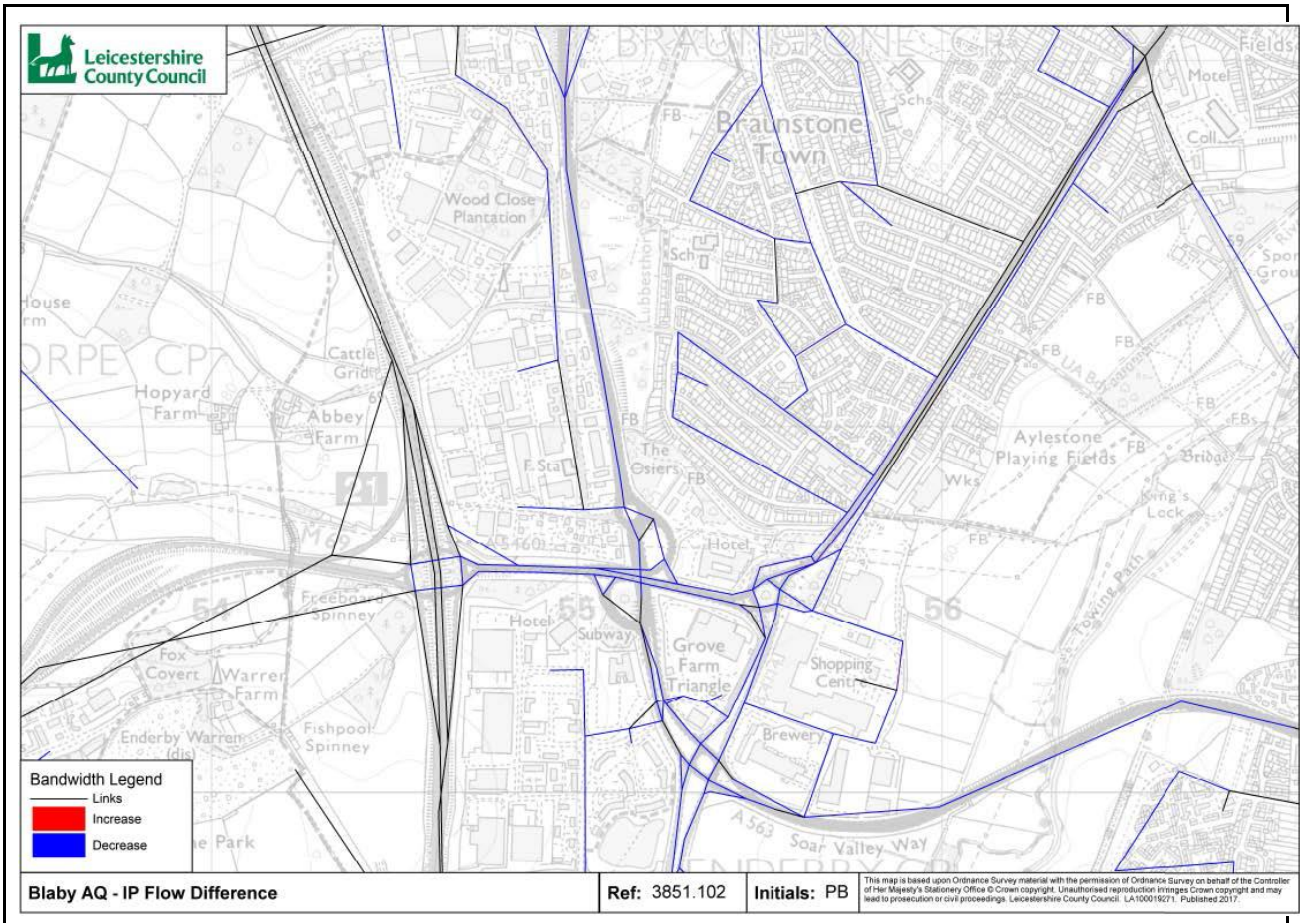


AADT Difference between DS and DN – Bandwidths

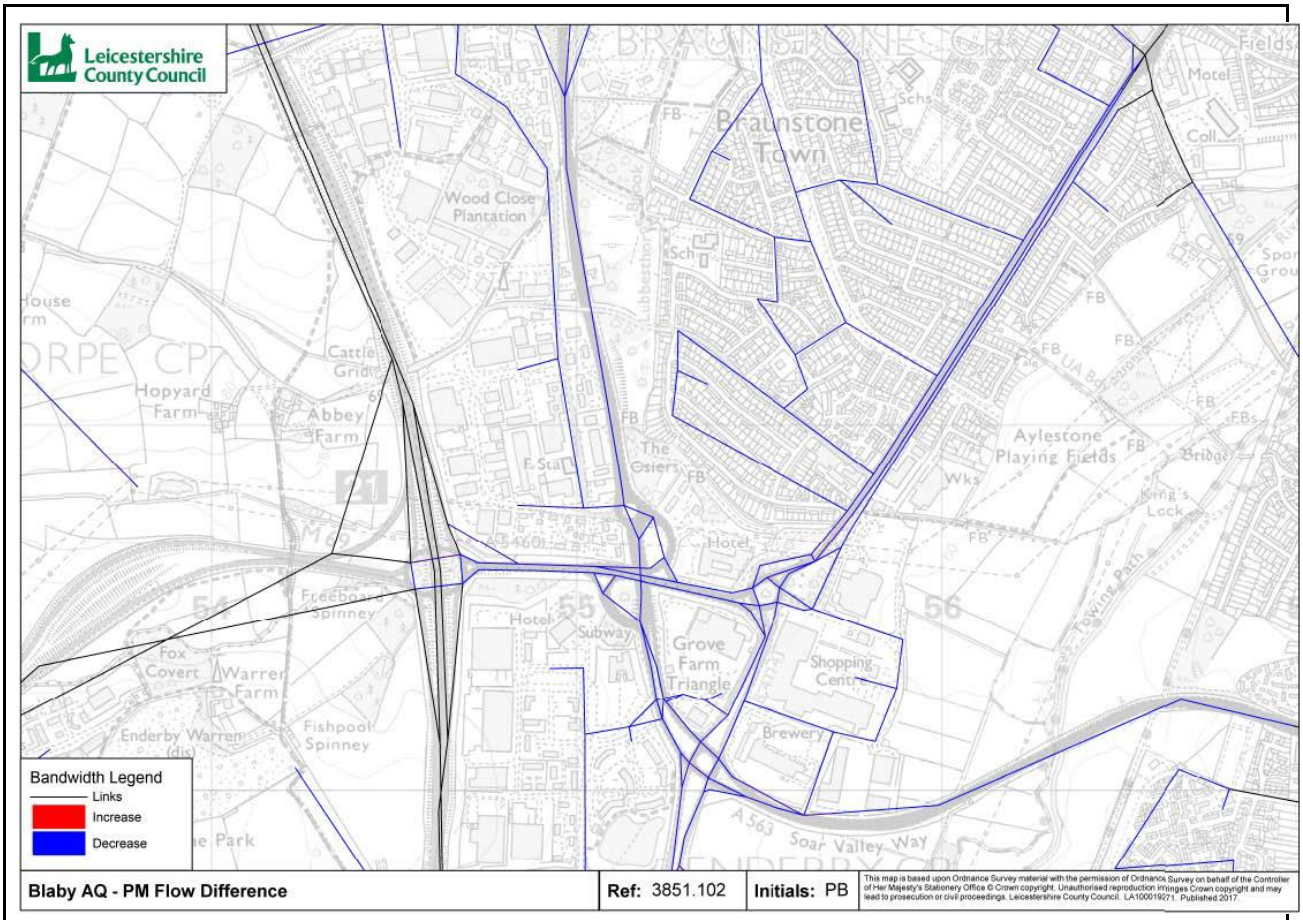
The figure above indicates a non-significant change in AADT when comparing the two scenarios and is symptomatic of the high demand for road space in the area coupled with the congestion on many of the surrounding junctions. This results in no significant amount of trips rerouting to pass through this junction in the surrounding area or from longer distance trips. The flow difference for the AM, IP and PM are shown below, and these emphasise the negligible difference in each of the modelled periods. The bandwidth units are 10 PCU per 1 meter to enable any change of significance to easily be highlighted in the plots.



AM Flow Difference



IP Flow Difference



PM Flow Difference

Conclusions

- The proposed scheme returned little benefits or even changes to the identified Area of Interest (AoI), for any of the network properties scrutinised.
- Due to negligible change in daily network difference between the two scenarios evidenced the outputs from the EFT have not been included in this report, as the inputs have been reported on and show no difference with scheme implementation.
- The scheme itself could work as a mitigation measure if proposed as part of an area wide improvement scheme of the entire junction 21 vicinity. Though due to the very large demand for this section of the road network, any capacity increases could in fact draw in more traffic, which may potentially result in poorer air quality in the immediate area but with the benefit of improvements for the routes that the rerouted trips divert from.

Behavioural Change Measures

The package of behavioural change measures seeks to encourage and facilitate a modal shift for commuters to/from businesses in close proximity to the links included in the Feasibility Study. It also seeks to encourage and facilitate changes to traffic related to schools in close proximity to those links. The work is detailed in the bids for Air Quality Grant that have been previously approved.

The successful implementation of the package relies on a number of factors including

- successful engagement with relevant individuals;

- the ability of those individuals to change their behaviour given other influences such as working patterns, associated infrastructure/facilities;
- The ability and motivation of those individuals to maintain the behavioural change into the future

The impact of the Local Sustainable Transport Fund (Summary Report, DfT, 2017) included projects that promoted alternative transport options including walking and cycling. The secondary objectives of the projects included bringing improvements in air quality. The Summary Report includes the following information which is relevant to this Feasibility Study:

Reduced Car Use

"During the LSTF period, per capita car traffic reduced in the Large Project areas by 2.3 percentage points, relative to a comparator group of local authorities. LSTF was unlikely to be the only cause of this, but appears to have made a significant contribution" (page 17).

Cycling

In addition, the LSTF report states that "In the Large Project areas, the proportion of people cycling increased by 6.6pp relative to the comparator group. This appeared to be due to more people cycling, rather than existing cyclists cycling more. There was only weak evidence of an increase in people walking in the Large Project areas" There was some evidence pointing towards an increase in cycling in Large Project areas. According to the Active People Survey, the proportion of adults in the Large Project areas who had cycled in the past month rose (from 14.1% in 2010-12 to 14.5% in 2013-15, an increase of 2.8%), while the same proportion decreased in the comparator group (from 16.0% to 15.4%, a decrease of 3.8%).This is equivalent to a difference in changes of 6.6pp.

There was indirect evidence that this increase may have been due to more people cycling, rather than existing cyclists cycling more, since existing cyclists reported little change in the hours they spent cycling. Although LSTF may have contributed to the uplift in cycling, other factors, such as previous investment in cycling, are likely to have played a part. This is suggested by an increase in cycling, in various areas, before LSTF.

Specific interventions included cycle routes, secure cycle parking, cycle training, cycle maintenance schemes and cycle hire, along with promotional events such as cycling challenges, festivals and led rides. When interviewed, project managers suggested that promotional activities were unlikely to be successful without good cycling infrastructure, and that a combination of approaches was most effective travel to work.

Many LSTF projects aimed to change the way people travel, focussing especially on people who drive to work. According to surveys of workplaces in Large Project areas who implemented LSTF initiatives, the proportion of people driving to work fell by 2.7pp. This was equivalent to 4.1% fewer car driver trips.

Reducing Congestion

Despite many Projects including measures to improve traffic flow, the LSTF investment did not lead to the sought reduction in congestion. There is evidence that individual interventions reduced congestion problems for bus users. In four Large Projects, bus punctuality or bus journey times improved either at a network-wide level or along some corridors, and measures funded through LSTF seem likely to have contributed to this.

For the behavioural change package, this evidence suggests that whilst there may be little impact on congestion, the package may result in fewer car journeys. Any reduction in car use is likely to improve the air quality on the links included in this Study. As discussed earlier, the

majority of journeys along those links are being made by drivers that are not in the AoI. The relatively low reduction in car journeys that result from the implementation of such a package are unlikely to be sufficient to bring forward compliance in advance by themselves. However, there are merits to implementing such measures even in such circumstances.

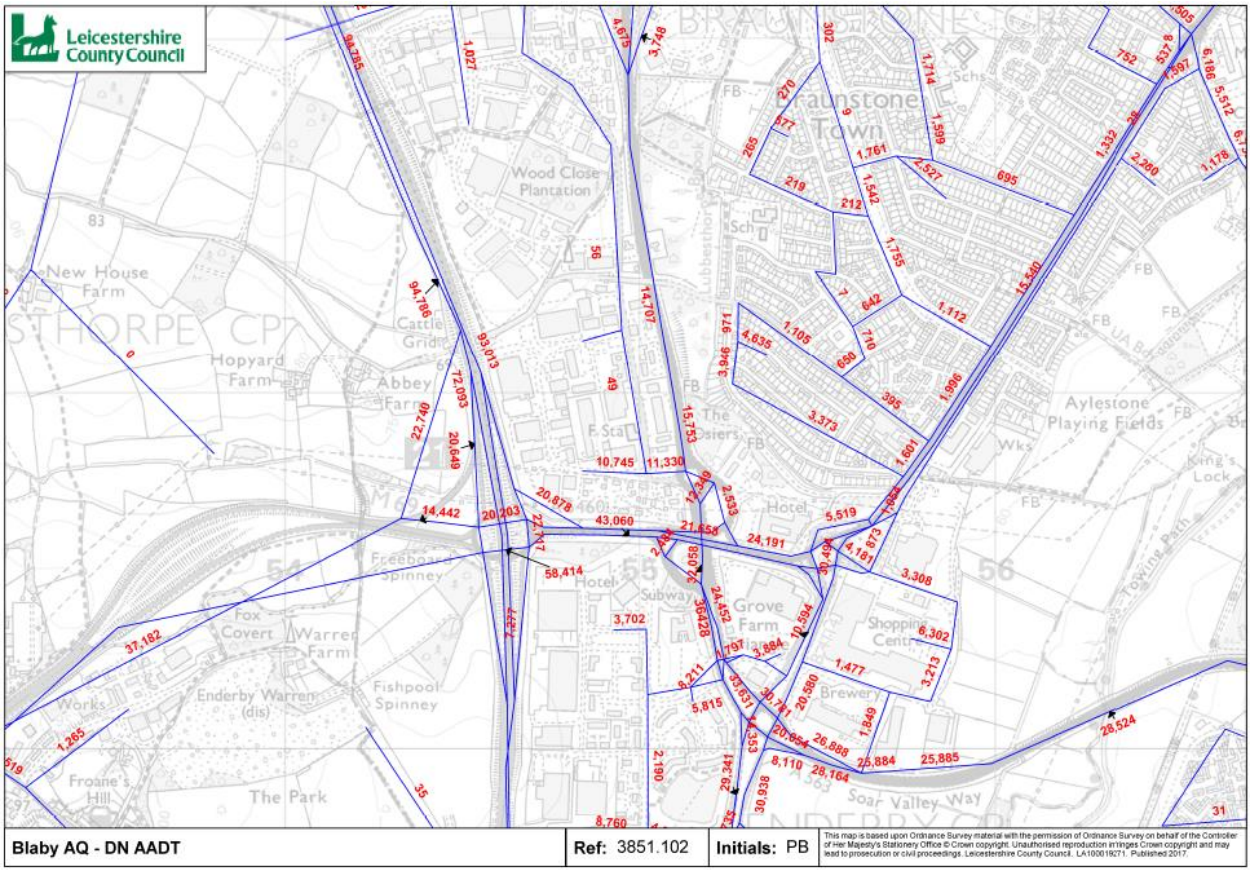
The project summary report, entitled 'Exploring and appraising proposed measures to tackle air quality', (Defra, May 2016) includes a section on the findings of the first step evidence review on effectiveness of measures to improve air quality. This refers to modal shift away from single person car use, as follows:

"Demand management measures and measures to encourage shift away from single person car use to other transport modes (walk, cycle, bus, train) can be very cost effective and can have a wide range of benefits from reduced congestion, improved air quality, reduced carbon emissions and increased levels of physical activity. However, travelling attitudes and habits are often very deep rooted and can be hard to change; comprehensive packages of measures which include a focus on information on travel options e.g. personalised travel planning or eco-driving can help to address this. However, the emissions benefit of such information campaigns may tail off over time. Also, although significant impacts in terms of travel behaviour changes have been seen, directly related improvements in air quality have not always been observed. In some cases NO2 concentration benefits may have been too small to perceive."

A document was produced for the Welsh Government by WSP entitled 'EFFECTIVENESS REVIEW Consideration of interventions on the Welsh Government Trunk Road and Motorway Network for Nitrogen Dioxide reduction'. A Literature Review Summary is included as table 3 on pages 14-18 of that document. There is an entry relating to walking and cycling as follows:

"Changes in behaviour were tracked following provision of new infrastructure in UK. Loss of employment, high education, being male and part of the ethnic majority were found to be significantly and positively associated with modal shift Construction of walking and cycling routes promotes modal shift but infrastructure alone may not be enough to promote active travel (Song, 2017)"

The links included in this Feasibility Study form part of a local network, including the Area of Influence (AoI) cited in Part 3 above. The AADT data for the junction 21 area is shown below (extracted from the Blaby Air Quality Support PowerPoint document)



The traffic flows within the AoI can be seen as considerable, and much of those flows are associated with through traffic. It is recognised that it would only be possible to include a relatively small proportion of the drivers of the vehicles within those flows using the behavioural change package of measures. This partially as a direct result of the majority of drivers not being employed within the AoI; but also because of the low expectations of take-up predicted from businesses in the AoI, based upon our previous behavioural change project work. It is less likely that the baseline values for composition by vehicle kilometres or speed can be influenced by those measures. A reduction in car trips of 4.1% was quoted as an outcome of the large LSTF projects (please see above). However the large projects included a larger number of modal shift choices. Given the more limited number of measures being proposed here, a more conservative estimate of 2% could be more realistic. The AADT figure for the northbound side of link reference 80483 is 36,428. The predicted reduction would therefore be 729 trips, assuming that all of the trips used this link. The local road network can be seen as complex and so this assumption is not strong. However many of the businesses that would be targeted have good access to the link. It is more difficult to make any predictions for reductions is trips for link reference 80466. The layout of the local road network gives a less direct access to this route.

The 2% reduction in cars was run through the SL-PCM for 2018 by colleagues at JAQU. The resulting roadside NO2 for ID80463 being 41.45ugm-3, a decrease of 0.31. Given the time frame for implementing the measures for this Study this is considered to be an upper estimate of the impact it would have. In addition, given that even in this case it doesn't bring forward compliance, it indicates that compliance would not being brought forward by the implementation of the behavioural change package of measures

Part 5: Setting out a preferred option

In this section, local authorities should set out a summary of their preferred option to bringing forward compliance (where such measures exist). Where new measures have been identified that could bring forward compliance, local authorities should also assess a range of Secondary Critical Success Factors in order to identify the preferred option.

Road link	PCM identified link?	Summary of exceedance	Measures identified that could bring forward compliance	For any new measures, please set out costs and timeframe
Census ID 80463	Yes – this link was identified as having an exceedance in the national PCM modelling	E.g. The national PCM modelling has projected that this link will be compliant in 2019. Summary of NO2 concentration projections: 2018: 42 µg/m_3 2019: 40 µg/m_3 2020: 38 µg/m_3 2021: 36 µg/m_3	E.g. We have not identified any measures that could bring forward compliance on this road link. However the package of behavioural change measures is likely to result in a lesser degree of improvement.	A proportion of the Air Quality Grant that has been awarded to Blaby District Council (£59,000), as set out in the associated application, together with the remaining balance of the Feasibility Study support funding would be used, before the end of 2018.
Census ID 80466	Yes – this link was identified as having an exceedance in	E.g. The national PCM modelling has projected that this link will be	As above	As above

	the national PCM modelling	compliant in 2019. Summary of NO2 concentration projections: 2018: 41 µg/m_3 2019: 40 µg/m_3 2020: 38 µg/m_3 2021: 36 µg/m_3		