

APPENDIX B
Responses to HDC comments, July 2016

Lutterworth East Development**Transport Input to Harborough District Council Comments****Executive Summary**

Since attending the Delivery Surgery in June 2016 and receiving comments from Harborough District Council (HDC), Leicestershire County Council's transport consultant AECOM has met with the Local Highway Authority (LHA) and Highways England (HE), and formulated this response to address the various comments made by HDC and the LHA. The key issues covered include:

- Traffic Forecasting – Updated traffic forecasts have been prepared for the current master plan of around 2,960 houses and 23Ha employment land.
- Other Developments – The updated traffic forecasts take account of the approved development site (with planning permission) to the north of A4303 Lutterworth Road between Frank Whittle roundabout and M1/Junction 20. A second traffic forecasting scenario has also been prepared for further potential development at Magna Park and on land south of A4303 Coventry Road for 'future proofing' of the junction improvements.
- Operational Junction Capacity Assessments – Junction modelling has been undertaken using the updated traffic forecasts for the development site and other developments.
- Off-site Junction Improvements – As a result of the updated forecasts and modelling, modifications are required to three of the junctions as follows:
 - A4303 Lutterworth Road / A426 Rugby Road 'Frank Whittle' junction – additional roundabout (to provide for local development access) to the north of the Frank Whittle signalised crossroads, plus an additional southbound lane on the approach from the north.
 - A4304 Lutterworth Road / Main Site Access – additional lane on the Spine Road from the north and longer lanes from the south.
 - A426 Leicester Road / Spine Road – signalised junction replaced by a roundabout.
- Wider Impacts – Further analysis of the Leicester & Leicestershire Integrated Transport Model runs have revealed there to be no impacts at M1/Junction 21, minor impacts on A4303 Coventry Road and A5 near Magna Park and it is likely the increase in traffic can be accommodated within existing highway capacity, and major impacts at Gilmorton village as well as at A426 Leicester Road / Gilmorton Road junction which cannot be mitigated.
- Gilmorton Road – Due to forecast increases in traffic demand, it is recommended that traffic calming / traffic management measures be investigated to reduce / limit the impact of Lutterworth East development traffic on the junction in Lutterworth town centre and on the route through Gilmorton village.
- Role of the Spine Road – In addition to providing access to development area, the new road will also provide alternatives for some Lutterworth and Gilmorton Road traffic to use the road to 'bypass' the town centre. Initial modelling indicates that traffic volumes on A426 Leicester Road could reduce by around 10% when compared with the reference case without the development and the Spine Road. As the design of the Spine Road progresses, the following will require further consideration: speed limit, design standard, junction configurations / method of control, 'urban design' of the road within the context of the master plan and complementary measures within Lutterworth town (e.g. weight limits, traffic calming, bus priority measures).
- Development Threshold Prior to Second Access – A broad calculation of the traffic capacity and resulting threshold of development that can be supported prior to completion of the Spine Road bridge over the M1 and the junction with A426 Leicester Road has revealed around 75% of development to the north and 100% to the south of A4304 Lutterworth Road can be supported.
- Junction Costs – These have been provided on an individual junction basis.
- Highways England – Responses have been made to HE's initial and further comments.

1. Background

Comments on the transport elements of the proposed development have been received from Harborough District Council (HDC). The comments relate to the information that had been provided in advance and at the Delivery Surgery with HDC on Wednesday 22nd June 2016. Since then various items of information have been provided to HDC and meetings have been held to further understand and to formulate how best to respond to the comments. As part of this process, Leicestershire County Council (LCC) and its transport consultant AECOM have met with the Local Highway Authority (LHA) at County Hall on 11th July 2016 and all three organisations subsequently met with Highways England (HE) and their Spatial Planning framework consultants in Birmingham on 14th July 2016.

This technical note aims to address the various comments and concerns raised by HDC and the LHA. It also refers to the meeting with HE and how HE's comments have been addressed. For ease of reference, the note is structured to follow the LHA's comments provided to HDC.

2. Impact of the development proposals on the highway network:

2.1 LHA Comment

We understand that some initial work has been undertaken to identify the impact of the proposed SDA on the highway network including committed development. Further details on this would be useful in order for LCC to understand if this is sufficiently comprehensive, in particular has a wide enough study area been used? (For example is it necessary to consider any potential impact on M1 J21 to the north or the route to the M6 to the south?).

2.2 Response

The Draft Strategic Transport Assessment (STA) report was issued to the LHA on 5th July and to HDC on 7th July 2016. The Draft STA provides details of the transport assessment including use of the Leicester & Leicestershire Integrated Transport Model (LLITM) which is described in further detail in Appendix C of the report. In relation to committed development Appendix C states the model runs were based on LLITM v5 and included a 'core scenario' produced in late-2013 covering the latest (at that time) forecast assumptions on land use development, highway network improvements, public transport service changes, investment in Smarter Choices initiatives and other model inputs. Further details on these assumptions can be found in the LLITM PR104 – Revised Forecasting Report.

The draft STA study area covers the following junctions:

- A4303 Lutterworth Road / A426 Rugby Road;
- A4303 Lutterworth Road / M1 Junction 20 / A4304 Lutterworth Road;
- A4304 Lutterworth Road / Main Access for Lutterworth East development;
- A426Leicester Road / Gilmorton Road;
- A426 Leicester Road / Bill Crane Way; and
- A426 Leicester Road / Northern Access for Lutterworth East development.

The wider impacts of the full development of 2,960 houses and 23Ha of employment land together with the proposed Spine Road have been assessed beyond the above study area junctions. This has involved updating the LLITM 2031 forecasts for the full development and comparing these with the reference case forecasts without the development and Spine Road.

The wider impacts are summarised in **Figures 2.1 and 2.2** for the morning and evening peak hours respectively.

Figure 2.1 Wider Impacts – AM Peak Hour 2031

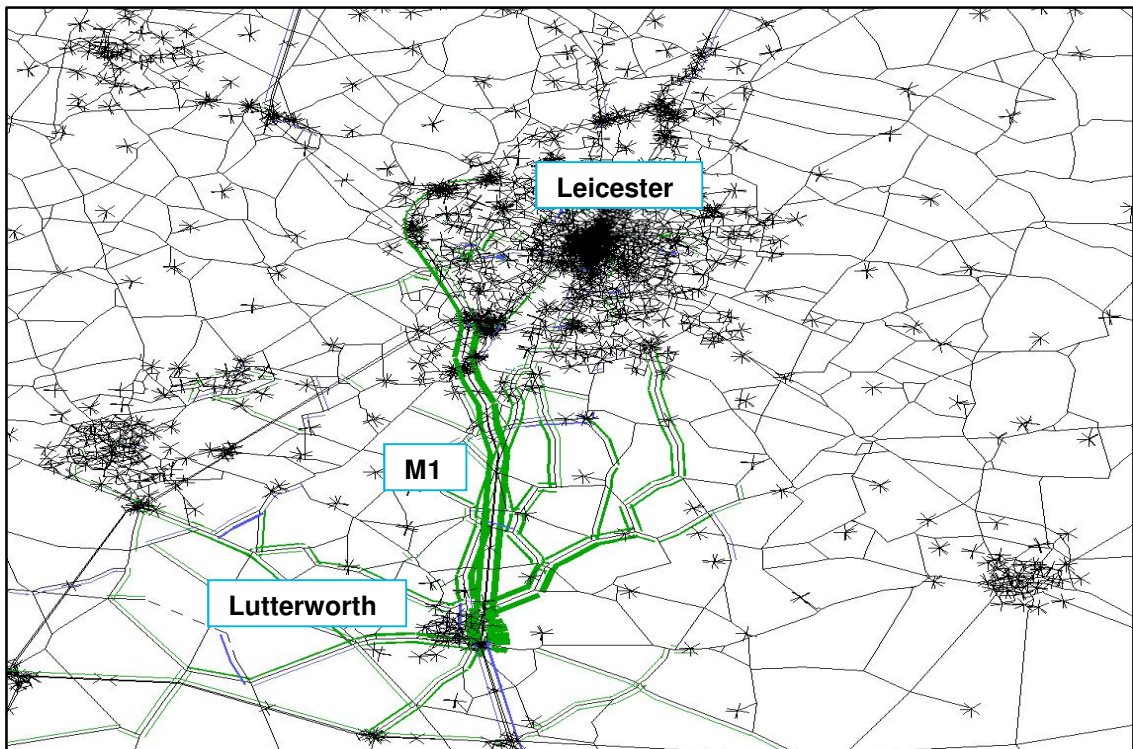
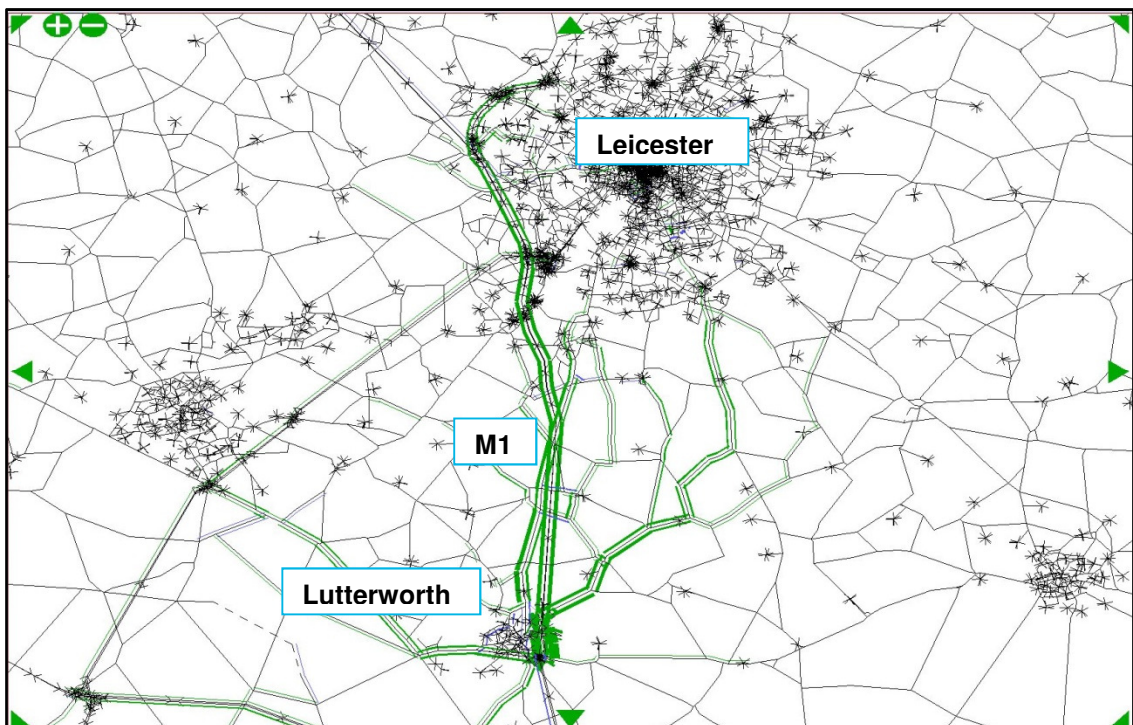


Figure 2.2 Wider Impacts – PM Peak Hour 2031



Figures 2.1 and 2.2 show the main impacts in the form of 'band widths' whereby the wider the 'band width' the greater the increase in traffic flow with development. The figures show increases:

- north of Lutterworth along the M1, A426 Leicester Road, on the route via Gilmorton village and A5199 Welford Road to south Leicester; and
- west along A4303 towards Magna Park.

The impacts at M1/Junction 21 are summarised in **Figures 2.3 and 2.4** for the morning and evening peak hours respectively. The figures show percentage changes on all road links comprising the junction and connecting roads of less than 10%. Only on the southbound on-ramp to the M1 are the changes greater than 10%. The results therefore show there should not be any adverse impacts for Leicester City Council to be concerned with.

Figure 2.3 Wider Impact at M1/J21 – AM Peak Hour 2031

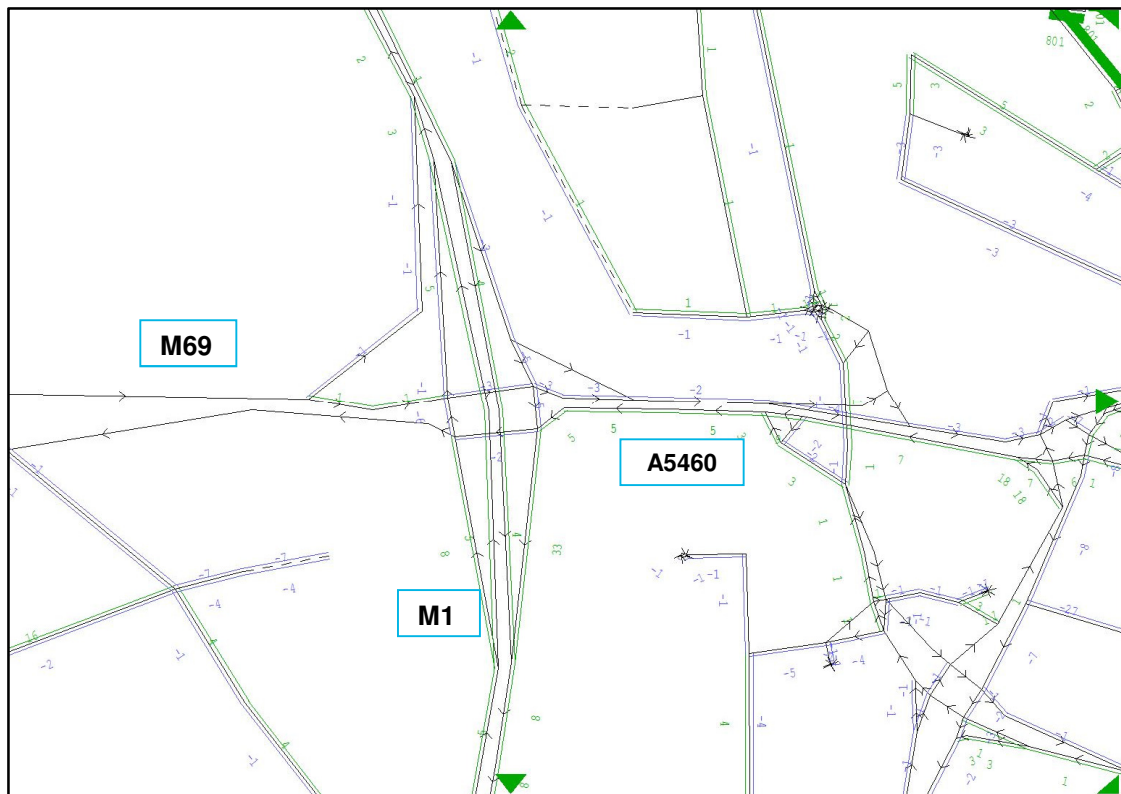
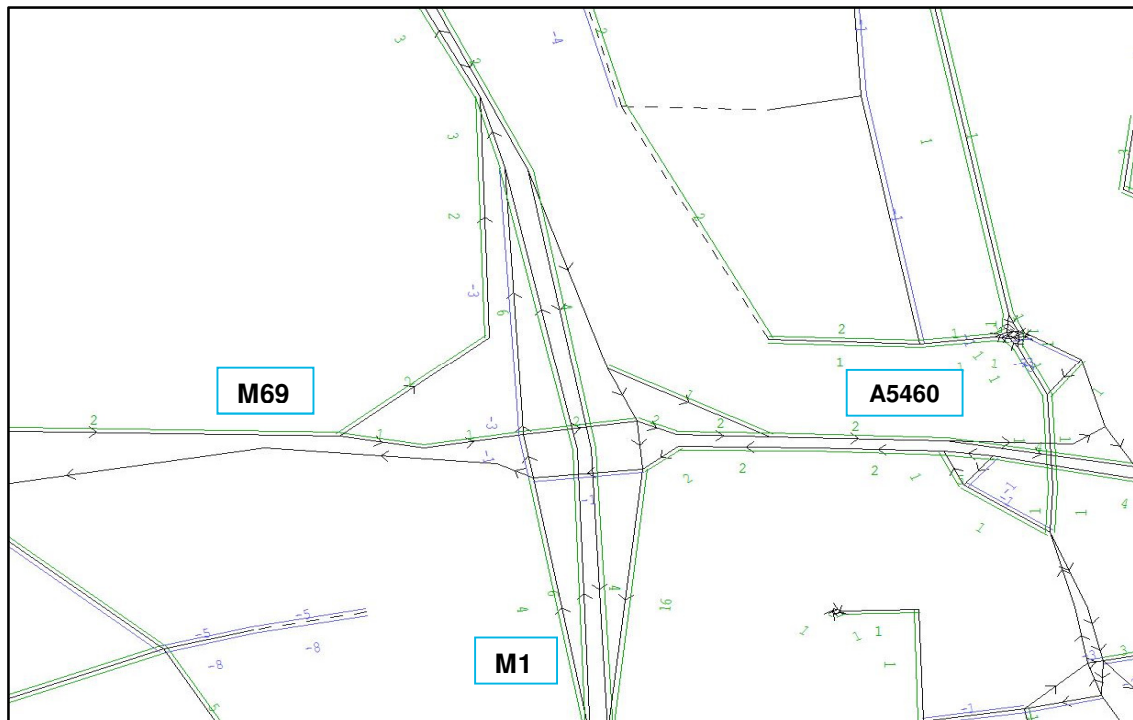


Figure 2.4 Wider Impact at M1/J21 – PM Peak Hour 2031



Although the model shows increases of greater than 10% along A426 Leicester Road north of Lutterworth, the increases do not extend all the way into south Leicester as traffic disperses along the route to various side roads and areas.

The impacts at Gilmorton village are summarised in **Figures 2.5 and 2.6** for the morning and evening peak hours respectively. The figures show large percentage increases through the village. We have therefore conducted operational junction capacity modelling for the following priority junctions which are both close to The Crown Inn public house:

- Lutterworth Road / Main Street; and
- Mill Lane / Kimcote Road.

Figure 2.5 Wider Impact Through Gilmorton Village – AM Peak Hour 2031

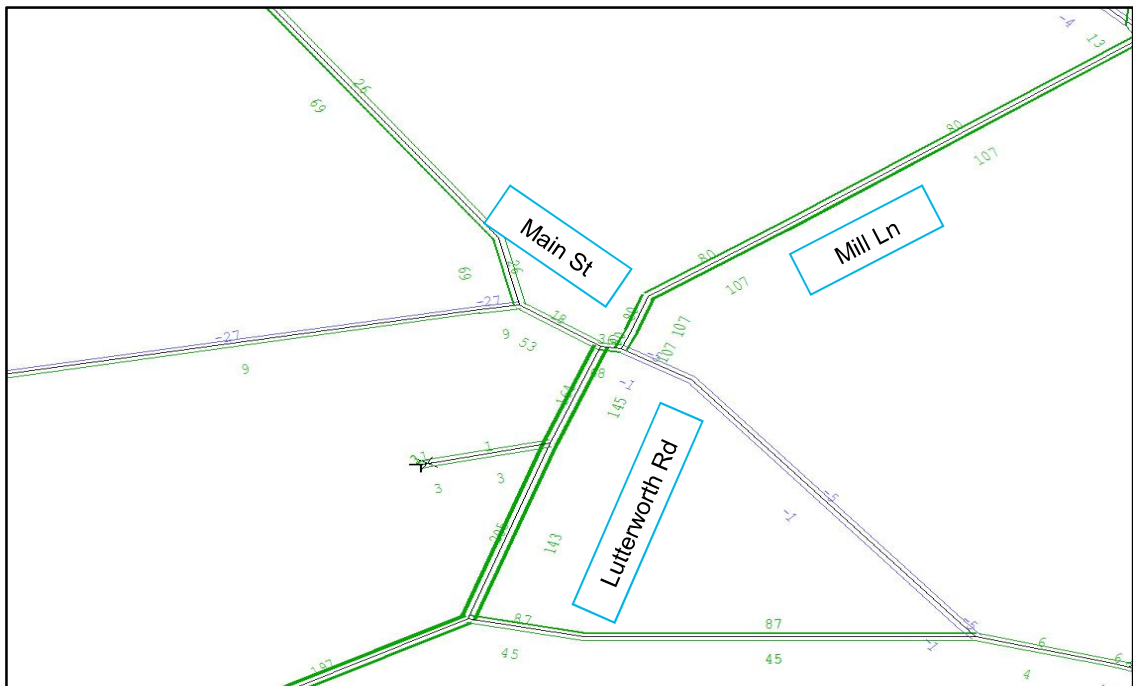


Figure 2.6 Wider Impact Through Gilmorton Village – PM Peak Hour 2031



The results of the junction modelling for 2031 are summarised in **Table 2.1**.

Table 2.1 Gilmorton Junctions

ARM	Lutterworth Road / Main Street			
	AM		PM	
	RFC	Queue (vehicles)	RFC	Queue (vehicles)
Lutterworth Rd - Left	1.233	12	1.413	19
Lutterworth Rd - Right	1.219	20	1.462	91
Main St - Right	0.302	1	0.272	1

ARM	Mill Lane / Kimcote Road			
	AM		PM	
	RFC	Queue (vehicles)	RFC	Queue (vehicles)
Lutterworth Rd - Left	1.157	1	0.990	2
Lutterworth Rd - Right	1.610	90	1.286	62
Main St - Right	0.030	0	0.030	0

The results show that the junctions would operate with ratios of flow to capacity (RFC) greater than 1.0 with large queues. Due to site constraints, there is little that can be done in terms of mitigation measures at these junctions in Gilmorton.

It will therefore be necessary to develop alternative measures to discourage Lutterworth East traffic from travel via Gilmorton and instead to use alternative routes such as via A4304 Lutterworth Road and B5414 Pincet Lane to access A5199 Leicester Road. Such measures could include traffic calming along Gilmorton Road between the development area and Gilmorton village.

The wider impacts around Magna Park are summarised in **Figures 2.7 and 2.8** for the morning and evening peak hours respectively.

Figure 2.7 Wider Impact Around Magna Park – AM Peak Hour 2031

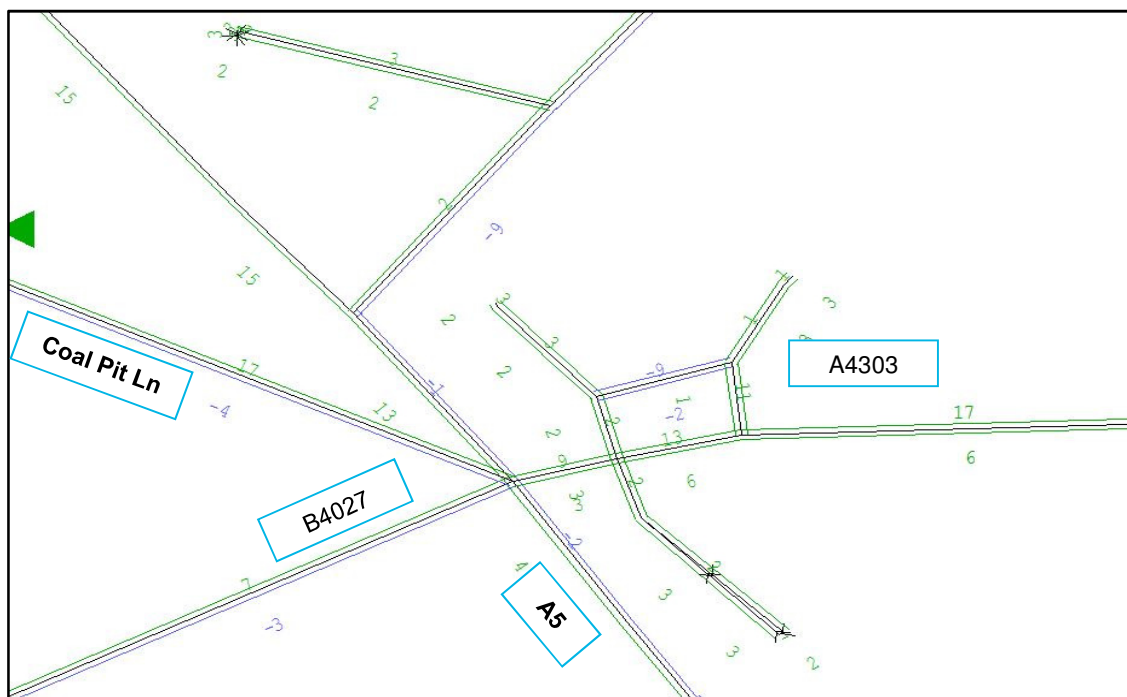
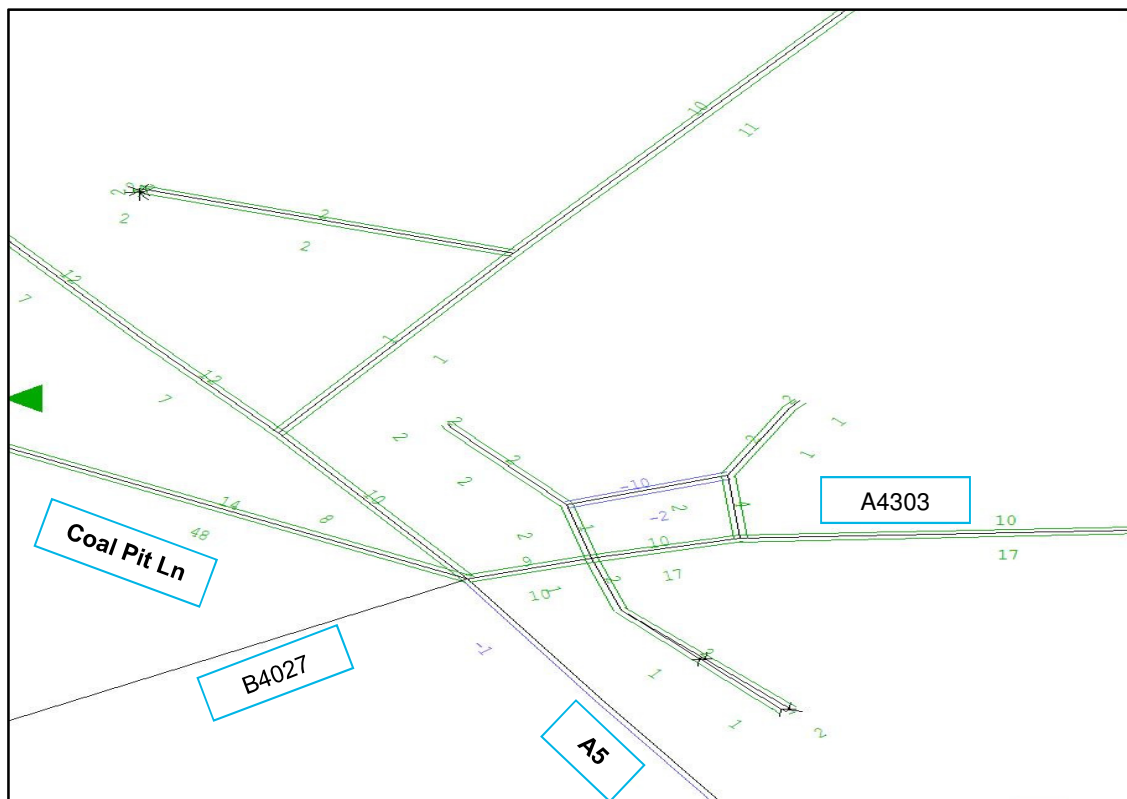


Figure 2.8 Wider Impact Around Magna Park – PM Peak Hour 2031



The figures show increases slightly above 10% along A4303 Coventry Road and along the A5 to/from the north. As there may be impacts at junctions along these routes, we have reviewed the findings of a recent Transport Assessment which has been undertaken in support of a planning application for further development at Magna Park. This shows that all these junctions are forecast to operate well within the desirable maximum RFC of 0.85 with the addition of Magna Park traffic. We therefore conclude it is likely that these junctions will have sufficient spare capacity to also accommodate further additional traffic as a result of the Lutterworth East development.

3. Mitigation required as a result of this impact (includes sustainable travel measures).

3.1 LHA Comment 1

As the further evidence becomes available it may be necessary to consider additional mitigation proposals. Full identification of necessary mitigation will happen as a result of the evidence gathered at point one.

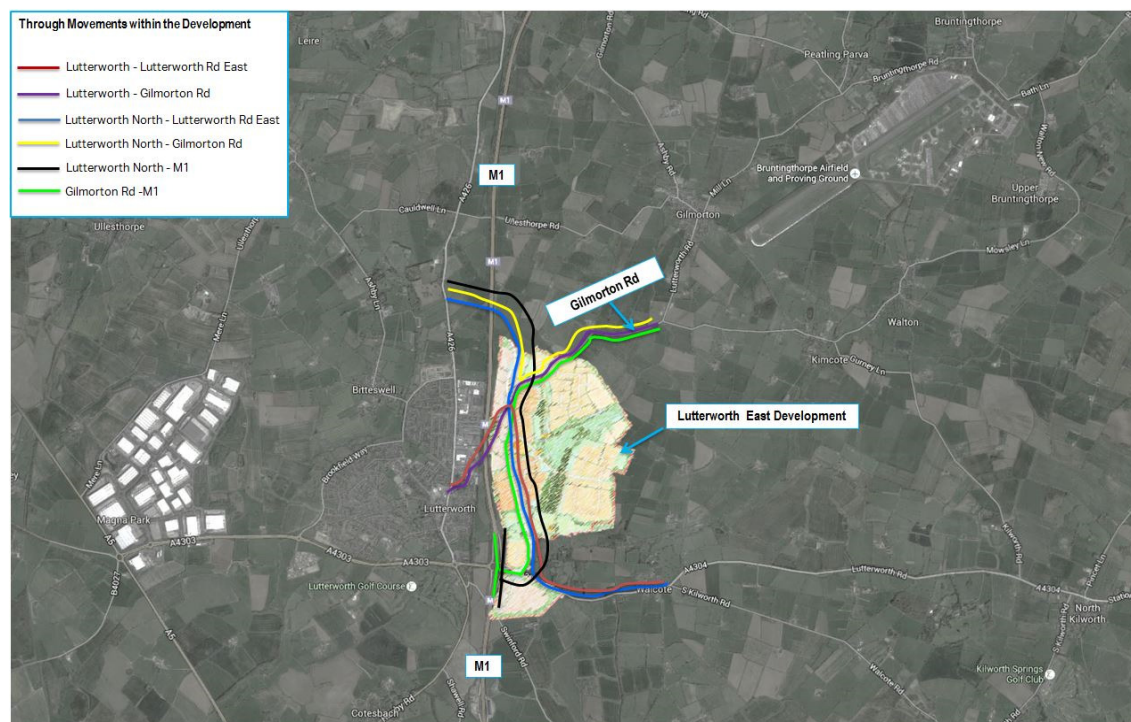
LCC note that proposals for mitigation include an alternative route to Lutterworth town centre in the form of a road through the development and that the associated benefits are intended to be improved air quality in the area, better access to town centre services and businesses with non town centre traffic using the new route through the SDA. At this stage LCC would like to understand further the role of the new road in the context of the local and strategic network, how it will interact with the existing road network and the broad design principles that will help it fulfil this role.

3.2 Response 1

The primary purpose of the proposed Spine Road is to provide access for the development area to the south at A4304 Lutterworth Road and to the north at A426 Leicester Road. Its secondary purpose will be to provide alternatives for some Lutterworth town and Gilmorton Road traffic to use the new road to 'bypass' the town centre to access the M1 at Junction 20. In terms of the initial LLITM modelling, the model shows that with the full development of the Lutterworth East development and the Spine Road, that traffic volumes on A426 Leicester Road could reduce by around 10% when compared with the reference case forecasts without the development and Spine Road.

The potential through-traffic movements that may use the Spine Road are summarised in **Figure 3.1**.

Figure 3.1 Potential Through-Traffic Movements



It should, however, be noted that the Spine Road and its intermediate junctions have yet to be designed in detail. The proposed speed limit, design standard, junction configurations and method of control, together with the overall 'urban design' of the road within the context of the master plan development will influence its ability to attract and accommodate through-movements. The need for complementary measures within Lutterworth town such as a possible weight limit (to reduce HGV movements) on A426 Leicester Road and/or possible traffic calming (to reduce traffic) and/or bus priority measures (to encourage bus use) on Gilmorton Road may also need to be considered as the master plan and design of the Spine Road are further developed.

3.3 LHA Comment 2

LCC note from the presentation that the following significant pieces of offsite road infrastructure have been identified by the promoters as necessary to support the development:

- *2 new accesses that interact with strategic road network*
- *a bridge over the M1*
- *Upgrades to J20*
- *Upgrades (redesign) of the Frank Whittle Roundabout*

Due to the size and complex nature of this infrastructure and the early stage of the proposal, the highway authority would consider that there are some inherent significant unknowns/risks associated with its delivery. (e.g. land ownership, cost estimates, constraints, utilities, etc.) Whilst this is to be expected in the early stages and we note that the promoters will develop the proposals further and intend to deliver the key pieces of infrastructure it should be noted that the Highway Authority would not accept a s.106 agreement relating to this until further work to reduce risk has been undertaken.

3.4 Response 2

We note the above comment. From our meeting with the LHA and further comments from HDC, we understand that the proposed offsite junction improvements will need to be 'future proofed' to ensure they can also accommodate traffic associated with other potential developments in the area. Furthermore, the operational junction assessments need to be updated to reflect the current masterplan of 2,960 houses and 23Ha employment land (whereas the Draft STA assessed the previous master plan of 2,500 houses and 20Ha employment land).

We have therefore updated the forecasts and assessments for two scenarios:

- Scenario 1: Current master plan plus traffic associated with committed development on land to the north of A4303 Lutterworth Road between Frank Whittle roundabout and M1/Junction 20.
- Scenario 2: As Scenario 1 with the addition of traffic associated with two current but undetermined planning applications for Magna Park and for land south of A4303 Coventry Road.

The methodology, revised forecasts and results of operational junction capacity assessments are described in **Appendix A**.

As a result, the traffic forecasts have changed and now require some modifications to three of the junctions as follows:

- A4303 Lutterworth Road / A426 Rugby Road 'Frank Whittle' junction – additional 30m diameter roundabout to the north of the Frank Whittle signalised crossroads, plus an additional southbound lane on A426 between the roundabout and crossroads junction. The roundabout is to allow right turns out of the Travelodge/Business Unit development as this currently has left-out only and thereby traffic travelling to Lutterworth needs to U-turn at Frank Whittle roundabout, which if changed to a signalised crossroads will no longer be possible. Also, the committed development site on land to the north of A4303 Lutterworth Road between Frank Whittle roundabout and M1/Junction 20 will only have left-in/left-out access and will rely on U-turns both at Frank Whittle roundabout and at M1/Junction 20. The roundabout will provide for such a U-turn. The layout of the roundabout would be subject to further design considerations and investigation.

- A4304 Lutterworth Road / Main Site Access – additional lane on the Spine Road from the north and longer lanes from the south.
- A426 Leicester Road / Spine Road – signalised junction replaced by 40m diameter roundabout.

While the assessments and above revised junctions have concluded that the 2031 reference case forecasts, plus traffic associated with committed development, Lutterworth East, land south of A4303 Coventry Road and Magna Park can be accommodated, it is considered there may be an element of 'double counting' in the forecasts. This is because the LLITM reference case forecasts without additional development already assumes considerable growth in traffic from the 2008 base year model to 2031. It is therefore recommended that a cumulative impact assessment be undertaken using LLITM at some point once there is some certainty over which developments may proceed. This will be necessary to check the junction mitigation measures are still appropriate prior to proceeding to subsequent design stages and eventual construction.

4. Connectivity to Lutterworth town and wider services

4.1 LHA Comment

LCC note from the presentation that a key feature of the development will be its connectivity with key services in Lutterworth. In order to achieve this it will be necessary to demonstrate appropriate walking and cycling routes that provide practical access to key services to and from the development addressing the potential severance issues associated with the M1. A clear strategy for delivering this and reassurance of deliverability of offsite improvements in particular should be demonstrated.

LCC acknowledge that the Lutterworth SDA option has potential for good connectivity to key centres based on existing public transport routes and understand that further work on the public transport elements of the scheme would be undertaken together with engagement with commercial operators to develop proposals further for this SDA. This would need to demonstrate that appropriate levels of service, accessible at reasonable distances to those living on the new development are provided without detriment to existing service, particularly those serving the town centre.

4.2 Response

Information has been provided separately to cover these matters.

5. Consideration as to how the identified mitigation measures relate to the existing highway network (impact of the development and mitigation)

5.1 LHA Comment

This could be shown through a model run of the development plus the proposed mitigation looking towards the end of plan period (2031) that demonstrates the impact of the SDA is effectively mitigated and that there are no unintended consequences arising from the provision of new infrastructure. This would also need to demonstrate that there is a safe and suitable interaction with the existing highway network (e.g. Correct junctions, speed limits etc)

5.2 Response

Please see the above response in Section 3.4 and **Appendix A**.

6. The estimated cost of the necessary transport infrastructure and sustainable measures and assumptions used to arrive at these costs

6.1 LHA Comment

LCC note that the promoters stated an intention to deliver the highway infrastructure as part of the development though s.278, however it should be noted that LCC would not accept a s.106 agreement to deliver major schemes until such a stage in the design process that all significant risks had been managed as far as possible, in order to prevent the risk of a funding gap occurring.

LCC have not yet seen the finalised list of transport costs. Comments will follow on this when received. However this should include sufficient estimates for public transport and sustainable travel infrastructure to deliver the vision of connectivity as well as the road infrastructure.

6.2 Response

Cost estimates have been provided separately.

7. The likely phasing of the development and provision of necessary mitigation

7.1 LHA Comment

The transport modelling evidence will help to inform this decision as well as confirmation of the number of dwelling to be included on the site. For example it is not yet clear how many dwellings could be built and occupied prior to new infrastructure being required.

Appropriate phasing and trigger points would be key to LCC's overall ability support for the local plan if this SDA were taken forward. This may impact on the deliverability or delivery timetable of an SDA should considerable investment be required at an early stage.

7.2 Response

In order to estimate the size of land use development that will trigger the need for the secondary (northern) access, a simplified exercise was undertaken based on the following assumptions:

- Because of the capacity constraints at A426 / Gilmorton Road junction; there will be no additional traffic travelling in that direction from the Lutterworth East development;
- Lutterworth East will not generate traffic which will travel north-east via Gilmorton village due to capacity constraints;
- The capacity of the main access will determine the traffic "budget" that would define the traffic limit which should not be exceeded; and
- Under any scenario, the employment area to the south of Lutterworth Road main access still can be included.

Therefore, and based on the previous assumptions, a traffic budget has been defined based on the latest main access junction model which indicates that the junction would operate close to its capacity.

The results of the exercise indicated that around 75% of the development is the limit where the junction would still operate within/at its capacity and would not be exceeded.

In other words, the development can accommodate around 2,210 dwellings and 8.6 ha of employment land north of A4304 Lutterworth Road in addition to the 11.5 ha of employment land south of the main access, before the need for the secondary northern access and associated bridge across the M1.

8. Engagement with other relevant highway and planning authorities

8.1 LHA Comment

If this site were to be taken forward it will be essential to continue to engage with Leicester City Council and Warwickshire in their roles as Highways Authorities.

8.2 Response

Noted. However, the wider impacts demonstrated above show minimal impact on Leicester City and on Warwickshire. This is because traffic disperses over a wide area and with distance from Lutterworth decreases in the volume of traffic added to the network.

On 14th July 2016, LCC, the LHA and AECOM met with HE and their Spatial Planning framework consultants. At the meeting, HE's initial comments and AECOM's responses were discussed which largely related to the estimates of trip generation for Lutterworth East which HE considered to be too low. However, HE has subsequently agreed with AECOM's explanation in writing also on 14th July 2016, along with providing some further comments. AECOM subsequently provided a written response to HE's further comments on 25th July 2016 which was copied to the LHA and will hopefully satisfy all of HE's questions and comments.

APPENDIX A
UPDATED TRAFFIC FORECASTS AND
OPERATIONAL JUNCTION CAPACITY ASSESSMENTS

Lutterworth East Development
Technical Note on Updated Traffic Forecasting and Assessment

1. Introduction

This technical note describes the forecast committed development flows from the consented development situated between the A426 and M1 J20 roundabouts to the north of the A4303 and other significant development flows from the Magna Park and Lutterworth East developments. In particular, forecast traffic reported in these developments Transport Assessments have been applied to the A426 Rugby Road/A4303 Lutterworth Road Frank Whittle junction for operational assessment and subsequent outline design purposes. Updated forecasts and assessments have also been undertaken for all other junctions previously assessed in the Draft Strategic Transport Assessment (STA) (Issue 4), February 2016.

2. Proposed and Committed Developments

Three development proposals have been identified to the south west, south and east of Lutterworth, that will distribute traffic onto the A4303 Lutterworth Road, impacting upon the A426/A4303 junction. These developments are:

1. Magna Park - Outline application for the erection of up to 419,800m² Storage and Distribution (B8) with ancillary offices (B1a), up to 3,700m² for a Logistics Institute of Technology (D1) with associated playing field, up to 9,000m² small business space (B1a, B1b), up to 300m² estate office with conference facility and exhibition centre (D1), and detailed application for the creation of a 140 space HGV parking facility, associated gatehouse and HGV Driver Training Centre, vehicle wash and fuelling facilities, and a rail freight shuttle terminal, with associated hardstanding submitted on 29/09/2015. This development is still awaiting a planning determination.
2. A pre-application development on land south of Coventry Road, provision of 9,467m² of B1/B8 employment use plus 70 allotments. This development is also still awaiting a planning determination.
3. Land North of Lutterworth Road, Lutterworth committed (with planning permission) development (Planning Ref 14/01090/OUT) 11,348m² of B1 Office employment.

The original Lutterworth East development master plan (2,500 dwellings and 20ha of employment land) traffic forecasts have been included within the Design Case traffic forecasts. The additional Lutterworth East development arising from the current master plan (460 dwellings and 3ha of employment land use) have been added separately to the traffic forecast.

Figure 1 depicts the proximity of the three development proposals to one another and the A426/A4303 and A4303/M1 J20 junctions.

The Magna Park proposals have not yet received a planning decision as of July 2016, consequently the development cannot be regarded as committed development. However AECOM has taken account of the Magna Park proposals as part of the junction traffic forecasts due to the scale of the potential development and its associated forecast trip generation and impact upon the A426/A4303 and A4303/M1 J20 junctions.

The development north of Lutterworth Road has two extant applications associated with the same site. The first was approved on 13/05/2015 with the second (Planning Ref 16/00980/FUL) proposes erection of a building for employment purposes including B1c (business), B2 (general industrial) and B8 (storage and distribution) covering a total 12,232m². The latter application, submitted on 15/06/2016, is at the time of writing (July 2016), still pending a planning decision notice.

Consequently AECOM has considered the consented development and proposed development in separate scenarios.

Design Case Traffic

Design traffic flows are reported in the Draft STA. This report described the methodology used to determine the baseline and reference case peak hour traffic turning flows depicted in **Figure 2**. The forecast traffic flows include the originally proposed development quantum of 2,500 dwellings and 20ha of employment land. This traffic forecast also assumes the additional link with the A426 to the north of Lutterworth is implemented.

Development Traffic Generation and Distribution

Following calculation of the reference case traffic flows, the forecast development traffic turning flows for each of the individual sites included within the AECOM forecasts are depicted in **Figures 3 – 6** for the Magna Park, South of Coventry Road, North of Lutterworth Road and additional Lutterworth East developments respectively. **Figure 7** depicts the forecast combined development traffic turning flows.

Combined Reference Case and Development Traffic Flows

The combined forecast development traffic flows which are identified as impacting upon the A426/A4303, A4303/M1 J20/A4304 and Lutterworth East junctions, were then applied to the Reference case traffic flows. **Figure 8** depicts the combined forecast turning flows used for junction operational assessment and subsequent outline design purposes.

Figure 1: Proposed Development Sites Proximity to A426/A4303 and A4303/M1 J20 Junctions.

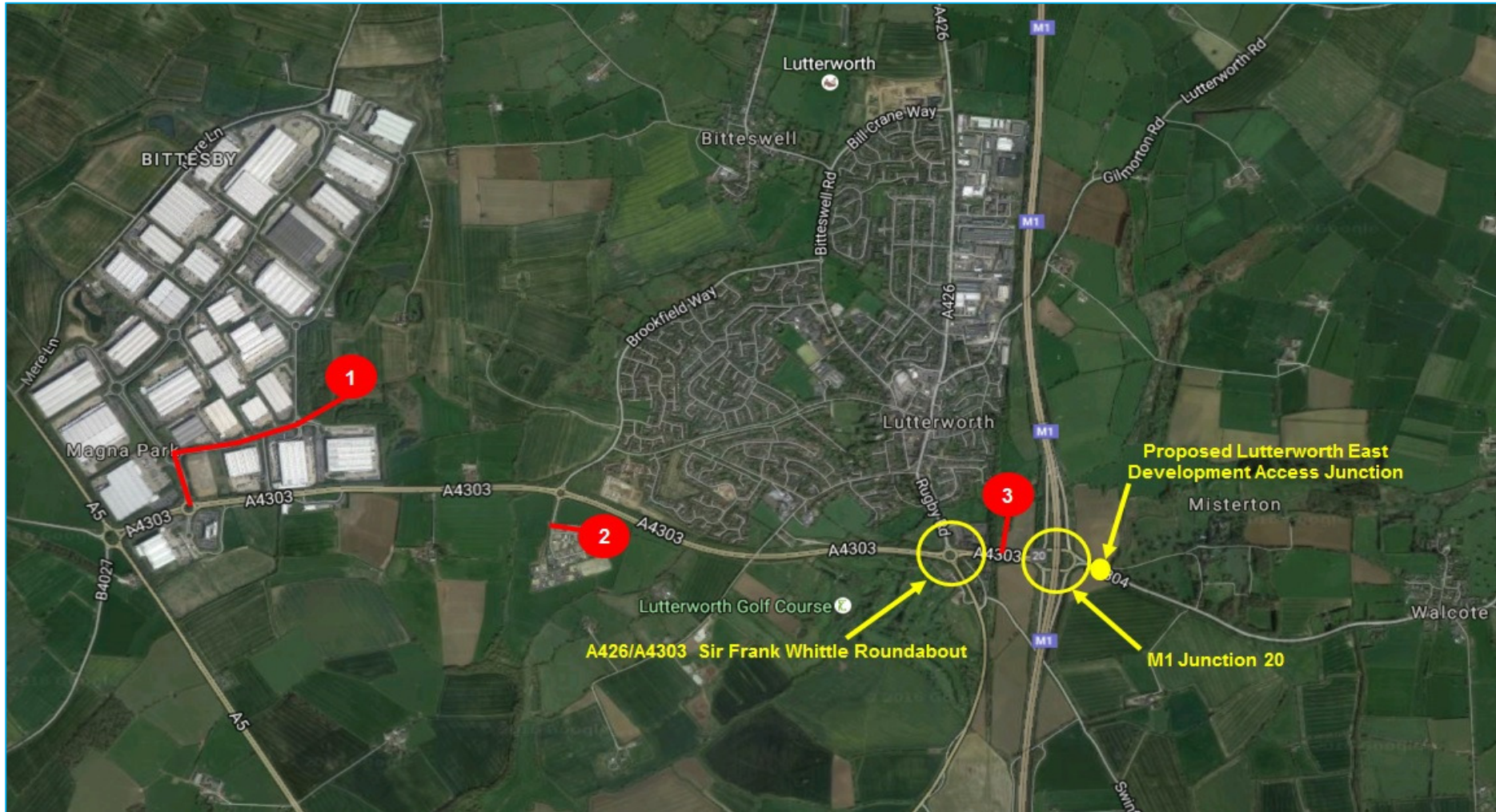


Figure 2: Design Case Peak Hour 2031 Traffic Flows (Taken from Lutterworth East Draft STA)

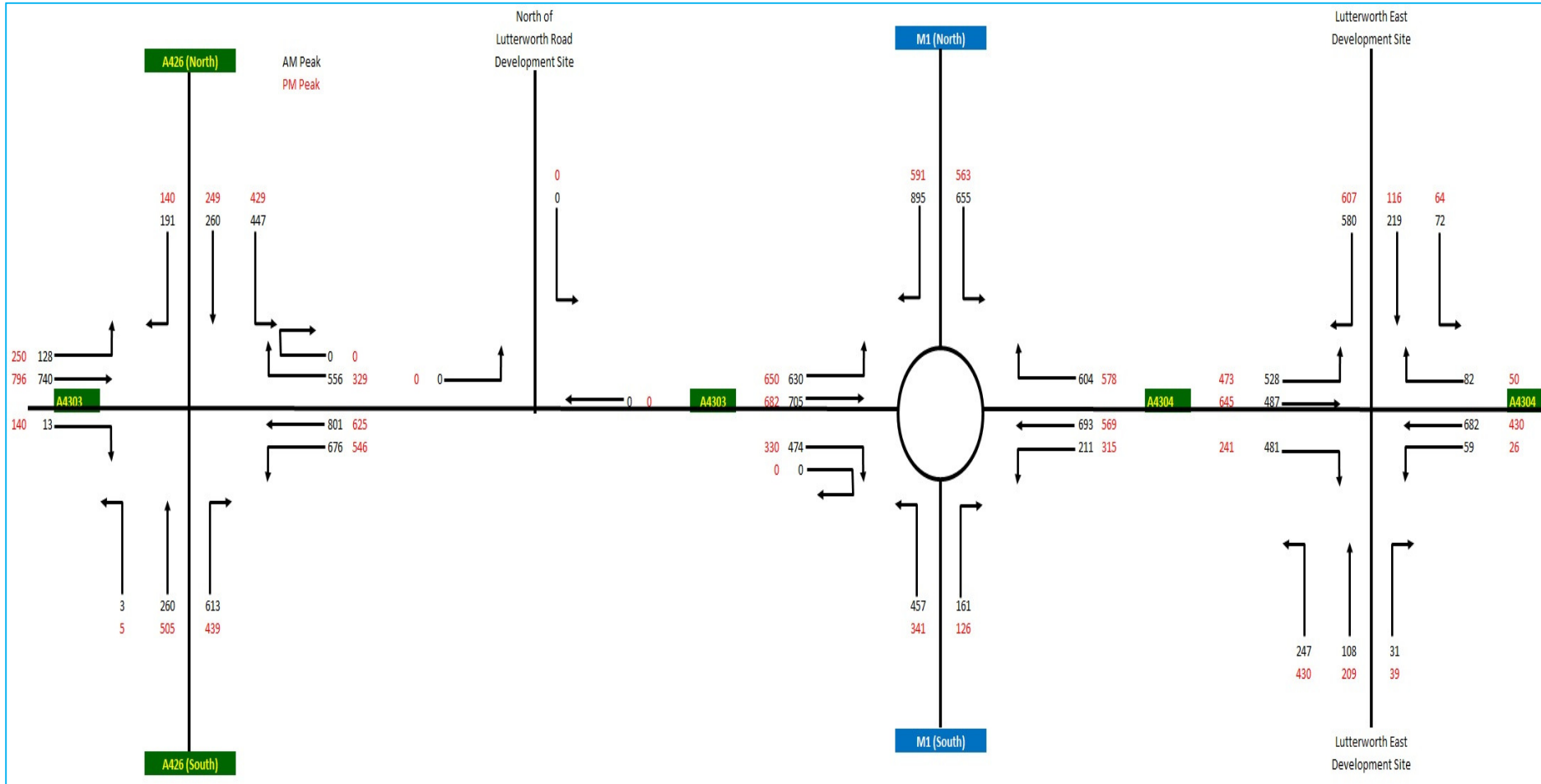


Figure 3: Forecast Peak Hour Magna Park Development Traffic Turning Flows (expressed as PCU's)

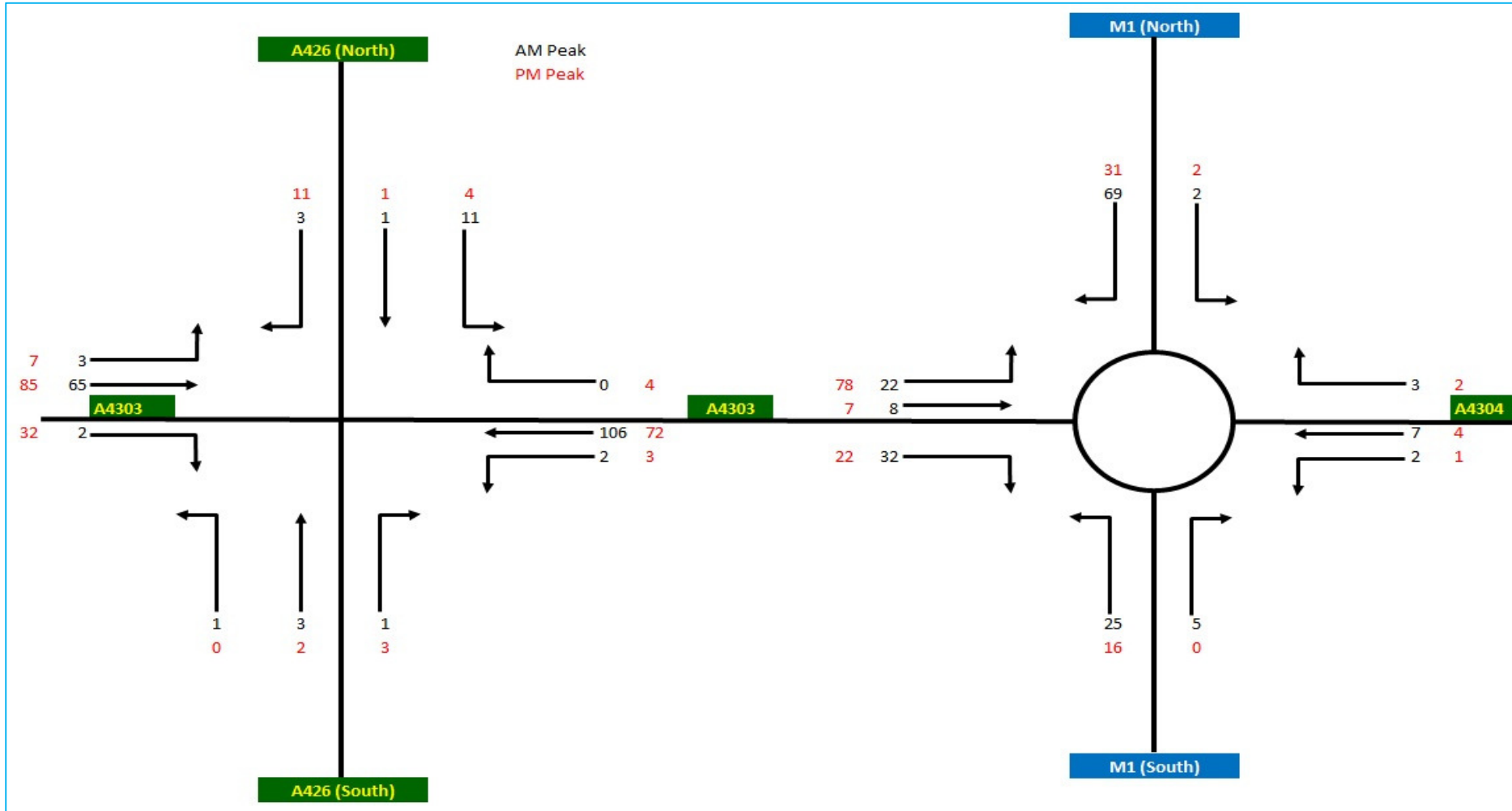


Figure 4: Forecast Peak Hour South of Coventry Road Development Traffic Turning Flows (expressed as PCU's)

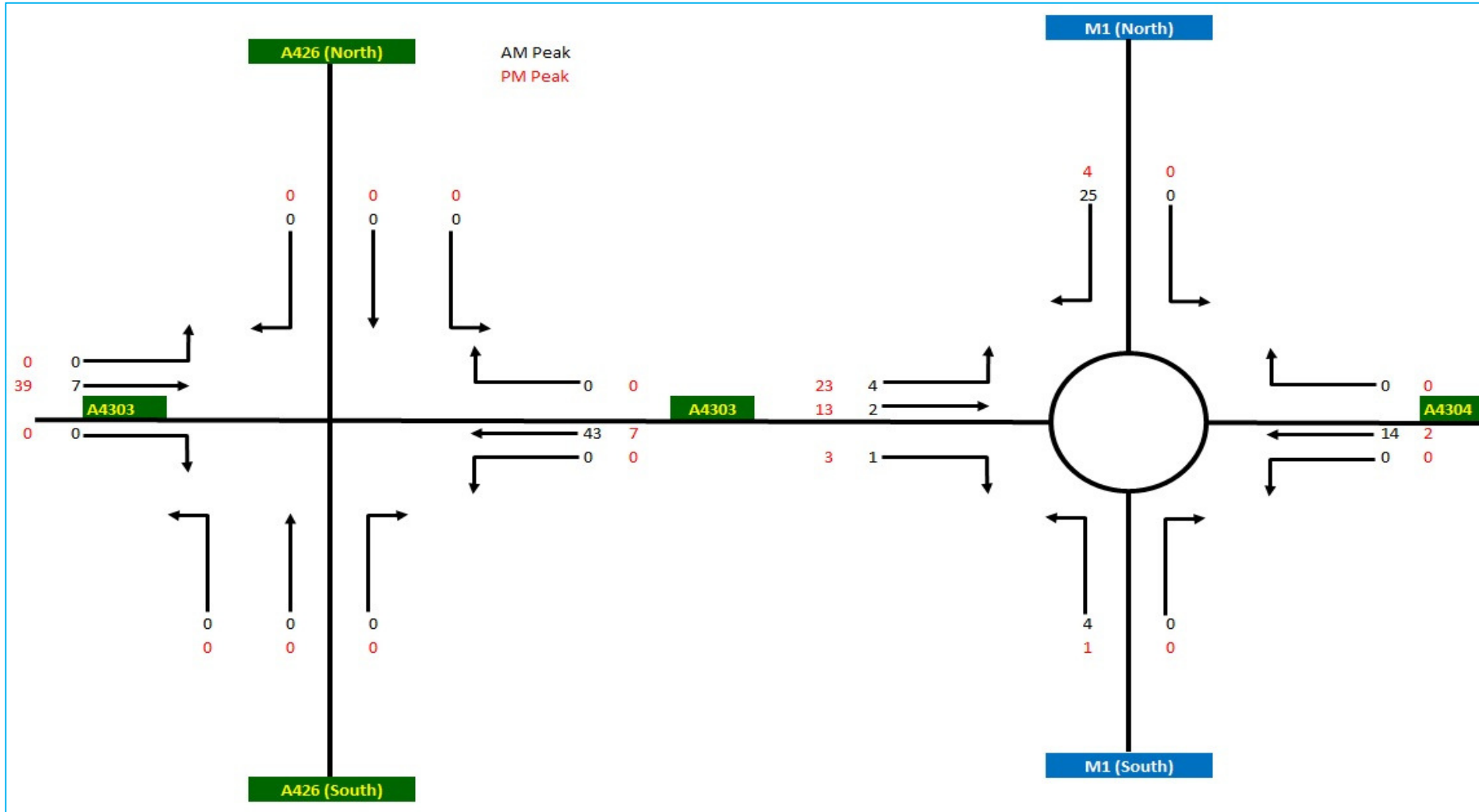


Figure 5: Forecast Peak Hour North of Lutterworth Road Development Traffic Turning Flows (expressed as PCU's)

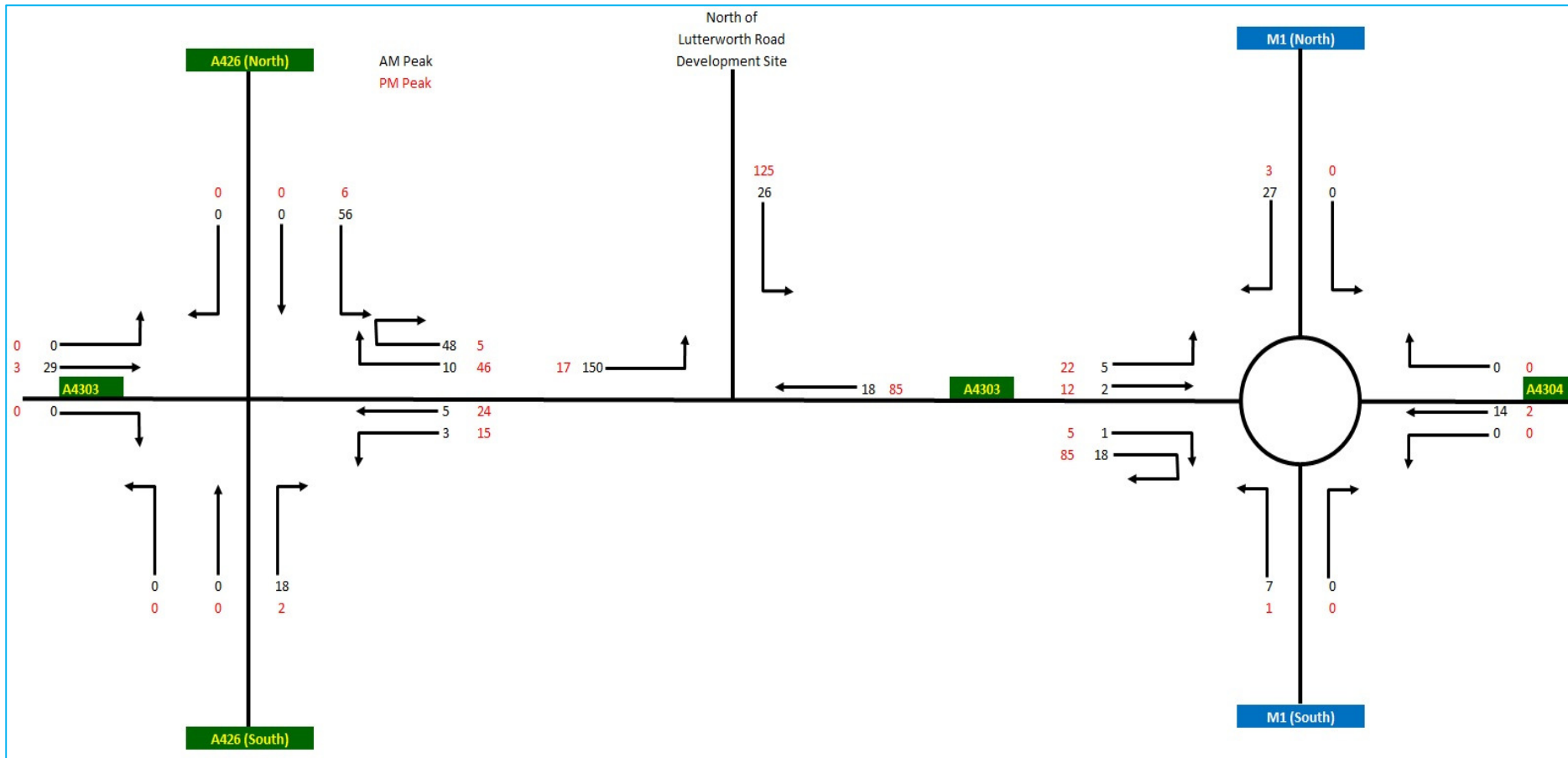


Figure 6: Forecast Peak Hour Additional Lutterworth East Development Traffic Turning Flows (expressed as PCU's)

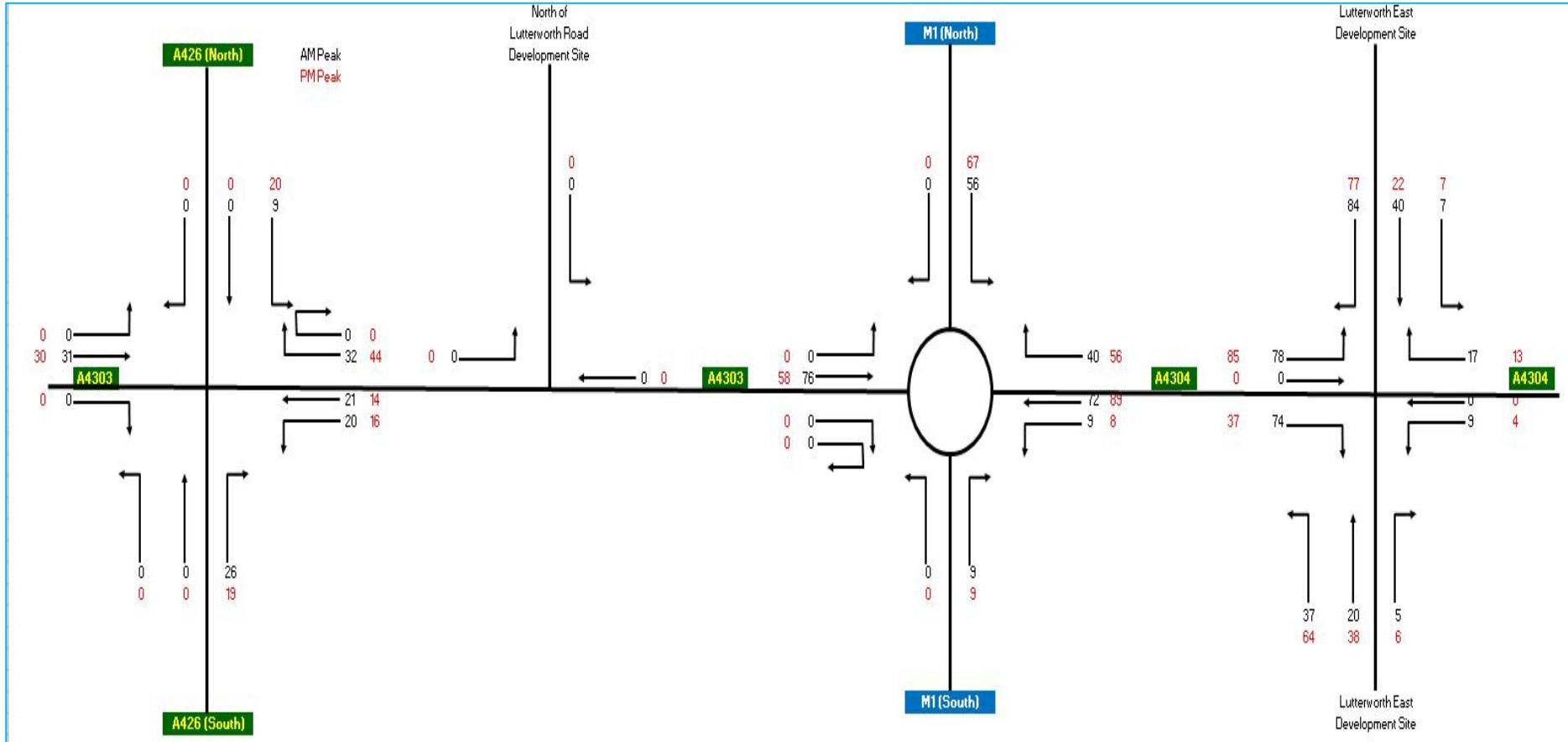


Figure 7: Forecast Peak Hour Combined Development Traffic Turning Flows (expressed as PCU's)

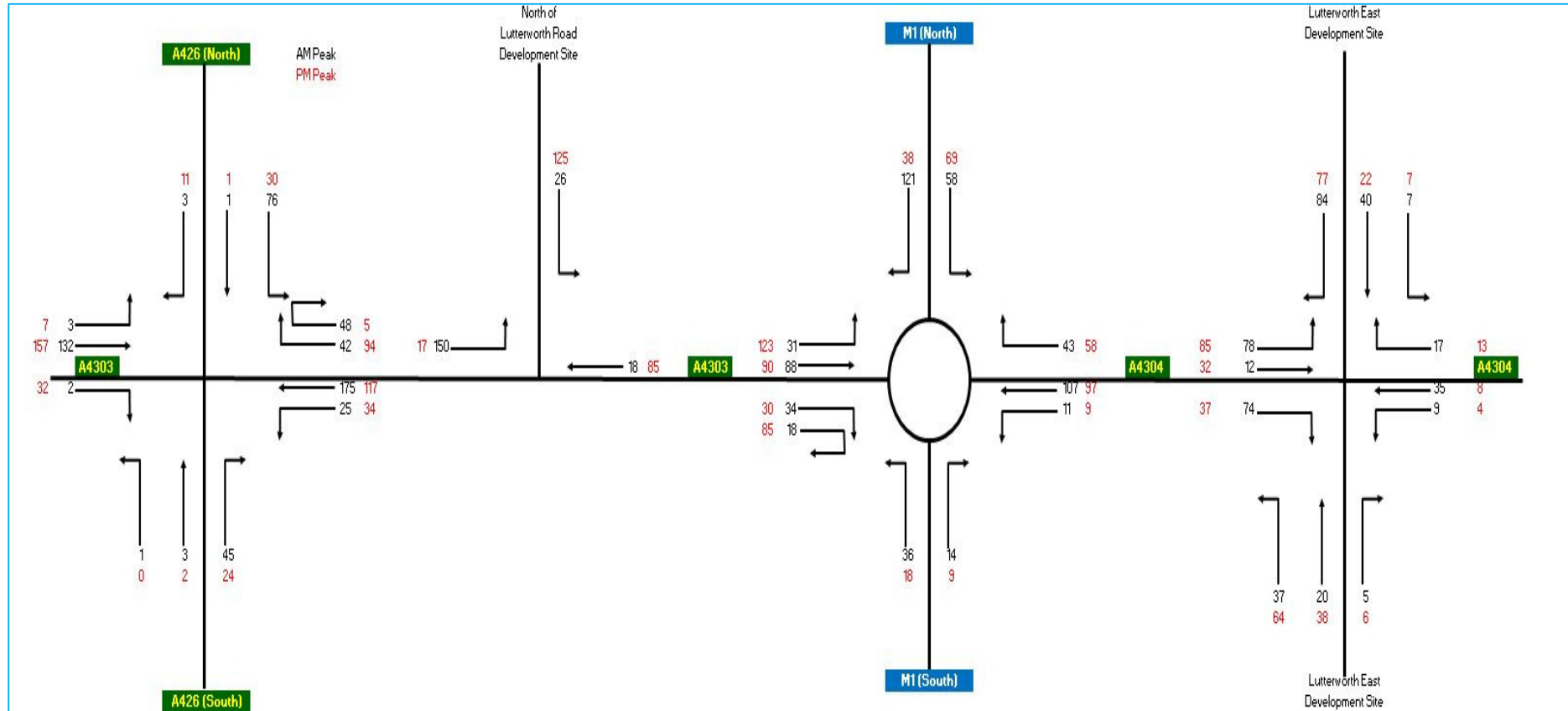
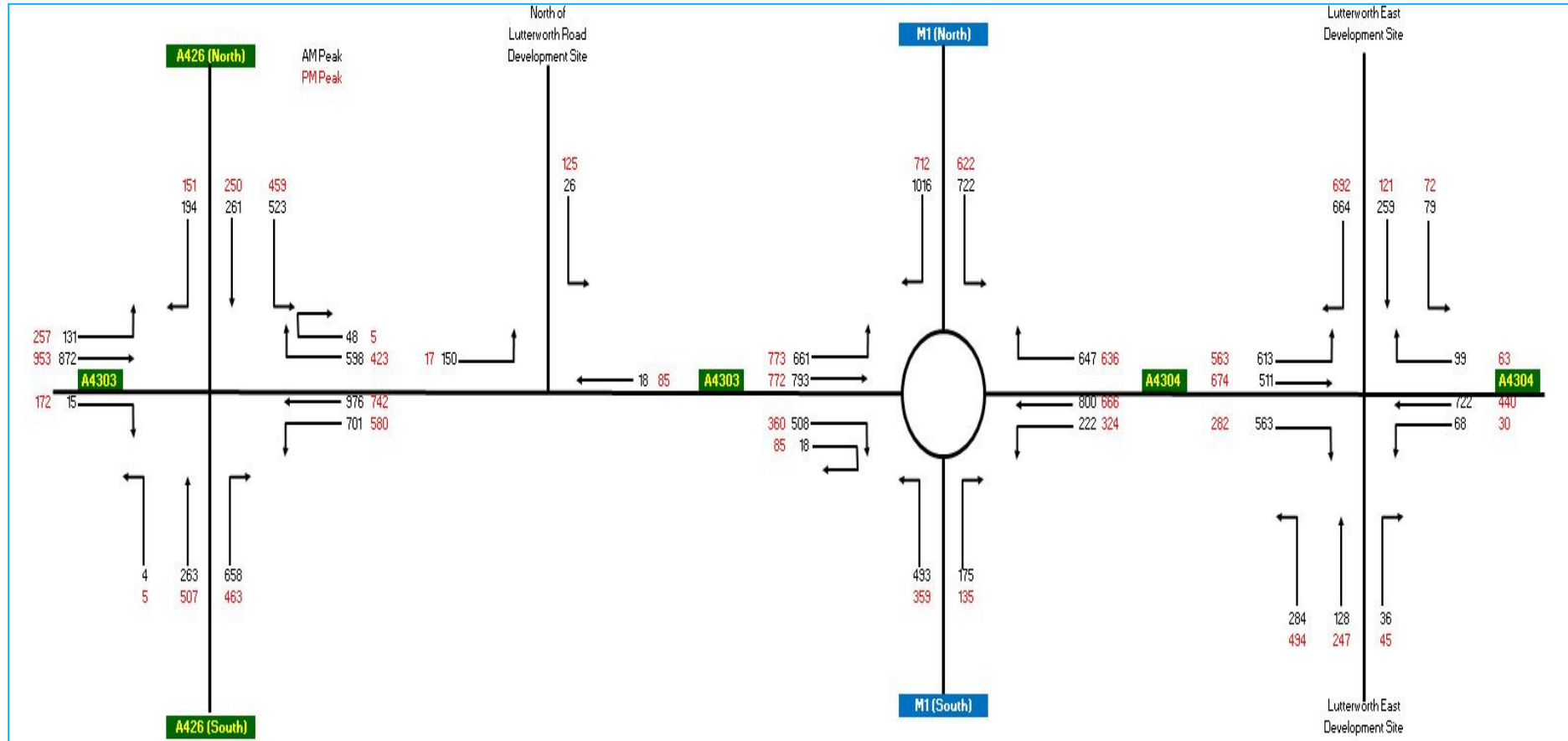


Figure 8: Forecast Peak Hour Forecast Total 2031 Traffic Turning Flows (expressed as PCU's)



3. Forecasting Methodology

It was agreed with Leicestershire County Council to consider two scenarios to test:

- **Scenario 1:** is the cumulative impact for the increase of the Lutterworth East development and Land North of Lutterworth Road.
- **Scenario 2:** is the cumulative impact for Scenario 1 plus the Magna Park development and development on land south of Coventry Road.

First step was to cordon the SATURN model for both AM and PM peaks around the study area which includes all of the key junctions and all of the developments six zones. The outcome of the cordoning procedure comprised of trip matrices, containing the traffic from/to all of the Lutterworth East development zones among another 25 zones covering all of the study area. **Figure 9** shows the Lutterworth east zones and **Figure 10** shows the study area and the cordon.

Figure 9: Lutterworth East zoning

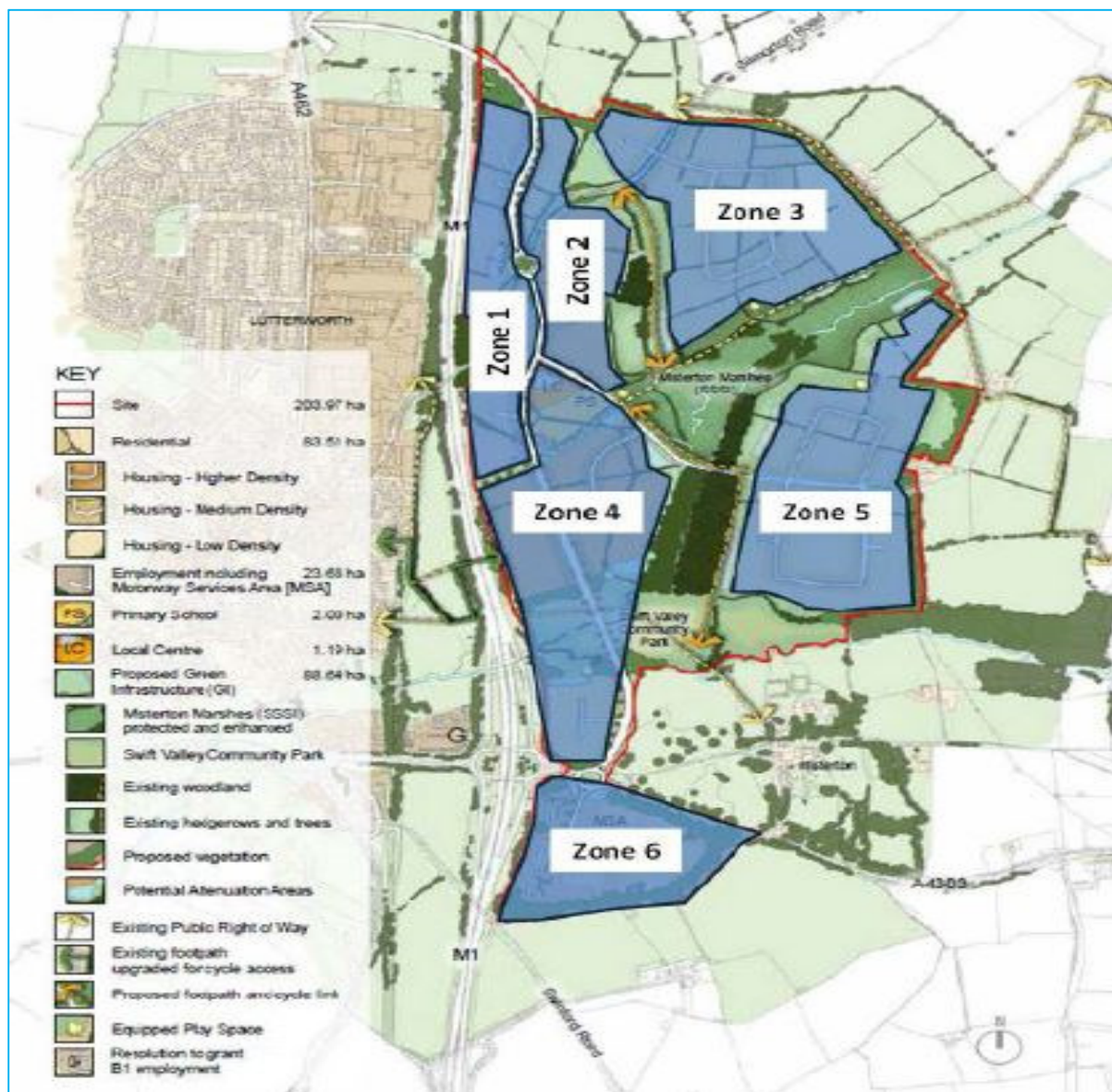
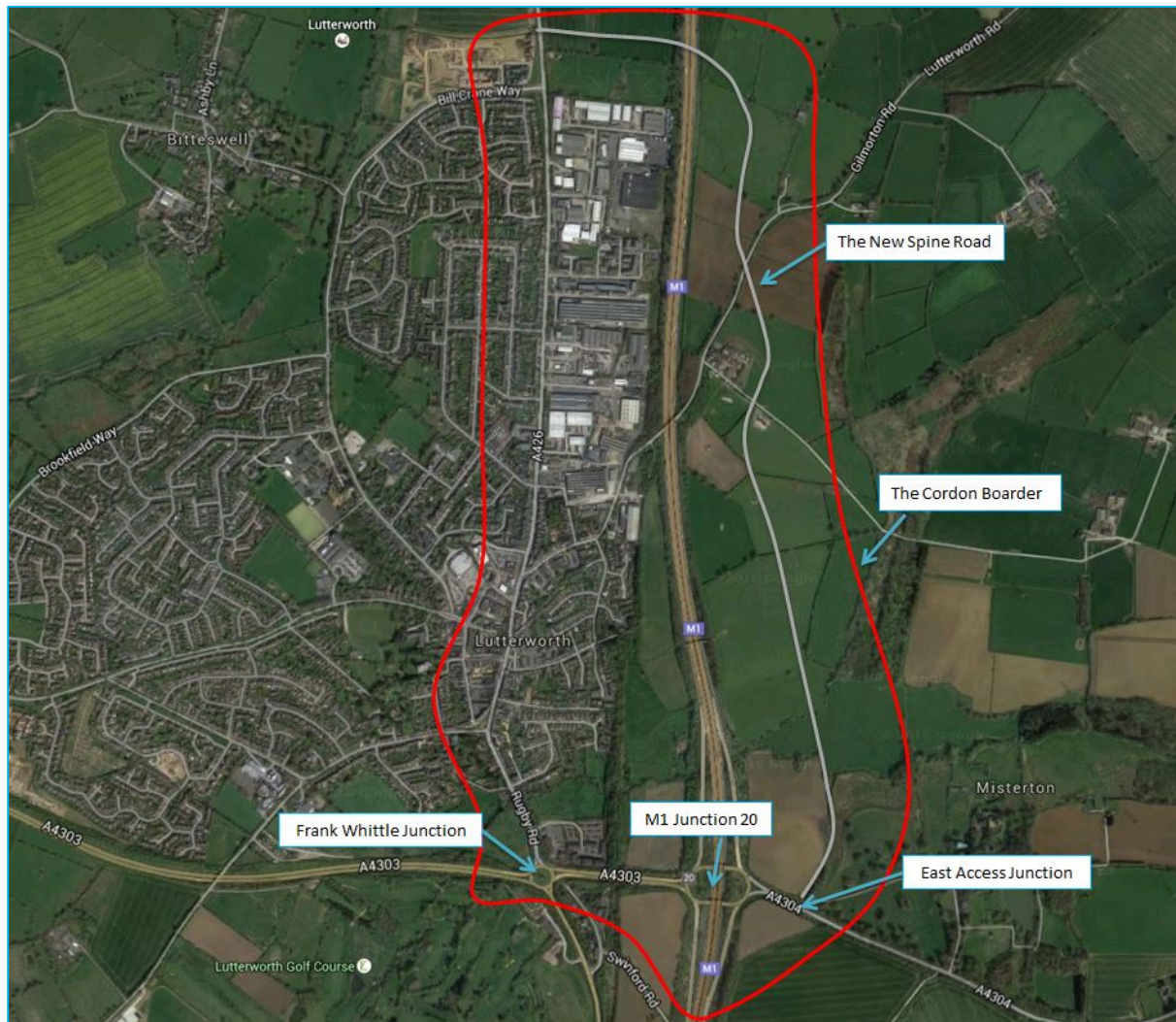


Figure 10: Study Area - Cordon

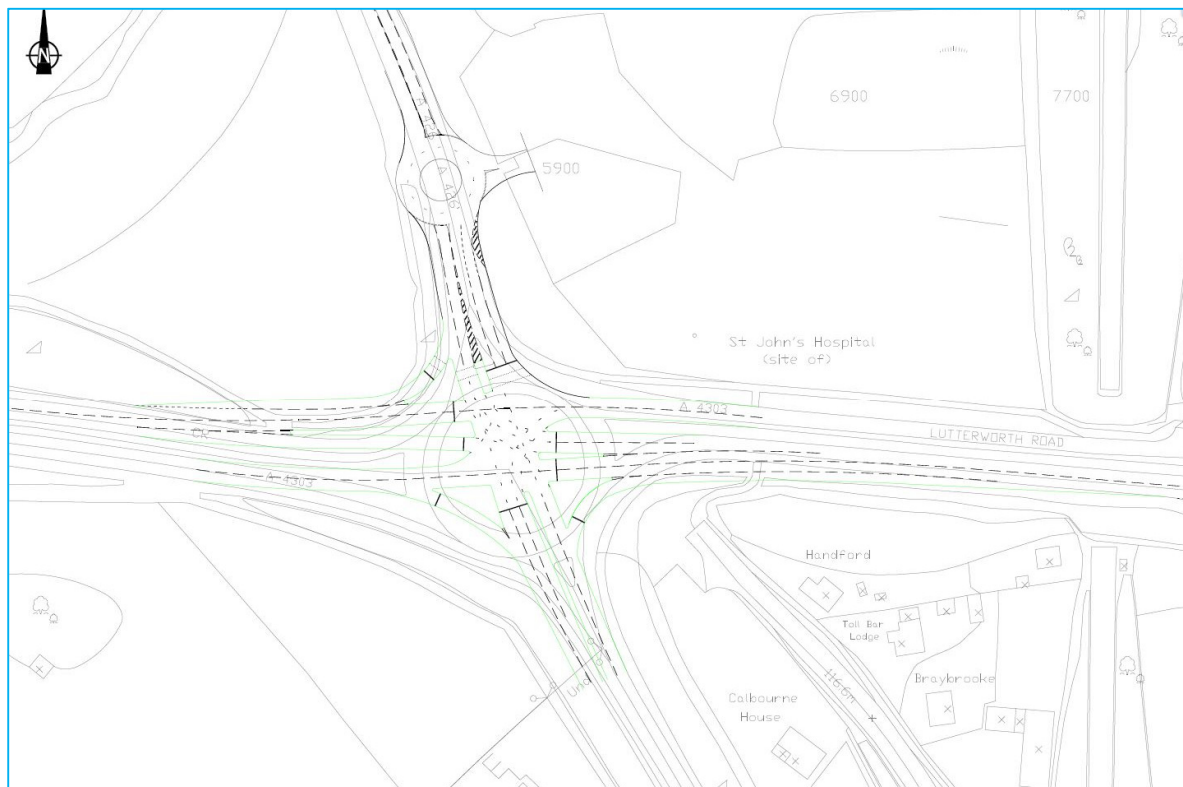


Based on the cordoned matrices, the traffic from/to the six development zones were isolated and then were factored in order to estimate the additional traffic that would be generated by the increased development size.

For zones 2, 3, 4, and 5, traffic was factored by 18.4 % (2,950/2,500) and for zones 1 and 6 the increase factor was 15% (23/20). The additional traffic from the Lutterworth East development has been split by each zones from/to traffic and distributed based on the cordoning outcome matrices. The total traffic diagram for all six zones is shown in **Figure 2**. The additional traffic of the Lutterworth east additional land-use was shown in **Figure 6**.

As the Frank Whittle junction mitigated into a crossroads signalized junction, there was a need to provide a solution for the traffic heading to the development north of the Lutterworth Road (between Frank Whittle junction and M1 Junction 20). A new roundabout was provided with an ICD of 30 metre to accommodate the U-turn movement of the committed development, in addition to provide a right turn for the traffic heading out of the Travelodge arm. **Figure 11** shows the layout arrangement. The layout of the roundabout would be subject to further design considerations and investigation.

Figure 11: Frank Whittle and Indicative Travelodge Junctions Arrangement



4. Junctions Assessment

Junction assessments were undertaken using the industry standard software, LINSIG for signalised junctions and ARCADY and PICADY for roundabouts and priority junctions respectively.

For both LINSIG the important outputs which will be assessed are:

- **DoS (Degree Of saturation):** recommended value of DoS is less than 90%, where values above 90% can lead to queues and delays.
- **Mean Maximum Queue (MMQ):** is the mean of the maximum number of queued vehicles across the respective analysis period on a junction signal cycle-by-cycle basis.
- **PRC (Practical Reserve Capacity):** positive values means junction will have spare capacity, whereas negative values indicate queuing.

For both ARCADY and PICADY the important outputs which will be assessed are:

- **RFC (Ration of Flow to Capacity):** the optimum value is 0.85, and any value over 0.85 will lead to queuing.
- **Queue:** is the number of queued vehicles.

4.1 Scenario 1

This scenario was to test the additional traffic impact of the extra land-use of the Lutterworth East development in addition of the committed development that is located north of Lutterworth Road between Frank Whittle junction and M1 J20.

Frank Whittle Junction

The results of the initial tests showed that the junction would operate over its capacity, especially at AM peak, therefore the junction was tested with further improvements; adding a left turn flare for the Rugby Road north arm. Results shown in **Table 1**.

Table 1: SC1 - Frank Whittle Junction LINSIG Results

ARM	Frank Whittle Junction - SC1			
	AM		PM	
	DoS %	MMQ	DoS %	MMQ
Rugby Rd North	90	17	75	11
A4403 East	87	18	79	10
Rugby Rd South	89	14	77	9
A4403 West	75	14	78	11
PRC %	-0.3		14.3	

The results showed that the junction would operate within its capacity in PM peak, where in the AM peak it would operate at its capacity.

Travelodge Roundabout

The junction is tested with an ICD of 30 metre. Results shown in **Table 2**.

Table 2: Travelodge Roundabout Results

ARM	Travelodge Roundabout#			
	AM		PM	
	RFC	Queue	RFC	Queue
Travelodge East	0.000	0	0.163	0
Rugby Rd South	0.530	1	0.595	2
Rugby Rd North	0.727	3	0.572	1

The results showed that the junction would operate well within its capacity.

M1 Junction 20 & Main Development Access

The combined junction model was tested for the additional traffic, and results showed that the junction would operate over its capacity. Therefore, improvements were introduced to the junctions as the following:

- Additional short lane to the development north arm; and
- Increasing the lane of the left short lane of the development south arm from 30 metre into 60 metre.

The results are shown in **Table 3**.

Table 3: SC1 - Combined Model of M1 J20 & East Access Junction LINSIG Results

ARM	M1 J20 & Main Access			
	AM		PM	
	DoS %	MMQ	DoS %	MMQ
Main Access Junction				
Dev North	86	12	82	11
Lutterworth Rd - East	90	15	55	6
Dev South	82	6	77	8
Lutterworth Rd West	89	18	80	12
M1 Junction 20				
Lutterworth Rd East Arm	66	11	57	7
Opposing Gyratory	69	6	61	4
M1 NB Off-slip	86	6	78	5
Opposing Gyratory	82	8	67	5
A4303 West	84	11	79	10
Opposing Gyratory	52	7	58	6
M1 SB Off-slip	84	10	71	7
Opposing Gyratory	78	6	58	5
Total PRC %	-0.3		10.5	

The results shown under Scenario 1 indicate the junction could operate around its capacity in the AM peak and with a positive PRC in the PM peak.

The Scenario 1, combined junctions' model summary results indicate the junction would operate at its capacity. However, it is noted that the motorway junction (M1 J20) would operate within its capacity, where the east access junction would operate close to its capacity. In the PM peak, both junctions would operate within their capacity with a total reserve positive PRC of 10.5%.

4.2 Scenario 2

The cumulative impact of the additional traffic that would be generated by the Magna Park and development on land south of Coventry Road, as **Figure 3** and **Figure 4** showed the traffic of these two developments is tested in this scenario

Frank Whittle Junction

The Results of the Frank Whittle junction shown in **Table 4**.

Table 4: SC2 - Frank Whittle junction LINSIG Results

ARM	Frank Whittle Junction - SC2			
	AM		PM	
	DoS %	MMQ	DoS %	MMQ
Rugby Rd North	92	18	81	12
A4403 East	92	22	80	11
Rugby Rd South	94	16	82	10
A4403 West	77	15	82	13
PRC %	-4.1		9.5	

The results showed the junction would operate slightly over its capacity in the AM peak, whereas in the PM peak, the junction would operate within its capacity.

Table 5: SC2 - Combined Model of M1 J20 and East Access Junction LINSIG Results

ARM	M1 J20 & Main Access			
	AM		PM	
	DoS %	MMQ	DoS %	MMQ
Main Access Junction				
Dev North	91	13	73	10
Lutterworth Rd - East	90	15	57	7
Dev South	86	7	82	9
Lutterworth Rd West	89	18	82	11
M1 Junction 20				
Lutterworth Rd East Arm	82	13	56	7
Opposing Gyrotory	63	6	63	4
M1 NB Off-slip	88	7	79	5
Opposing Gyrotory	86	13	69	5
A4303 West	81	10	87	14
Opposing Gyrotory	61	5	58	6
M1 SB Off-slip	88	13	73	7
Opposing Gyrotory	78	12	68	4
Total PRC %	-0.9		3.1	

The summary results indicate under Scenario 2, the junction would operate slightly over its capacity in the AM peak and within its capacity in the PM peak.

4.3 Other Junctions

The additional traffic of the Lutterworth East development additional land-use besides the committed development between Frank Whittle junction and M1 Junction 20, would have impacts on other junctions.

Capacity assessment tests were undertaken for these junctions in order to examine the impact of the additional traffic and produce solutions where capacity issues might occur.

Norther Access (the secondary access)

The junction been tested firstly as a signalised junction, and results shown in **Table 6**.

Table 6: Northern Access Results

ARM	Northern Access - Additional Traffic			
	AM		PM	
	DoS %	MMQ	DoS %	MMQ
Rugby Rd North	82	17	90	26
Development Rd	80	10	64	17
Rugby Rd South	68	13	91	11
PRC %	9.5		-4.1	

The results showed that the junction would operate within its capacity in the AM peak, however, in the PM peak the junction would operate slightly over its capacity

Therefore, the initial design of this junction, as a standard roundabout with a 40 metre ICD, was tested as well. Results shown in **Table 7**.

Table 7: Northern Access Roundabout Results

ARM	Northern Access - Additional Traffic			
	AM		PM	
	RFC	Queue	RFC	Queue
Rugby Rd North	0.653	2	0.747	3
Development Rd	0.400	1	0.594	1
Rugby Rd South	0.795	4	0.554	1

The results showed that the junction as a roundabout would operate well within its capacity. The option for a roundabout has already been presented in the Draft STA.

Bill Crane Way Junction

This junction was tested with similar layout that was presented in the TA, a signalised junction. Results shown in **Table 8**.

Table 8: Bill Crane Way Results

ARM	Bill Crane Way - Additional Traffic			
	AM		PM	
	DoS %	MMQ	DoS %	MMQ
Rugby Rd South	73	15	48	8
Bill Crane Way	73	10	66	7
Rugby Rd North	72	7	68	12
PRC %	22.7		33.2	

The results showed that the junction would operate well within its capacity with a high practical reserve capacity.

Gilmorton Rd/Rugby Rd junction.

The junction was tested with the mini-roundabout design as was presented in the TA. Results shown in **Table 9**.

Table 9: Gilmorton Rd/Rugby Rd Junction

ARM	Gilmorton Rd - Additional Traffic			
	AM		PM	
	RFC	Queue	RFC	Queue
Rugby Rd North	1.508	186	1.946	230
Development Rd	1.927	185	1.299	37
Rugby Rd NB	1.331	147	1.520	154

The results showed that the junction would operate over its capacity in both AM and PM peak. Further consideration needs to be taken as to the future role and function of Gilmorton Road in relation to the proposed development master plan. This could include investigations into restricting use of the Gilmorton Road bridge over the M1 and encouraging use of the Spine Road to access the town centre through measures such as traffic management, traffic calming and/or bus priority.