APPENDIX C
Responses to HDC comments, January 2017

AECOM

Lutterworth East Development

Transport Input to Harborough District Council Comments, Dated 28th November 2016

1. Background

Comments on the transport elements of the proposed development have been received from Harborough District Council (HDC) dated 28th November 2016. AECOM as Leicestershire County Council's (LCC) transport consultant has prepared this technical note to address the various comments and concerns raised. Each comment has been reproduced followed by our response. The responses to non-transport related comments are for others within the development team to respond.

2. Viability of the Scheme

Comment 2.1

Currently our viability consultants advise that the scheme is not viable against their assumptions on Threshold Land Value; we need to be assured that the return being achieved by the key landowners is sufficient for them to proceed.

Response 2.1

For others to respond.

Comment 2.2

The poor viability is largely a result of the very high infrastructure costs; evidence is required that the figures provided on infrastructure costs (as set out in the attached document) are accurate; evidence should be in the form of comparative costs for similar schemes and/ or endorsement by the relevant statutory body (e.g. county highway authority, Highways England, statutory undertakers).

Response 2.2

For others to respond.

Comment 2.3

Certain costs have been identified as potentially 'light' and could further adversely impact on viability; evidence as above should be especially robust in relation to:

- The junction to replace the Frank Whittle roundabout (and associated highway improvements) taking into account the changes in levels at this location;
- The signalisation and other proposed improvements to junction 20 on the M1;
- The amount allowed for sustainable transport measures (see below);

- The cost of the 'relief road' taking account of the standard required for this road to achieve its objectives.

Response 2.3

For others to respond.

Comment 2.4

In addition the cost of utility connections across the motorway has been estimated by Peter Brett Associates at £8 million; this exceeds your estimates so we require that a robust and defensible figure be provided for this.

Response 2.4

For others to respond.

Comment 2.5

Information, such as a viability/ cash flow statement, is required to justify the inclusion of the employment land to the south-east of junction 20 on the M1.

Response 2.5

For others to respond.

3. Deliverability of the Relief Road

Comment 3.1

A letter of assurance is required from the Underwoods and the Aikmans that they would be willing to have their land included in the SDA so that an Inspector is likely to be able to come to the view that 'the site has a reasonable prospect of being delivered'.

Response 3.1

For others to respond.

Comment 3.2

An undertaking, together with supporting evidence in the form of transport modelling, that the relief road is required to be delivered in order for the SDA to be developed and a suggested method (such as the outline terms of a section 106 agreement and/ or a bond) to give comfort that the scheme will not 'stall' at the trigger point for the road and motorway bridge should be provided.

Response 3.2

We confirm the Spine Road is required to deliver the whole of the SDA development.

A technical note Early Phases Traffic Assessment, October 2016, has been produced to summarise the results of transport modelling of the early phases of development to determine the trigger point for when the road would need to extend northwards over the motorway to provide a secondary access.

It was found that the early phases that can be accommodated prior to extending the Spine Road include:

- 14 Hectares of Employment (10Ha south of A4304 Lutterworth Road and 4Ha north of A4304 Lutterworth Road adjacent to the M1);
- 1,290 dwellings;
- Primary School; and
- Local centre.

The operational junction capacity assessment showed that M1/Junction 20 and A4303 / A426 Frank Whittle, A426 / Gilmorton Rd and A426 / Bill Crane Way junctions would need to be improved before the early phases are completed. The absence of the Spine Road M1 Bridge / northern access would increase the traffic on all these junctions thereby requiring their early completion.

Development above and beyond the early phases of the development would therefore require the Spine Road M1 bridge and the new junction with the A426 Leicester Road. Without the northern access via the Spine Road over the M1, additional development would lead to queues and delays at the A4304 Lutterworth Road / Main access junction in the AM peak hour, which is forecast to operate around capacity with the early phases of the development.

The technical note Early Phases Traffic Assessment, October 2016, is included in **Appendix A**.

Comment 3.3

A report is needed of initial discussions both within the County Council and with other relevant public sector bodies (the HCA and the LLEP)on the potential availability of public sector funding (grant aid or loan finance) to enable the early delivery of the relief road and in particular the motorway crossing.

Response 3.3

For others to respond.

4. Effectiveness of the Relief Road

Comment 4.1

A report from transport consultants is needed on the extent to which the relief road (at various design speeds) will be effective in reducing through traffic, particularly heavy goods vehicles, from Lutterworth town centre both with and without additional traffic management measures in the town centre.

Response 4.1

In our responses to comments on 27th July 2016, we stated:

"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. It's 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.

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.
We therefore consider the road as a District Distributor Road to serve the new development area, while acting as a potential Relief Road."

We have produced a technical note in regards of the design consideration and the functionality of the Spine Road. A technical note Spine Road Design Considerations, October 2016, is included in **Appendix B**. The technical note discusses the consideration of alternative design standards ranging from a 60mph national speed limit road to a 40/30mph road fully 'integrated' into the new development area at the other extreme, as well as various intermediate design standards. We have also considered whether a 20mph zone for the road section adjacent to the district centre may or may not be appropriate.

The various design standards for the route have been appraised against a wide range of criteria including impact on journey time, relief to traffic in Lutterworth town centre, safety, severance, complementary measures, impact on the Lutterworth East master plan, environment (air quality and noise), impact on public transport, community/place-making, etc. The technical note sets out our evaluation of the alternatives and recommendations for next steps in the design process.

It was concluded that the Spine Road could provide an alternative route for traffic travelling to/from M1 Junction 20 and it has been demonstrated that, irrespective of the design standard/speed limit, the route would provide a quicker alternative to travel via the A426 through Lutterworth town centre.

The Spine Road could help to relieve the volume of HGVs through the town centre, thereby improving noise and air quality. In order to encourage use of the Spine Road, a 7.5 tonne weight limit may be needed for a section of A426 in Lutterworth town centre.

The role, function and design of the route will require a multi-disciplinary assessment of options in order to satisfy the 'competing' objectives for the route.

Concerning potential use of the road, AECOM has carried out more analysis of the LLITM transport model forecasts.

The analysis showed that 9% of the traffic in the morning AM peak would use the spine road as a through movement, whereas 7% of the spine road traffic in the evening PM peak would use the spine road for through movement.

Details of this through movement along the spine road is summarised in the following table.

Through movement description	PCUs Per Hour AM	PM
Spine Road NW to Gilmorton East	45	13
Gilmorton East To Spine Road NW	18	21
Spine Road NW to Lutterworth Road A4304 East	11	15
Lutterworth Road East A4304 to Spine Road NW	11	5
Spine Road NW to M1 J20	0	66
M1 J20 to Spine Road NW	0	0
Spine Road NW to Gilmorton Road West	1	2
Gilmorton Road West to Spine Road NW	3	1
Gilmorton Road East to Lutterworth A4304 East	19	8
Lutterworth A4304 East to Gilmorton Road East	8	6
Gilmorton Road East to M1 J20	188	135
M1 J20 to Gilmorton Road East	132	77
Gilmorton Road West to Lutterworth A4304 East	1	0
Lutterworth A4304 East to Gilmorton Road West	0	0
M1 J20 To Gilmorton Road West	2	5
Gilmorton Road West to M1 J20	12	1
Total 2-Way Traffic	**451**	**355**
Though Traffic as a % of Total Traffic	**9%**	**7%**

It is noted that the majority of the through movements on the Spine Road are to/from Gilmorton Road East, with only very small volumes travelling end-to-end. The above movements have been included in the model tests and junction designs for the Spine Road.

As mentioned above and in the technical note, it is possible that additional traffic may use the Spine Road, which will be dependent both on the design and capacity of the new road and also on what measures may be implemented within Lutterworth town centre to encourage its use, rather than travelling via A426 Leicester Road. To assess the potential additional traffic demand, AECOM has also conducted further analysis of the LLITM forecasts for the A426 Leicester Road which passes through Lutterworth town centre road, in order to determine the through movements and assess the maximum volume that could potentially divert to use the Spine Road.

From analysis of the traffic movements using the A426 through the town centre, the model has around 300 pcus per hour by direction in the AM peak and 150 pcus per hour northbound and 350 pcus per hour southbound in the PM peak. These volumes are made up of traffic travelling to/from M1/J20 from areas north of the town on the A426 and from areas in the northern part of the town.

Operational junction models tests have been conducted with this traffic added to the Spine Road in order to represent a possible 'worst case' scenario; assuming all the potential through movement on the A426 would switch to use the Spine Road.

The initial tests of this 'worst case' associated traffic showed that both M1/J20 and the main Spine Road access of the development would operate above capacity with queues and delays, and would therefore need a higher capacity design.

AECOM has therefore carried out further junctions analysis tests which have concluded in order to accommodate the 'worst case' scenario, the main access junction would need to have three lanes turning right from the development arm north, and to maintain three lanes between the junction and the motorway junction westbound. Furthermore, the motorway junction would need an additional lane at the gyratory on the west side at the A4303 Lutterworth Road approach to the roundabout.

AECOM considers an additional lane on the west side of the motorway junction would be feasible and would effectively be the 'mirror image' of the widening already proposed for the eastern side. However, having three lanes turning right from the Spine Road at the main junction could possibly be unsafe, due to the radius of the turn and presence of HGVs.

A potential solution has therefore been considered and modelled. This involves splitting the junction into two junctions as follows:

- A4304 Lutterworth Road / Spine Road at the current planned location; and
- A4304 Lutterworth Road / Southern Development Area several hundred metres to the east.

AECOM has analysed the possibility of providing this solution, and it was concluded that both junctions would operate within their capacity with high reserve capacity and without the need for three right turn lanes.

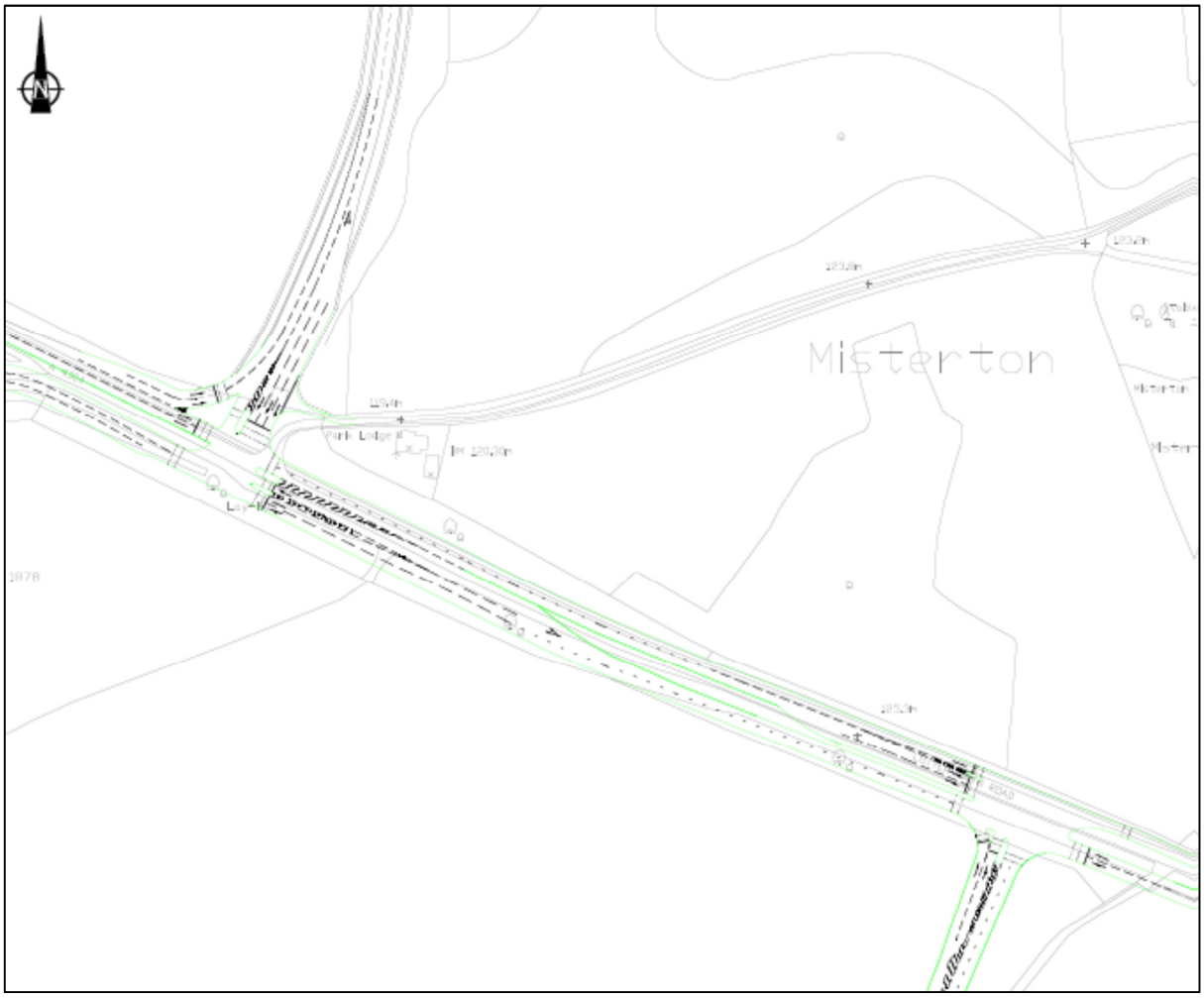
The positive points associated with this solution are:

- Smaller junction sizes; i.e. less number of lanes;
- Minimising the constraints caused by the spacing with the motorway junction; and
- Gives potential extra traffic capacity for possible changes in the Master Plan.

This solution needs to be further analysed in terms of estimated cost.

Figure 1 illustrates the potential two junction solution.

Figure 1 Two Junction Solution



In conclusion, AECOM considers:

- The Spine Road can be made to accommodate some traffic diverting from using A426 Leicester Road in the town centre;
- The LLITM forecasts and junction capacity assessment already include some through traffic;
- With additional traffic diverting to the Spine Road, it will be necessary to split the A4304 Lutterworth Road / Spine Road / Southern Development Area junction into two junctions, one for the Spine Road at the same location and another to the east for the south development area;
- 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);
- Depending on the design of the Spine Road it may then be necessary to re-visit and amend the Master Plan, particularly in the relation to the primary school and local centre which are both currently shown as being immediately adjacent to the road; and

- In order to provide an improved forecast of the likely through movement, further area-wide traffic modelling using LLITM and detailed junction modelling may be needed.

Comment 4.2

If traffic management measures are required, an indication is needed of what measures are likely to be effective and practical.

Response 4.2

In 2007, LCC appointed Scott Wilson (a legacy company of AECOM) to prepare a Lutterworth Traffic Study which reported in May 2008. In its introduction, the report stated:

"Analysis contained within the Local Transport Plan (LTP) indicates that the worst location for nitrogen dioxide (N02) pollution is at the location of Regent Court; and that little of this pollution can be attributed to car traffic. Rather, the LTP states that the main contributors to the N02 pollution are lorries (both articulated and non-articulated) and buses.

It is therefore considered within the LTP that the solution to this problem would either be less lorries, or less polluting lorry and bus fleets.

The LTP developed a series of strategies for addressing the air quality impacts noted within Lutterworth town centre. The most promising of these, in terms of impact on air quality and potential cost, were:

- *the introduction of a 7.5T weight limit (by Traffic Regulation Order, TRO) to divert lorries from the A426 (through the town centre); and*
- *working with bus operators to reduce emissions.*

The former of these two strategies would add to the number of HGVs using any alternative route that is selected. This report examines different options to accommodate such displaced HGV movements."

The report therefore identified options for removing HGVs from the town centre including a possible eastern relief road route (Option C in the report) which was broadly similar to the Spine Road now being proposed to serve the Lutterworth East development area. The Scott Wilson report showed that HGV volumes were greatest along the southern section of the A426 and if the majority were diverted to use an eastern relief road option, could lead to a decrease of approximately 6µg/m3 of NO2 in the town centre. The report also stated *"However this option has not considered any air quality sensitive receptors located within a close proximity to the new alignment of Option C, although air pollutant concentrations at such receptors should remain within the respective air quality objective values."* Therefore, while the report showed potential benefits for the town centre, it did not and could not conclude what the impacts may be for developments along the relief road route.

The report indicated the highest 2-way HGV 12-hour volume on the A426 south of the town centre to be 1,453 vehicles. From an automatic number plate recognition (ANPR) survey, the report also estimated the 12-hour HGV through-traffic movements (i.e. vehicles without an original or destination in Lutterworth) to be 374 vehicles northbound and 320 vehicles southbound, and therefore totalling 694 vehicles.

Based on the Scott Wilson report, the Spine Road together with a 7.5 tonne weight limit could potentially help to reduce HGVs travelling through the town centre. However, it is not known what the environmental impact would be on the Lutterworth East development area.

Comment 4.3

Based on the above work, a recommendation is required with respect to the appropriate design for the relief road (if necessary varying along its length) and on the alternative route for the road currently being evaluated.

Response 4.3

Please see our responses to 4.1 and 4.2 above.

5. Transport connectivity/ sustainability

Comment 5.1

A more thought through and detailed accessibility strategy is required to include:

- Proposals for cycle and pedestrian links to the upgraded existing footbridge to/from key destinations within the existing town (e.g. secondary schools, leisure centre, health facilities, employment locations);
- Proposed works to enable sustainable travel on the Gilmorton Road motorway crossing, in order to provide links to the site's northern end;
- Assurances from the public transport operators about the long-term prospects for commercial bus services to the SDA, together with proposals for public transport subsidy to enable this and to ensure a service in the interim;
- Maximising the provision of services within the SDA so that it is as self-contained as possible, including convenience retail, a doctors surgery and (in the long term) a replacement site for the leisure centre;

Response 5.1

The upgrade to the existing footbridge will include improvements to cycle and pedestrian links to/from the town. This will include improvements to the existing public rights of way between the footbridge and Misterton Way and Station Road, both of which connect to the A426 High Street. The improvements will include provision of a standard hard surface with segregated cycle/pedestrian lanes and lighting.

It is proposed that the Gilmorton Road motorway bridge crossing becomes a sustainable transport link for buses, cycles and pedestrians only, while also being available for use by emergency services use. It is considered the bridge has sufficient width to safely accommodate these uses. The existing footpath on Gilmorton Road within the town will need to be extended to meet with the footpath on the motorway bridge. Similar connections will be made within the new development area.

Given the proposed size of the development we would anticipate that bus operators would be interested in running services to/from the development area. We agree in the early phases of development, there may be the need for subsidy. Details of service operation and subsidy can be determined through the planning process at a time when an application for planning is submitted.

We agree that a degree of self-containment should be sought through the provision of local services, amenities and facilities to help reduce the need for travel to/from the existing town.

Comment 5.2

Connections to Gilmorton Road should not be relied upon to service the SDA or to make the scheme acceptable in terms of traffic impact in order to minimise any adverse traffic impacts on Gilmorton village and other rural settlements in the vicinity.

Response 5.2

Agreed. Please see our response to 5.1 and also to our statements on Gilmorton Road and Gilmorton village in our 27th July 2016 responses to comments.

6. Capacity and delivery assumptions.

Comment 6.1

Confirmation, together with supporting evidence from completion / sales rates in comparable locations elsewhere, is required that 1,550 dwellings can be delivered within the plan period to 2031 and that a further 1,200 dwellings can be delivered by 2036.

Response 6.1

For others to respond.

Comment 6.2

Similar confirmation is required with regard to the employment elements of the SDA.

Response 6.2

For others to respond.

Comment 6.3

Following my e-mail of 24th November agreement is sought on the phasing of and triggers for infrastructure provision associated with the housing trajectory.

Response 6.3

We suggest this is discussed further with HDC and HE at the Planning meeting on 9th January and at the Transport meeting on 12th January 2017.

Comment 6.4

Specific justification is required, taking account of the updated MDS Trans Modal Study 2016 and proposals for development at Magna Park, for the strategic distribution development being proposed for the land south–east of junction 20 on the M1.

Response 6.4

For others to respond.

7. Environmental Matters

Comment 7.1

Confirmation is required of the commitment to delivery of the mitigation strategy on which Natural England's withdrawal of their objection in relation to Misterton Marshes SSSI has been based, together with the cost and timing of this;

Response 7.1

For others to respond.

Comment 7.2

Confirmation, together with supporting information on mitigation methods, costs and timing, is required that the SDA's impacts on flood risk can be adequately managed to the satisfaction of the Environment Agency;

Response 7.2

For others to respond.

Comment 7.3

Evidence is required that the noise and air pollution to be experienced by future residents of parts of the SDA adjoining the M1 will be within limits acceptable to the Council's Environmental Health officers and / or that effective mitigation can be put in place to ensure that this is the case.

Response 7.3

For others to respond.

8. Masterplanning

Comment 8.1

Any further changes to the ‘vision’ for the site should be made arising from the above, as well as from emerging issues such as the need to relocate the leisure centre, the need for a cemetery and the need to take account of the overhead power cables.

Response 8.1

For others to respond.

AECOM

APPENDIX A

Technical Note: Early Phases Traffic Assessment, October 2016

Lutterworth East Development

Technical Note: Early Phases Traffic Assessment

Leicestershire County Council

Project Number: 60472967

October 2016

Quality information

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Figures

Tables

1. Introduction

Leicestershire County Council (LCC) has asked AECOM to assess the traffic impact of the early phases of the Lutterworth East Development before the Spine Road bridge over the M1 and a new junction with A426 Leicester Road is implemented.

This Technical Note summarises the following:

- Land-use assumptions;
- Trip generation and traffic forecast;
- Junction operational assessment; and
- Summary and key findings.

2. Land-use assumptions

LCC has advised AECOM regarding the early phases' land-use assumptions which need to be assessed in this note.

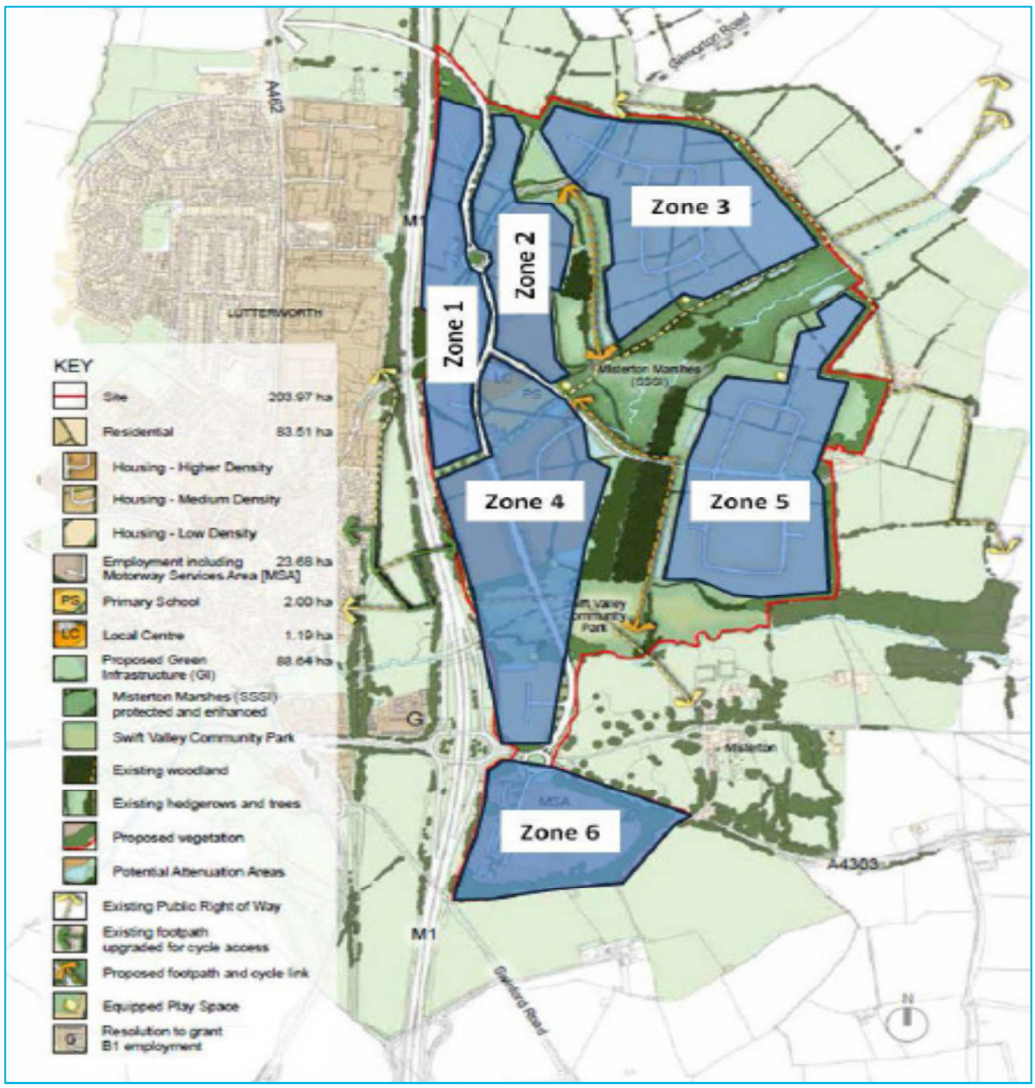
Error! Reference source not found. shows the land-use assumptions

Table 2.1 Early phases Land-use Assumptions

Land Use	Location	Size
Employment	Development South (Zone 6)	10 hectares
Housing	Development North	1,290 dwelling
Employment	Development North (Zone 1)	4 hectares
Primary School	Development North (Zone 4)	1 school
Local Centre	Development North (Zone 4)	1 centre

Figure 2.1 shows the whole of the development master plan and the location of the development zones assumed in the transport assessment.

Figure 2.1 Lutterworth East Development Initial Masterplan



3. Trip Generation and Traffic Forecast

3.1 Trip Generation

In order to estimate the trip generation of the development, trip rates were extracted out of the Leicester and Leicestershire Integrated Transport Model (LLITM). These rates were based, as shown in **Table 3.1**, on both housing and employment.

Table 3.1. Trip Rates

	Vehicles per Hour				
	Unit	AM		PM	
		Arrivals	Departures	Arrivals	Departures
Housing	Dwelling	0.059	0.244	0.231	0.108
Employment	Employee	0.225	0.113	0.112	0.199

The resulting estimates of trip generation are shown in **Table 3.2**.

Table 3.2. Trip Generation

			Vehicles per Hour			
			AM		PM	
Land-use	Location	Size	Arrivals	Departures	Arrivals	Departures
Housing	North	1,290 (dwelling)	76	315	298	139
Employment	North	1,360 (Employee)	308	154	154	273
School - centre	North	1 – 1	118	40	61	101
Employment	South	3,400 (Employee)	770	386	384	683
Total			1,272	895	896	1,197

Table 3.3 shows the early phases generated traffic compared with the full development for both housing and employment.

Table 3.3 Early Phases Vs Full Development

		Vehicle per Hour			
		AM		PM	
Land-use		Arrivals	Departures	Arrivals	Departures
Housing	Early phases	76	315	298	139
	Full Development	148	610	578	270
	%	52%	52%	52%	52%
Employment	Early phases	1,078	540	538	956
	Full Development	1,530	768	762	1,353
	%	70%	70%	71%	71%

In regards to the primary school and the local centre, they both would be included in the early phases.

3.2 Traffic Forecast

In order to produce the traffic forecast for the early phases of the development, some assumptions have been made.

The forecast will represent a possible 'worst case' scenario; where all the development traffic would use the main access on the A4304 Lutterworth Road, and no traffic would use Gilmorton Road in order to travel to/from the development.

The forecast of the traffic associated with early phases of the development was based on the 2031 reference case. The reference case which was directly extracted from the LLITM as was reported in Strategic Transport assessment (STA, draft issue 4, February 2016).

The development traffic (from Table 3.2) was distributed at the main access junction to all the roads and junctions based on the LLITM modelled turning proportions. The development traffic was then added to the reference case flows.

Figure 3.1 shows the reference case traffic forecast. **Figure 3.2** shows the development traffic. **Figure 3.3** shows the final traffic forecast of the early phases development traffic added to the reference case.

Figure 3.1. 2031 Reference Case

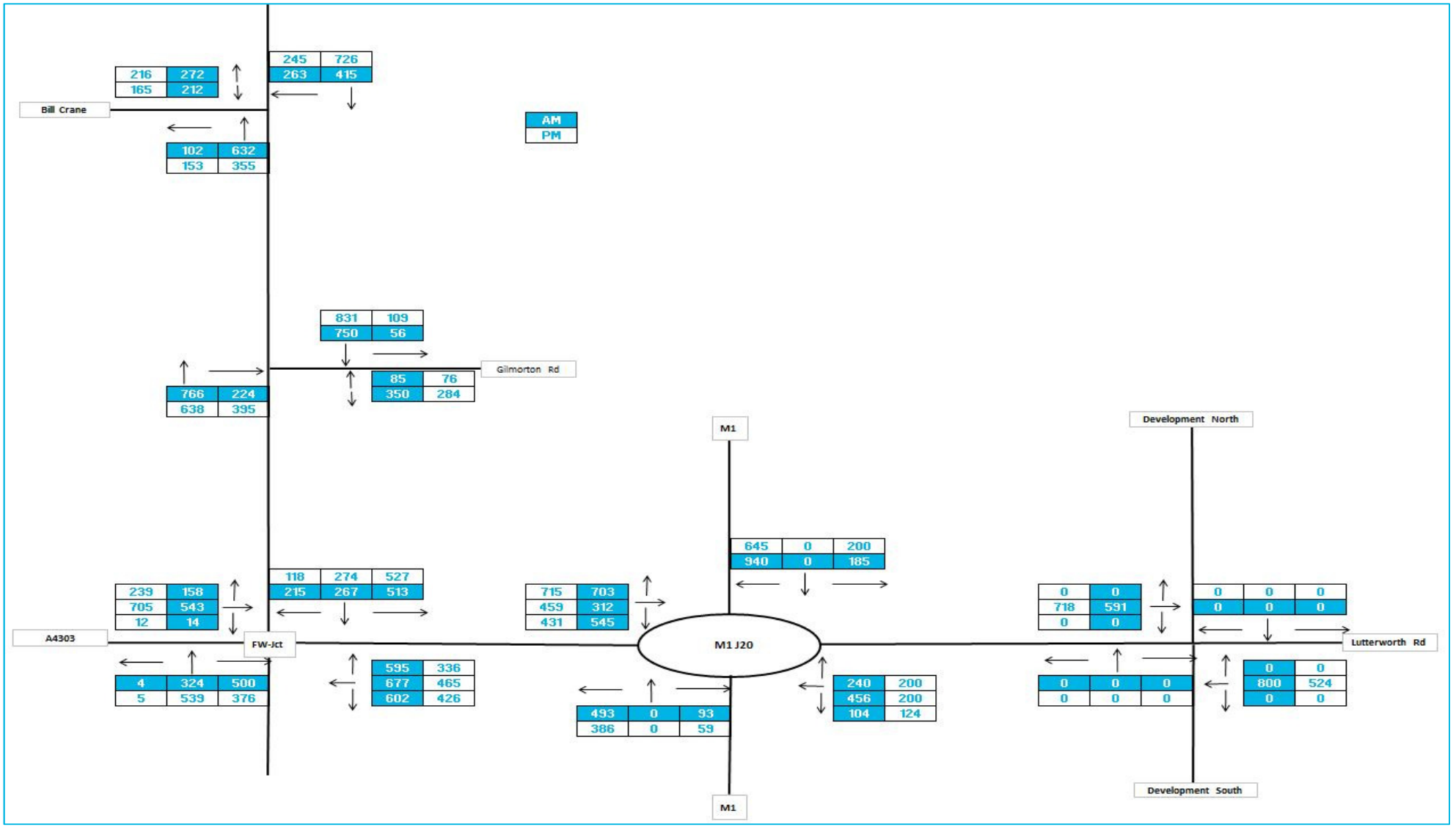


Figure 3.2 Development Traffic

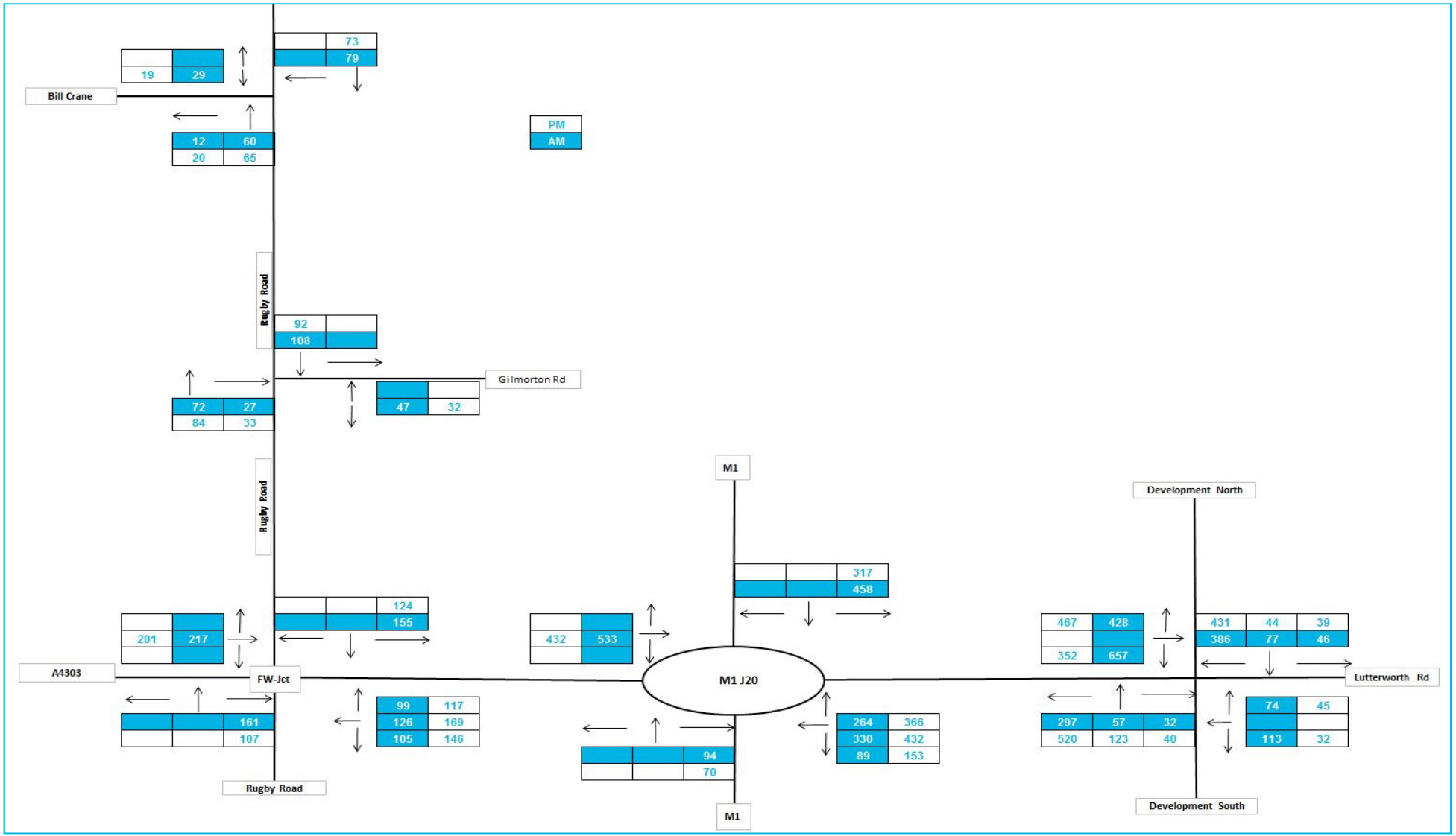
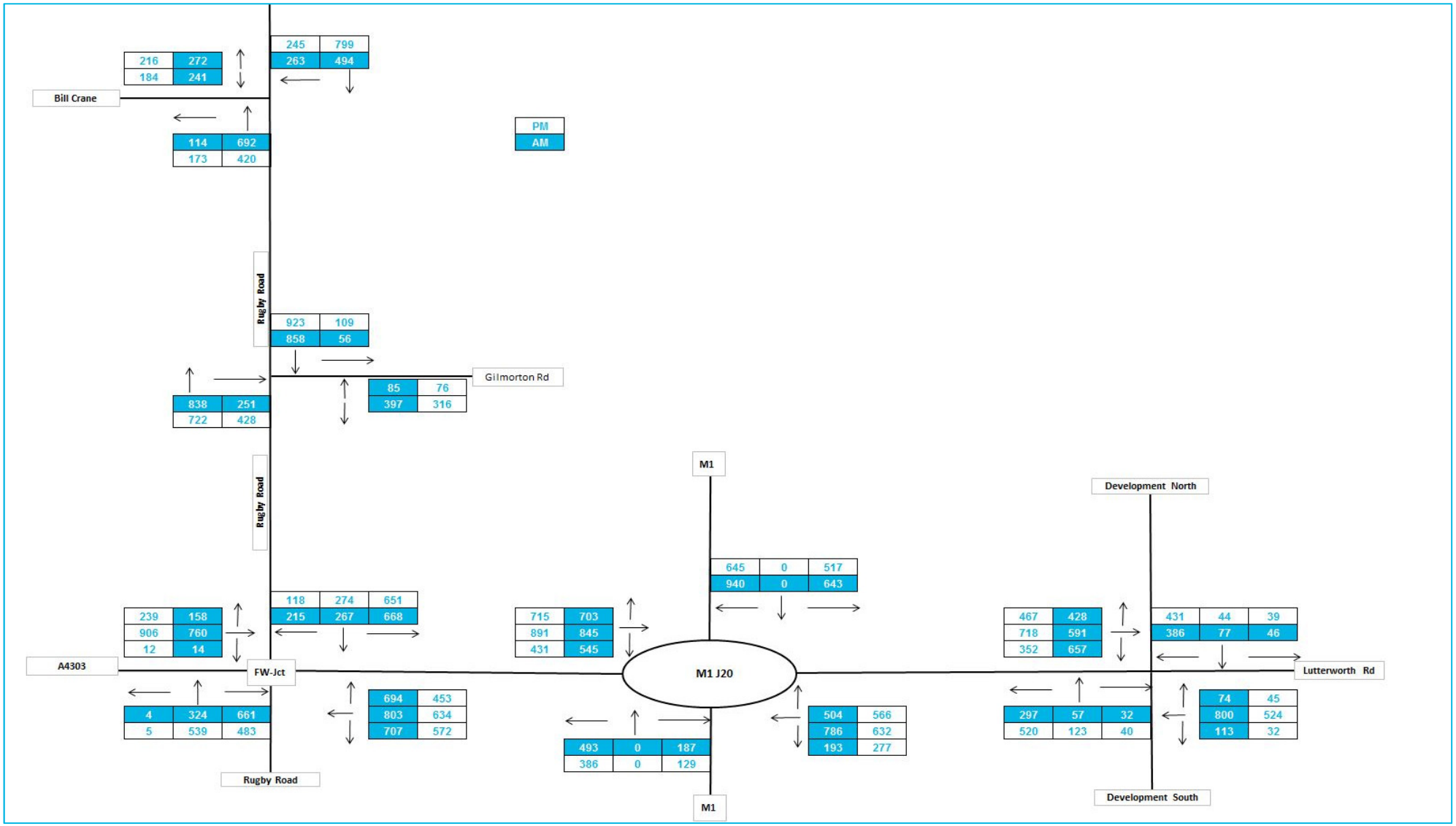


Figure 3.3 Early Phases Traffic Forecast



4. Operational Junction assessment

The aim of this section is to assess whether the traffic impact of the early development phases would require the road network mitigation previously reported to support full development. In order to carry out this assessment, an operational capacity analysis was undertaken for each of the following junctions:

- The main access junction on the A4304 Lutterworth Road;
- M1 Junction 20;
- Frank Whittle Junction;
- A426 Leicester Road /Gilmorton Road Junction; and
- A426 Leicester Road / Bill Crane Way Junction.

Tests were undertaken using the industry-standard software; ARCADY, PICADY, and LINSIG for roundabouts, priority junctions and signalised junctions respectively.

For Both ARCADY and PICADY the operational capacity results are expressed by:

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

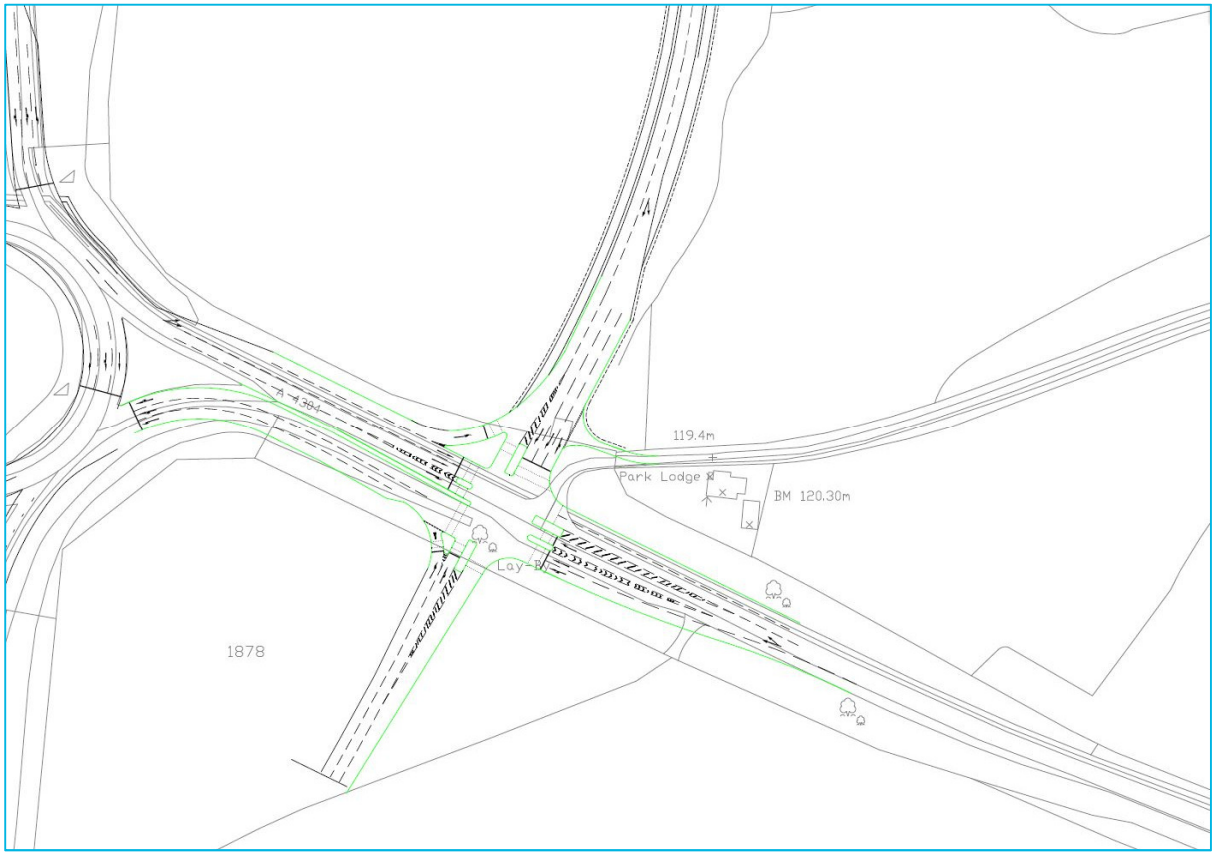
For the LINSIG, factors which will be assessed are:

- **DoS (Degree Of saturation):** recommended value of DoS is less than 90%, where values above 90% can lead to queues and delays.
- **Mean Max Queue (MMQ):** is the number of queued vehicles.
- **Practical Reserve Capacity (RFC):** positive values means a junction will have spare capacity, whereas negative values indicate queuing.

4.1 Main Access

The assessment of this junction was undertaken on the final junction layout; shown in **Figure 4.1.**

Figure 4.1. Main Access Layout



The results are shown in **Table 4.1**.

Table 4.1. Main Access LINSIG Results

	AM		PM	
ARM	**DOS %**	**MMQ**	**DOS %**	**MMQ**
Development North	88	8	66	6
A4304 East	91	17	54	7
Development South	54	3	71	5
A4304 West	90	21	69	10
PRC % (Junction)	-1.0 %		+ 27.4	

The results indicate that the junction would operate close to capacity in the AM peak hour, whereas it would operate well within its capacity in the PM hour.

4.2 M1 Junction 20

This junction was tested as its existing layout; a priority roundabout. The results are shown in **Table 4.2.**

Table 4.2. M1 Junction 20 ARCADY Results

	AM		PM	
ARM	RFC	Queue	RFC	Queue
M1 Southbound Off-Slip	0.996	27	0.701	2
Lutterworth Road East	1.435	278	1.203	147
M1 Northbound Off-Slip	0.478	1	0.334	1
Lutterworth Road West	1.199	209	1.191	194

Results indicate that the junction as a priority roundabout would operate over its capacity in both morning and evening hour. Lutterworth Road both west and eastbound would operate over their capacity.

4.3 Frank Whittle Junction

The junction was tested as priority roundabout. The results are shown in **Table 4.3**.

Table 4.3. Frank Whittle ARCADY Results

	AM		PM	
ARM	RFC	Queue	RFC	Queue
A4303 West	0.724	3	0.899	8
Rugby Road North	1.416	219	1.391	179
A4303 East	1.056	82	1.781	5
Rugby Road South	1.660	252	1.286	135

Results indicate the junction would operate over its capacity in both morning and evening peak hours.

4.4 A426 Leicester Road / Gilmorton Road Junction

This junction was tested as a priority T-junction as its existing layout. The results are shown in **Table 4.4**.

Table 4.4. A426 Leicester Road / Gilmorton Road PICADY Results

	AM		PM	
ARM	RFC	Queue	RFC	Queue
Gilmorton Rd – A426 North	3.327	142	**	-
Gilmorton Rd – A426 South	3.219	36	**	-
A426 South – Gilmorton Rd	0.732	3	1.264	30

Results indicate that the junction would operate over its capacity in both morning and evening peak hours. In the evening peak, the results showed that traffic on Gilmorton Road will be dominated by the A426 traffic, and therefore the capacity of this arm would drop so low and finding gaps would be very difficult.

4.5 A426 Leicester Road / Bill Crane Way Junction

This junction was tested as a 4-arms staggered priority junction with the arm associated with new development (Royal Housing Lutterworth) to the east of the junction. The results are shown in **Table 4.5.**

Table 4.5 A426 Leicester Road / Bill Crane Way Junction PICADY Results

	AM		PM	
ARM	RFC	Queue	RFC	Queue
Leicester Rd South	0.015	0	0.057	0
Bill Crane	2.627	100	1.660	230
Leicester Rod North	0.685	2	0.546	1
Royal Housing	1.6	1	0.097	0

The results indicate that the junction would operate over its capacity.

5. Summary and Key Findings

5.1 Summary

As was advised by LCC in regards to the land-use assumptions, the early phases of the development would include 1,290 dwelling, 14 hectares of employment, primary school, and the local centre.

The early phases of the development would represent around 52% of the total housing, 70% of total employment, 100% school and 100% local centre.

In terms of traffic generated by the early phases of the development, it would generate **67%** of the traffic generated by the full development.

For the traffic distribution, it was assumed that all the development traffic would use only the main access. No traffic would use Gilmorton Road to travel to/from Lutterworth, which represents a possible 'worst case' scenario.

5.2 Key Findings

The operational junction capacity assessment showed that all of the M1 Junction 20, Frank Whittle Junction, A426 / Gilmorton Rd junction and Bill Crane Way junction would need to be improved before the early phases are completed. The absence of the M1 bridge/northern access would increase the traffic on all these junctions.

Development above and beyond the early phases of the development would therefore require the M1 bridge and the new junction with the A426 Leicester Road. Without the northern access via the spine road over the M1, additional development would lead to queues and delays at the A4304 Lutterworth Road / Main access junction in the AM peak hour, which is forecast to operate around capacity with the early phases of the development, as shown in Table 4.1.

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APPENDIX B

Technical Note: Spine Road Design Considerations, October 2016

Lutterworth East Development

Technical Note: Spine Road Design Considerations

Leicestershire County Council

Project Number: 60472967

October 2016

Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position

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1. Introduction

Leicestershire County Council (LCC) appointed AECOM to assess how the proposed Lutterworth East Spine Road may be designed to take account of various 'competing' objectives including providing a relief road to A426 High Street in the centre of Lutterworth and acting as a district distributor road for the proposed new Lutterworth East development area. AECOM considered alternative design standards ranging from a 60mph national speed limit road to a 40/30mph road fully 'integrated' into the new development area at the other extreme, as well as various intermediate design standards. We have also considered whether a 20mph zone for the road section adjacent to the district centre may or may not be appropriate.

The various design standards for the route have been appraised against a wide range of criteria including impact on journey time, relief to traffic in Lutterworth town centre, safety, severance, complementary measures, impact on the Lutterworth East master plan, environment (air quality and noise), impact on public transport, community/place-making, etc.

This technical note sets out our evaluation of the alternatives and recommendations for next steps in the design process.

2. Potential to Provide a Relief Road Function

There has been some concern in recent times with regards to the volume of traffic using the A426 High Street, in particular heavy goods vehicles (HGVs), and their impact on the quality of life (e.g. air quality, noise, severance, etc.) within the town centre. We understand an area of Lutterworth town centre was declared an Air Quality Management Area in 2001.

In 2007, LCC appointed Scott Wilson (a legacy company of AECOM) to prepare a Lutterworth Traffic Study which reported in May 2008. In its introduction, the report stated:

"Analysis contained within the Local Transport Plan (LTP) indicates that the worst location for nitrogen dioxide (N02) pollution is at the location of Regent Court; and that little of this pollution can be attributed to car traffic. Rather, the LTP states that the main contributors to the N02 pollution are lorries (both articulated and non-articulated) and buses.

It is therefore considered within the LTP that the solution to this problem would either be less lorries, or less polluting lorry and bus fleets.

The LTP developed a series of strategies for addressing the air quality impacts noted within Lutterworth town centre. The most promising of these, in terms of impact on air quality and potential cost, were:

- the introduction of a 7.5T weight limit (by Traffic Regulation Order, TRO) to divert lorries from the A426 (through the town centre); and
- working with bus operators to reduce emissions.

The former of these two strategies would add to the number of HGVs using any alternative route that is selected. This report examines different options to accommodate such displaced HGV movements."

The report therefore identified options for removing HGVs from the town centre including a possible eastern relief road route (Option C in the report) which was broadly similar to the Spine Road now being proposed to serve the Lutterworth East development area. The Scott Wilson report showed that HGV volumes were greatest along the southern section of the A426 and if the majority were diverted to use an eastern relief road option, could lead to a decrease of approximately 6µg/m3 of NO2 in the town centre. The report also stated "However this option has not considered any air quality sensitive receptors located within a close proximity to the new alignment of Option C, although air pollutant concentrations at such receptors should remain within the respective air quality objective

values." Therefore, while the report showed potential benefits for the town centre, it did not and could not conclude what the impacts may be for developments along the relief road route.

The report indicated the highest 2-way HGV 12-hour volume on the A426 south of the town centre to be 1,453 vehicles. From an automatic number plate recognition (ANPR) survey, the report also estimated the 12-hour HGV through-traffic movements (i.e. vehicles without an original or destination in Lutterworth) to be 374 vehicles northbound and 320 vehicles southbound, and therefore totalling 694 vehicles.

Based on the Scott Wilson report, the Spine Road together with a 7.5 tonne weight limit could potentially help to reduce HGVs travelling through the town centre. However, it is not known what the impact would be on the Lutterworth East development area.

3. Potential Speed Limit by Section

Potential speed limits have been considered and assessed for the Spine Road. The Design Manual for Roads and Bridges (DMRB) shows several standards for Urban Roads as summarized in **Table 3.1**.

Table 3.1. DMRB Types of Urban Roads

Volume 5 Section 1 **Chapter 2**
Part 3 TA 79/99 Amendment No 1 **General Principles**

Feature	ROAD TYPE				
	Urban Motorway	Urban All-purpose			
	UM	UAP1	UAP2	UAP3	UAP4
General Description	Through route with grade separated junctions, hardshoulders or hardstrips, and motorway restrictions.	High standard single/dual carriageway road carrying predominantly through traffic with limited access.	Good standard single/dual carriageway road with frontage access and more than two side roads per km.	Variable standard road carrying mixed traffic with frontage access, side roads, bus stops and at-grade pedestrian crossings.	Busy high street carrying predominantly local traffic with frontage activity including loading and unloading.
Speed Limit	60mph or less	40 to 60 mph for dual, & generally 40mph for single carriageway	Generally 40 mph	30 mph to 40 mph	30mph
Side Roads	None	0 to 2 per km	more than 2 per km	more than 2 per km	more than 2 per km
Access to roadside development	None. Grade separated for major only.	limited access	access to residential properties	frontage access	unlimited access to houses, shops & businesses
Parking and loading	none	restricted	restricted	unrestricted	unrestricted
Pedestrian crossings	grade separated	mostly grade separated	some at-grade	some at-grade	frequent at-grade
Bus stops	none	in lay-bys	at kerbside	at kerbside	at kerbside

Table 1 Types of Urban roads and the features that distinguish them

In order to provide access to the new development areas, the Spine Road will likely have more than two side roads per kilometer for much of its length. Therefore the road types UAP2, UAP3 and UAP4 would generally apply with speed limits of between 30mph and 40mph. However, for completeness, we have assessed a wider range of potential speed limits, from 60mph down to 20mph.

The assessment has broadly taken account of:

- road type;
- journey time;
- accident severity;
- at-grade pedestrian crossings;
- severance;
- users (including pedestrians, cyclists, public transport, servicing and motor vehicles);
- nearby land uses; and
- environmental impacts (e.g. air quality and noise).

The assessment has been undertaken for different surrounding land uses including:

- residential;
- employment; and
- district centre.

The indicative results summarized in **Table 3.2** are subject to further more detailed assessment indicate a maximum speed limit of 60 mph would be inappropriate in all three land-use areas assessed. However a 30mph maximum speed may be most appropriate in the employment and residential areas of the development, with a 20mph speed limit imposed in the District Centre and school area.

The summary scores in **Table 3.2** indicate a degree of similarity between the 20-40 mph speed limits in all three land use areas, which were assessed as equal, with no weighting in favour of lower road speeds in any of the land use areas.

Table 3.2. Spine Road Speed Limit Summary Scoring By Land Use

Speed Limit	Employment	Housing	Local Centre & School
60 mph	41	28	3
40 mph	57	64	44
30 mph	**65**	**75**	71
20 mph	54	74	**76**

Appendix A provides further details of the scoring assessments by land use type.

4. Impact on Journey Times

The impacts of different speed limits by section for the Spine Road on overall journey times have been assessed.

For the assessment, we have estimated the journey time for:

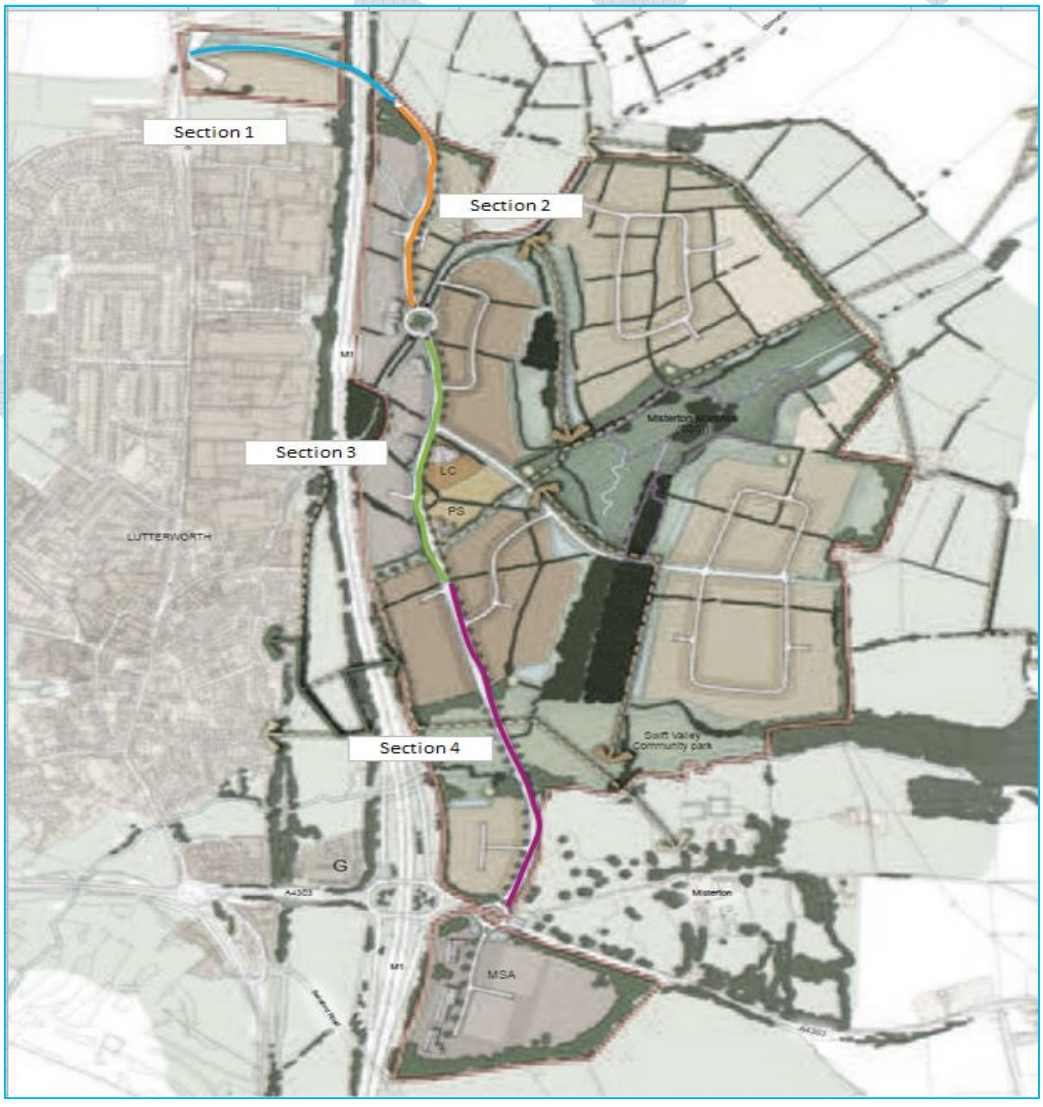
- the Spine Road route - from the northern junction of the Spine Road with A426 Leicester Road to M1 Junction 20 via the Spine Road and A4304 Lutterworth Road; and
- The A426 route - from the northern junction with the Spine Road to M1 Junction 20 via the town centre and A4303 Lutterworth Road.

The journey time via the Spine Road has been estimated from the point-to-point distance and potential speed limit by section of the route, assuming the potential slowest option of 30mph with 20mph in the section by the district centre. The actual speed has been estimated by applying the speed/flow curve relationships used in the LLITM for road with same characteristics so as not to over-estimate the speed.

Based on the initial master plan for the development, the assumption was made to split it for four sections, as shown in **Figure 4.1**.

Section 3 is the section where the local Centre and the primary school where a suggested 20mph zone was assumed.

Figure 4.1. Lutterworth East Spine Road Journey Time Sections



The journey time via the A426 and the town centre has been estimated from the Leicester & Leicestershire Integrated Transport Model, Google Maps journey planner and the TomTom journey planner.

A426 Peak jour journey times have been estimated by direction as an average for five working days (Mon-Fri) for the morning and evening peaks as summarized in **Table 4.1**.

Table 4.1. A426 Journey Times (Seconds)

Journey Time Data Source	Southbound		Northbound	
	AM	PM	AM	PM
Model	227	243	246	240
TomTom	264	264	264	264
Google	360	420	348	336

The A426 estimated Journey Time route is shown in **Figure 4.2.**

Figure 4.2. A426 Journey Time Route Through Lutterworth

The estimated times by the two routes is summarised in **Table 4.2**, assuming the slowest maximum speeds of 30mph in the employment and housing areas and 20mph in the local centre and school land use areas.

Table 4.2. Journey Time Comparison (mm:ss)

Journey Time Route	Southbound		Northbound	
	AM	PM	AM	PM
A426	06:00	07:00	05:48	05:35
Spine Road	04:25	04:20	04:16	04:19

The summary journey time comparison indicates that the potential slowest speed limit option of 30mph in the employment and housing land use areas and 20mph in the local centre and school land use areas, the Spine Road would still offer a slightly reduced overall journey time when compared with the existing A426 route via the town Centre.

5. Further Design Considerations

Determining the role, function and design of the Spine Road will require further assessment and consideration. Many aspects of design will need to be considered and could include:

- how the road can be incorporated into the design of the master plan area;
- how the buildings and public spaces relate to the road;
- where and how to provide pedestrian crossings;
- where and how to incorporate facilities for cyclists;
- the locations of bus stops;
- whether or not to provide for on-street parking and loading bays for servicing in the local centre;
- design of major and minor junctions; and
- Environmental impact (i.e. air quality and noise).

Such further design considerations will therefore require the inputs of:

- architects;
- environmental specialists;
- town planners;
- traffic/highway engineers;
- transport planners; and
- Urban designers.

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6. Summary

The Spine Road could provide an alternative route for traffic travelling to/from M1 Junction 20.

It has been demonstrated that irrespective of the design standard/speed limit the route would provide a quicker alternative to travel via the A426 through Lutterworth town centre.

The Spine Road could help to relieve the volume of HGVs through the town centre, thereby improving noise and air quality. In order to encourage use of the Spine Road, a 7.5 tonne weight limit may be needed for a section of A426 in Lutterworth town centre.

The role, function and design of the route will require a multi-disciplinary assessment of options in order to satisfy the 'competing' objectives for the route.

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Appendix A Assessment Scores

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Employment Land Use

Speed Limit	Road Type: UM	UAP1	UAP2	UAP3	UAP4	1-lane	2-lanes	Sub-Total	Journey Time	Accident Severity	At-grade Ped Crossing	Severance	Sub-Total	User Heirarchy: Ped.	Cycle	PT	Servicing	MV	Sub-Total	Appropriate to Proposed Location Context: School	Residential	Local Centre	Employment	Sub-Total	Frontage Development	Frontage Access	On-Street parking	Bus Stops	On-Street Cycle Lanes	Segregated Cycle Lanes	On-street servicing access	High-Density Street Grid	Low-Density Street Grid	Movement Function	Place Function	Sub-Total	NMU Environment	Noise	Air Quality	Sub-Total	TOTAL
60mph	0	5	2	0	0	1	0	**8**	5	1	0	1	**7**	1	1	1	2	5	**10**	0	0	0	1	**1**	0	0	0	0	0	1	0	0	1	5	1	**8**	1	3	3	**7**	**41**
40mph	0	3	4	4	4	1	0	**16**	3	2	0	2	**7**	3	2	2	3	4	**14**	0	0	0	1	**1**	2	1	0	1	0	1	0	0	1	3	3	**12**	3	2	2	**7**	**57**
30mph	0	0	4	5	3	1	0	**13**	2	4	1	3	**10**	5	4	3	4	3	**19**	0	0	0	1	**1**	3	1	1	1	1	0	1	1	0	2	3	**14**	4	2	2	**8**	**65**
20mph	0	0	1	3	1	1	0	**6**	1	5	1	4	**11**	5	5	3	2	1	**16**	0	0	0	0	**0**	3	1	1	1	1	0	1	1	0	1	4	**14**	5	1	1	**7**	**54**
Spine Road Scoring																																									
Not possible	0	0	0	0	0	0	0		0	0	0	0		0	0	0	0	0		0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0		
Low	1	1	1	1	1	Yes = 1	Yes = 1		5	5	Yes = 1	5		1	1	1	1	1		Yes = 1	Yes = 1	Yes = 1	Yes = 1		1	Yes = 1	Yes = 1	Yes = 1	Yes = 1		0	0	0	0	0		1	5	5		
High	5	5	5	5	5	No = 0	No = 0		1	1	No = 0	1		5	5	5	5	5		No = 0	No = 0	No = 0	No = 0		5	No = 0	No = 0	No = 0	No = 0		0	0	0	0	0		5	1	1		

(Taken from TA79/99)

(Taken from Manual for Streets)

Strategic Route - high movement function, low place function	5	1
High Street - medium movement function, medium to high place function	3	3
Residential streets – low to medium movement function, low to medium place function.	1	5

(Taken from Manual for Streets)

Feature	ROAD TYPE				
	Urban Motorway	**Urban All-purpose**			
	UM	**UAP1**	**UAP2**	**UAP3**	**UAP4**
General Description	Through route with grade separated junctions, hardshoulders or hardstrips, and motorway restrictions.	High standard single/dual carriageway road carrying predominantly through traffic with limited access.	Good standard single/dual carriageway road with frontage access and more than two side roads per km.	Variable standard road carrying mixed traffic with frontage access, side roads, bus stops and at-grade pedestrian crossings.	Busy high street carrying predominantly local traffic with frontage activity including loading and unloading.
Speed Limit	60mph or less	40 to 60 mph for dual, & generally 40mph for single carriageway	Generally 40 mph	30 mph to 40 mph	30mph
Side Roads	None	0 to 2 per km	more than 2 per km	more than 2 per km	more than 2 per km
Access to roadside development	None. Grade separated for major only.	limited access	access to residential properties	frontage access	unlimited access to houses, shops & businesses
Parking and loading	none	restricted	restricted	unrestricted	unrestricted
Pedestrian crossings	grade separated	mostly grade separated	some at-grade	some at-grade	frequent at-grade
Bus stops	none	in lay-bys	at kerbside	at kerbside	at kerbside

Table 1 Types of Urban roads and the features that distinguish them

		Two-way Single Carriageway - Busiest direction flow (Assumes a 60/40 directional split)									**Dual Carriageway**			
		Total number of Lanes									Number of Lanes in each direction			
		2				2-3	3	3-4	4	4+	2		3	4
Carriageway width		6.1m	6.75m	7.3m	9.0m	10.0m	12.3m	13.5m	14.6m	18.0m	6.75m	7.3m	11.0m	14.6m
Road type	**UM**	**Not applicable**										4000	5600	7200
	UAP1	1020	1320	1590	1860	2010	2550	2800	3050	3300	3350	3600	5200	*
	UAP2	1020	1260	1470	1550	1650	1700	1900	2100	2700	2950	3200	4800	*
	UAP3	900	1110	1300	1530	1620	*	*	*	*	2300	2600	3300	*
	UAP4	750	900	1140	1320	1410	*	*	*	*	*	*	*	*

Table 2 Capacities of Urban Roads
One-way hourly flows in each direction

Notes
1. Capacities are in vehicles per hour.
2. HGV ≤ 15%
3. (*) Capacities are excluded where the road width is not appropriate for the road type and where there are too few examples to give reliable figures.

Housing Land Use

Speed Limit	Road Type: UM	UAP1	UAP2	UAP3	UAP4	1-lane	2-lanes	**Sub-Total**	Journey Time	Accident Severity	At-grade Ped Crossing	Severance	**Sub-Total**	Ped.	Cycle	User Heirarchy: PT	Servicing	MV	**Sub-Total**	Appropriate to Proposed Location Context: School	Residential	Local Centre	Employment	**Sub-Total**	Frontage Development	Frontage Access	On-Street parking	Bus Stops	On-Street Cycle Lanes	Segregated Cycle Lanes	On-street servicing access	High-Density Street Grid	Low-Density Street Grid	Movement Function	Place Function	**Sub-Total**	NMU Environment	Noise	Air Quality	**Sub-Total**	**TOTAL**
60mph	0	1	0	0	0	1	0	**2**	5	1	0	1	**7**	0	0	1	2	5	**8**	0	1	0	0	**1**	0	0	0	0	0	1	0	1	5	1	**8**	0	1	1	**2**	**28**
40mph	0	3	4	4	1	1	0	**13**	3	3	1	3	**10**	4	3	3	3	4	**17**	0	1	0	0	**1**	3	1	1	1	0	1	1	0	3	2	**14**	3	3	3	**9**	**64**
30mph	0	1	3	5	5	1	0	**15**	2	4	1	4	**11**	5	4	4	4	3	**20**	0	1	0	0	**1**	4	1	1	1	1	0	1	1	0	2	4	**16**	4	4	4	**12**	**75**
20mph	0	0	1	2	4	1	0	**8**	1	5	1	5	**12**	5	5	5	5	1	**21**	0	1	0	0	**1**	5	1	1	1	1	0	1	1	0	1	5	**17**	5	5	5	**15**	**74**
Spine Road Scoring																																								
Not possible	0	0	0	0	0	0	0		0	0	0	0		0	0	0	0	0		0	0	0	0		0	0	0	0	0			0	0	0	0		0	0	0		
Low	1	1	1	1	1	Yes = 1	Yes = 1		5	5	Yes = 1	5		1	1	1	1	1		Yes = 1	Yes = 1	Yes = 1	Yes = 1		1	Yes = 1	Yes = 1	Yes = 1	Yes = 1	Yes = 1		Yes = 1	Yes = 1	Yes = 1			1	5	5		
High	5	5	5	5	5	No = 0	No = 0		1	1	No = 0	1		5	5	5	5	5		No = 0	No = 0	No = 0	No = 0		5	No = 0	No = 0	No = 0	No = 0	No = 0		No = 0	No = 0	No = 0			5	1	1		

(Taken from TA79/99) (Taken from Manual for Streets)

Strategic Route - high movement function, low place function	5	1
High Street - medium movement function, medium to high place function	3	3
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	UM	UAP1	UAP2	UAP3	UAP4
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Table 1 Types of Urban roads and the features that distinguish them

		Two-way Single Carriageway- Busiest direction flow (Assumes a 60/40 directional split)									Dual Carriageway			
		Total number of Lanes									Number of Lanes in each direction			
		2				2-3	3	3-4	4	4+	2		3	4
Carriageway width		6.1m	6.75m	7.3m	9.0m	10.0m	12.3m	13.5m	14.6m	18.0m	6.75m	7.3m	11.0m	14.6m
Road type	**UM**	**Not applicable**										4000	5600	7200
	UAP1	1020	1320	1590	1860	2010	2550	2800	3050	3300	3350	3600	5200	*
	UAP2	1020	1260	1470	1550	1650	1700	1900	2100	2700	2950	3200	4800	*
	UAP3	900	1110	1300	1530	1620	*	*	*	*	2300	2600	3300	*
	UAP4	750	900	1140	1320	1410	*	*	*	*	*	*	*	*

Table 2 Capacities of Urban Roads
One-way hourly flows in each direction

Notes
1. Capacities are in vehicles per hour.
2. HGV ≤ 15%
3. (*) Capacities are excluded where the road width is not appropriate for the road type and where there are too few examples to give reliable figures.

Local Centre & School Land uses

Speed Limit	Road Type: UM	UAP1	UAP2	UAP3	UAP4	1-lane	2-lanes	**Sub-Total**	Journey Time	Accident Severity	At-grade Ped Crossing	Severance	**Sub-Total**	User Heirarchy: Ped.	Cycle	PT	Servicing	MV	**Sub-Total**	Appropriate to Proposed Location Context: School	Residential	Local Centre	Employment	**Sub-Total**	Frontage Development	Frontage Access	On-Street parking	Bus Stops	On-Street Cycle Lanes	Segregated Cycle Lanes	On-street servicing access	High-Density Street Grid	Low-Density Street Grid	Movement Function	Place Function	**Sub-Total**	NMU Environment	Noise	Air Quality	**Sub-Total**	**TOTAL**
60mph	0	0	0	0	0	1	0	**1**	0	1	0	1	**2**	0	0	0	0	0	**0**	0	0	0	0	**0**	0	0	0	0	0	0	0	0	0	0	**0**	0	0	0	**0**	**3**
40mph	0	0	1	2	3	1	0	**7**	4	3	1	3	**11**	1	2	3	2	4	**12**	0	0	0	0	**0**	3	0	0	0	0	0	0	0	2	2	**7**	1	3	3	**7**	**44**
30mph	0	0	2	4	5	1	0	**12**	3	4	1	4	**12**	2	4	4	4	3	**17**	0	0	1	0	**1**	4	1	1	1	1	0	1	0	3	4	**17**	4	4	4	**12**	**71**
20mph	0	0	0	3	5	1	0	**9**	1	5	1	5	**12**	5	5	5	5	1	**21**	0	0	1	0	**1**	5	1	1	1	1	0	1	0	3	4	**18**	5	5	5	**15**	**76**
Spine Road Scoring																																								
Not possible	0	0	0	0	0	0	0		0	0	0	0		0	0	0	0	0		0	0	0	0		0	0	0	0	0		0	0	0	0		0	0	0		
Low	1	1	1	1	1	Yes = 1	Yes = 1		5	5	Yes = 1	5		1	1	1	1	1		Yes = 1	Yes = 1	Yes = 1	Yes = 1		1	Yes = 1	Yes = 1	Yes = 1	Yes = 1		Yes = 1	Yes = 1	Yes = 1	1	1		1	5	5		
High	5	5	5	5	5	No = 0	No = 0		1	1	No = 0	1		5	5	5	5	5		No = 0	No = 0	No = 0	No = 0		5	No = 0	No = 0	No = 0	No = 0		No = 0	No = 0	No = 0	5	5		5	1	1		

(Taken from TA79/99)

(Taken from Manual for Streets)

Strategic Route - high movement function, low place function	5 / 1
High Street - medium movement function, medium to high place function	3 / 3
Residential streets – low to medium movement function, low to medium place function.	1 / 5

(Taken from Manual for Streets)

Feature	ROAD TYPE				
	Urban Motorway	**Urban All-purpose**			
	UM	**UAP1**	**UAP2**	**UAP3**	**UAP4**
General Description	Through route with grade separated junctions, hardshoulders or hardstrips, and motorway restrictions.	High standard single/dual carriageway road carrying predominantly through traffic with limited access.	Good standard single/dual carriageway road with frontage access and more than two side roads per km.	Variable standard road carrying mixed traffic with frontage access, side roads, bus stops and at-grade pedestrian crossings.	Busy high street carrying predominantly local traffic with frontage activity including loading and unloading.
Speed Limit	60mph or less	40 to 60 mph for dual, & generally 40mph for single carriageway	Generally 40 mph	30 mph to 40 mph	30mph
Side Roads	None	0 to 2 per km	more than 2 per km	more than 2 per km	more than 2 per km
Access to roadside development	None. Grade separated for major only.	limited access	access to residential properties	frontage access	unlimited access to houses, shops & businesses
Parking and loading	none	restricted	restricted	unrestricted	unrestricted
Pedestrian crossings	grade separated	mostly grade separated	some at-grade	some at-grade	frequent at-grade
Bus stops	none	in lay-bys	at kerbside	at kerbside	at kerbside

Table 1 Types of Urban roads and the features that distinguish them

		Two-way Single Carriageway- Busiest direction flow (Assumes a 60/40 directional split)									**Dual Carriageway**			
		Total number of Lanes									Number of Lanes in each direction			
		2				2-3	3	3-4	4	4+	2		3	4
Carriageway width		6.1m	6.75m	7.3m	9.0m	10.0m	12.3m	13.5m	14.6m	18.0m	6.75m	7.3m	11.0m	14.6m
Road type	**UM**	**Not applicable**										4000	5600	7200
	UAP1	1020	1320	1590	1860	2010	2550	2800	3050	3300	3350	3600	5200	*
	UAP2	1020	1260	1470	1550	1650	1700	1900	2100	2700	2950	3200	4800	*
	UAP3	900	1110	1300	1530	1620	*	*	*	*	2300	2600	3300	*
	UAP4	750	900	1140	1320	1410	*	*	*	*	*	*	*	*

Table 2 Capacities of Urban Roads
One-way hourly flows in each direction

Notes
1. Capacities are in vehicles per hour.
2. **HGV** ≤ 15%
3. (*) Capacities are excluded where the road width is not appropriate for the road type and where there are too few examples to give reliable figures.

	Road Type			Safety			User Heirarchy		
Speed Limit	**Employment**	**Housing**	**Local Centre + School**	**Employment**	**Housing**	**Local Centre + School**	**Employment**	**Housing**	**Local Centre + School**
60mph	8	2	1	7	7	2	10	8	0
40mph	16	13	7	7	10	11	14	17	12
30mph	13	15	12	10	11	12	19	20	17
20mph	6	8	9	11	12	12	16	21	21

	Appropriate to Proposed Location Context			Development Environment			Environmental			TOTAL SCORE		
Speed Limit	**Employment**	**Housing**	**Local Centre + School**	**Employment**	**Housing**	**Local Centre + School**	**Employment**	**Housing**	**Local Centre + School**	**Employment**	**Housing**	**Local Centre + School**
60mph	1	1	0	8	8	0	7	2	0	41	28	3
40mph	1	1	0	12	14	7	7	9	7	57	64	44
30mph	1	1	1	14	16	17	8	12	12	**65**	**75**	71
20mph	0	1	1	14	17	18	7	15	15	54	74	**76**

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