PHASE 2 – DETAILED SITE ALLOCATION STRATEGY ANALYSIS

Objectives

- To refine the existing Rugby Wide Area (RWA) Paramics model to reflect the latest housing trajectory figures through a series of 'focussed' options:
  - **Option 1A –** Key Local Housing Assumptions
  - **Option 1B –** Option 01A plus delivery of 974 dwellings in the Area of Ashlawn Road Rugby
  - **Option 2 North** – Option 01A or 01B plus approximately 2000 dwellings allocated to the North of Rugby
  - **Option 2 Southwest -** Option 01A or 01B plus approximately 3400 dwellings allocated to the Southwest of Rugby
  - **Option 2 Southeast** - Option 01A or 01B plus approximately 3900 dwellings allocated to the Southeast of Rugby.

Rugby 2031 Reference Case

- Original model updated in October 2014.
- Model assumed 5,000 dwellings at Rugby Radio Mast (RRM) and 1,300 dwellings at Rugby Gateway.
- The original model had been capped around NTEM adjusted TEMPRO levels (circa 30%).
- The update was intended to:
  - Ensure DIRFT III is accounted for as a commitment
  - Revise RRM and Gateway housing numbers to reflect updated trajectory.
  - To revise TEMPRO growth forecasts to take greater cognisance of updated housing numbers.

Forecasting Adjustments

- Adjustments to internal growth only. External growth retained as per original model scenarios.
- Adjustment calculations excluded DIRFT III
- Original 2009 to 2031 TEMPRO forecast assumes 12588 houses for the period.
- Housing numbers identified through housing trajectory:
  - 2009 to 2010 = 412 dwellings
  - 2010 to 2026 = 3388 dwellings
  - Core strategy housing numbers = 5879 (1129 Gateway & 4,750 RRM)
  - New Housing Options = 1230 to 6065 dwellings
  - Total initial housing = **10909 to 15744**
- Additional housing forecasts up to 15744 dwellings (25% increase on TEMPRO forecasts).
- TEMPRO adjusted by a factor calculated by comparing TEMPRO assumed housing numbers with total housing being assessed.

Development Assumptions

Housing & Employment Assumptions

	SITE	Dwelling Cap	Stage 1		Stage 2		
			A	B	North	South West	South East
Allocations (Residential)	L/B Cawston Lane & Alwyn Rd (within SWBL) Cawston S14/102 & S14/116*	1250	125	125	125	1250	125
	Cherry Tree Farm, Dunkleys Farm & Homestead Farm S14/117	223				223	
	Cosford, Rugby S14/66 **	0					
	Coton Park East S14/34	855	855	855	855	855	855
	Cawston Spinney****	2660	250	250	250	2285	250
	Waldens Farm, Rugby S14/046	914					914
	Moat Farm, Rugby S14/098	500					500
	Ashlawn Road, Rugby S14/068	974		974	974	974	974
	Rugby Riding Club, S14/143	578					578
	Florin Place, Rugby, S14/041	138					138
	Moat Farm S14/135	707					707
	Hillmorton Triangle, S14/026 & Kilsby Lane, Hillmorton, S14/042	316					316
	Moat Farm, S14/134	708					708
	Coton House S14/74 (inc S14/79) ***	2024			2024		
	Total Dwellings		**1230**	**2204**	**4228**	**5587**	**6065**
Employment	Coton Park	-	7.5Ha	7.5Ha	15.3Ha	7.5Ha	7.5Ha
	Cawston Spinney	-				27.9Ha	

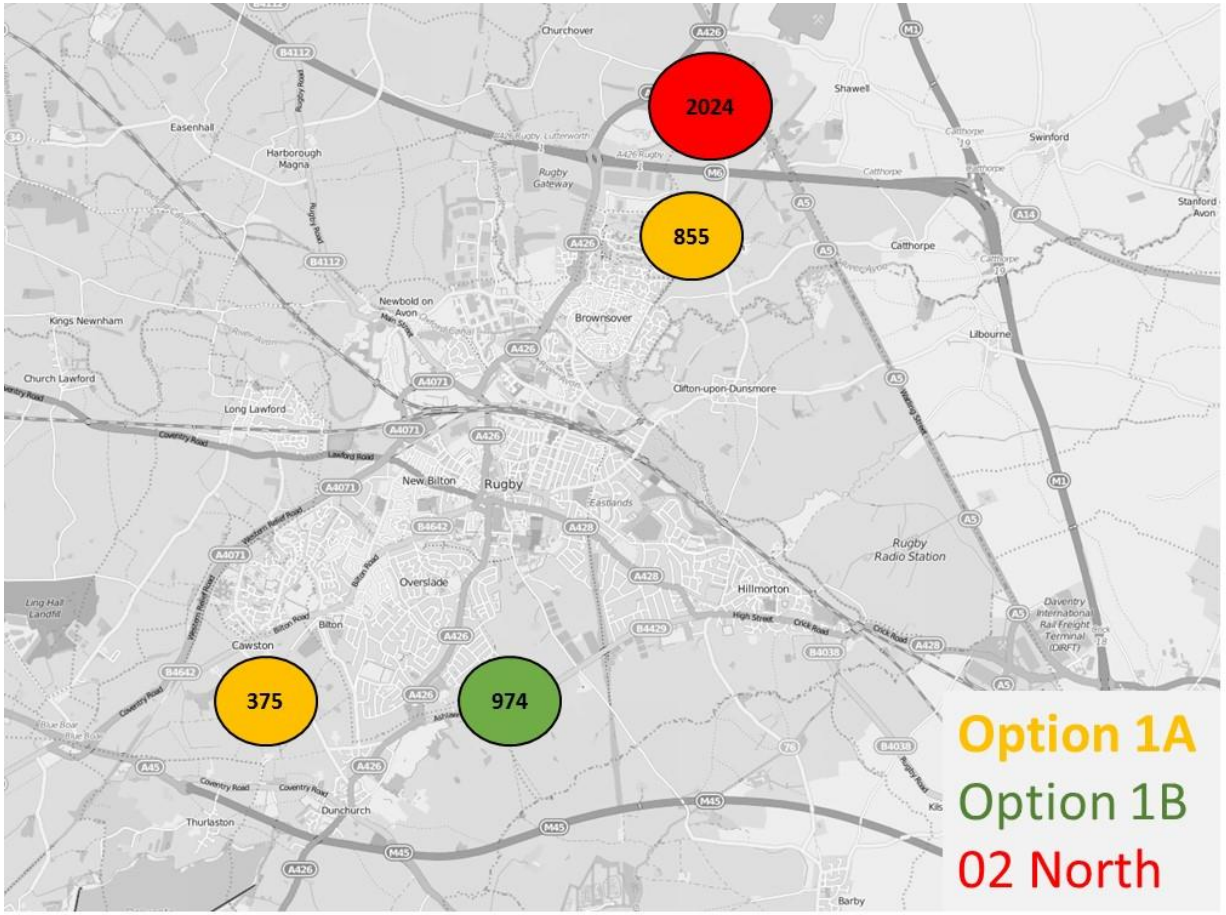
Forecasting Adjustments

Demand & Forecast Adjustments

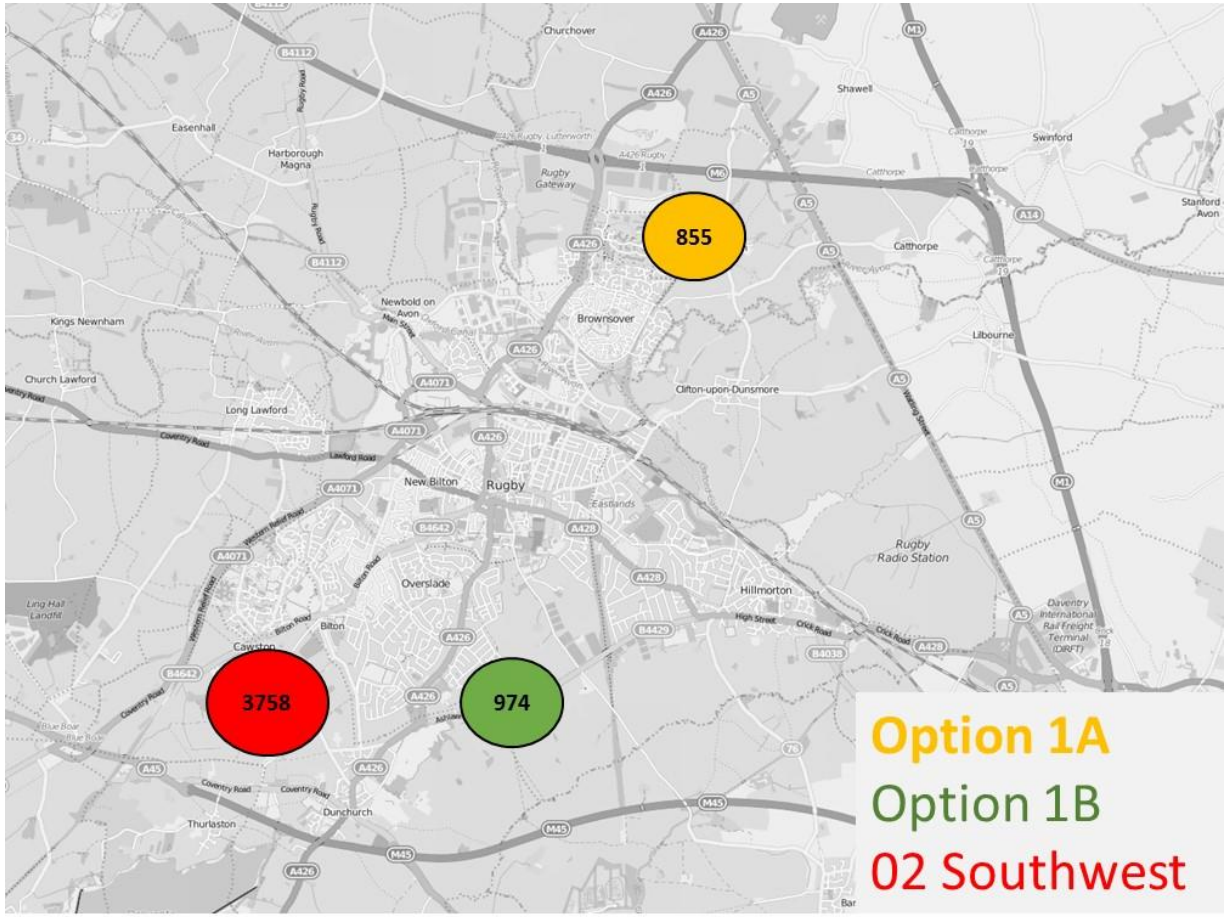
	Data/Source	Stage 1				Stage 2					
		Option 01A		Option 01B		Option 2 North		Option 2 Southwest		Option 2 Southeast	
Housing Numbers	TEMPRO	12588.8		12588.8		12588.8		12588.8		12588.8	
	2009 to 2010	412		412		412		412		412	
	2010 to 2026	3388		3388		3388		3388		3388	
	CS Housing Numbers	5879		5879		5879		5879		5879	
	Development Housing	1230		2204		4228		5587		6065	
	TOTAL	10909		11883		13907		15266		15744	
TEMPRO Adjusted Factors	Adjustment	0.8666		0.9439		1.1047		1.2127		1.2506	
	AM Revised	1.1504		1.1638		1.1917		1.2105		1.2170	
	PM Revised	1.1678		1.1828		1.2139		1.2348		1.2422	
Demand	Period	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
	Background	80117	93368	79786	93130	78701	92291	78437	92139	78472	92185
	HGV	12262	9973	12262	9973	12262	9973	12262	9973	12262	9973
	Com Dev	10026	11176	9984	11148	9848	11047	9815	11029	9820	11035
	Growth	7388	8061	7388	8061	7388	8061	7388	8061	7388	8061
	Core Strategy	9471	11647	9432	11617	9304	11512	9273	11493	9277	11499
	DIRFT III	2249	2736	2249	2736	2249	2736	2249	2736	2249	2736
	Development	1966	2105	3147	3446	6095	6660	7498	8307	7832	8763
	Total	123478	139066	124248	140111	125847	142281	126921	143739	127299	144251
	2009	102367	113944	102367	113944	102367	113944	102367	113944	102367	113944
Growth		**20.62%**	**22.05%**	**21.37%**	**22.96%**	**22.94%**	**24.87%**	**23.99%**	**26.15%**	**24.35%**	**26.60%**

Development Allocations 01A & 01B

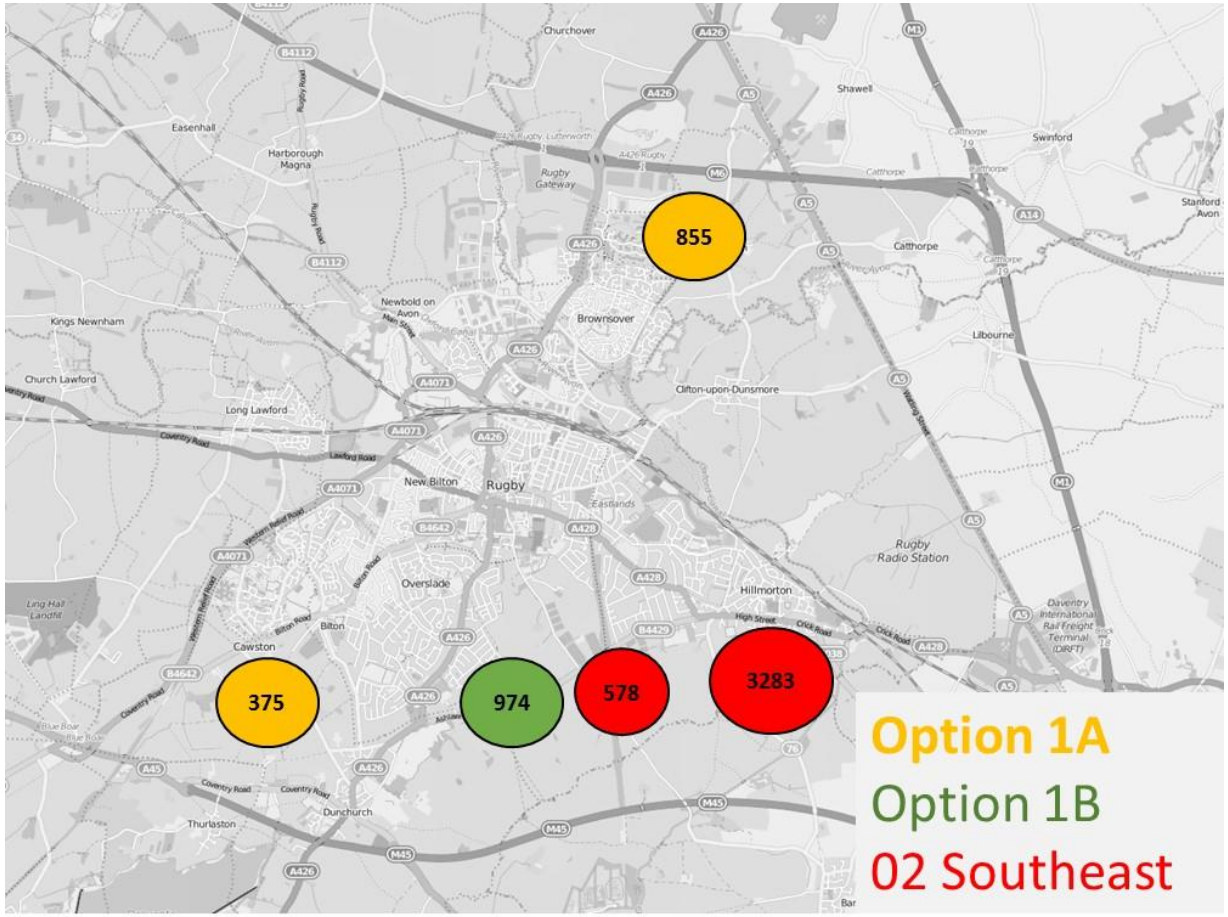
Development Allocations 02 North



Development Allocations 02 Southwest



Development Allocations 02 Southeast



Methodology

- **Stage 1 Assessment of Localised Options:**

Scenarios

- **Option 1A –** Assessment of sites with high chance of deliverability in the short term
- **Option 1B –** Assessment of the impact of delivering 974 houses in the Ahslawn Road area on the findings from Option 01A
- **Dunchurch Sensitivity Test –** A review of the impacts of the 974 dwellings on the Dunchurch area using the bespoke cordon model of that area.

Objectives

- To ascertain the likely strategic impacts of allocation either Option 01A or 01B housing numbers
- To determine whether there are any 'essential' mitigation measures necessary to deliver the housing numbers identified in Option 01A & 01B
- To assess, in detail, the likely impacts on the Dunchurch crossroads, specifically regarding Option 01B, and to identify what, if any, mitigation strategy may be appropriate in the long term for that area.
- To identify the appropriate housing assumptions (option 01A or Option 01B) to be taken forward as baseline assumptions for consideration within the Broad Allocation assessment completed as part of Stage 2 of the methodology.

Methodology cont….

- **Stage 2 Assessment of Board Locations:**

Scenarios

- **Option 2 North** – Option 01A or 01B plus approximately 2000 dwellings allocated to the North of Rugby
- **Option 2 Southwest** - Option 01A or 01B plus approximately 3400 dwellings allocated to the Southwest of Rugby
- **Option 2 Southeast** - Option 01A or 01B plus approximately 3900 dwellings allocated to the Southeast of Rugby.

Tests

- **Do Nothing –** The housing plus access strategies only
- **Do Minimum –** Do Nothing plus proximate mitigation
- **Do Something –** Do Minimum plus major infrastructure where applicable

Methodology cont….

- **Stage 2 Assessment of Broad Locations (cont):**

Objectives

- To ascertain the respective impacts of each of the allocation options
- To determine the likely effectiveness of the localised, proximate, mitigation strategy in accommodating the development proposals
- To identify the benefits of delivering broader access strategy and mitigation measures such as those identified in the assessment of the Rugby Southern Relief Road
- To determine whether there are any options which, at this stage, can be ruled out on transport impact grounds
- To inform the assumptions pertaining to the likely mitigation strategy, at the strategic level, which will be needed to accompany one or more of the allocation options should they be adopted.

Mitigation Assumptions

- Up to 16 schemes have been identified within the initial analysis work, these have been reviewed by WCC and, although there are risks associated with some of the schemes, non of the schemes have been identified as undeliverable.
- Mitigation measures were not included within the Option 01A & 01B networks but it is likely that some of the measures will be required in these scenarios also. Furthermore, separate analysis of the performance of the Dunchurch Crossroads junction has revealed that a signal optimisation strategy, such as MOVA, will be essential for that junction should the 974 dwellings at Ashlawn Road be allocated.
- Throughout the course of the analysis there are also a number of additional schemes that have been identified as likely to be required to accommodate the trips associated with one or more of the development allocation strategies. These measures have not been included within this assessment but should be considered at a future stage should any one of the options be taken forward for further consideration.

Mitigation Overview

- 16 original interventions identified within the original model network.

Scheme	Description
Dunchurch Signposting	Sign posting of traffic away from Dunchurch via the southern distributor link
Ashlawn Road	Sign posting of traffic away from Ashlawn Road/Hillmorton Road via southern distributor link
Hillmorton Road Ped crossing	Pedestrian crossing on hillmorton road (w of Barby Road) set to sync with new Gyratory crossing to the west of existing crossing
Leisure Centre Access	Opening up of southern link into Leisure Centre
Potford Dam roundabout	Widening of roundabout approaches and between the existing roundbaout and southern distributor link
B4429/Onley Lane/Barby Road widening	Junction widening and introduction of right turn bays on all approaches
Barby Lane/Ashlawn Road Roundabout	Reconfiguration of junction to roundabout configuration
M6 to Coton House	Dualling between M6 J2 and new development access

Mitigation Overview

Scheme	Description
M6 J2	Signal optimisation and re-lining to enable vehicles to travel NB using two lanes
Rugby gyratory	De-activation of queue detector on Corporation street & optimisation of signal times on a scenario specific basis
Clifton Road/Lower Hill Morton	Part signalisation of roundabout
Whitehall Road Pedestrian crossing	Introduction of pedestrian crossing on Whitehall Road to 'gate' traffic in response to queueing on Hillmorton Road WB
Butlers Leap/Clifton Road	Optimisation of signal proposals
A426/Brownsover roundabout	Widening to three lanes south and north of roundabout to increase NB vehicle throughput
A5/A428 'Half-way house' roundabout	Part-signalisation of the roundabout
Dunchurch Road/Sainsburys Roundabout	Widening of all approaches to roundabout to increase throughput

1	Dunchurch Signposting
2	Ashlawn Road signpostin
3	Hillmorton Road Ped crossing
4	Leisure Centre Access
5	Potford Dam roundabout
6	B4429/Onley Lane/Barby Road widening
7	Barby Lane/Ashlawn Road Roundabout
8	M6 to Coton House
9	M6 J2
10	Rugby gyratory
11	Clifton Road/Lower Hill Morton
12	Whitehall Road Pedestrian crossing
13	Butlers Leap/Clifton Road
14	A426/Brownsover roundabout
15	A5/A428 'Half-way house' roundabout
16	Dunchurch Road/Sainsburys Roundabout

Development Do Nothing

- Northern Access Strategy

Secondary access via priority junction with A426

Primary access via roundabout with A426

Minor access via priority junction with Newton Lane

Development Do Nothing

- South-eastern Access Strategy

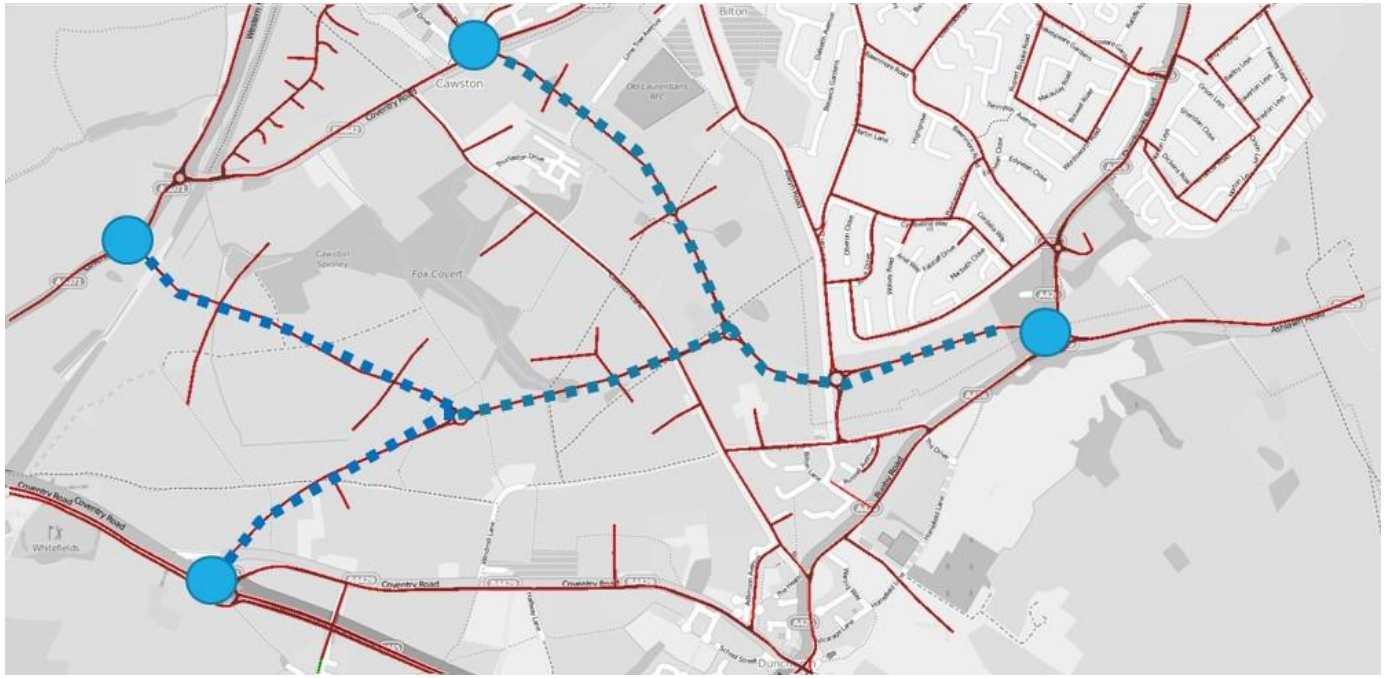
Additional route provided through Moat Farm Drive

New Junction with Rugby Road

New Junctions with Barby Lane

Development Do Nothing

- South-western Access Strategy

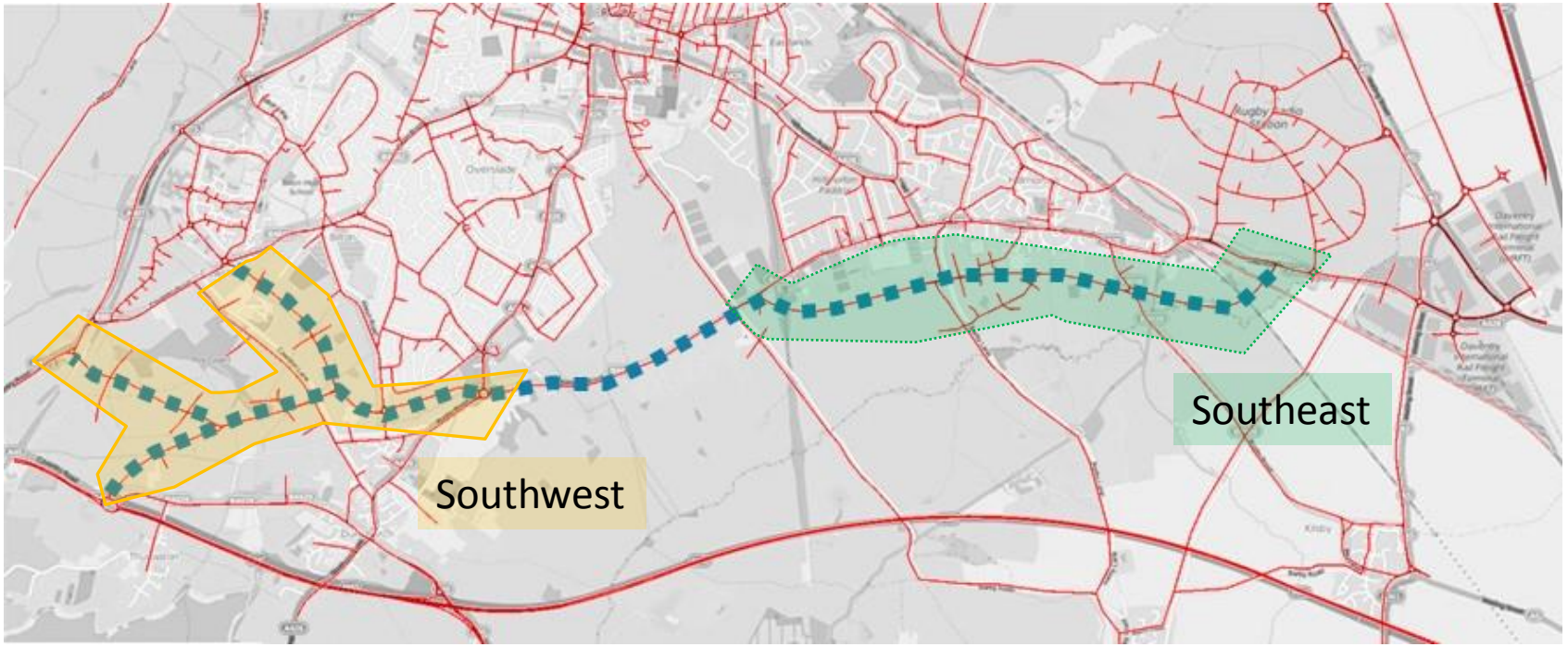


Distributor Links

New/Upgraded Access junctions

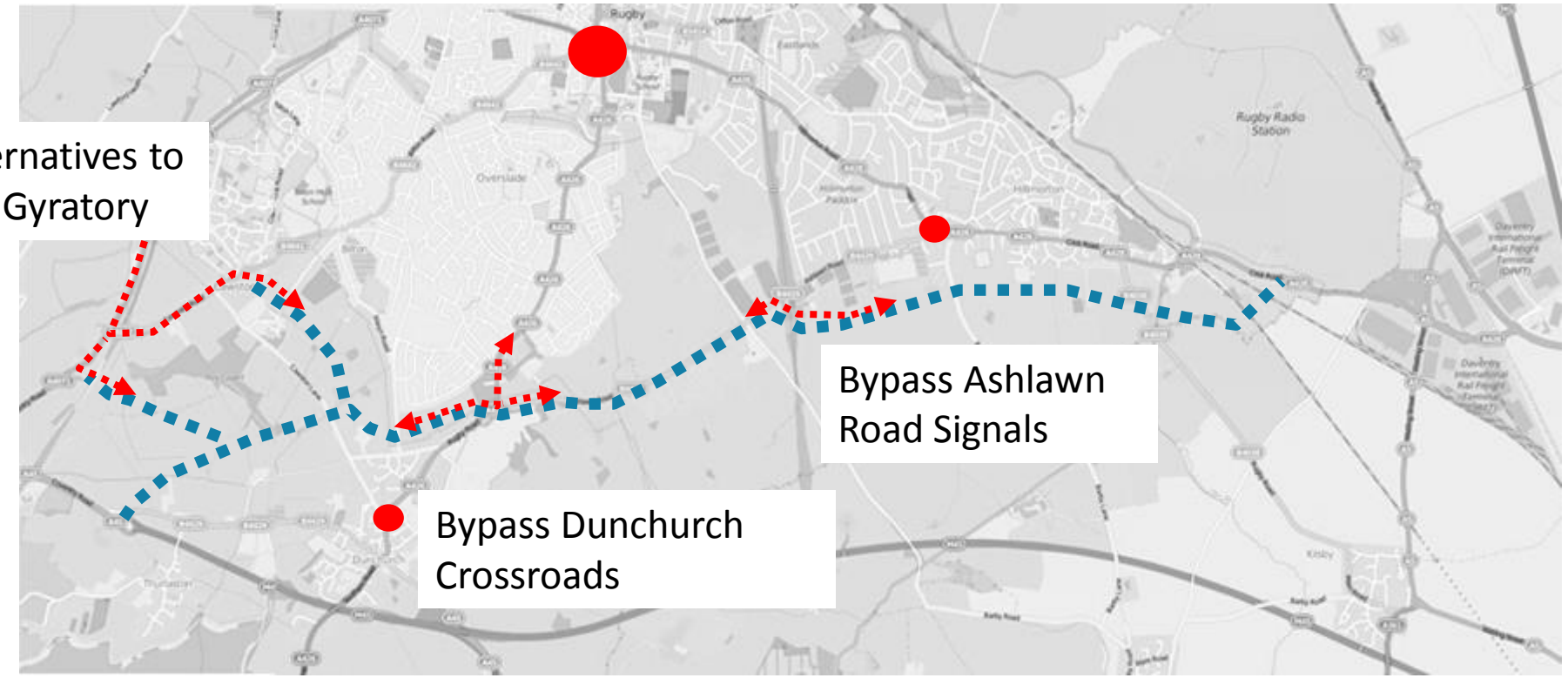
Development Do Something

- Partial connection of southern distributor link



Distributor link - Benefits

- Bypass existing congestion ‘hot-spots’



Mitigation Assumptions

Scheme	Status				
	Option 01A	Option 01B	North	Southwest	Southeast
Dunchurch Signposting				Included	
Ashlawn Road signposting		Recommended			Included
Hillmorton Road Ped crossing		Recommended	Recommended	Recommended	Recommended
Leisure Centre Access			Included	Included	Included
Potford Dam roundabout				Included	
B4429/Onley Lane/Barby Road widening					Included
Barby Lane/Ashlawn Road Roundabout					Included
M6 to Coton House		Recommended	Included		
M6 J2			Included		
Rugby gyratory	Included	Included	Included	Included	Included
Clifton Road/Lower Hill Morton					
Whitehall Road Pedestrian crossing					
Butlers Leap/Clifton Road			Included		
A426/Brownsover roundabout		Recommended	Included		
A5/A428 'Half-way house' roundabout					Included
Dunchurch Road/Sainsburys Roundabout				Included	
South-western link				Included	
South-eastern link					Included
Full signalisation of M6 J1		Possible	Recommended		
Full signalisation of M45 J1				Possible	
A426/Central Park Drive		Recommended	Recommended		
A426/Newton Manor Lane		Recommended	Recommended		
Cawston Grange Drive/A4071				Recommended	

Assessment Measures

- **Model Stability** – Analysis of the level of stability between scenario runs and the level of congestion within the model scenarios.
- **Average Journey Time (seconds)** – The average travel time of a completed trip during the model simulation period.
- **Average Speed (Km/h)** – The average speed travelled by all vehicles that completed a journey during the model simulation period.
- **Completed Trips (vehicles)** – The number of completed trips recorded during the model simulation.
- **Queuing Impacts –** The maximum queue length increase on any approach to the key junctions identified for analysis within the model network

Stage 1 Localised Option Testing

Option 1A Assumptions:

- 125 dwellings on land between Cawston Lane and Alwyn Rd
- 855 dwellings at Coton Park East
- 250 Dwellings at Cawston Spinney
- 7.5 Hectares Employment at Coton Park
- TOTAL = 1230 Dwellings & 7.5 Hectares employment.

Option 01B Assumptions

- Option 01A plus 974 dwellings at Ashlawn Road
- TOTAL = 2204 Dwellings & 7.5 Hectares employment

2011 to 2031 Forecast Growth (inc. commitments)

- Option 01A = 22% & Option 01B = 23% maximum growth levels

Stage 1 Analysis – Model Stability

	2031 Rugby Reference		Scenario 1A		Scenario 1B	
	AM	PM	AM	PM	AM	PM
Success Rate	100%	100%	100%	100%	90%	100%
Peak (veh): Max	9702	9056	9933	9367	9984	9684
Peak (veh): Ave Max	9491	8912	9752	9204	9835	9491
End of Period (veh): Max	5848	6322	6827	6281	6534	6346
End of Period (veh): Ave	5595	6023	5948	6072	5754	6190

Key findings

- All models are stable.
- Minor reduction in stability observed within Option 01B
- Pattern of congestion is broadly similar between options albeit the highest peak of congestion occurs, as expected, within Option 01B, due to the higher traffic volumes.

Stage 1 Analysis – Network Statistics

AM	2031 Ref Case	1A	1B
Total Vehicles	116915	117549	118535
Average Journey Distance (km)	11.3	11.3	11.3
Average Speed per vehicle	59.9	58.4	58.1
Average Delay (s)	679	695	700

PM	2031 Ref Case	1A	1B
Total Vehicles	131663	132970	133760
Average Journey Distance (km)	10.5	10.5	10.5
Average Speed per vehicle	60.5	59.6	58.2
Average Delay (s)	626	636	651

Key findings

- Steady increase in journey times between scenarios.
- Small impact on journey speeds also observed.
- Journey times increase by up to 3% in Option 01A and 4% in Option 01B which indicates that some impacts have occurred on the network as a result of the allocations.
- The level of delay increase is not likely to indicate the need for strategic level mitigation but some localised measures will inevitably be required.

Stage 1 Analysis – Queueing on the Network

Full analysis of all queueing impacts for Option 01A/01B for the AM and PM periods is provided within MQ001 to MQ004 respectively.

Option 01A Queueing Analysis:

- Impacts appear concentrated to the North.
- Increases in queueing is experienced along the A426 and is most prevalent in the PM.
- It is likely that these impacts are attributable to the housing sites allocated to the North.
- Consideration should be given to the delivery of localised mitigation measures at the following junctions:
  - A426/Central Park Drive/Gateway Northern Access
  - A426/Newton Manor Lane/Gateway Southern Access
  - A426/Brownsover Lane/Boughton Road
- During the previous round of strategic analysis a scheme was identified at the A426/Brownsover Lane roundabout which would likely serve to mitigate some of the impacts identified.

Stage 1 Analysis – Queueing on the Network cont….

Option 01B Queueing Analysis:

- Impacts still appear concentrated to the North and are most prevalent within the PM.
- At the strategic level, the allocation of the 974 dwellings has little additional impact.
- However, localised impacts are anticipated at the Dunchurch Crossroads area which has been dealt with via a discrete, separate assessment. This indicated that, as a minimum, delivery of a signal optimisation strategy of MOVA or similar will be required at the Dunchurch crossroads.

Stage 1 Conclusions

Option 01A & Option 01B Conclusions

- The allocations tested in Option 01A & 01B result in a concentration of impacts along the A426 to the North.
- The modelling analysis indicates that there will be impacts that occur as a result of the allocations, journey times will increase and, in some areas, queueing at junctions will also increase. However, it is likely that development specific mitigation strategies can be identified to deal with these impacts.
- Separate analysis of the impacts of development on the Dunchurch Crossroads reveals that the junction will require specific mitigation to be applied, most likely in the form of a signal optimisation strategy such as MOVA. The separate analysis also revealed that the delivery of the southern distributor link, with the potential to bypass the crossroads, is likely to elicit substantial benefits.
- It is recommended that the focus of mitigation, necessary to facilitate the allocations identified in Option 01A and 01B is to the North of Rugby, along the A426 and M6 Junction 1 as well as the Dunchurch Crossroads. Additional, minor mitigation measures are likely to be required which it is anticipated will be identified and dealt with via the development specific impact assessments.

Strategic Options

- Three core scenario assessments:
- **Do Nothing –** The housing plus access strategies only
- **Do Minimum –** Do Nothing plus proximate mitigation
- **Do Something –** Do Minimum plus major infrastructure where applicable

Strategic Option North Analysis – Model Stability

	2031 Rugby Reference		Scenario 02 North Do Nothing		Scenario 02 North Do Minimum	
	AM	**PM**	**AM**	**PM**	**AM**	**PM**
Success Rate	100%	100%	90%	55%	80%	100%
Peak (veh): Max	9702	9056	11825	11339	12101	10579
Peak (veh): Ave Max	9491	8912	11381	10968	11769	10263
End of Period (veh): Max	5848	6322	9766	8143	10531	6904
End of Period (veh): Ave	5595	6023	8878	7801	9385	6778

- Do Nothing demonstrates high levels of instability indicating delivery of mitigation measures are essential.
- It is notable that the Do Minimum scenario stability reduces in the AM post application of the mitigation measures indicating further mitigation measures likely to be required within the AM to improve network conditions.

Stage 2 North Analysis – Network Statistics

AM	2031 Ref Case	Scenario 02 North Do Nothing	Scenario 02 North Do Minimum
Total Vehicles	116915	117019	116466
Average Journey Distance (km)	11.3	11.0	11.0
Average Speed per vehicle	59.9	51.5	51.3
Average Delay (s)	679	773	770

PM	2031 Ref Case	Scenario 02 North Do Nothing	Scenario 02 North Do Minimum
Total Vehicles	131663	134309	135499
Average Journey Distance (km)	10.5	10.6	10.6
Average Speed per vehicle	60.5	52.32	55.54
Average Delay (s)	626	729	684

Key findings

- Do Minimum alleviates some of the impacts on delays in both the AM and PM in spite of reduced AM stability.
- Do minimum achieves a 6% reduction in delays compared to the do nothing scenario.
- Delays have increased by 13% and 9% across the AM and PM respectively even once the mitigation strategy has been assigned indicating a need for further measures.

Stage 2 North Analysis – Queueing on the Network

Full analysis of all queueing impacts for the Scenario 02 North Do Minimum for the AM and PM periods is provided within MQ005 to MQ008 respectively. The following analysis focusses only on the Do Something outputs (MQ013 & MQ014)

Queueing Analysis:

- Similar to the assessment of Option 01B the majority of impacts appear concentrated to the North.
- The scheme proposals at the A426/Brownsover Lane junction appear to have reduced the scale of impact at this junction but the remaining two junctions on the A426 clearly require further mitigation.
  - A426/Central Park Drive/Gateway Northern Access
  - A426/Newton Manor Lane/Gateway Southern Access
- In addition to the junctions listed previously, the development option appears to elicit an impact at M6 Junction 1 and this is in spite of the introduction of further signal optimisation. It is reasonable to conclude that full signalisation of the M6 Junction 1 will likely be required to facilitate the allocation of development to the North as identified.
- In both the AM and PM periods queue increases are observed in the area of Rugby gyratory that it is unlikely can be mitigated due to the constraints on options for delivering further transport mitigation measures, in this area, over and above the scheme proposals that were delivered in 2015.

Stage 2 North Conclusions

Stage 2 North Conclusions

- The allocations tested in Scenario 02 North compound the concentration of impacts along the A426 to the North that were identified within the first series of option tests.
- The modelling analysis indicates that the scheme proposals at the A426/Brownsover Lane junction will likely mitigate the development impacts but there will likely be a need for further mitigation measures to be delivered at a number of other junctions along the A426.
- It is reasonable to conclude that full signalisation of the M6 J1 will also be required if the housing is allocated to the north of the motorway as has been proposed within this option.
- Some impacts are likely to be induced, within the town centre, with little in the way of mitigation options, consideration will therefore need to be given to options which reduce the number of car based trips between the allocated land to the north and Rugby town centre in order that these impacts can be further mitigated.

Strategic Option Southwest Analysis – Model Stability

	2031 Rugby Reference		Scenario 2B SW Do Nothing		Scenario 2B SW Do Minimum		Scenario 2B SW Do Something	
	AM	PM	AM	PM	AM	PM	AM	PM
Success Rate	100%	100%	71%	67%	90%	78%	100%	95%
Peak (veh): Max	9702	9056	10562	10631	10751	11100	10528	10188
Peak (veh): Ave Max	9491	8912	10451	10108	10453	10576	10298	9992
End of Period (veh): Max	5848	6322	6452	6883	6218	7395	6700	6966
End of Period (veh): Ave	5595	6023	6019	6574	5753	6787	6076	6601

- Do Nothing demonstrates high levels of instability indicating delivery of mitigation measures are essential.
- Model stability is highest within the Do Something model network and congestion peaks are also lowest within the Do Something network indicating that the traffic levels are likely to be better accommodated when the mitigation measures and the distributor link are in place.

Stage 2 Southwest Analysis – Network Statistics

AM	2031 Ref Case	Scenario 02 SW Do Nothing	Scenario 02 SW Do Minimum	Scenario 02 SW Do Something
Total Vehicles	116915	120948	121175	120857
Average Journey Distance (km)	11.3	11.2	11.3	11.2
Average Speed per vehicle	59.9	56.9	57.0	57.3
Average Delay (s)	679	709	712	704

PM	2031 Ref Case	Scenario 02 SW Do Nothing	Scenario 02 SW Do Minimum	Scenario 02 SW Do Something
Total Vehicles	131663	136852	136863	137154
Average Journey Distance (km)	10.5	10.5	10.6	10.5
Average Speed per vehicle	60.5	56.2	54.8	57.5
Average Delay (s)	626	674	694	658

Stage 2 Southwest Analysis – Network Statistics cont....

Key findings

- Impacts appear greatest within the PM period with delays increasing by 8%.
- Within the PM the delays increase within the Do Minimum network but so too does the completed trips indicating that the increase in delay may, in part, be attributable to more longer distance trips being completed. Longer distance trips are symptomatic of the fact that the development allocations are located on the periphery of the study area.
- Compared to Option 01B the increase in journey times within the Do Something network is minimal within the AM (4 seconds) whilst a reduction is achieved in the PM (7 seconds) indicating that, in general, the development impacts must be at least partially mitigated as a result of the proposals within the Do Something network.
- Within the Do Something network there is an increase in the delays recorded but considering the amount of growth allocated to the network the 4% increase in the AM and the 5% increase in the PM is not considered severe.

Stage 2 Southwest Analysis – Queueing on the Network

Full analysis of all queueing impacts for the Scenario 02 Southwest Do Minimum for the AM and PM periods is provided within MQ009 to MQ014 respectively.

Queueing Analysis:

- Within the Do Minimum, particularly during the PM period, there are an extensive number of instances where the queueing impacts at junctions are severe or very severe, these are largely mitigated in the Do something scenario which indicates that the southern distributor road will likely alleviate a significant number of impacts that will otherwise occur within the town centre.
- Overall, the impacts on queueing appears minimal, the queue impacts identified to the north of the study area will be attributable to the previous allocation of housing identified within Option 01B.
- There are only 5 instances of queueing impacts having been identified within the AM analysis and 7 within the PM, 3 of which are attributable to the deliver of the housing sites to the north of the study area.
- There is an impact on queueing levels identified at the M45/A45 junction which may indicate that a signalisation scheme may be necessary for this junction in order that the impacts on the SRN can be managed and further mitigated.
- There are far fewer instances of queueing increases within the town centre area within the Do Something analysis, when compared to the Northern site assessment, which indicates that, in general, delivery of the southwest allocation will elicit a lower level of impact, overall, than the northern allocation.
- Impacts at the Cawston Grange Drive/A4071 junction indicates that further mitigation in this area is likely to be required to accompany this allocation option.

Stage 2 Southwest Conclusions

Stage 2 Southwest Conclusions

- The allocations tested in Scenario 02 Southwest appear to induce lower levels of impacts, once the mitigation strategy has been incorporated within the assessment, than the Northern allocation and, furthermore, the impacts are comparable to those identified within the Option 01B analysis which indicates that the mitigation strategy and southern distributor link are successfully mitigating a number of developmental impacts.
- The modelling analysis indicates that there will be a substantial number of instances where queueing levels increase at junctions across the study area without the link road in place. Delivery of the distributor road to the southwest will mitigate a significant number of these queueing impacts without further, focussed mitigation. Thus it can be concluded that the links will provide mitigation and may also serve to relieve other congested routes into the town centre by improving connectivity to the Western Relief Road.
- The Southwest option appears to elicit a lower level of overall impact than the Northern allocation at the Do Minimum stage. The Do Something stage further improves network conditions and, thus, it can be concluded that a mitigation strategy is likely to be more easily discernible for the Southwest strategy due to the availability of land and proximate infrastructure (such as the Western Relief Road) than is the case with the Northern Allocation.

Strategic Option Southeast Analysis – Model Stability

	2031 Rugby Reference		Scenario 2 SE Do Nothing		Scenario 2 SE Do Minimum		Scenario 2 SE Do Something	
	AM	PM	AM	PM	AM	PM	AM	PM
Success Rate	100%	100%	94%	0%	100%	0%	91%	77%
Peak (veh): Max	9702	9056	11090	0	11213	0	10940	12217
Peak (veh): Ave Max	9491	8912	10754	0	10874	0	10681	11463
End of Period (veh): Max	5848	6322	6795	0	7365	0	6565	10720
End of Period (veh): Ave	5595	6023	6061	0	6622	0	5932	9264

- Do Nothing and Do Minimum networks do not work, therefore the southern distributor link can be considered essential.
- Even within the Do Something network the stability levels are poor which indicates that further mitigation is likely to be required.

Stage 2 Southeast Analysis – Network Statistics

AM	2031 Ref Case	Scenario 02 SE Do Nothing	Scenario 02 SE Do Minimum	Scenario 02 SE Do Something
Total Vehicles	116915	120941	119980	121418
Average Journey Distance (km)	11.3	11.2	11.2	11.2
Average Speed per vehicle	59.9	55.1	55.3	55.8
Average Delay (s)	679	733	730	723

PM	2031 Ref Case	Scenario 02 SE Do Nothing	Scenario 02 SE Do Minimum	Scenario 02 SE Do Something
Total Vehicles	131663	-	-	133315
Average Journey Distance (km)	10.5	-	-	10.7
Average Speed per vehicle	60.5	-	-	50.8
Average Delay (s)	626	-	-	754

Stage 2 Southeast Analysis – Network Statistics cont....

Key findings

- No results are presented for the Do Nothing and Do Minimum networks as the model networks do not accommodate the demands assigned to the model until the south-eastern distributor link is included within the assessment.
- Within the AM model period, the increase in delays that occurs within the SE Do Something model network is around 7% lower than the DM Northern Option which is the scenario which returns the highest of any of the mitigated scenario journey times within the AM.
- Within the PM, the SE Do Something scenario returns the highest overall delay increase with delays increasing by over 20% even after the allocation of the mitigation strategy. This increase is considered severe.

Stage 2 Southeast Analysis – Queueing on the Network

Full analysis of all queueing impacts for the Scenario 02 Southwest Do Minimum for the AM and PM periods is provided within MQ015 to MQ020 respectively. Queuing plots have not been produced for the failed PM scenarios and, on that basis, the following analysis focussed only on the Do Something network conditions:

Queueing Analysis:

- The SE Do Something network experiences the greatest number of queueing impacts of any of the mitigated options that have been tested.
- Within the PM period there are a large number of instances of severe and very severe increases in queueing levels which indicates that a significant amount of mitigation is likely to be required to enable this development option to be delivered.
- There are a considerable number of queueing impacts experienced within the town centre area and, also, a number of queueing impacts experienced all across the study area indicating that the impacts associated with the SE Do Something option, particularly within the PM, are likely to be widespread.

Stage 2 Southeast Conclusions

Stage 2 Southeast Conclusions

- The level of model instability present within the PM model network indicates that the mitigation measures proposed thus far should be considered essential.
- The network performance is still considered very poor and, on that basis, the identification of further mitigation measures intended to mitigate the impacts induced by this allocation option is also likely to be essential.
- The allocations tested in Scenario 02 Southeast induce the highest levels of delay, within the PM period, of any of the options which indicates a substantial amount of mitigation is likely to be required to accommodate this housing.
- The modelling analysis indicates that, particularly within the PM period, there will be a substantial number of instances where queueing levels increase at junctions across the study area even with the south-eastern distributor link in place.

Strategic Scenario Comparisons

Measure	Scenario 2 North Do Minimum		Scenario 2 West Do Something		Scenario 2 East Do Something	
	AM	PM	AM	PM	AM	PM
Housing Numbers	Lowest				Highest	
Model Stability	Lowest	Highest	Highest			Lowest
Delays	Highest		Lowest	Lowest		Highest
Completed Trips	Lowest			Highest	Highest	Lowest
Potential for mitigation measures to be delivered?	Lowest		Highest			

Strategic Scenario Comparisons cont…

- Comparisons of the performance of the three model networks indicates:
  - That the southwest option results in the lowest levels of delay across both the AM and PM period.
  - That the southwest option scores highest in Model Stability (AM) and Network Statistics (PM)
  - It is considered that the Southwest option, with the southern distributor link, is the scenario with the greatest potential for further mitigation measures to be identified.
  - In terms of the absolute measures the Northern site returns the highest model stability (PM) whilst the Southeast option achieves the highest number of completed trips within the AM.
  - When reviewing the options in unison it is clear that the Southwest Option, inclusive of the distributor link, performs most favourably.

Conclusions

- To deliver the level of housing identified to the south of Rugby, provision of the southern distributor link in part, within the development allocation area, is considered essential for the SW and SE options.
- In spite of the mitigation that has been proposed, there are still likely to be a number of residual impacts which occur on the network which will require the identification of further mitigation measures, once an allocation option is taken forward for detailed analysis.
- It is clear that the South-western model network performs best and the South-eastern network performs worst. It is therefore reasonable to conclude a preference for delivery in transport impact terms of the SW option, then the Northern option, and lastly the South-eastern option on account of the fact that this option returns the highest increases in delay and the greatest number of increases in queues at key junctions.

Conclusions cont.....

- Although further work is recommended before a conclusion can be fully determined, the early high level analysis indicates that the level of housing that has been tested for the South-eastern allocation is likely to generate traffic levels which reach, and in some cases exceed, the network capacity even once mitigation measures have been assigned. This option is only likely to be feasible once the south-western allocation is built out, inclusive of the link road, as it will provide relief to the transport network around the south-eastern allocations and, therefore, mitigate some of the impacts that have been observed thus far.
- The analysis of the Northern scenario impacts reveals that the PM network performs better than the SE option whilst the AM network is the worst performing network. Potentially this problem may relate to the conflict between traffic entering the study area to travel to work in Rugby Centre and traffic leaving Rugby along the A426 to travel to work via the M6. Further analysis of the potential implications of these conflicts is recommended if this option is to be taken forward.

Recommendations & Future Considerations

- Depending upon which option is to be taken forward, both the SE and SW allocation options would benefit from a more detailed review of the deliverability of the link proposals, particularly since, in both instances a crossing is required of railway land (dis-used in the case of the SW link).
- If the northern option comes forward a comprehensive traffic management strategy will be required along the A426 and at M6 J1 to ensure that traffic movements can be accommodated within this area.
- All of the options that have been assessed at this stage would benefit from a review of the potential for encouraging use of sustainable transport modes particularly with a view to reducing car based trips between the site proposals and Rugby town centre since the potential for further transport mitigation schemes to be delivered within the Town centre is very limited.
- A preferred option for allocation of development should be identified and a full mitigation strategy identified for that option inclusive of an estimate of scheme costs and, in line with PINS guidance, an indicate of the scheme importance, via a grading system.
- An isolated assessment of the Gyratory would be considered beneficial, in both Paramics and Linsig, to determine whether there is potential for further capacity to be unlocked in this area that cannot fully be identified within the strategic level due to the coarse nature of the assessment.
- Analysis of the potential for enhancements to the existing public transport network should also be undertaken to identify what, if any, options exist to reduce the impacts of the trips associated with the allocations via a shift to sustainable modes such as buses/rail, cycling and walking.