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microsimulation specialists


BOROUGH
RUGBY
COUNCIL
Warwickshire
County Council

Objectives

- To refine the existing Rugby Wide Area (RWA) Paramics model to reflect the latest housing trajectory figures.
- To assess the impacts of allocating the additional pre-application and SHLAA sites identified in the updated RBC housing trajectory.
- To identify a potential mitigation strategy in response to the emerging impacts identified as a result of the inclusion of the SHLAA and pre-application housing.
- To assess the additional impacts likely to occur as a result of the allocation of extra housing in the area in line with live planning applications.

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 12588.8 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 & 4750 RRM)
  - Total initial housing = **11754** (less than TEMPRO forecast)
- Additional housing forecasts = 21433 dwellings (70% increase on TEMPRO forecasts).

* Taken from 2013 Housing trajectory

TEMPRO Adjustments

Scenario	Period	Housing Numbers	TEMPRO Adjustment	Resultant Growth
2031 Reference (inc. RRM & Gateway)	AM	9679	0.77	13.3%
	PM			14.9%
2031 Reference + SHLAA Sites	AM	21433	1.701	29.5%
	PM			33.0%
2031 Reference + SHLAA + Existing Applications	AM	22118	1.76	30.5%
	PM			34.0%

Scenarios

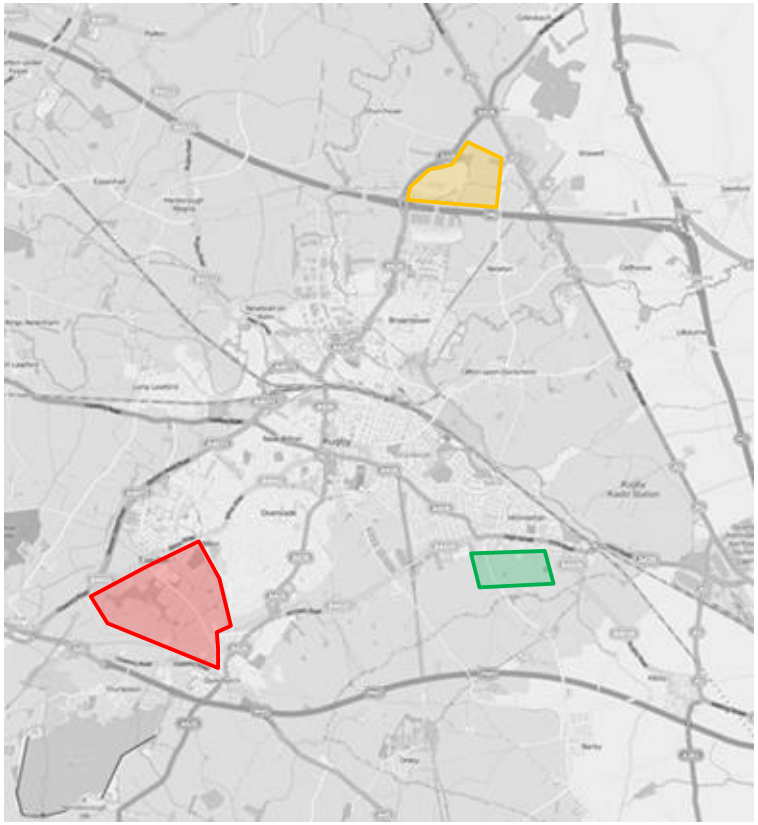
- **2031 Reference Case** – Updated to include revised growth forecasting & DIRFT III Assumptions
- **2031 Rugby Development Do Nothing** – Includes SHLAA assumptions and minimal access strategy
- **2031 Rugby Development Do Minimum** – As per Do Nothing but with connection of southern distributor road.
- **2031 Rugby Development Do Something** – As per Do Minimum but with additional mitigation measures
- **2031 Rugby Development Do Something + Planning Applications** – As per 2031 Do Something plus an additional circa 650 dwellings (1%)

Scenario Rationale

- **2031 Rugby Development Do Nothing** – Will the network operate without any additional mitigation?
- **2031 Rugby Development Do Minimum** – Will connecting the southern distributor road sufficiently mitigate the development impacts?
- **2031 Rugby Development Do Something** – Will the additional mitigation measures identified sufficiently mitigate the development impacts?
- **2031 Rugby Development Do Something + Planning Applications** – Will the mitigation accommodate additional housing above the SHLAA numbers?

Development Do Nothing

- Three core development concentration areas



Northern Growth – 2024 Dwellings

South-eastern Growth - 3145 Dwellings

South-western Growth - 4133 Dwellings & 27.9 Ha employment

Development Do Nothing

- Northern Access Strategy

Secondary access via priority junction with A426

Primary access via roundabout with A426

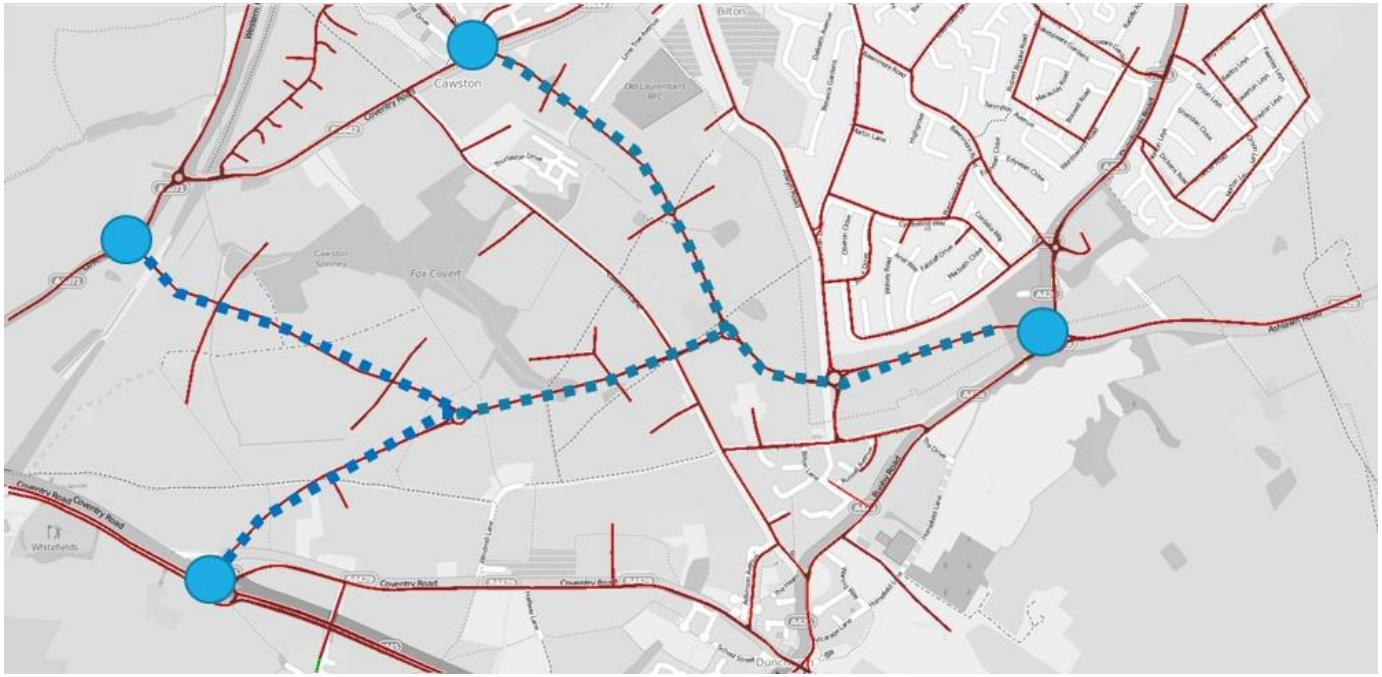
Minor access via priority junction with Newton Lane

Development Do Nothing

- South-eastern Access Strategy

Development Do Nothing

- South-western Access Strategy



Distributor Links

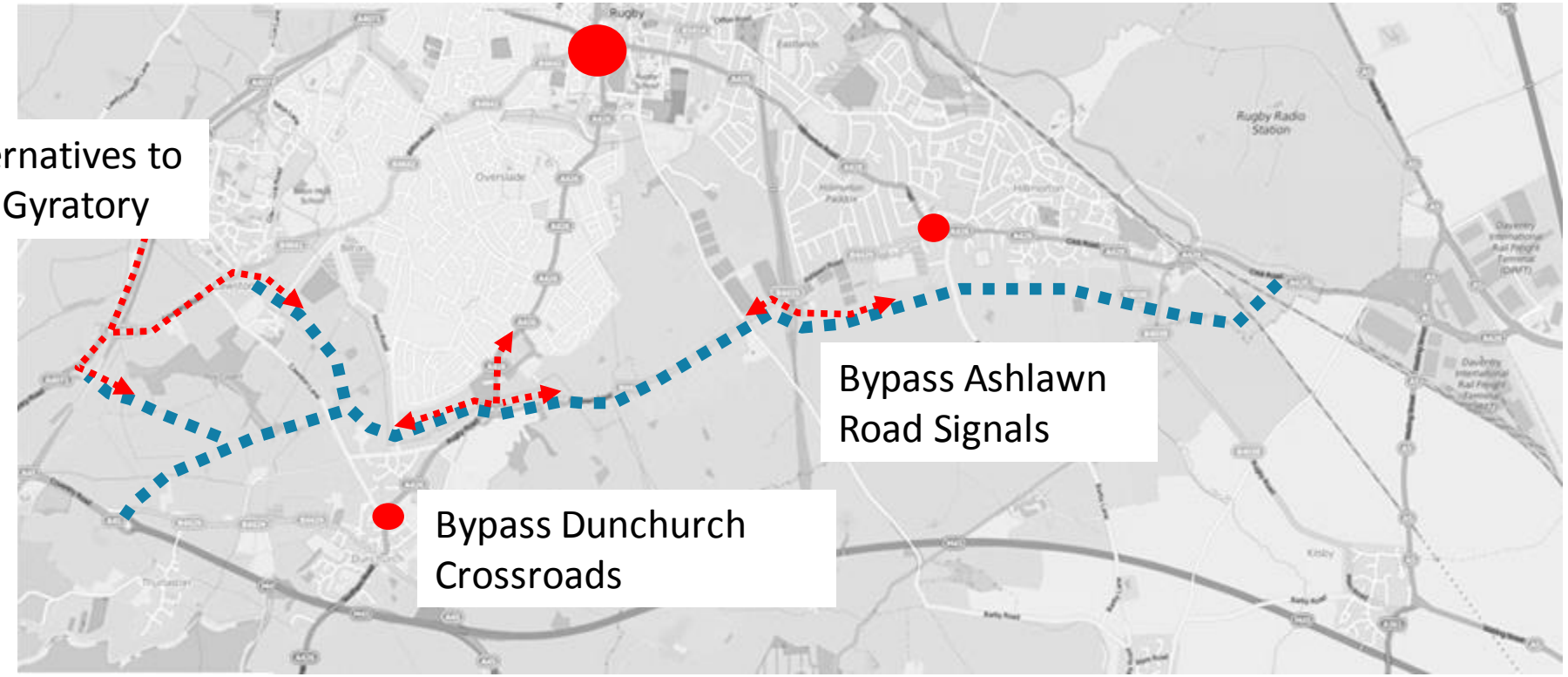
New/Upgraded Access junctions

Development Do Minimum

- Connection of southern distributor link

Development Do Minimum

- Bypass existing congestion ‘hot-spots’



Development Do Something

- 16 additional interventions identified and assigned within the model network.

Scheme	Description
Dunchurch Signposting	Sign posting of traffic away from Dunchurch via the southern distributor link
Ashlawn Road	Signposting 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 roundabout 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

Development Do Something

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
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 signposting
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

Model Run Analysis

	2031 Rugby Reference		2031 Rugby Do Nothing		2031 Rugby Do Minimum		2031 Rugby Do Something		2031 Rugby Do Something + PA	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Runs	20	20	20	20	20	20	20	20	20	20
Successful Runs	20	20	20	0	20	0	20	18	16	0
Success Rate	100%	100%	100%	0%	100%	0%	100%	90%	80%	0%
Peak (veh): Max	9901	9520	13699	0	13511	0	14062	11539	16325	0
Peak (veh): Ave Max	9534	9210	13133	0	13114	0	13255	11233	15638	0
End of Period (veh): Max	5811	6342	11077	0	10487	0	10963	8412	14058	0
End of Period (veh): Ave	5443	6059	9583	0	9647	0	9750	7972	12727	0

Model Run Analysis

- Without the mitigation measures the PM model will not operate at a satisfactory level.
- Congestion levels continue to build and delays increase exponentially.
- The presence of the distributor road alone does not provide sufficient mitigation.
- Analysis of scenarios other than the Do Something would not provide reliable outputs since delays and congestion are too high to yield realistic comparisons between these scenarios and the Reference Case.
- Thus the remainder of the analysis focuses on the comparisons between the Reference Case and the Development Do Something scenario only.

Network Wide Performance

- **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.

AM	Total Vehicles	Average Speed Per Vehicle	Average Delay
Reference	117083	60	683
Do Something	122127	50	790
Diff	4.3%	-16.7%	15.7%

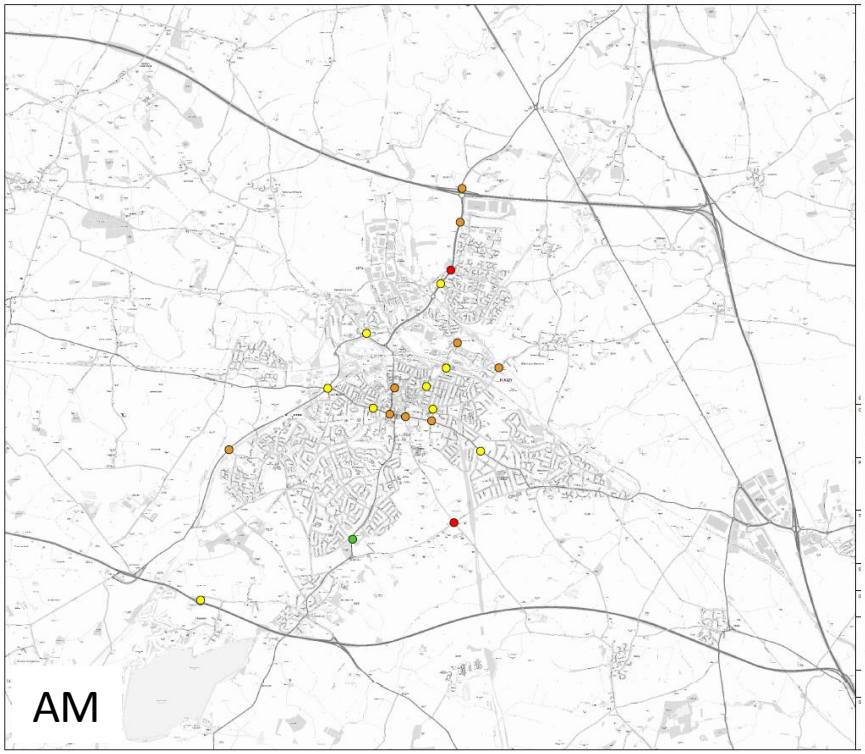
PM	Total Vehicles	Average Speed Per Vehicle	Average Delay
Reference	131622	59	641
Do Something	141339	53	716
Diff	7.4%	-10.4%	11.8%

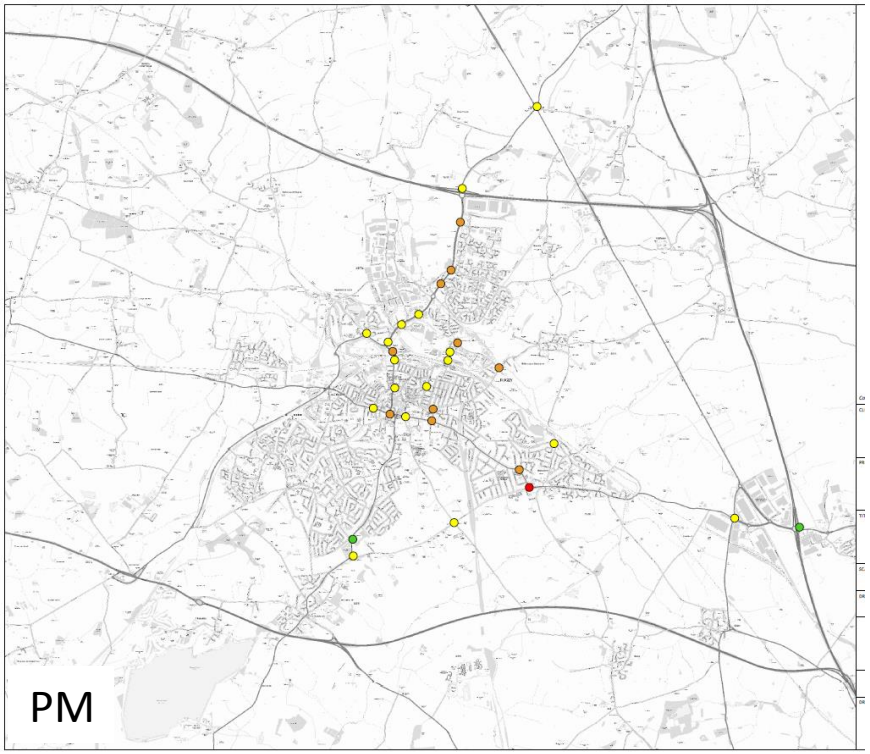
Network Wide Performance cont.....

- During the AM journey times increase by over 15% on average whilst speeds reduce by over 16%.
- During the PM journey times increase by 12% whilst speeds reduce by over 10%.
- During the AM just over 5000 more trips are completed in the Do Something scenario but over 9,000 extra trips exist in the model network meaning a significant reduction in the number of trips likely to occur within the same model period occurs as a result of the inclusion of the new developments and accompanying mitigation measures.
- During the PM over 9,000 more trips are completed in the Do Something but over 12,000 are assigned within the model network. Again although a greater number of trips are completed compared to the AM this indicates that the inclusion of the developments will result in less trips being completed despite the inclusion of the additional mitigation measures.

Junction Queueing Analysis

- Refer to MQ001 & MQ002 for comparisons between the Reference Case and Do Something queueing levels



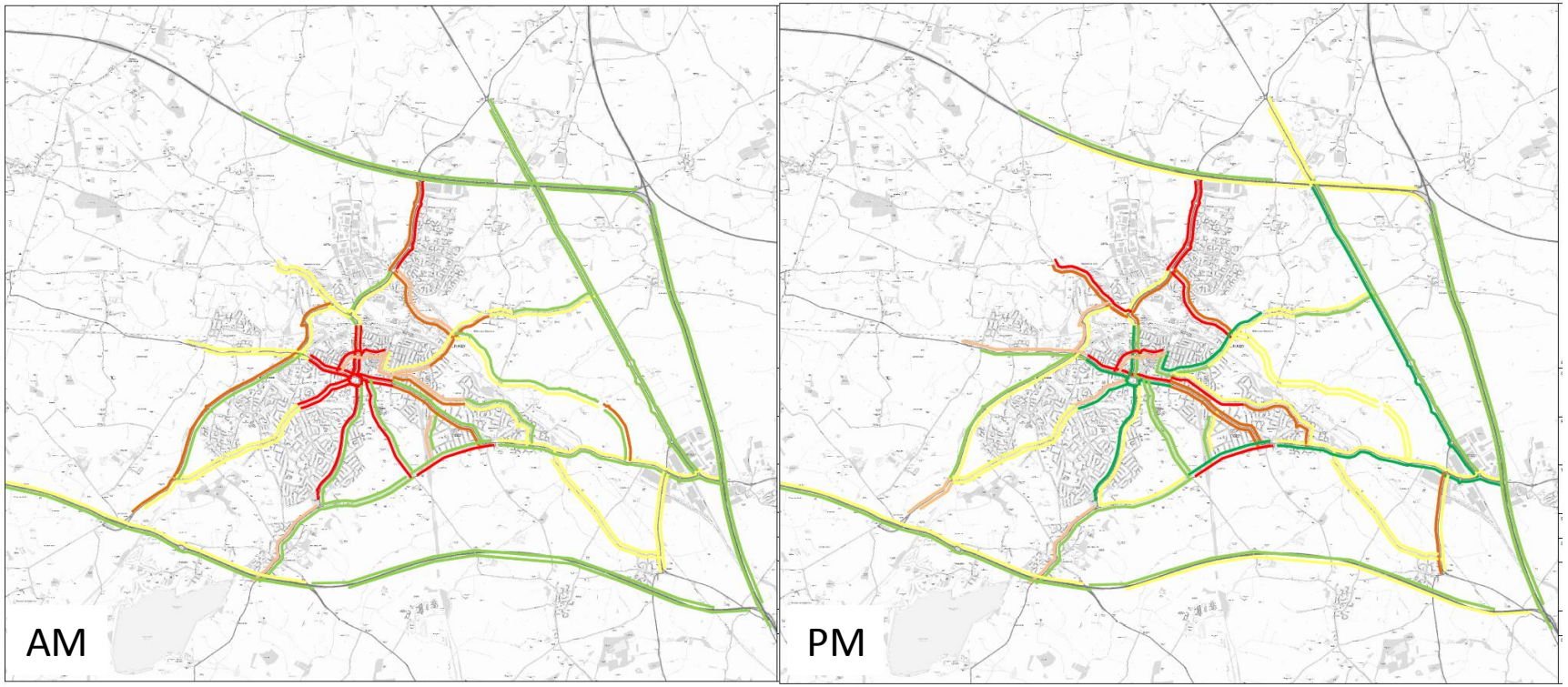


Junction Queueing Analysis cont.....

- Despite the mitigation measures the is only one instance of queues reducing (Dunchurch Road/Sainsburys roundabout).
- The AM network experiences in creases in queueing on the route to the west of Rugby, most likely as a result of developments in the southwest using this route to the M6.
- There is a cluster of queueing increases within the town centre during both the AM and PM model periods.
- During the AM there are severe increases in queueing experienced at Barby Road/Ashlawn Road and the Newton Manor Lane/A426 roundabout.
- During the PM there is a very severe increase in queueing at the Ashlawn Road/Hillmorton Road junction despite the relief provided by the southern distributor link.

Journey Time Impacts

- Refer to MD001 & MD002 for comparisons between the Reference Case and Do Something journey times



Journey Time Impacts cont.....

- During the AM there are clearly significant issues arising from the convergence of flows at the Gyratory within central Rugby. Previous analysis of this junction has indicated that there is little else that can be done in this location.
- This indicates that the distributor link does not provide sufficient relief to the gyratory from traffic approaching the junction from either the north or the south.
- During the AM, journey times to the West of Rugby increase, most likely due to increase in traffic travelling towards the M6 from the housing located in the Southwest.
- During the AM there are also issues north of rugby along the A426, potentially some of these impacts could be alleviated by signalisation of the roundabouts in this section of the corridor.
- There are also issues at the Butler's Leap/Rugby Road junction, similar to the gyratory, it is unclear whether there are any other options for mitigation in this area that could be delivered.

Journey Time Impacts cont.....

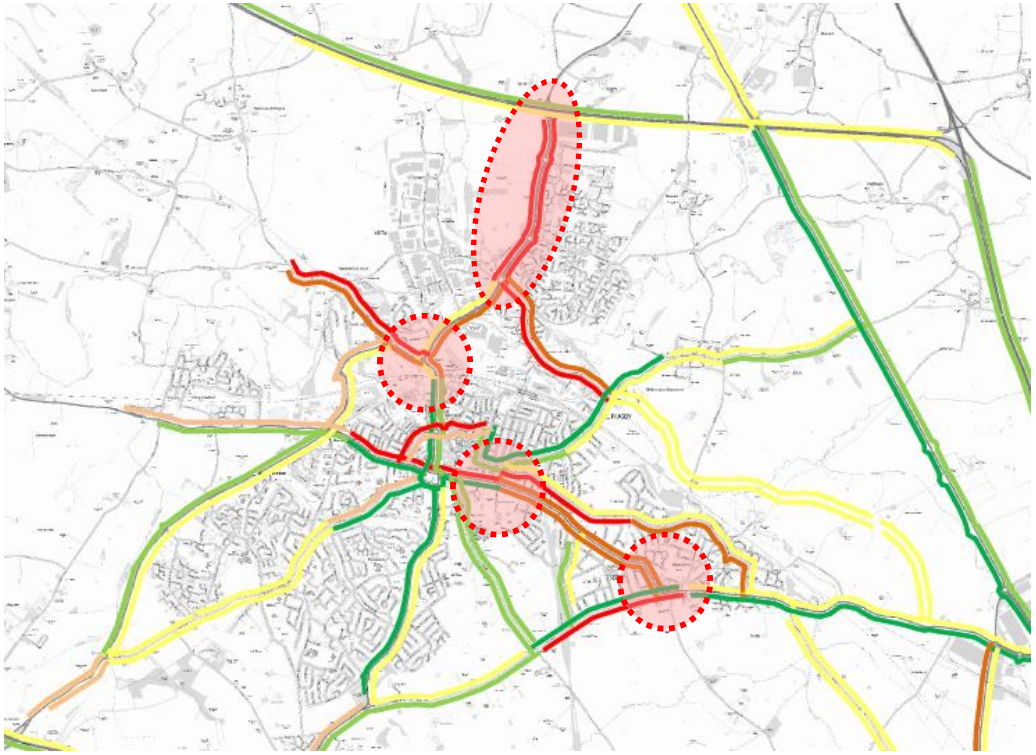
- Analysis of the impacts that occur within the AM indicate that additional attention should be afforded to the following locations:

Journey Time Impacts cont.....

- During the PM the gyratory does not appear to incur the same level of constraint. There are, however, severe impacts occurring just east of the gyratory, which is directly attributable to the performance of the Clifton Road/Whitehall Road roundabout as well as the Hillmorton Road/Whitehall Road roundabout.
- Journey times are also adversely effected on the approaches, from the north, to Avon Mill roundabout, as well as further north on the A426 corridor.
- Journey times suffer on this section of the A426 because it represents the primary routes between Rugby and the M6. prior to this section of the A426 there are a number of routes that vehicles can choose (via A426, via Clifton Road/Butlers Leap, via the new RRM link road and via the RWRR and Brownsover Road) which means the effects are dissipated south of this section.

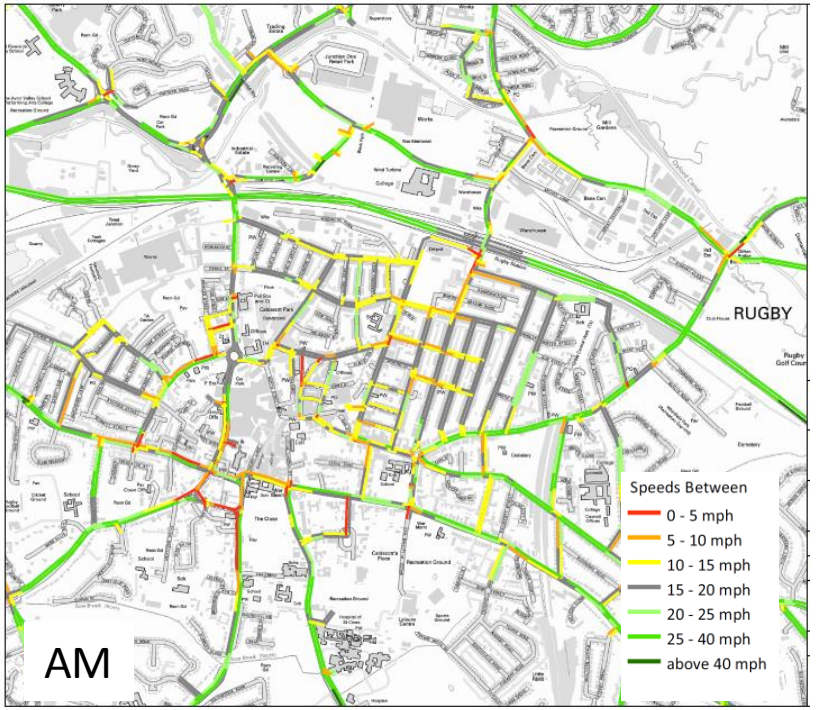
Journey Time Impacts cont.....

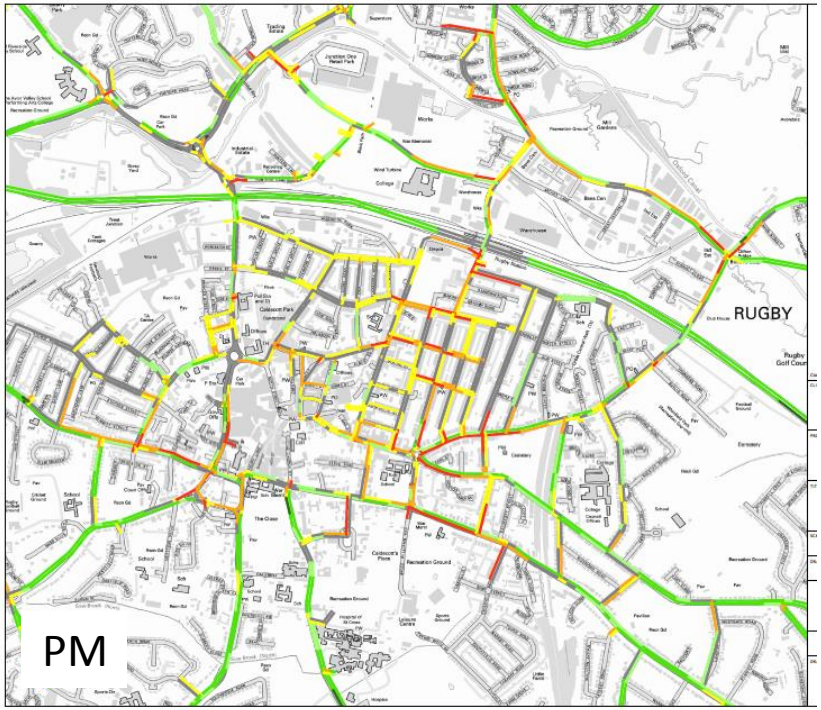
- Analysis of the impacts that occur within the PM indicate that additional attention should be afforded to the following locations:



Impacts on Link Speeds cont.....

- Refer to MS001 to MS012 for an indication of the average speeds achieved on the network for key areas of the model in both the Reference and Do Something network.
  - **Central Rugby**





Impacts on Link Speeds

- In a number of instances average speeds, during the peak hour, are observed to fall in the region of 0-5mph.
- During the AM and PM the whole of central Rugby rarely achieve average speeds greater than 20 mph. On all approaches to the gyratory the speeds don't exceed 15 mph.
- In the PM the low speeds propagating back from the area of Clifton Road/Whitehall Road/Lower Hillmorton Road reveals significant congestion patterns on all links and, again, average speeds on the junction approaches are low, rarely exceeding 10 mph.
- When reviewing the link speeds in the SE and SW sections of the network, in close proximity to some of the highest concentrations of housing, there are few instances of low speeds and therefore it is reasonable to assume that the network operation in these areas, although likely to be heavier trafficked, will remain at acceptable levels.

Summary

- When reviewing network stability it is apparent that the access strategy and distributor link, in isolation, are insufficient to mitigate the developmental impacts during the PM.
- Furthermore, the network performance of the Planning Application sensitivity test also confirms that the assignment of additional housing, in excess of the SHLAA levels identified, will require the allocation of further mitigation measures
- It is likely that the PM network performance is worse because of the constant loading pattern with regards trip profiling. During the AM there is a noticeable peak of traffic within the peak hour which then dissipates, during the PM the trip loading pattern is more constant between the 16:30 to 18:30 period meaning the network is under stress for a much longer period.
- When mitigated, the PM network performance improves substantially whilst the AM, in congestion terms, can be seen to worsen. Thus there should be further work undertaken on the optimisation and improving of scheme proposals that have been assigned within the AM model network.

Summary cont.....

- There are a number of areas which appear to suffer from congestion and delays as a result of the inclusion of the additional housing and in spite of the additional mitigation these include:
  - The Gyratory
  - The A426 between Avon Mill and the M6
  - Clifton road and specifically the junction with Butlers Leap to the north and Whitehall Road to the south.

Conclusions

- To deliver the level of housing identified to the south of Rugby, provision of the southern distributor link should be considered as critical and, furthermore, if housing is to be delivered to the southwest and southeast then the link should be provided in full.
- 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. Some of these impacts, such as the congestion levels around the gyratory, along Clifton road and along the A426 between Avon Mill and the M6 are likely to be considered severe.
- The performance of the Gyratory potentially represents one of the biggest constraints to growth on the network. Options for highway interventions in this area are limited and consideration should be given to options which either divert traffic away from this junction or reduce the number of car based trips to the town centre, from the new sites, altogether.

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 is likely to generate traffic levels which reach and in some cases exceed, the network capacity even once mitigation measures have been assigned.
- The location of the developments in the broad locations identified (southeast, southwest and north) appear to elicit a limited volume of localised impacts, rather the majority of impacts occur away from the developments in areas where congestion problems either already exist or have been forecast as likely to occur in the future anyway. Thus it can be concluded that the development locations are favourable in terms of transport impacts, so long as they are delivered alongside the associated mitigation measures, but the quantum of development may be too high to be accommodated without the occurrence of some severe impacts.

Recommendations & Future Considerations

- Further review of the performance of the mitigation measures within the AM and additional investigation of what, if any, supplementary measures could be assigned to the model network to improve the overall level of performance.
- Feasibility and cost estimates for the currently proposed schemes to inform any viability work pertaining to the allocations.
- 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.
- Further focussed assessment on the implication of growth on the section of the A426 between Avon Mill and the M6 is recommended to identify what, if any, additional options for mitigation in this area may exist (potential for currently un-signalised roundabouts to convert to signal control)
- Testing the impacts of allocating housing in each of the broad locations may also be desirable in order that the location with the lowest additional impact could be identified and, thus, brought forward sooner than the other areas.