

Warwickshire County Council

South Warwickshire Local Plan STA Testing

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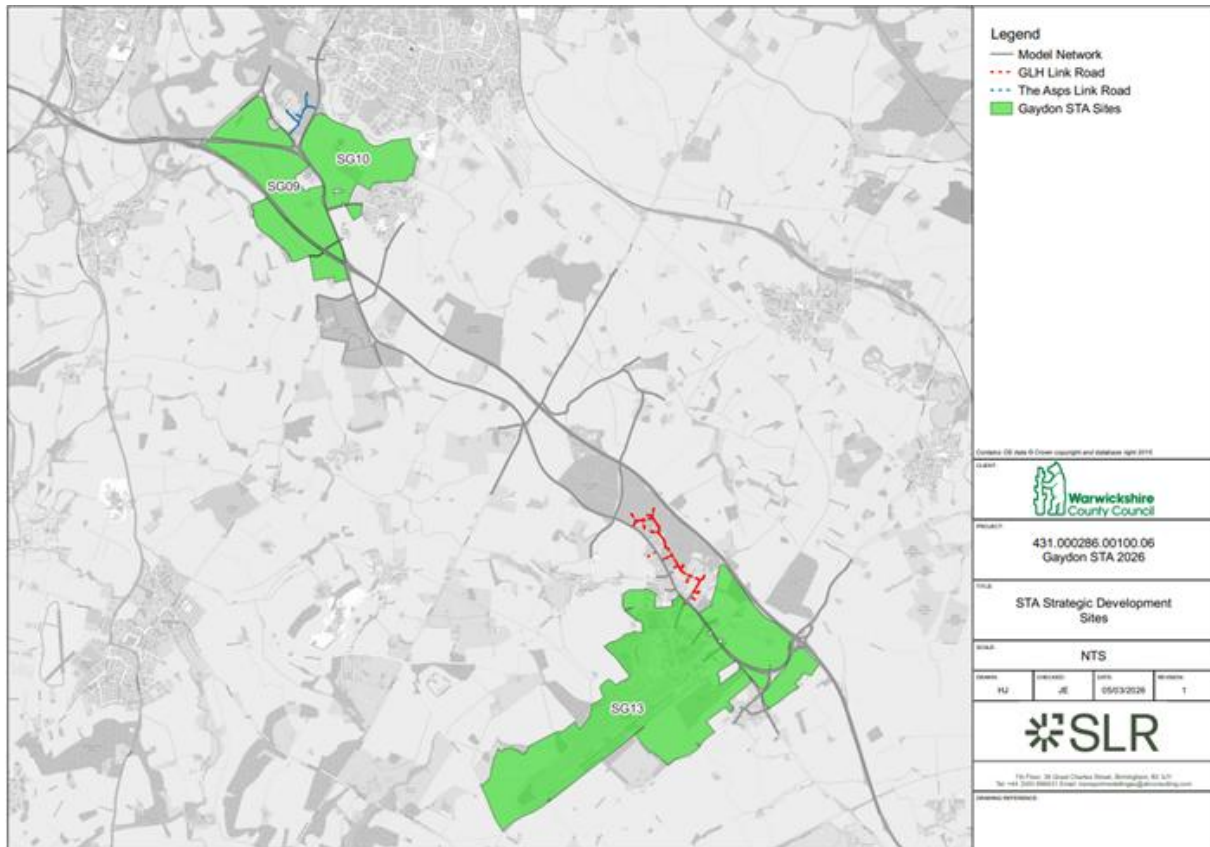
GAYDON STA TESTING RESULTS SUMMARY

1.0 Introduction

- 1.1 SLR Consulting have been commissioned by Warwickshire County Council to undertake the traffic modelling analysis used as part of the Strategic Transport Assessment (STA), with the aim of identifying the potential impacts resulting from the delivery of the developments included within the new South Warwickshire Local Plan (SWLP).
- 1.2 This technical note has been produced to outline the inclusions, required schemes and resultant impact reported within the M40 Gaydon Model network. This has been produced following the release of a detailed review of the modelling results, provided within **Appendix A**.
- 1.3 The Gaydon Model Extent, presented within **Figure 1**, covers the M40 mainline between Junctions 12 and 14, inclusive, as well as the B4100 local route between Greys Mallory Roundabout (south of Warwick) and Gaydon Village.
- 1.4 The Gaydon base model was developed in 2022 using a new set of observed traffic data across the network. Forecasting was most recently completed during early 2026 to produce an updated 2031, 2040 and 2050 Reference Case, inclusive of committed development and infrastructure, alongside predicted background growth levels informed via NTEM.
- 1.5 The SWLP STA testing presented within this note has been completed using the 2050 Reference Case scenario, as a starting point/benchmark, which assumes full build out of all committed development sites, including the GLH and Asps residential sites (and associated link roads).
- 1.6 The Gaydon model network captures several of the proposed preferred SWLP allocated sites, as shown within **Figure 1**. Each of the following have been considered within this testing:
 - **SG09 South of Warwick:** 750 Dwellings (Park Farm) and 121Ha Employment Land (Red House Farm). Also due to deliver new M40 Junction, in place of the existing Junctions 13 and 14.

- **SG10 Bishops Tachbrook:** 1,945 Residential Dwellings
- **SG13 Gaydon Lighthorne Heath:** Total of 157Ha Employment Land

Figure 1: Gaydon Model Network (with Internal SWLP Strategic Sites)



2.0 STA Model Inclusions

Internal Strategic Sites

2.1 Within the Gaydon model STA testing, detailed site inclusions have been considered for the three internal strategic sites: SG09, SG10 and SG13. A summary of each site is provided below:

- **SG09 South of Warwick:** Residential (Park Farm) and Employment (Red House Farm) elements included separately:
 - Residential (750 Dwellings):
 - Two access junctions from the A425, priority junction to north & signalised junction to the south (opp. The Asps).
 - Link Road through the site.
 - Trip Generation informed by Planning Application
 - Employment (121Ha):
 - To be delivered alongside new junction on M40, replacing slip roads at J13&14

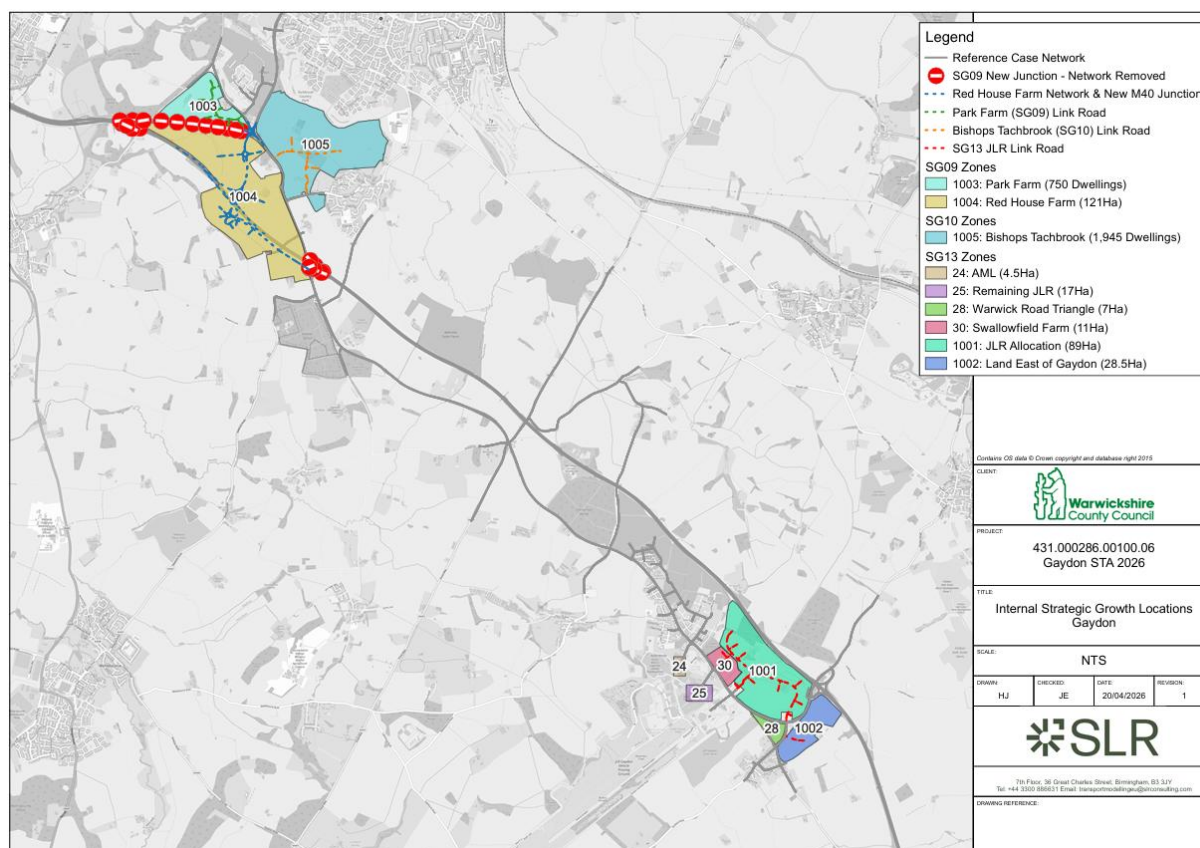


- New 40mph link road through the site, with several points of access for development trips
- Link road connects to B4100 (south of existing M40 J13 off-slip) & reconfigured Greys Mallory roundabout with bus lanes through centre (screenshot below)
- Trip Generation informed by planning application
- **SG10 Bishops Tachbrook:**
 - Two access points onto A452 Banbury Road and Mallory Road, both priority junctions
 - Link road through the site included – also due to connect to B4087, meaning some trips do not interact with model network
 - Trip Generation informed using WCC STA Trip Rates
- **SG13 Gaydon Lightthorne Heath:**
 - Employment divided across several parcels, each with distinct access strategy as summarised below:
 - AML (4.5Ha) accessed using existing ‘Kingsway’ junction
 - Remaining JLR (17Ha) accessed using existing east JLR access (Gate 2) junction
 - Warwick Road Triangle (7Ha) accessed via western arm of B4100/Kineton Road roundabout
 - Swallowfield Farm (11Ha) accessed via a link road to the north of the B4100
 - JLR Allocation (89Ha) accessed via link road (site was allocated within previous local plan)
 - Land East of Gaydon (28.5Ha) accessed via new priority junction on B4100 as shown
 - The trip generation for each parcel was also calculated separately using the following methodology:
 - Swallowfield Farm and Land East of Gaydon informed using respective pending planning applications (Transport Assessment)
 - JLR Allocation assumed to be ‘Strategic’ site: B2:B8 split of 25:75 – WCC STA Trip Rates
 - AML, Remaining JLR and Warwick Road Triangle assumed to be ‘Non-Strategic’ sites; B2:B8 split of 75:25 – WCC STA Trip Rates

2.2 The location of each internal strategic site, divided by land parcel and including all corresponding road network changes, is presented within **Figure 2**.



Figure 2: Internal Strategic Growth Locations (Gaydon)



Scenarios Assessed

- 2.3 For the purposes of this assessment, two Local Plan STA scenarios have been reported, in order to enable an assessment of the proposed new M40 Junction (and SG09 employment quantum). The resulting model scenarios reported within this note are defined as follows:
- **2050 Reference Case:** The benchmark scenario incorporating all committed development and infrastructure, including GLH and The Asps, plus background growth.
 - **Local Plan Option 1:** Inclusive of full SG10 and SG13 proposals, plus the residential (Park Farm) element of SG09 only, excluding the new M40 Junction
 - **Local Plan Option 2:** Inclusive of the SG09 employment element (Red House Farm) plus the new M40 Junction
- 2.4 The modelling analysis has also considered the operation of a ‘Do Nothing’ scenario alongside a ‘Do Minimum’ scenario which provide an indication of how the network without any schemes as well as the role that mode shift could play in managing the impacts of the proposed development traffic on the highway network.
- 2.5 The modelling results set out within the following section relate to the assessment of the above Local Plan scenarios with no further highway mitigation (‘Do Nothing’) and the consideration of modal shift only (‘Do Minimum’). Section 4 then outlines the proposed highway mitigation strategy used to develop the ‘Do Something’ scenario. The mitigation



strategy assumes the inclusion of modal shift, and the delivery of the new M40 Junction and associated new layout at Greys Mallory (Option 2).

- 2.6 Finally, Section 5 sets out the final modelling outcomes for Local Plan Option 1 and Option 2, following the application of the ‘Do Something’ mitigation strategy.

Demand and Growth Level Summary

- 2.7 Demand sets for each of the scenarios reported have been developed, with the resultant hourly demand totals and growth levels, over the 2022 baseline, presented within **Table 1**.

Table 1: Demand Totals & Growth Levels by Scenario

Scenario	0700 to 0800	0800 to 0900	0900 to 1000	1600 to 1700	1700 to 1800	1800 to 1900
2050 Reference	13,822	14,637	10,787	14,903	15,128	11,411
Growth	20.17%	28.40%	23.44%	24.25%	29.11%	30.68%
Local Plan Option 1	16,287	17,548	12,612	17,181	17,926	13,172
Growth	41.59%	53.94%	44.32%	43.24%	52.99%	50.84%
Local Plan Option 2	16,993	18,648	13,598	18,162	19,026	14,007
Growth	47.73%	63.59%	55.60%	51.42%	62.38%	60.40%

- 2.8 Unlike other SWLP modelling assessments, no NTEM constraint has been applied to the demand within this modelling. This is due to the high growth levels already present within the Reference Case caused by the large internal committed development sites, The Asps and GLH (totalling over 4,000 additional dwellings) and the relatively small study area which makes the application of further regional growth constraint more complex to apply given the nature of the spatial allocation of growth across the model. However, it should be noted that this means the outputs presented reflect a worst case position concerning future traffic growth as it assumes that all trips generated by the development are new trips and it does not allow for demand responses and changes in travel patterns which occur through redistribution of traffic growth across a study area as developments build out.

Effects of Modal Shift

- 2.9 Prior to the development of the ‘Do Something’ scenarios, via the inclusion of target highway mitigation schemes, the first stage of mitigation considered within the Gaydon model consists of the application of a modal shift to the model demands. The adopted methodology for the inclusion of modal shift is consistent with that applied across all SWLP STA models, as detailed within a separate technical note.
- 2.10 As shown within **Table 2**, the impact of mode shift within the full Local Plan scenario (Option 2) is notably lower than the other SWLP modelling assessment. This is primarily as a result



of the high proportion of long strategic trips, particularly on the M40 mainline, instead of short distance local trips, which are the trips affected by the mode shift.

Table 2: Pre and Post Mode Shift Demand Comparison (Local Plan Option 2)

Scenario	0700 to 0800	0800 to 0900	0900 to 1000	1600 to 1700	1700 to 1800	1800 to 1900
Total (pre-MS)	16,993	18,648	13,598	18,162	19,026	14,007
Total (post-MS)	16,980	18,631	13,588	18,146	19,009	13,994
Total % Reduction	-0.08%	-0.09%	-0.08%	-0.08%	-0.09%	-0.10%
Internal % Reduction (excl. M40 trips)	-0.15%	-0.16%	-0.16%	-0.20%	-0.20%	-0.20%

3.0 ‘Do Nothing’/’Do Minimum’ Impacts

- 3.1 To identify the scale and nature of highway mitigation required to support traffic growth associated with the SWLP allocations, the performance of the model network has been reviewed within the ‘Do Nothing’ and ‘Do Minimum’ scenarios.
- 3.2 As outlined in the previous section, the mitigation strategy at this stage has been developed for Local Plan Option 2, which assumes delivery of the full SG09 allocation, including the Red House Farm employment site, and the construction of the new M40 junction as infrastructure which will be delivered alongside SG09. The remaining schemes are therefore identified alongside this infrastructure.
- 3.3 The following figures present the reported impact in terms of maximum queue length at each junction across the model network, within the Local Plan Option 2 Do Minimum scenario compared to the (benchmark) Reference Case.
- 3.4 Option 2 Do Minimum contains the adjustments to allow for Mode Shift alongside the proposed SG09 infrastructure.



Figure 3: 2050 Reference Case vs Local Plan Option 2 'Do Minimum' – AM Queue Impacts



Figure 4: 2050 Reference Case vs Local Plan Option 2 'Do Minimum' – PM Queue Impacts



- 3.5 The above figures, together with the detailed modelling analysis provided in **Appendix A**, lead to the following conclusions for the 'Do Nothing' and 'Do Minimum' model scenarios:
- Large queue increases are predicted at the southern junction of M40 J12 (NB On/Off Slip). This impact relates to the southbound approach on the B4451 Gaydon Road, with the resulting queue extending beyond the signals to the north and leading to queueing on the southbound M40 off-slip, close to the mainline
 - Queue impacts along the B4100 corridor, past the JLR and GLH sites. This also leads to unreleased vehicles on the side arms, leaving JLR and the GLH residential development, following the large increase in demand along the B4100 itself.
 - Major queue impacts at Harwoods House Roundabout (B4100 / Fosse Way)
 - General improvement around Greys Mallory, resulting from the revised junction layout, removal of M40 J13 slip roads, addition of link road through the employment site and direct connection between B4100 and new M40 Junction. However, despite these improvements, the AM peak still shows a queue increase on the northwest-bound approach, driven by demand associated with the SG10: Bishops Tachbrook allocation.
- 3.6 Given the network performance issues identified above, it is concluded that the highway mitigation measures outlined in the following section are essential to support the delivery of the SWLP proposals.

4.0 'Do Something' Scheme Inclusions

- 4.1 To accommodate the large levels of traffic growth present within the full Local Plan STA model scenario (Option 2), an indicative mitigation package has been developed across the Gaydon model network, creating a 'Do Something' model scenario.
- 4.2 The schemes proposed within the modelling have not been subject to any detailed design or safety review at this stage. Furthermore, it should not be assumed that the schemes recommended through this study are fixed and will be delivered in the exact form described within this report.
- 4.3 It is intended that the schemes proposed are outline schemes which may change through further optimisation and detailed design that will precede the final delivery. Thus, the concept and location of the schemes are considered fundamental rather than the precise form at this stage as it would be impractical to expect all schemes to be fully designed at this stage of the assessment, particularly given the extended time frame associated with the delivery of the Local Plan.
- 4.4 In addition to the highway schemes, signals timings across the network have also been refined and optimised where necessary. It is expected that specific requirements to optimise signalised junctions will be identified during the detailed planning phases associated with the allocated sites and that these assumptions would be revisited at that time. The location of each mitigation scheme is presented within **Figure 5** below, with further details on each scheme provided within the following text.



Figure 5: Gaydon ‘Do Something’ Scheme Locations



Scheme 1: B4100 / B4451 Crossroads

4.5 Improvement required due to large queue on the northern arm, out of JLR allocation. No road network changes applied but a new stage introduced to the existing signals, allowing left turners from the north green time alongside left turners from the south and right turners from the east and west.

Scheme 2: B4100 / JLR Gate 2 / Swallowfield Farm

4.6 Improvement required due to long queue exiting JLR car park, resulting in a large number of unreleased vehicles within the model. Also, the existing ‘reversed’ priority layout on the eastern approach to the roundabout results in a small number of model ‘lockups’ due to the resulting queue from the circularity, blocking back through the whole junction (preventing any further vehicles entering the roundabout).

4.7 Roundabout converted into a 4-arm signalised crossroads with two free-flowing slip lanes, the existing slip from the B4100 east into JLR and a new slip from JLR onto the B4100 westbound. Also adds full eastbound dualling between this junction and the British Motor Museum junction to the east.

4.8 Two lanes available for movements from both the B4100 west and JLR approaches, onto the eastern exit.



Scheme 3: B4100 / Kingsway

- 4.9 Improvement required due to long queues on southern arm (AML access), resulting in a large number of unreleased vehicles within the model. Retains current roundabout with the addition of a free-flowing slip from Kingsway/AML onto the B4100 westbound. Allows two lanes to the eastern B4100 arm from both the west (B4100) and south (Kingsway/AML access).

Scheme 4: Central GLH Residential Priority Junction

- 4.10 Following delivery of both the committed developments and SWLP sites, particularly the GLH residential and SG13, the resulting large traffic growth along the B4100 leads to major congestion at junctions along the corridor. This includes the three access junctions for the GLH development link road. These junctions consist of priority roundabouts to the north and south, plus a smaller T-junction in the centre.
- 4.11 However, with long queues on the roundabout accesses, the central junction experiences a large increase in demand, resulting the queueing both into and out of the reasonably small GLH arm.
- 4.12 To mitigate this queue and reduce the potential safety issue caused, the junction has been assigned as left-in left out (LiLo) only, banning all right turns.

Scheme 5: B4100 / Fosse Way (Harwoods House) Roundabout

- 4.13 Major improvement required due to long queues on most approaches following the large traffic growth along the B4100.
- 4.14 Major widening has been at the junction to accommodate this increased demand, comprising increases from 2 to 3 lanes on both B4100 and Fosse Way approaches. In addition to the associated widening on the circularity, the roundabout lanes have been assigned to allow 2 lanes to be used for the following movements:
- B4100 Northbound and Southbound
 - From B4100 South to Fosse Way Northeastbound
 - From Fosse Way South to B4100 Northbound
 - Fosse Way Northeastbound

Old Gated Road Closure

- 4.15 In addition to the above junction improvements, it has also been decided to permanently close The Old Gated Road, between the B4100 and Chesterton Green, to all vehicular traffic.



- 4.16 Prior to the inclusion of the Do Something schemes, particularly at the nearby Harwoods House roundabout, the route was being used as a ‘rat-run’ away from the large B4100 northbound queue, resulting in possible peak hour two way up to 500 vehicles. This is significantly over capacity for the current single-track route.
- 4.17 Delivery of the scheme at Harwoods House provides sufficient capacity on the preferred B4100 / Fosse Way route, allowing for the complete closure of the Old Gated Road.

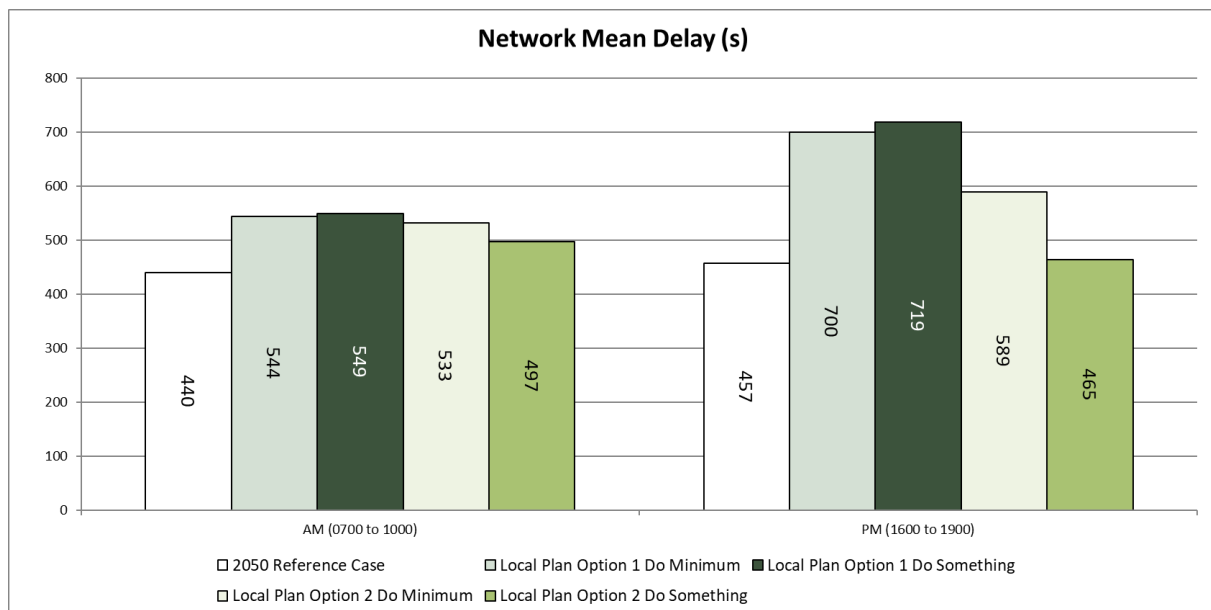
5.0 ‘Do Something’ Impacts

- 5.1 The following section presents the final impact across the Gaydon model network following the inclusion of the ‘Do Something’ highway mitigation within both the Local Plan Option 1 and Option 2 scenarios, testing the STA impact with and without the new M40 junction.
- 5.2 The differences between these scenarios have been set out earlier within this note. All results have been compared to the benchmark 2050 Reference Case scenario, representing the baseline conditions prior the SWLP inclusions.

Strategic Level/Network Wide Impacts

- 5.3 **Figure 6** presents the average journey time for all trips across the model network, representing a strategic level indication of impact pertaining to both the SWLP as well as the new M40 Junction (Option 2).

Figure 6: Network Wide Delay (Seconds) by Scenario



- 5.4 As shown above, despite the inclusions of the ‘Do Something’ schemes, Local Plan Option 1 results in a significant impact on the Gaydon model network operation, particularly within the PM, where average delay increases by up to 60% over the benchmark scenario. Option 1 does not deliver any improvements around the Greys Mallory junction and M40 Junctions 13 and 14, leading to major delays within the area.



5.5 Following delivery of the new M40 Junction and the SG09 employment element, in addition to removal of the existing Junction 13 and 14 slip roads, and reconfiguration of Greys Mallory, this delay improves significantly. Compared to the benchmark, this full SWLP scenario, with mitigation applied, results in a 13% and 2% increase in delays across the network during the AM and PM peak periods, respectively.

Localised Queue Impacts

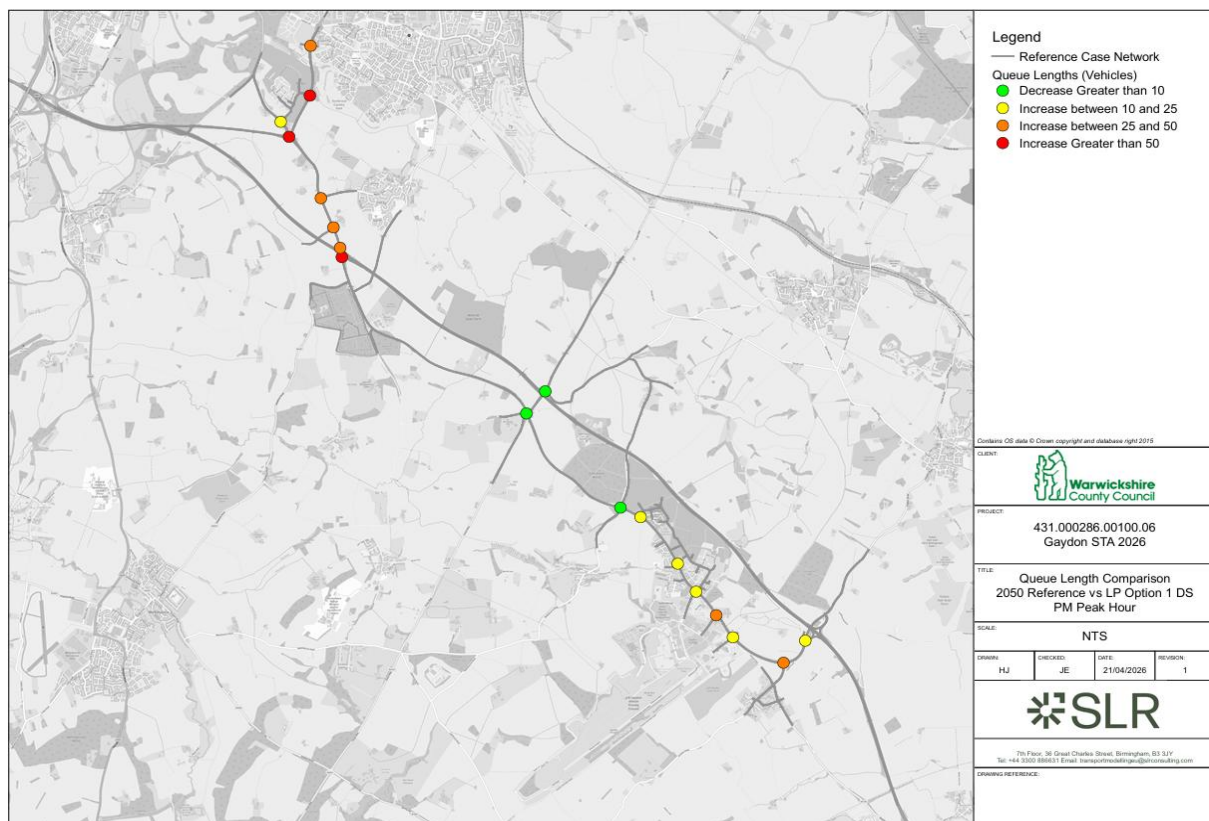
5.6 The following analysis presents the localised impact across the model network, based upon the changes in queue lengths within each Local Plan scenario, when compared to the benchmark scenario.

Local Plan Option 1

Figure 7: 2050 Reference Case vs Local Plan Option 1 – AM Queue Impacts



Figure 8: 2050 Reference Case vs Local Plan Option 1 – PM Queue Impacts



5.7 The queue impact plots for Option 1 show significant increases (over 50 vehicles in length) at the following junctions:

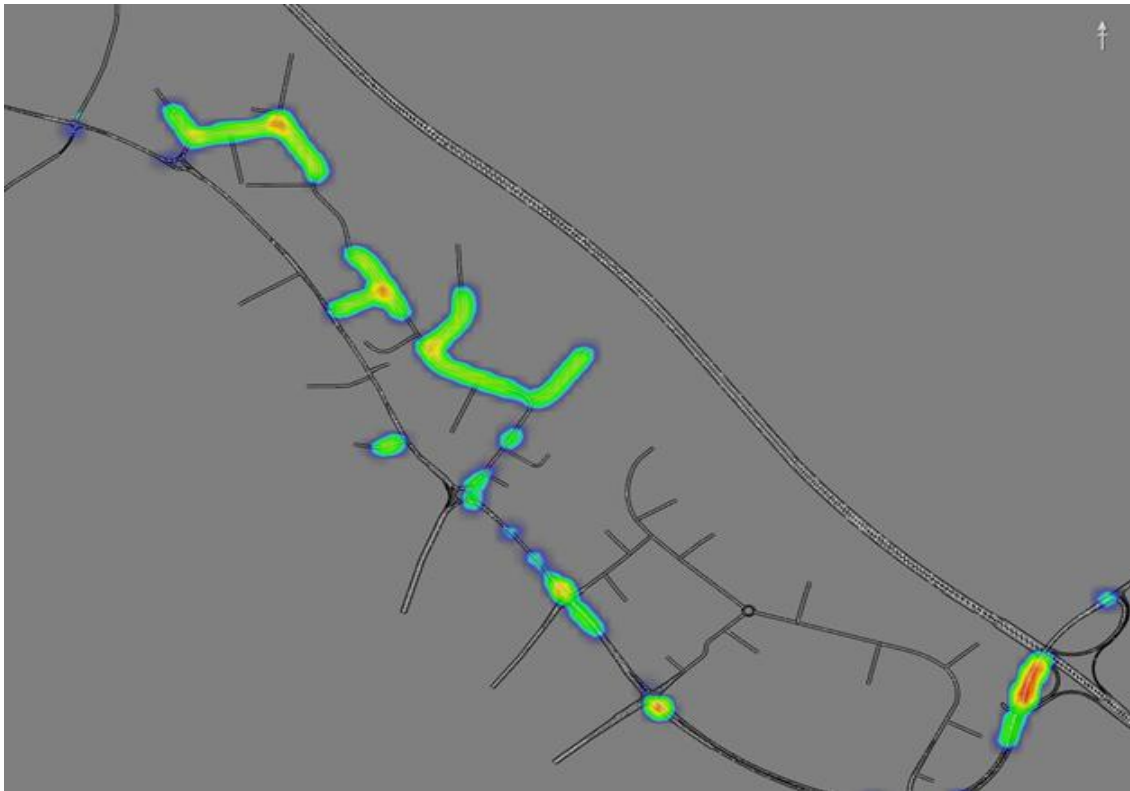
- B4100 / GLH Western Access Roundabout – AM Peak Hour
- B4100 / White Lias Way (GLH Eastern Access) / Kingsway Roundabout – AM Peak Hour
- Greys Mallory Roundabout – PM Peak Hour
- Europa Way / The Asps Access – PM Peak Hour
- M40 Junction 13 – PM Peak Hour

5.8 During the AM period, major queue increases are reported at several junctions along the B4100 corridor, relating to queueing on the side arms, namely out of the GLH residential development. An example of this within the model is shown by the snapshot in **Figure 9**.

5.9 While long peak queues leaving the residential area are a concern, further scheme improvements to the accesses and the wider B4100 corridor were not applied due to a lack of space for further widening.



Figure 9: B4100 Corridor / GLH Access – Local Plan Option 1 Model Screenshot



- 5.10 Without the inclusion of the SG09 employment (Red House Farm) and associated new junction on the M40, Local Plan Option 1 reports a significant queueing impact around Greys Mallory Roundabout, with long queues during both the AM and PM Peak Periods, as presented within the following screenshots:



Figure 10: Greys Mallory – Local Plan Option 1 Model Screenshot

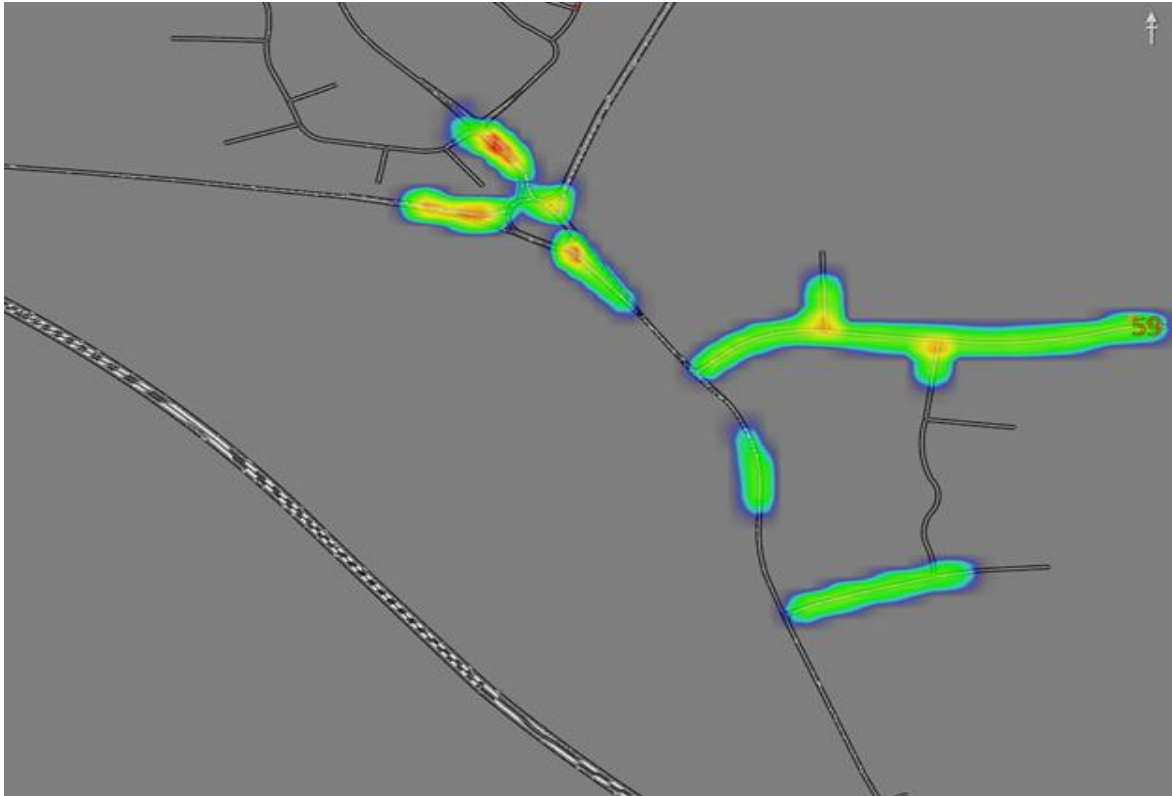


Figure 11: Greys Mallory – Local Plan Option 1 Model Screenshot



- 5.11 The previous queue plots demonstrate that if the new M40 Junction layout is not delivered, a new scheme will be required at the Greys Mallory junction, in place of the existing full signalisation committed improvement.
- 5.12 In addition to the Greys Mallory junction itself, a lengthy separate queue (not caused by an upstream queue blocking back) is also reported on the Mallory Road approach to the B4100 and the new Bishops Tachbrook allocation (SG10) access priority junction. It is also therefore necessary to consider a revision to the proposed access strategy.

Local Plan Option 2

Figure 12: 2050 Reference Case vs Local Plan Option 2 – AM Queue Impacts



Figure 13: 2050 Reference Case vs Local Plan Option 2 – PM Queue Impacts



5.13 Following delivery of the full SWLP proposals within the Local Plan Option 2 scenario, and delivery of the new junction and supporting infrastructure onto the M40, the number of queue impacts are significantly reduced. It is clear that delivering this junction, alongside the SWLP allocations, results in an acceptable level of network operation within this area, albeit there remain some residual issues along the B4100.

5.14 The residual queueing impacts are concentrated around the GLH access junctions, most notably during the AM peak hour, as shown previously within **Figure 9**. While these queue clear toward the end of the peak hour, and do not extend through multiple junctions along the corridor, consideration may be given to revising the current GLH residential access arrangement, to reduce the potential implications arising from large queues leaving the site.

6.0 Conclusions

6.1 The Do Something highway mitigation package identified through this study provides substantial improvement across the network and supports the delivery of the SWLP allocations. Most critically this comprises the M40 junction and associated wider highway works associated with SG09.

6.2 Once included within the modelling, key junctions, including the Harwoods House roundabout, the JLR access points, and the B4100 corridor, operate at manageable levels once mitigation is applied. Queueing at M40 J12 which was identified within the previous Do Minimum testing is suitably mitigated and therefore the previous suggestion identified within



the adopted SDC Core Strategy (2017) that the M40 J12 NB on slip would need to be upgraded is no longer considered necessary.

- 6.3 The delivery of the identified mitigation on the B4100 corridor, and at the Harwoods House roundabout, combined with the new junction on the M40, results in a more attractive route between Gaydon/JLR and northbound on the M40, reducing the traffic flows through M40 Junction 12. This reduces the requirement for further changes to M40 Junction 12.
- 6.4 The final 'Do Something' scenario presented, inclusive of SG09 employment and the new M40 junction, (which replaces the existing slip roads at Junctions 13 and 14), reports some potential further limitations which should be considered at a later stage. These are defined as follows:
- GLH residential access junctions along the B4100 corridor see long queues leaving the site in the AM. Consideration may be given to revising the access, possibly to consider signalisation
 - The updated layout at Greys Mallory, while being a major improvement on the existing layout/scheme, still reports long queues on the NWB approach, mainly caused by trips from the SG10/Bishops Tachbrook allocation. Consideration may be given to revising this scheme to accommodate these trips, appreciating the current scheme design did not consider the large development at Bishops Tachbrook.
 - Further alterations may be required at the new M40 junction, particularly the southern dumbbell roundabout, which sees a large number of trips from the B4100 accessing the M40. This will be improved by widening the northbound approach to 2 lanes.
 - The current assumed access to SG10 allocation appears to be over capacity, this should be revised at detailed design stage.
- 6.5 The Do Something mitigation package presented within this report is dependent on the delivery of the new M40 Junction (and supporting infrastructure). Without this, the existing layout at the Grey's Mallory roundabout (full signalised as per the committed scheme) and M40 Junctions 13 and 14 are predicted to operate significantly over capacity following delivery of the SWLP proposals.

Recommendations for Further Stages of Analysis

- 6.6 It is anticipated a subsequent phase of analysis would comprise a review of Greys Mallory design in the context of SG10 demand in full and the residential element of SG09 to understand the extent to which development in this area may benefit from the proposed consolidation of M40 J13/J15. However, as agreed with National Highways, detailed analysis of the J13/14 consolidation will be completed within the WLWA model since this model also reflects J15 alongside J14/13 and so is a more appropriate model to apply in this context meaning that assessment will likely be undertaken within the WLWA model.
- 6.7 In addition to reviewing the operation of the Grays Mallory junction in detail outwith the proposed SG09 employment, the following stages may be beneficial:



- Further review and refinement of the schemes proposed along the B4100 to determine if they can be further optimised to better manage the congestion observed on the side roads around the GLH residential area.
- A review of the active and sustainable transport strategy proposals may be beneficial to identify opportunities to achieve higher levels of reduced car dependency and additional schemes which may support the development proposals and minimise the traffic generation created by the sites alongside the associated impacts.



Appendix A Initial Model Outputs



