Land Northeast of M42 Junction 10
Note on AECOM TRANSYT 2033 Local Plan Comments, April 2024

Client: Hodgetts Estates Limited — Date: 10 April 2024

1 Introduction

1.1 Tetra Tech (TT) have been appointed by Hodgetts Estates Limited to provide technical highways and transport support for their outline planning application comprising a proposed development of up to 100,000sqm employment uses and 150-space overnight lorry park (including an associated 400sqm amenity block) on land to the northeast of M42 Junction 10. The application is supported by a Revised Transport Assessment (TA) prepared by TT, dated February 2023, and a TA Addendum (TAA), dated December 2023.

1.2 This Note seeks to address the comments made by AECOM acting on behalf of National Highways (NH), provided by email from Patrick Thomas on 28th March (attached in Appendix A), in relation to TT's M42 Jn10 TRANSYT Note, dated 8th March 2024, and the v7 TRANSYT model files also supplied on 8th March.

1.3 A meeting between TT, Hodgetts Estates, NH and AECOM was held on 28th March to discuss the comments raised in the email from Patrick Thomas, a copy of the meeting note is attached in Appendix B.

1.4 Each comment raised has been addressed in turn below.

2 General

2.1 **NH/ AECOM comment summary**: *Where there is blocking back on a roundabout circulatory lane, TRANSYT will not be able to model the effect of the blocking back on the other approach lanes that do not connect into the blocking back lane. Where this situation arises, the queues on these approach lanes could be under-estimated. This is more of a concern in the with development scenario due to the increased queues on certain links. A potential aid to the model understanding the blocking back could be to add more connectors to enable the model to better understand the blocking back, whilst maintaining the flow patterns. This could also assist in enabling some lane switching on the longer sections of the gyratory to aid the balancing of flows on each lane where practical.*

2.2 At the 28th March meeting it was confirmed that AECOM only have concerns with queues from the 2033 Local Plan modelling results with the proposed Additional Mitigation (3-lane eastbound exit from Junction 10), i.e. Table 5.5a in the March 2024 TRANSYT Note. The modelling of and the impact of the proposed development generated traffic on the network is acceptable for the 2026 and 2033 Reference Case scenarios as well as the 2033 Local Plan scenario.

3 AM Peak Operation

3.1 **NH/ AECOM comment summary**: *The queue on the circulatory lane next to the Trinity Road approach (Link 27/2) sees a minor increase (15pcu to 16pcu or 92m). This queue will stretch back to the A5 Westbound entry. Although this blocking back will be taken into effect on Links 23/2 and 22/2 (the two lanes that feed it), the blocking back will also affect traffic trying to enter the roundabout on Links 23/3 and 23/4 (the offside two lanes of the A5 Westbound approach). This effect is not currently modelled in TRANSYT, so the queuing on Links 23/3 and 23/4 will be higher than predicted. However, in this instance increased queues on Links 23/3 and 23/4 are likely to be accommodated on the existing highway due to the distance back to proposed site access junction. They could increase to levels predicted on the nearside lane, which the TRANSYT animation mode has indicated would stretch back to the access junction on occasions even though the Mean-Max Queue is shown not to stretch back this far. The introduction of a yellow box or similar could potentially mitigate any issues at the access junction or queueing would be contained within the site if it was unable to get out onto the A5. This approach is of a concern but our feeling is that it is likely not to be a material impact, although the model should be updated to better reflect the true impact in terms of queues for review.*

3.2 Image 1 below was included in the AECOM email of 28th March to illustrate the comment raised.

Image 1: AECOM Screenshot of the A5 Eastern Approach to Junction 10 (AM Peak)

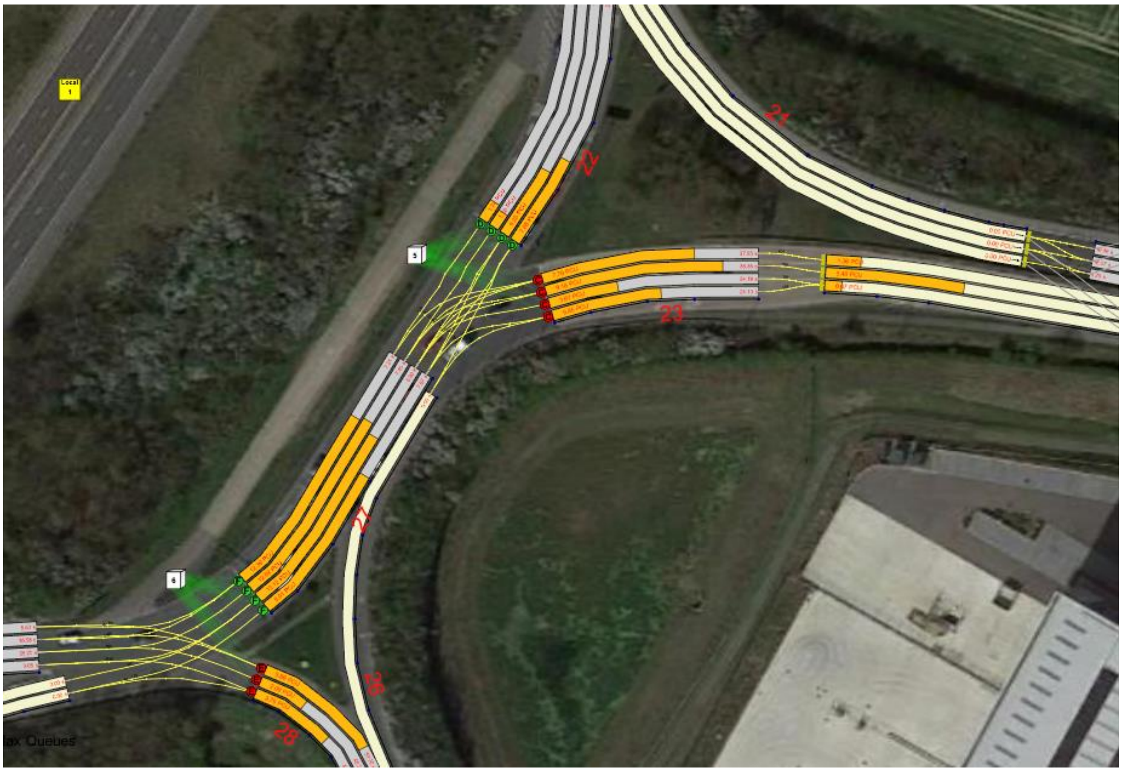
3.3 As suggested by AECOM in their email and meeting (28th March), additional lane connectors have been added on the circulatory lanes of the roundabout so that traffic can switch lanes to join a shorter queue, as this would occur in reality, so

3.4 effectively making the model less "rigid" and more flexible in its operation. In addition, as also suggested by AECOM, traffic flows on the approach lanes have been slightly adjusted to more evenly distribute the flows and balance the queues.

3.5 Image 2 below shows the equivalent revised TRANSYT modelled queues. Briefly, this shows the circulatory queue on Link 27/2 is now shorter at 12pcu (reduction of 4pcu) and less likely to block back and affect traffic trying to enter the roundabout from Links 23/3 and 23/4. However necessary connectors have been added so that blocking back will be captured.

3.6 The changes on Link 22 are discussed in the sections below.

Image 2: Revised Modelling, A5 Eastern Approach to Junction 10 (AM Peak)



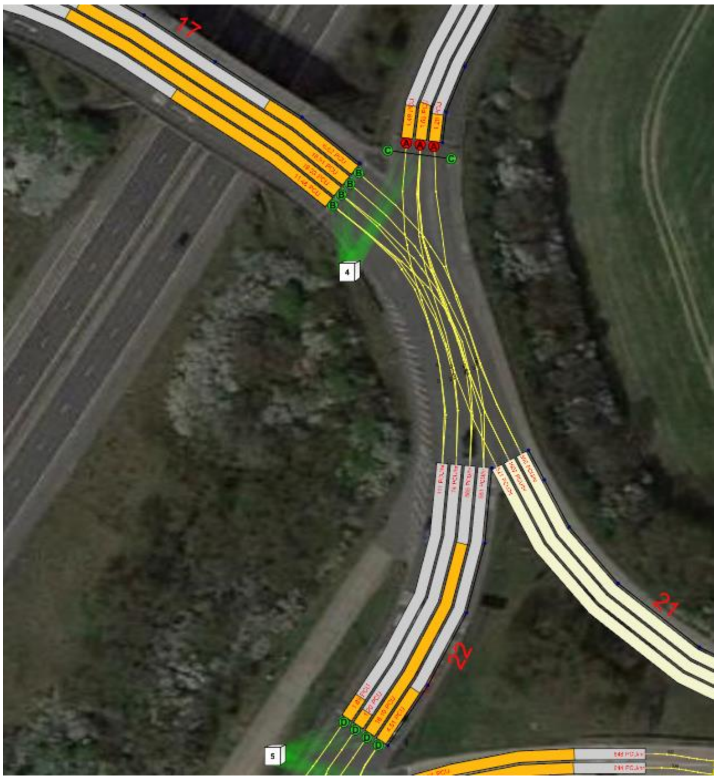
3.7 Table 5.5a v2 AM Peak attached in Appendix C shows the results for No Development, With Development (original results) and With Development (after the adjustments above) for comparison purposes. These show that by making adjustments to the traffic flow allocation and facilitating lane switching elsewhere on the roundabout, the queue on the circulatory Trinity Road approach (Link 27/2) is reduced to 12pcu (69m) from 16pcu. The predicted queue is unlikely to affect traffic trying to enter the roundabout from Links 23/3 and 23/4 (offside two lanes of the A5 westbound approach). Increased queues on Links 23/3 and 23/4 are therefore unlikely to occur as the model shows there isn't a problem with queuing back from the downstream Link 27/2. The predicted queue on Link 27/2 is also shorter than that in the No Development scenario (15pcu).

3.8 AECOM stated that updates to the model would provide a better reflection of the true impact in terms of queue and the revised TRANSYT animation feature (with model updates discussed above) now does not show queueing back to the site access junction, therefore the introduction of a yellow box as suggested by AECOM is not required at the site access junction.

3.9 **NH/ AECOM comment summary**: *With the increased blocking back to Link 22/2, the results show that the queue on this Link will increase from 6pcu (35m) to 17pcu (98m), this is a potential concern. The distance back to the A5 Eastbound exit from the roundabout on this lane is approximately 90m, and it is likely that this queue would impede traffic leaving the roundabout from the northern overbridge (Links 17/1, 17/2, 17/3 and 17/4), which the model currently does not fully account for. As the queues reported are Mean-Max Queues, they are an average of the maximum queues each cycle, so in reality the quoted queue length will be exceeded at times.*

3.10 Image 3 below was included in the AECOM email of 28th March illustrating the comment raised.

Image 3: AECOM Screenshot of the A5 Eastbound Exit at Junction 10 (AM Peak)



3.11 As suggested by AECOM additional lane connectors have been included to enable traffic to switch lanes to join shorter queues. In addition, the traffic flows between the lanes on the approaches and circulatory carriageway have been adjusted to improve the flow balance.

3.12 Image 4 below shows the revised TRANSYT queues and resultant queues summarised further below. Briefly, this shows the circulatory queue on Link 22/2 is reduced from 17pcu to 6pcu (a reduction of 11pcu) and much less likely to block back and affect traffic leaving the roundabout from the northern overbridge (Links 17/1, 17/2, 17/3 and 17/4). The queue on lane 22/1 has increased from 5pcu to 8pcu, and is some 46m in length. This queue does not extend back to the A5 eastbound exit.

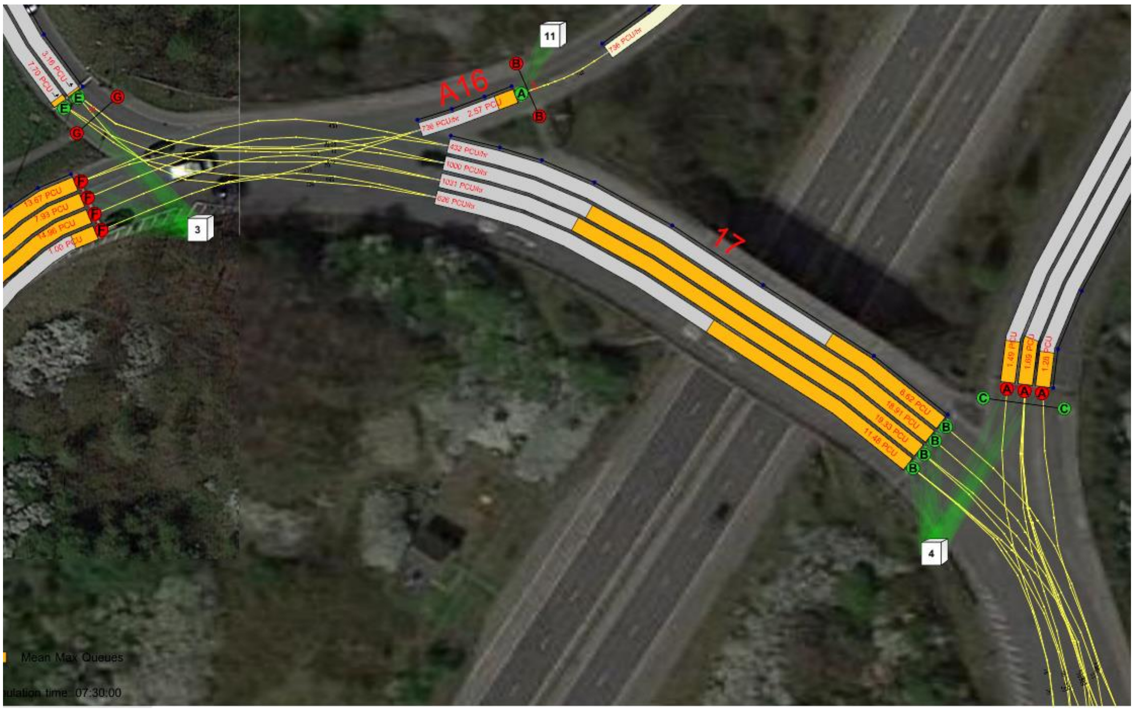
Image 4: Revised Modelling, A5 Eastbound Exit at Junction 10 (AM Peak)

3.13 Table 5.5a v2 AM Peak attached in Appendix C shows the results for No Development, With Development (original results) and With Development (after the adjustments above) for comparison purposes. Image 4 and Table 5.5a v2 AM Peak shows that by making adjustments to the traffic flow allocations and facilitating lane switching elsewhere on the roundabout, the queue on the circulatory Link 22/2 is reduced to 6pcu from 17pcu. The predicted queue is also the same as the No Development scenario (6pcu). The queue on the circulatory Link 22/1 has increased from 5pcu to 8pcu (48m) which is some 4pcu less than the No Development situation. The distance back from the eastbound circulatory stop line to the A5 Eastbound Exit is 53m, therefore the predicted queue of 8pcu (48m) is unlikely to impede traffic leaving the roundabout from the northern overbridge (Links 17/1, 17/2, 17/3 and 17/4). However, the model is set up so that if there are short-lived queues which do block back, then the consequential upstream effects are appropriately modelled.

3.14 **NH/ AECOM comment summary**: *As Links 17/1, 17/2 and 17/3 (the three lanes going to the A5 Eastbound exit) do not take into effect the blocking back on Link 22/2, the modelled queues will be greater than predicted currently in the model outputs. Whist the queue on Lane 3 is predicted to fall from 21 to 19pcu (109m), the queue on lane 2 is predicted to increase from 16 to 19pcu (109m) with the distance back to the M42 Northbound On-slip on this lane being approximately 98m. Of the three northern overbridge lanes that go the A5 Eastbound exit, TRANSYT sees an imbalance with half the flows on lane 1 compared to lanes 2 and 3. Half of the flow on lane 3 stays on the roundabout (going to Link 22/1), but it would be fair to assume that there would be a more equitable split across the three lanes (currently 432 in lane 1, 1000 in lane 2 and 1031 in lane 3). TRANSYT is quite limited in its ability for vehicles to change lane on Links (unless set up with multiple connectors), which is likely to happen in reality and is replicated in software such as VISSIM. With a more equitable lane split, it is less likely queues will block back to the M42 Northbound on-slip. Can the applicant see if they can resolve this matter with a model amendment.*

3.15 Image 5 below was included in the AECOM email of 28th March illustrating the comment raised.

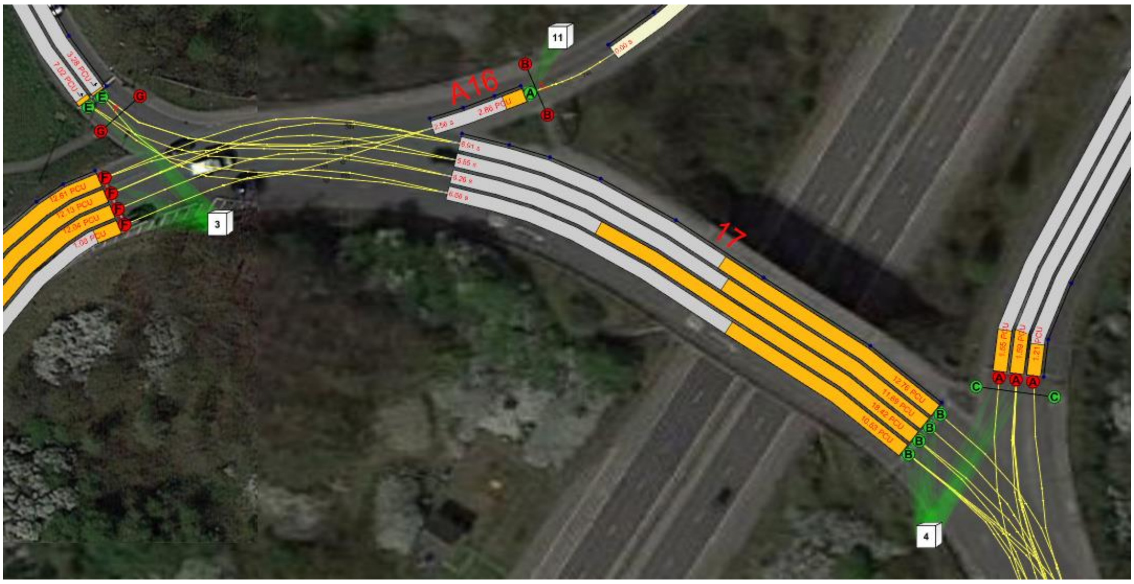
Image 5: AECOM Screenshot of the Northern Overbridge and Exit to the M42 Northbound On-Slip (AM Peak)



3.16 As suggested by AECOM additional lane connectors have been included to enable traffic to switch lanes to join shorter queues. In addition, the traffic flows between the lanes on the approaches and circulatory carriageway have been adjusted to improve the flow balance.

3.17 Image 6 below shows the revised TRANSYT queues. Briefly, this shows the circulatory queue on Link 17/2 is reduced by 5pcu to 12pcu (69m) which does not block back to the M42 northbound on-slip. The queue on Link 17/3 is 18pcu, a reduction of 1pcu. This queue extends to the M42 northbound exit, but does not impede M42 bound traffic as this is the nearside two lanes (Links 15/1 and 15/2 are allocated for Green Lane and M42 North).

Image 6: Revised Modelling, Northern Overbridge and Exit to the M42 Northbound On-Slip (AM Peak)



3.18 Table 5.5a v2 AM Peak attached in Appendix C shows the results for No Development, With Development (original results) and With Development (after the adjustments above) for comparison purposes. The Table shows that by making adjustments to the traffic flow allocations and facilitating lane switching elsewhere on the roundabout, the queue on the circulatory Link 22/2 is reduced to 6pcu (35m) from 17pcu. Links 17/1 to 17/3 (three lanes going to the A5 Eastbound Exit) are therefore unlikely to experience blocking back from Link 22/2. As a result of the changes, the split of traffic on the three Northern Overbridge lanes which go to the A5 Eastbound Exit is more balanced, i.e. 689/ 793/ 955 in Lane 1/ Lane 2/ Lane 3 as opposed to 432/ 1000/ 1031.

3.19 The modelling results reflect these changes and now show the queue on Link 17/2 is 13pcu (75m) reduced from 19pcu, which is also 3pcu shorter than the No Development queue. The queue on Link 17/3 is 18pcu (104m), 3pcu shorter than the No Development queue of 21pcu. With the more equitable lane split and reduction in queues the queue in 17/3 does extend back to the M42 northbound exit, but does not block the exit because traffic for M42 north is located in the adjoining 2 nearside lanes (Links 15/1 and 15/2). As noted elsewhere, the model is set up so that if there are short-lived queues which do block back, then the consequential upstream effects are modelled.

Summary

3.20 The TRANSYT Local Plan model with additional mitigation (three A5 eastbound exit lanes) has been modified following AECOM's suggestion to include additional connectors so that areas of potential blocking back are appropriately modelled, to facilitate lane switching and to adjust the split of traffic between lanes. As a result of the changes, the critical queues identified by AECOM in the AM Peak With Development model are now shorter than the previous modelling results and queueing back is unlikely to affect upstream Links either trying to enter the roundabout or blocking the paths to exit the roundabout. In addition, the critical queues on Links identified by AECOM are less than the No Development queues.

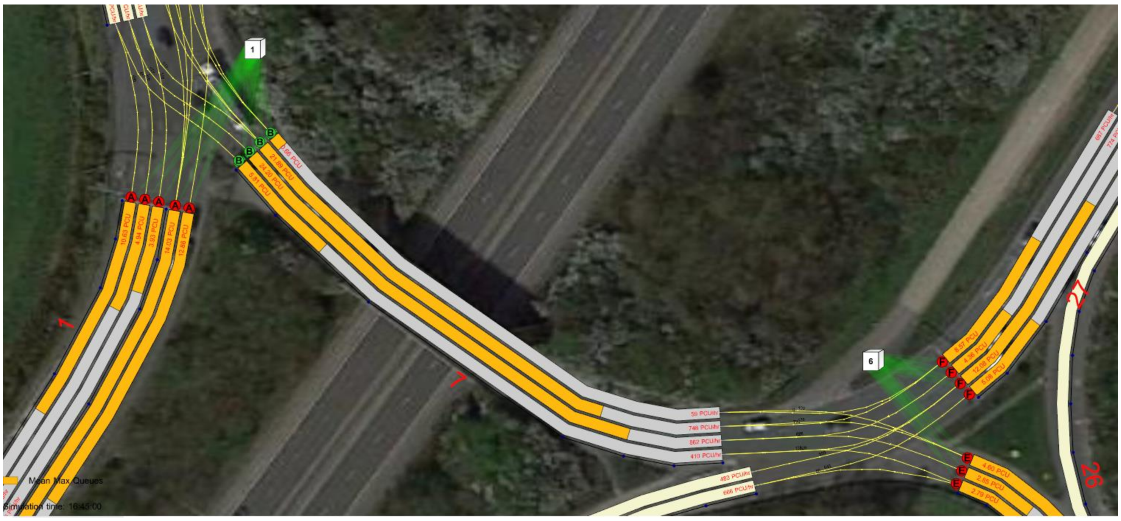
3.21 The impact of the proposed development in the 2033 Local Plan scenario (with additional mitigation) is considered to be acceptable and not severe with reference to National Planning Policy Framework (NPPF) para 111.

4 PM Peak Operation

4.1 **NH/ AECOM comment summary**: *In the PM Peak, the main area of concern is on the southern circulatory (Link 7). Lane 2 sees the queue increase from 20 to 25pcu (144m), whilst lane 3 sees the queue increase from 18 to 22pcu (127m). On both lanes, the distance back to the M42 southbound on-slip is approximately 120m. Such a queue wouldn't block traffic getting onto the M42, but may stop traffic getting onto the roundabout from Trinity Road, which isn't a material concern to National Highways. Lanes 1, 2 and 3 on the southern overbridge all go to the A5 westbound exit (lane 3 is shared with traffic remaining on the roundabout). As with the issue highlighted on the northern overbridge in the AM Peak, lane 1 sees half of the flow exhibited on lanes 2 and 3 (410 on lane 1, 862 on lane 2 and 748 on lane 3). It would be fair to assume that in reality some of the lane 2 and lane 3 flows heading to the A5 will move over to lane to create a fairer balance of flows and therefore reducing the queue lengths on lanes 2* *and 3. TRANSYT is limited in its ability for vehicles to change lanes whilst on the lanes, unlike as it would happen in a more sophisticated VISSIM model. An amended model with additional connectors may be able to resolve this matter.*

4.2 Image 7 below was included in the AECOM email of 28th March illustrating the comment raised.

Image 7: AECOM Screenshot of the A5 Southern Overbridge at Junction 10 (PM Peak)



4.3 As suggested by AECOM additional lane connectors have been included to enable traffic to switch lanes to join shorter queues. In addition, the traffic flows between the lanes on the approaches and circulatory carriageway have been adjusted to improve the flow balance.

4.4 Image 8 below shows the revised TRANSYT queues. Briefly, this shows the circulatory queue on Links 7/2 and 7/3 are now shorter (reduction of 5pcu to 20pcu, and a reduction of 3pcu to 19pcu in Links 7/2 and 7/3 respectively) and are less likely to block back and affect traffic exiting to the M42 southbound on-slip. The model is set up so that if there are short-lived queues which do block back, then the consequential upstream effects are modelled.

Image 8: Revised Modelling, Southern Overbridge at Junction 10 (PM Peak)

4.5 The model results are summarised in Table 5.5a v2 PM Peak. This shows that by making adjustments to the traffic flow allocations and facilitating lane switching elsewhere on the roundabout there is a more balanced division of traffic flows on the overbridge; Link 7/1 488pcu, 7/2 962pcu, 7/3 781pcu, and 7/4 207pcu as opposed to respectively 635pcu, 932pcu, 754pcu and 116pcu. With the changes made, the queue on Link 7/2 is reduced to 20pcu (115m) from 25pcu, which is also the same as the No Development queue. In Link 7/3 the queue is reduced to 19pcu (109m) from 22pcu, which is 1pcu more than the No Development queue. Lane 2 (Link 7/2) is fed by Link 27/3 and if the queue extends back to the stopline of Link 27/3 it does not block the exit to the M42 southbound from the nearside Links 27/1 and 27/2. Traffic from the 3rd lane of Trinity Road (Link 28/3) would be affected if the queue was 23pcu (130m), therefore the predicted queue of 20pcu (115m) would not affect traffic joining onto the roundabout from Trinity Road. The effects of short-lived queues which do block back and the knock-on effects on Trinity Way are included in the model.

<u>Summary</u>

4.6 The TRANSYT model with additional mitigation (three A5 eastbound exit lanes) has been modified following AECOM's suggestion to include additional connectors so that areas of potential blocking back are appropriately modelled, to facilitate lane switching and to adjust the split of traffic between lanes. As a result of the changes, the PM peak With Development critical queues identified by AECOM are now shorter than the previous modelling results and queueing back is unlikely to affect upstream links either trying to enter the roundabout or blocking the paths to exit the roundabout. The model is set up so that if there are short-lived queues which do block back, then the consequential upstream effects are modelled.

4.7 The impact of the proposed development in the 2033 Local Plan scenario (with additional mitigation) is considered to be acceptable and not severe with reference to National Planning Policy Framework (NPPF) para 111.

5 Microsimulation Modelling and TRANSYT

5.1 **NH/ AECOM comment summary**: *The TRANSYT model has its limitations in terms of vehicles being able to change lane in relation to where queues are. The flows profiles entering the network aren't as sophisticated as what can be modelled in software like VISSIM. In real life the junction would operate under MOVA control, which can adapt the timings as vehicle patterns alter to make the operation more efficient.*

5.2 The scoping discussions for the planning application were held in 2019 and 2020 with Bancroft Consulting, who were then acting for Hodgetts Estates on transport matters. In November 2019 NH advised that the transport assessment must use the A5 Atherstone Paramics microsimulation model, and this was jointly agreed by NH and WCC in the scoping meeting held on 30 March 2020.

5.3 On 31 December 2021, NH further advised that a LINSIG traffic signal model would be required to assess the impacts of the development at M42 Jn10, A5/ Birch Coppice and the proposed site access junction.

5.4 In January 2022 TT were appointed as transport and highway consultants and held discussions with NH and WCC to agree the modelling strategy for the road network. In a meeting held in March 2022 the strategy was discussed, together with the relative benefits and shortcomings of LINSIG and TRANSYT 16 as the most appropriate traffic signal network modelling tool. It was agreed at the meeting, and through the subsequent Modelling Strategy notes (Revised TA Appendix A) that TRANSYT 16 was the agreed traffic signals modelling tool.

5.5 The use of TRANSYT 16 was further agreed by NH, WCC and SCC in the Consolidated Modelling Strategy Note of June 2023, which was formally agreed by WCC in July 2023 and, following a minor amendment, by SCC and NH in November 2023.

5.6 Therefore, the agreed modelling tool for this application is TRANSYT 16. However, there is no perfect assessment tool for complex signal controlled networks, and each has their respective advantages and shortcomings. It is accepted that the modelling of queue interactions/ switching can be better in microsimulation models such as Paramics and Vissim, than in TRANSYT. This means that in reality some queues may be shorter than those predicted by TRANSYT, particularly where there is an imbalance in the modelled queues between adjoining lanes which have a common destination.

5.7 TRANSYT does not directly model the beneficial effects and flexibility of MOVA operation. Research by TRRL estimates that MOVA typically has a beneficial effect on junction operation in terms of reductions in delay of on average 19%, with a consequential reduction in queues. The M42 Jn10, A5 Birch Coppice and A5/ Core 42 junctions all operate on-street under MOVA control and therefore the on-street delays and queues are likely to be less than those predicted in the TRANSYT model. This means that some of the blocking back discussed above may be less than the model suggests.

5.8 Taking these points together this means that the TRANSYT predicted queues are likely to be pessimistic, and the on-street queues may be less than predicted.

6 Way Forward

1. Flow Scenarios

6.1 **NH/ AECOM comment summary**: *The applicant has compared their 2033 model results against a layout that includes local plan improvements at the roundabout (southern bridge widening and M42 southbound free flow left turn slip road). Is it clear when these improvements will be delivered, is the applicant conditioned to these improvements? The applicant has assessed the local plan year, rather than their opening year(s) (2026?), so it would be expected that these queue levels would be lower in a 2026 year of opening test. The applicant could model their year of opening (less traffic than tested currently) with associated infrastructure / mitigation if this was a sensible scenario in terms of planning / timing.*

6.2 The year of assessments and the infrastructure schemes to be included have all been agreed with NH, WCC and Staffordshire County Council (SCC) during extensive scoping discussions and set out in the agreed Consolidated Modelling Strategy Note. This agreement is in accordance with Department for Transport's (DfT's) Circular 01/2022 document which states at footnote 21, *"development proposals which are not consistent with an up-to-date plan or strategy, this should include all relevant development that is consented or allocated over the entirety of the plan period."*

6.3 The Local Plan TRANSYT model includes improvements at M42 Jn10 which are shown at PJA drawing 02853-01 Rev A attached at Appendix E. The Local Plan improvements for M42 Jn10 comprise three main elements i) widening the A5 eastbound approach to M42 Jn10, ii) a segregated left turn lane from M42 southbound off slip to the A5 eastbound, and iii) widening the southern overbridge to 4 lanes.

6.4 Our assessment shows that element i), A5 eastbound widening, is required in the Reference Case and Local Plan cases and it is proposed that these works will be delivered by a planning condition. Element ii), the segregated left turn lane is not required and is not included in the With Development Local Plan scenarios. Element iii) the southern overbridge widening, is required in the Local Plan case and the proposed development has a negligible impact on the queues and delays on the bridge. The scale of the works needed to widen the bridge are considerable and this remains to be provided via the Local Plan. NH are investigating low cost improvements to M42 Jn10, one of which is widening the southern overbridge.

6.5 The modelling results also demonstrate that the proposed development does not impede full delivery of the Local Plan Allocations along with their associated infrastructure.

2. Model Updates

6.6 **NH/ AECOM comment summary**: *As with all models they are not direct replications of what will occur on site and TRANYST is less sophisticated than say a microsimulation model and as a consequence can at times provide worse queues and delays than a microsimulation model – but this level of variation cannot be quantified. The junction is operating at capacity, in places, in both the base and proposed tests. There are changes in queues from the "base" scenario, with some queues increasing and some decreasing, but the blocking back into the conflict areas does increase in key areas and the impact of this is not captured fully within the model resulting in the upstream queues not being reflective. Potential options to resolve the above concerns (noting the potential to use the year of opening) are:*

- *The applicant looks at the signal optimisation, potentially provide additional connectors and move traffic to spread it more evenly over the gyratory lanes to reduce queues out of the conflict areas and also enable the model to better understand the residual blocking back. Queues are likely to be displaced from the gyratory onto the approach arms of the roundabout.*

6.7 The comments regarding microsimulation and TRANSYT are addressed in section 5 above. It is acknowledged that a TRANSYT model does not flexibly model queueing, or directly model the beneficial effects of MOVA, and therefore the results are considered robust and likely to be worse than would occur on-street. It is expected that the operation of the junctions and network will operate better in reality.

6.8 The blocking back effects identified in AECOM's email of 28th March have been addressed in sections 2, 3 and 4 above. With these changes the modelled queues on the circulatory lanes are unlikely to block back to affect upstream links either trying to enter the roundabout or blocking the paths to exit the roundabout and connector links have been added so that these effects, should they occur are reported in the model.

7 Reference Case Models

7.1 The reference case models have been reviewed in the light of the comments for the Local Plan with Additional Mitigation. The southern overbridge (Links 7/1 and 7/2 have queues in the PM peak hour which would extend back to the prior exit, however the Reference Case models have the appropriate connectors for the model to include blocking back issues in the output results.

7.2 There are no other queues, which give rise to concerns, and the changes above for the Local Plan model could be similarly made to the Reference Case to reduce the likely extent of queuing on the circulatory carriageway.

8 Summary and Conclusions

8.1 This Note seeks to address the comments raised by AECOM in their email of 28 March 2024 in relation to TT's M42 Jn10 TRANSYT Note, dated 8th March 2024, and the v7 TRANSYT model files.

8.2 The comments raised related to the modelling of the circulatory carriageway of M42 Jn10, and particularly the potential for queues to block back to affect entry and exit from the junction. The comments related only to the Local Plan with Additional Mitigation model.

8.3 In discussion with AECOM it was suggested that additional connectors should be added and the flow balance between lanes should be reviewed. The AM and PM models have been reviewed and a number of additional connectors and some flow adjustments between lanes have been made so that the queue on the circulatory carriageway are reduced and more balanced, and also so that any short-lived queues which do extend back to affect other movements are appropriately modelled.

8.4 The changes have resulted in improved AM and PM peak performance and the revised results are considered to be acceptable, and not severe with reference to National Planning Policy Framework (NPPF) para 111.

8.5 TRANSYT 16 is the agreed traffic signals modeling tool to assess the impact of the proposed development on the highway network. It is accepted that there is no perfect model to assess complex signal-controlled networks. It is also accepted that the modelling of queue switching can be better in microsimulation than in TRANSYT, but this means that the TRANSYT modelled queues may be longer than in reality, particularly where there is an imbalance in the modelled queues between adjoining lanes which have a common destination. TRANSYT does not directly model the beneficial effects of MOVA operation, and therefore the TRANSYT assessment is likely to be pessimistic, and the on-street queues may be less than predicted.

8.6 In conclusion it is considered that the Local Plan with Additional Mitigation TRANSYT model is appropriately constructed to assess the highway network, that the TRANSYT model shows acceptable performance, and that the impact of the proposed development is acceptable.

Appendix A

Patrick Thomas Email, 28th March 2024

Wakenshaw, Gareth

From: Patrick Thomas <Patrick.Thomas@nationalhighways.co.uk>
Sent: 28 March 2024 12:43
To: Wakenshaw, Gareth; Bunn, Nick
Cc: Adrian Chadha; AndrewCollinson@NorthWarks.gov.uk; Tony Burrows; alanlaw; Piechocki, Amrit (E,I&S); dwh@hodgettsestates.co.uk; Moises Muguerza; Spencer, Will (E,I&S); jane@hodgettsestates.co.uk; 'Ed'; james.warrington@wsp.com; Evans, Mark (E,I&S); richard-powell@tamworth.gov.uk
Subject: RE: Land NE of M42 J10 - Site Access & Mitigation Design Comments & TRANSYT Model Review [Filed 28 Mar 2024 13:22]

Hi Gareth,

As discussed on our earlier call.

Aecom have completed their review of the TRANSYT results in Appendix G of the TRANSYT note dated 8th March (Table 5.5a), which compares the 2033 AM and PM Peak (i.e. Future Year) models "No Development" and "With Development + Improvements". These correspond to TRANSYT models "3. M42 Jn10 and A5 - Local Plan Model v7 No Development.t16" and "5. M42 Jn10 and A5 - Local Plan Model v7 with Site Access & Addl Mitigation With Development.t16" respectively

The TRANSYT models use Lane Simulation mode, which ensures that the model does not allow vehicles to move forward into the downstream lane if it block backs to the end of the lane. Having spoken to TRL Software Bureau, they have confirmed that any blocking back will only affect the upstream lanes that are directly connected to the downstream lane that is exhibiting the blocking back. Therefore, where there is blocking back on a roundabout circulatory lane, TRANSYT will not be able to model the effect of the blocking back on the other approach lanes that do not connect into the blocking back lane. Where this situation arises, the queues on these approach lanes could be under-estimated. This is more of a concern in the with development scenario due to the increased queues on certain links.

The lane lengths have been measured from stopline to stopline. If a queue was to block back to, say 95% of the link length, this queue would block back into the upstream conflict area (the area in front the two adjacent stoplines – the roundabout entry and circulatory arms in this example). The length of the conflict area will vary on each roundabout node.

A potential aid to the model understanding the blocking back could be to add more connectors to enable the model to better understand the blocking back, whilst maintaining the flow patterns. This could also assist in enabling some lane switching on the longer sections of the gyratory to aid the balancing of flows on each lane where practical.

Below are Aecom's observations of the impact of the development, noting the above issues with the model triggered by the larger queues in some locations.

Please note the queues on the graph below (highlighted in amber) are not the actual queues on the ground, but they are shown as a proportion of the link length, which is a stopline to stopline distance. The lanes (shown in grey) are shown as going back to the start of conflict area (where the connectors join). Therefore, to determine where the queues will actually fall on the roundabout, the links (and the queue lengths), must be moved proportionally back to the upstream stoplines.

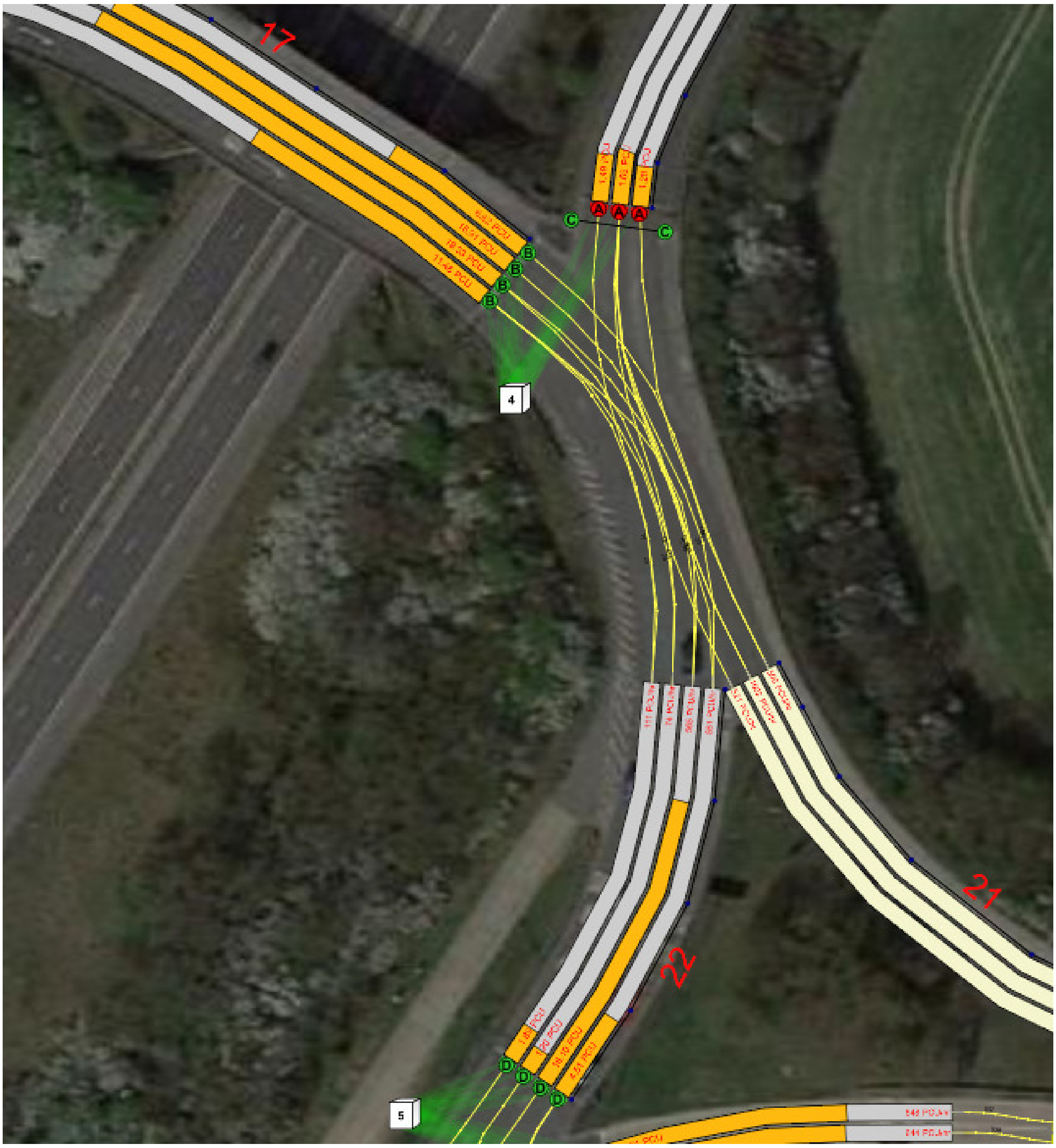
<u>AM Peak Operation</u>

The queue on the circulatory lane next to the Trinity Road approach (link 27/2) sees a minor increase (15pcu to 16pcu or 92m). This queue will stretch back to the A5 Westbound entry. Although this blocking back will be taken into effect on Links 23/2 and 22/2 (the two lanes that feed it), the blocking back will also affect traffic trying to enter the roundabout on Links 23/3 and 23/4 (the offside two lanes of the A5

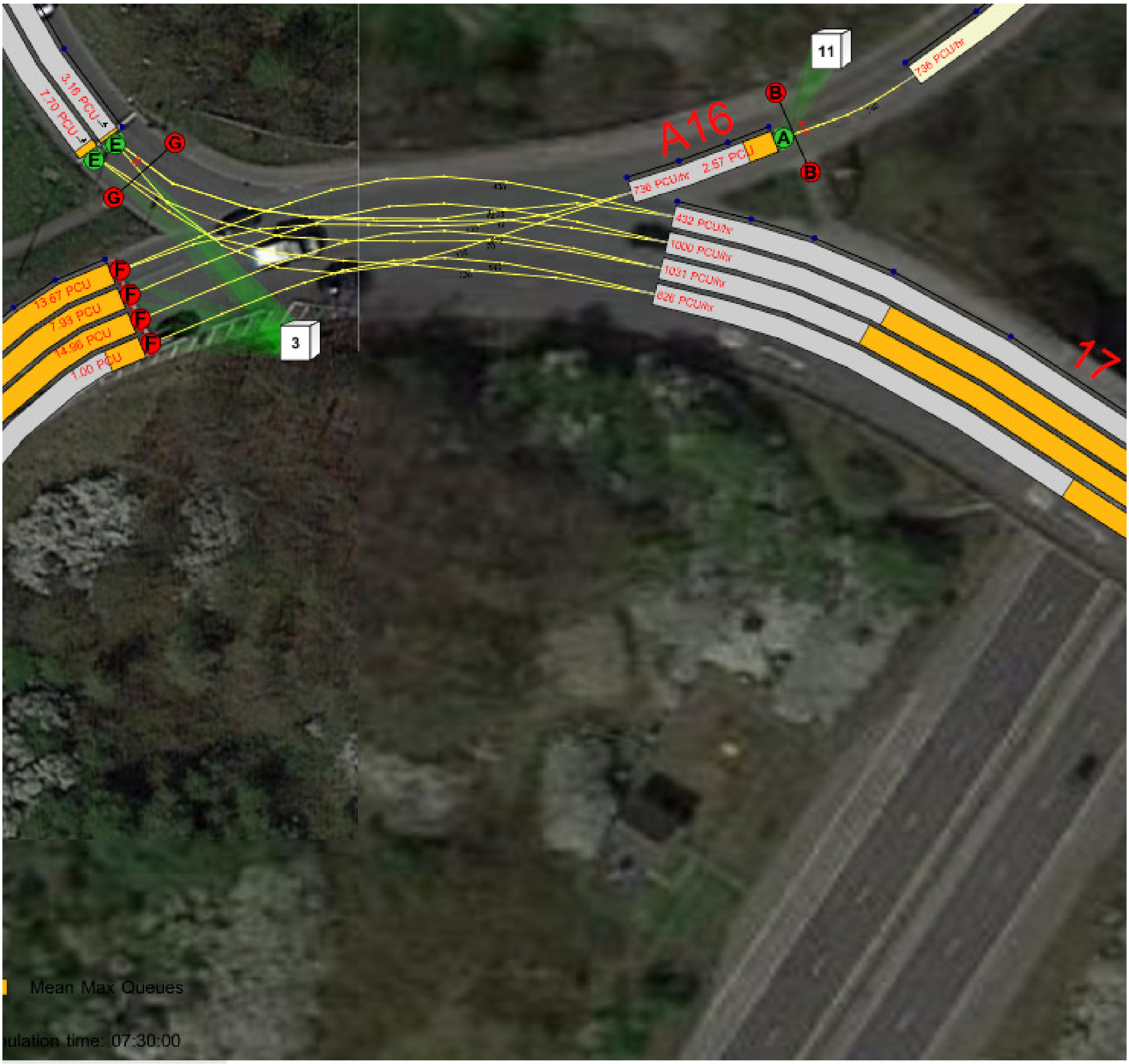
Westbound approach). This effect is not currently modelled in TRANSYT, so the queuing on Links 23/3 and 23/4 will be higher than predicted.

However, in this instance increased queues on Links 23/3 and 23/4 are likely to be accommodated on the existing highway due to the distance back to proposed site access junction. They could increase to levels predicted on the nearside lane, which the TRANSYT animation mode has indicated would stretch back to the access junction on occasions even though the Mean-Max Queue is shown not to stretch back this far. The introduction of a yellow box or similar could potentially mitigate any issues at the access junction or queueing would be contained within the site if it was unable to get out onto the A5. This approach is of a concern but our feeling is that it is likely not to be a material impact, although the model should be updated to better reflect the true impact in terms of queues for review.

With the increased blocking back to Link 22/2, the results show that the queue on this link will increase from 6pcu (35m) to 17pcu (98m), this is a potential concern. The distance back to the A5 Eastbound exit from the roundabout on this lane is approximately 90m, and it is likely that this queue would impede traffic leaving the roundabout from the northern overbridge (Links 17/1, 17/2, 17/3 and 17/4), which the model currently does not fully account for. As the queues reported are Mean-Max Queues, they are an average of the maximum queues each cycle, so in reality the quoted queue length will be exceeded at times.



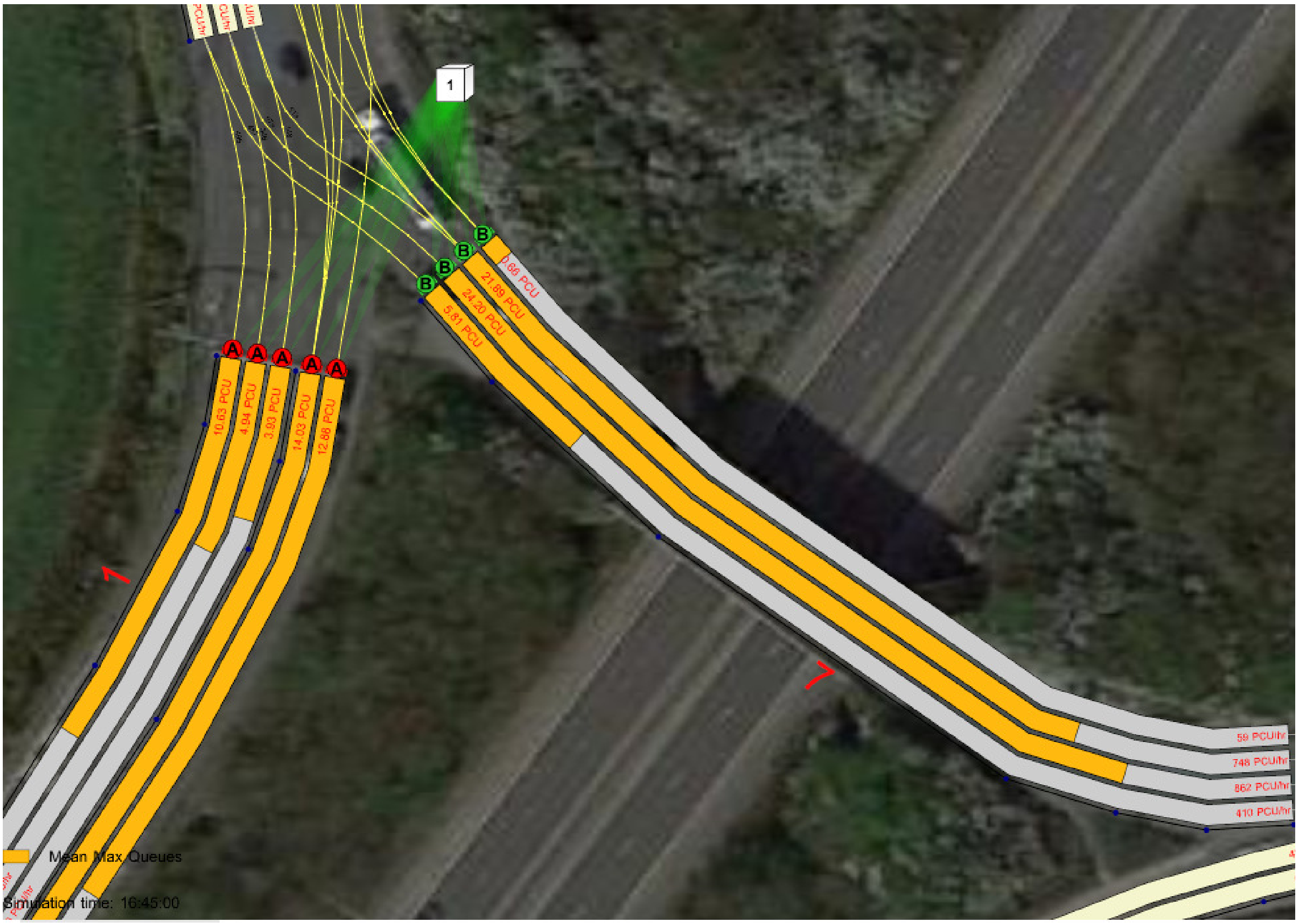
As Links 17/1, 17/2 and 17/3 (the three lanes going to the A5 Eastbound exit) do not take into effect the blocking back on Link 22/2, the modelled queues will be greater than predicted currently in the model outputs. Whist the queue on Lane 3 is predicted to fall from 21 to 19pcu (109m), the queue on lane 2 is predicted to increase from 16 to 19pcu (109m) with the distance back to the M42 Northbound On-slip on this lane being approximately 98m.



Of the three northern overbridge lanes that go the A5 Eastbound exit, TRANSYT sees an imbalance with half the flows on lane 1 compared to lanes 2 and 3. Half of the flow on lane 3 stays on the roundabout (going to Link 22/1), but it would be fair to assume that there would be a more equitable split across the three lanes (currently 432 in lane 1, 1000 in lane 2 and 1031 in lane 3). TRANSYT is quite limited in its ability for vehicles to change lane on links (unless set up with multiple connectors), which is likely to happen in reality and is replicated in software such as VISSIM. With a more equitable lane split, it is less likely queues will block back to the M42 Northbound on-slip. Can the applicant see if they can resolve this matter with a model amendment.

PM Peak Operation

In the PM Peak, the main area of concern is on the southern circulatory (link 7). Lane 2 sees the queue increase from 20 to 25pcu (144m), whilst lane 3 sees the queue increase from 18 to 22pcu (127m). On both lanes, the distance back to the M42 southbound on-slip is approximately 120m. Such a queue wouldn't block traffic getting onto the M42, but may stop traffic getting onto the roundabout from Trinity Road, which isn't a material concern to National Highways.



Lanes 1, 2 and 3 on the southern overbridge all go to the A5 westbound exit (lane 3 is shared with traffic remaining on the roundabout). As with the issue highlighted on the northern overbridge in the AM Peak, lane 1 sees half of the flow exhibited on lanes 2 and 3 (410 on lane 1, 862 on lane 2 and 748 on lane 3). It would be fair to assume that in reality some of the lane 2 and lane 3 flows heading to the A5 will move over to lane to create a fairer balance of flows and therefore reducing the queue lengths on lanes 2 and 3. TRANSYT is limited in its ability for vehicles to change lanes whilst on the lanes, unlike as it would happen in a more sophisticated VISSIM model. An amended model with additional connectors may be able to resolve this matter.

<u>Model is a Worst-Case Scenario</u>

The TRANSYT model has its limitations in terms of vehicles being able to change lane in relation to where queues are. The flows profiles entering the network aren't as sophisticated as what can be modelled in software like VISSIM. In real life the junction would operate under MOVA control, which can adapt the timings as vehicle patterns alter to make the operation more efficient.

<u>Way Forward</u>

1. Flow scenarios

The applicant has compared their 2033 model results against a layout that includes local plan improvements at the roundabout (southern bridge widening and M42 southbound free flow left turn slip road). Is it clear when these improvements will be delivered, is the applicant conditioned to these improvements? The applicant has assessed the local plan year, rather than their opening year(s) (2026?), so it would be expected that these queue levels would be lower in a 2026 year of opening test. The applicant could model their year of opening (less traffic than tested currently) with associated infrastructure / mitigation if this was a sensible scenario in terms of planning / timing.

2. Model updates

As with all models they are not direct replications of what will occur on site and TRANYST is less sophisticated than say a microsimulation model and as a consequence can at times provide worse queues and delays than a microsimulation model – but this level of variation cannot be quantified.

The junction is operating at capacity, in places, in both the base and proposed tests. There are changes in queues from the "base" scenario, with some queues increasing and some decreasing, but the blocking back into the conflict areas does increase in key areas and the impact of this is not captured fully within the model resulting in the upstream queues not being reflective. Potential options to resolve the above concerns (noting the potential to use the year of opening) are:

- The applicant looks at the signal optimisation, potentially provide additional connectors and move traffic to spread it more evenly over the gyratory lanes to reduce queues out of the conflict areas and also enable the model to better understand the residual blocking back. Queues are likely to be displaced from the gyratory onto the approach arms of the roundabout.

Failing the above, a microsimulation model of the junction could be used to get a better understanding of the vehicle blocking back issues and vehicle behaviours.

Kind Regards
Patrick

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Appendix B

28th March Meeting Notes

Wakenshaw, Gareth

From:	Bunn, Nick
Sent:	28 March 2024 23:31
To:	Thomas, Patrick; Morris, Chris; roger.dickinson@aecom.com; Wakenshaw, Gareth; dwh@hodgettsestates.co.uk
Cc:	'Warrington, James'
Subject:	M42Jn 10 NH/TT Meeting 28-3-2024

HI Patrick, Chris and Roger

Please find attached our notes of the meeting. I hope that they are a fair representation. Do let me know if you have any queries or comments.

Meeting held on Teams on 28 March at 11.00am.

National Highways	AECOM	TetraTech	Hodgetts Estates
Patick Thomas	Chris Morris (CM) Roger Dickenson (RD)	Nick Bunn (NB) Gareth Wakenshaw (GW)	David Hodgetts (DH)

1. Transyt Modelling –comments on 2026/ 2033 Reference Case and Local Plan models
CM and RD noted that in the 2033 Local Plan with additional mitigation model that some queues appeared to potentially block back to the preceding exit, which could have an effect on queues. CM and RD drew attention to Link 27/2, 22/2 where blocking back could affect other lanes (that aren't connected to the downstream lane). CM and RD advised that a note providing more detail would be issued, and that GW should look to increase the number of connectors, and, where there is large difference in queues on adjacent lanes to the same destination) consider lane changes, which would occur in reality. CM & RD advised that queuing on the approaches was more acceptable than blocking on the circulatory carriageway. GW noted that the discussion was about the 2033 Local Plan + Additional mitigation, and queried whether the 2033 and 2026 models had similar issues. CM advised that he though not. TT to review the 2026 and 2033 models. The main issues are solely at Jn 10, in the AM peak on the eastern/ northern side of the roundabout and in the PM peak on the southern overbridge.

CM confirmed that NH's principle area of interest was the year of opening assessment in 2026. GW/NB noted that a 2033 Local Plan scenario, and others had been agreed with NH, WCC and SCC as part of the consolidated methodology note.

CM noted that the Transyt model was somewhat pessimistic as it did not include the effects of MOVA.

CM and RD confirmed that there were no issues at other junctions in the model, although the changes to the queues on the circulatory could have an effect.

PT noted that he is confident the issues can be addressed, \and that there were no insurmountable issues to overcome.

ACTION i) PT to issue Transyt comments note; ii) TT to assess the notes and adjust the model and results.
Post meeting note: NH issued the Transyt comments on 28/3/24

2. Site Access junction – design issues to be addressed for planning
PT advised that NH were speaking to AECOM about assistance on assessing the design. PT noted that greater certainty on the modelling had been needed, but noted the Inspectors timetable to agreed to SoCG by 7 May. NB advised that TT had developed the site access design to 3-d to provide greater certainty on the changes to embankment and the reprofiling of the A5. **ACTION i) TT to issue the 3-d drawings; ii) NH to review the design and provide comments.**
Post meeting note: TT issued the drawings on 28/3/24

3. M42Jn10 – design issues to be addressed for planning
PT advised that NH were speaking to AECOM about assistance on assessing the design. PT noted that greater certainty on the modelling had been needed, but noted the Inspectors timetable to agreed to SoCG by 7 May. PT noted that the proposed departure has changed. **ACTION NH to review the design and provide comments**

4. Departures from Standard – update
NB updated PT on the change in the Departure submission from one relating to cycleway width to one relating to lane width. The change in lane widths were discussed. PT felt that the change was positive and queried TT had a further DAS submission to make. **ACTION TT**
Post meeting note: the Provisional agreement of the departure was granted on 28/3/24. Issue closed.

5. GG104, S1 RSA, WCHAR – update
GG104: NB noted that the GG104 was in progress and was exapted to be issued next week. **Action TT**
S1 RSA: PT advised that if time allowed he would prefer to have a S1 RSA completed prior to the appeal opening, however if there was insufficient time, the matter may be conditioned. PT had approved the Auditors for the RSA1. NB advised that to reduce timescales, TT would revise the S1 RSA Brief in line with the previous comments**. ACTION TT**
WCHAR: not discussed – the update is awaiting design comments from NH. **ACTION NH**

6. Trigger Assessment
Not discussed

7. Land Enquiries
PT had reviewed NB's comments of 26 March, and the attached email to Talvinder. PT confirmed that he had been in contract with NH Operations and Land Team to seek a resolution. PT felt that it was likely that the 2 land areas (Area 2 and Area 3 email 10/1/2024) were highway, but would confirm land team/ operations team's views. **ACTION NH**

8. SOCG/ Conditions
NB confirm that he had begun drafting an SOCG which would cover the agreements on the Transyt modelling and the areas to be resolved, site access, cycleway, M42 Jn10 etc. PT requested a copy as soon as possible. **ACTION TT**

If OK I'll circulate these to NWBC, WCC and SCC – pl confirm.

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TETRA TECH

Appendix C

Table 5.5a v2 2033 AM Peak Local Plan + Additional Mitigation (v7 models)

Table 5.5a v2: M42/ Junction 10 + A5/ Birch Coppice + A5/ Core 42, 2033 Local Plan + Additional Mitigation (v7 models) – AM Peak

Traffic Stream(s)	Lane	Saturation Flow pcu/hr	Model Output	AM Peak		
				No Dev	With Dev + Improv.	With Dev + Improv. Modified
B5080 Pennine Way North/ A5 Eastbound On/ Off Slip Road						
54/1 + 55/1	Pennine Way North Lane 1	N/A	Queue Aver Delay	3 20 secs	5 20 secs	4 23 secs
54/2	Pennine Way North Lane 2	N/A	Queue Aver Delay	1 7 secs	1 7 secs	1 8 secs
60/1	A5 Eastbound Off Slip Lane 1	N/A	Queue Aver Delay	0 4 secs	0 4 secs	0 4 secs
60/2	A5 Eastbound Off Slip Lane 2	N/A	Queue Aver Delay	0 4 secs	0 4 secs	0 4 secs
64/1 + 66/1 + 86/1	Northbound Overbridge Lane 1	N/A	Queue Aver Delay	1 6 secs	1 6 secs	1 7 secs
64/2	Northbound Overbridge Lane 2	N/A	Queue Aver Delay	0 4 secs	0 4 secs	0 4 secs
68/1 + 59/1 + 58/1	A5 Eastbound On-Slip Merge	N/A	Queue Aver Delay	7 26 secs	4 17 secs	5 20 secs
B5080 Pennine Way South/ A5 Westbound On/ Off Slip Road						
89/1	Southbound Overbridge Lane 1	N/A	Queue Aver Delay	0 5 secs	0 5 secs	0 5 secs
89/2	Southbound Overbridge Lane 2	N/A	Queue Aver Delay	0 5 secs	0 5 secs	0 5 secs
76/1	A5 Westbound Off Slip Lane 1	N/A	Queue Aver Delay	1 7 secs	1 7 secs	1 7 secs
76/2 + 75/1 + 71/1	A5 Westbound Off Slip Lane 2	N/A	Queue Aver Delay	1 8 secs	1 8 secs	1 8 secs
81/1	Centurion Way Lane 1	N/A	Queue Aver Delay	0 4 secs	0 5 secs	0 5 secs
81/2	Centurion Way Lane 2	N/A	Queue Aver Delay	0 4 secs	0 4 secs	0 4 secs
86/1	Quarry Hill Lane 1	N/A	Queue Aver Delay	1 6 secs	1 7 secs	1 7 secs
86/2	Quarry Hill Lane 2	N/A	Queue Aver Delay	0 4 secs	0 4 secs	0 4 secs
M42 Junction 10						
1/1 + 2/1 + 4/1 + 5/1	M42 Northbound Offslip Lane 1	1740	Queue Aver Delay	3 17 secs	3 17 secs	3 17 secs
1/2	M42 Northbound Offslip Lane 2	1740	Queue Aver Delay	2 15 secs	2 15 secs	2 15 secs
1/3	M42 Northbound Offslip Lane 3	1740	Queue Aver Delay	1 13 secs	1 13 secs	1 14 secs
3/1	M42 Northbound Offslip Lane 4	1849	Queue Aver Delay	6 23 secs	9 34 secs	8 34 secs
3/2	M42 Northbound Offslip Lane 5	1849	Queue Aver Delay	3 18 secs	3 17 secs	3 17 secs
7/1	M42 Northbound Circulating Lane 1	2039	Queue Aver Delay	3 8 secs	2 8 secs	2 8 secs
7/2	M42 Northbound Circulating Lane 2	1840	Queue Aver Delay	12 17 secs	14 20 secs	15 25 secs

7/3	M42 Northbound Circulating Lane 3	1840	Queue Aver Delay	13 19 secs	18 34 secs	13 19 secs
7/4	M42 Northbound Circulating Lane 4	1840	Queue Aver Delay	3 9 secs	2 8 secs	3 9 secs
8/1 + 9/1 + 11/1	A5 Eastbound Lane 1	1828	Queue Aver Delay	8 25 secs	22 54 secs	17 45 secs
8/2 + 9/2 + 11/2 + 69/1 + 70/1	A5 Eastbound Lane 2	1900	Queue Aver Delay	32 1m 38s	27 1m 17s	34 1m 55s
8/3	A5 Eastbound Lane 3	1900	Queue Aver Delay	4 17 secs	9 31 secs	7 20 secs
8/4 + 9/3 + 11/3 + 69/2 + 70/2	A5 Eastbound Lane 4	1900	Queue Aver Delay	34 1m 36s	22 1m 3s	13 44 secs
12/1	A5 Eastbound Circulating Lane 1	1846	Queue Aver Delay	4 21 secs	5 23 secs	5 22 secs
12/2	A5 Eastbound Circulating Lane 2	1878	Queue Aver Delay	1 18 secs	6 24 secs	3 20 secs
12/3	A5 Eastbound Circulating Lane 3	1878	Queue Aver Delay	7 22 secs	4 21 secs	8 27 secs
12/4	A5 Eastbound Circulating Lane 4	1878	Queue Aver Delay	7 24 secs	6 26 secs	6 25 secs
14/1	Green Lane Lane 1	1602	Queue Aver Delay	4 44 secs	3 40 secs	3 41 secs
14/2	Green Lane Lane 2	1602	Queue Aver Delay	6 1m 7s	8 1m 48s	7 1m 26s
15/1	Green Lane Circulating Lane 1	1950	Queue Aver Delay	1 2 secs	14 9 secs	13 10 secs
15/2	Green Lane Circulating Lane 2	1745	Queue Aver Delay	16 14 secs	8 7 secs	12 8 secs
15/3	Green Lane Circulating Lane 3	1745	Queue Aver Delay	10 11 secs	15 12 secs	12 11 secs
15/4	Green Lane Circulating Lane 4	1745	Queue Aver Delay	1 3 secs	1 5 secs	1 2 secs
A13/1	Green Lane Toucan Crossing	2272	Queue Aver Delay	N/A	2 2 secs	2 2 secs
18/1	M42 Southbound Offslip Lane 1	1804	Queue Aver Delay	1 25 secs	1 26 secs	1 26 secs
18/2	M42 Southbound Offslip Lane 2	1813	Queue Aver Delay	1 26 secs	2 39 secs	2 27 secs
18/3	M42 Southbound Offslip Lane 3	1813	Queue Aver Delay	2 27 secs	2 27 secs	2 26 secs
A16/1	M42 Northbound Onslip Toucan Crossing	2213	Queue Aver Delay	N/A	3 3 secs	3 3 secs
17/1	M42 Southbound Circulating Lane 1	1956	Queue Aver Delay	15 7 secs	7 4 secs	13 7 secs
17/2	M42 Southbound Circulating Lane 2	1956	Queue Aver Delay	16 6 secs	19 8 secs	12 6 secs
17/3	M42 Southbound Circulating Lane 3	1800	Queue Aver Delay	21 10 secs	19 8 secs	18 8 secs
17/4	M42 Southbound Circulating Lane 4	1800	Queue Aver Delay	1 4 secs	11 23 secs	11 7 secs
23/1 + 24/1 + A25/1	A5 Westbound Lane 1	1930	Queue Aver Delay	15 37 secs	19 1m 33s	7 27 secs

23/2	A5 Westbound Lane 2	1851	Queue Aver Delay	7 30 secs	6 47 secs	4 24 secs
23/3 + 24/2	A5 Westbound Lane 3	1851	Queue Aver Delay	9 25 secs	9 36 secs	15 1 min
23/4 + 24/3 + A25/2	A5 Westbound Lane 4	1851	Queue Aver Delay	12 31 secs	9 37 secs	9 34 secs
22/1	A5 Westbound Circulating Lane 1	1797	Queue Aver Delay	12 22 secs	5 15 secs	8 20 secs
22/2	A5 Westbound Circulating Lane 2	1797	Queue Aver Delay	6 19 secs	17 50 secs	6 19 secs
22/3	A5 Westbound Circulating Lane 3	1902	Queue Aver Delay	1 11 secs	1 11 secs	1 12 secs
22/4	A5 Westbound Circulating Lane 4	1902	Queue Aver Delay	2 12 secs	2 12 secs	2 12 secs
28/1	Trinity Road Lane 1	1669	Queue Aver Delay	4 44 secs	4 44 secs	4 50 secs
28/2	Trinity Road Lane 2	1669	Queue Aver Delay	2 39 secs	2 39 secs	2 47 secs
28/3 + 29/1	Trinity Road Lane 3	1669	Queue Aver Delay	9 1m 1s	9 1m 7s	12 1m 27s
27/1	Trinity Road Circulating Lane 1	1846	Queue Aver Delay	11 8 secs	10 8 secs	10 8 secs
27/2	Trinity Road Circulating Lane 2	1846	Queue Aver Delay	15 10 secs	16 13 secs	12 9 secs
27/3	Trinity Road Circulating Lane 3	1878	Queue Aver Delay	11 7 secs	13 8 secs	13 7 secs
27/4	Trinity Road Circulating Lane 4	1878	Queue Aver Delay	13 8 secs	13 9 secs	12 7 secs
A5/ Proposed Site Access						
A56/1	A5 Eastbound Left & Ahead Lane 1	1677	Queue Aver Delay	N/A	14 16 secs	14 16 secs
A56/2	A5 Eastbound Ahead Lane 2	1738	Queue Aver Delay	N/A	12 16 secs	12 16 secs
A56/3	A5 Eastbound Ahead Lane 3	1995	Queue Aver Delay	N/A	4 8 secs	5 8 secs
A59/1	A5 Westbound Ahead Lane 1	1930	Queue Aver Delay	N/A	3 15 secs	2 12 secs
A59/2	A5 Westbound Ahead Lane 2	1930	Queue Aver Delay	N/A	3 16 secs	2 12 secs
A60/1	A5 Westbound Right Turn Lane	1597	Queue Aver Delay	N/A	1 42 secs	1 42 secs
A54/1	Site Access Left Turn Lane	1624	Queue Aver Delay	N/A	1 36 secs	1 36 secs
A55/1	Site Access Right Turn Lane 1	1619	Queue Aver Delay	N/A	1 43 secs	1 41 secs
A55/2	Site Access Right Turn Lane 2	1619	Queue Aver Delay	N/A	1 45 secs	1 40 secs
A5/ Birch Coppice						
31/1	A5 Eastbound Ahead Lane 1	1814	Queue Aver Delay	1 9 secs	2 11 secs	2 11 secs
31/2	A5 Eastbound Ahead Lane 2	2082	Queue Aver Delay	2 11 secs	7 12 secs	7 11 secs
32/1	A5 Eastbound Right Turn Lane 3	1960	Queue Aver Delay	13 1m 43s	13 1m 52s	13 1m 43s

32/2	A5 Eastbound Right Turn Lane 4	1667	Queue Aver Delay	14 2m 14s	14 2m 20s	15 2m 21s
37/1	A5 Westbound Left Turn Lane 1	1751	Queue Aver Delay	2 13 secs	2 13 secs	2 13 secs
37/2 + 38/1 + 53/1	A5 Westbound Ahead Lane 2	2015	Queue Aver Delay	10 41 secs	12 45 secs	11 40 secs
37/3 + 38/2 + 53/2	A5 Westbound Ahead Lane 3	2015	Queue Aver Delay	12 50 secs	13 55 secs	13 52 secs
42/1	Birch Coppice Left Turn Lane 1	1695	Queue Aver Delay	7 44 secs	7 45 secs	7 44 secs
42/2	Birch Coppice Left Turn Lane 2	1983	Queue Aver Delay	4 38 secs	5 39 secs	5 38 secs
43/1	Birch Coppice Right Turn Lane 3	1690	Queue Aver Delay	3 41 secs	3 42 secs	3 42 secs
A5/ Core 42						
46/1	A5 Eastbound Ahead Lane 1	1833	Queue Aver Delay	2 3 secs	3 4 secs	3 4 secs
46/2	A5 Eastbound Ahead Lane 2	2082	Queue Aver Delay	1 1 sec	1 1 sec	1 1 sec
47/1	A5 Eastbound Right Turn Lane 3	1667	Queue Aver Delay	2 1m 5s	2 1m 5s	2 1m 6s
49/1	A5 Westbound Ahead & Left Turn Lane 1	1957	Queue Aver Delay	16 27 secs	19 30 secs	17 30 secs
49/2	A5 Westbound Ahead Lane 2	1909	Queue Aver Delay	14 25 secs	15 28 secs	14 28 secs
51/1	Core 42 Left Turn Lane 1	1695	Queue Aver Delay	3 3 mins	2 2m 46s	3 3m 3s
52/1	Core 42 Right Turn Lane 2	1690	Queue Aver Delay	1 8m 42s	1 7m 18s	1 7m 51s
A5/ Dordon Roundabout						
91/1	A5 Eastbound Lane 1	N/A	Queue Aver Delay	12 20 secs	11 20 secs	11 20 secs
91/2	A5 Eastbound Lane 2	N/A	Queue Aver Delay	12 19 secs	10 18 secs	10 18 secs
92/1 + 92/2 + 93/1	Long Street	N/A	Queue Aver Delay	7 1m 4s	7 1m 8s	8 1m 10s
98/1	A5 Westbound Left Turn Slip	N/A	Queue Aver Delay	0 5 secs	0 5 secs	0 5 secs
97/1 + 98/1	A5 Westbound Ahead Lane 1	N/A	Queue Aver Delay	6 20 secs	6 20 secs	7 20 secs
97/2 + 98/2	A5 Westbound Ahead Lane 2	N/A	Queue Aver Delay	5 18 secs	6 17 secs	7 17 secs
111/1	A5 Westbound Right Turn Lane 3	N/A	Queue Aver Delay	2 49 secs	2 48 secs	2 48 secs
100/1	Gypsy Lane	N/A	Queue Aver Delay	2 28 secs	2 29 secs	2 29 secs

KEY	
#	New traffic lanes as a result of the Local Plan works
#	New traffic lanes as a result of the proposed development mitigation works
	Impact of development results in a reduction in queue of over 10pcu and/ or a reduction in delays of over 1 minute.
	Impact of development results in an increase queue of 10pcu or over and/ or an increase in delay of over 1 minute

Appendix D

Table 5.5a v2 2033 PM Peak Local Plan + Additional Mitigation (v7 models)

charleyTable 5.5a v2: M42/ Junction 10 + A5/ Birch Coppice + A5/ Core 42, 2033 Local Plan + Additional Mitigation (v7 models) – PM Peak

				AM Peak		
Traffic Stream(s)	Lane	Saturation Flow pcu/hr	Model Output	No Dev	With Dev + Improv.	With Dev + Improv. Modified
B5080 Pennine Way North/ A5 Eastbound On/ Off Slip Road						
54/1 + 55/1	Pennine Way North Lane 1	N/A	Queue Aver Delay	1 9 secs	1 7 secs	1 7 secs
54/2	Pennine Way North Lane 2	N/A	Queue Aver Delay	1 6 secs	1 6 secs	1 6 secs
60/1	A5 Eastbound Off Slip Lane 1	N/A	Queue Aver Delay	0 4 secs	0 4 secs	0 4 secs
60/2	A5 Eastbound Off Slip Lane 2	N/A	Queue Aver Delay	0 5 secs	0 5 secs	0 5 secs
64/1 + 66/1 + 86/1	Northbound Overbridge Lane 1	N/A	Queue Aver Delay	6 15 secs	5 14 secs	5 15 secs
64/2	Northbound Overbridge Lane 2	N/A	Queue Aver Delay	1 7 secs	1 8 secs	1 8 secs
68/1 + 59/1 + 58/1	A5 Eastbound On-Slip Merge	N/A	Queue Aver Delay	5 30 secs	1 5 secs	1 5 secs
B5080 Pennine Way South/ A5 Westbound On/ Off Slip Road						
89/1	Southbound Overbridge Lane 1	N/A	Queue Aver Delay	0 4 secs	0 4 secs	0 4 secs
89/2	Southbound Overbridge Lane 2	N/A	Queue Aver Delay	0 5 secs	1 5 secs	0 5 secs
76/1	A5 Westbound Off Slip Lane 1	N/A	Queue Aver Delay	1 10 secs	2 10 secs	1 10 secs
76/2 + 75/1 + 71/1	A5 Westbound Off Slip Lane 2	N/A	Queue Aver Delay	38 1m 38s	37 1m 35s	38 1m 39s
81/1	Centurion Way Lane 1	N/A	Queue Aver Delay	0 7 secs	0 8 secs	0 8 secs
81/2	Centurion Way Lane 2	N/A	Queue Aver Delay	0 6 secs	0 6 secs	0 6 secs
86/1	Quarry Hill Lane 1	N/A	Queue Aver Delay	25 2m 49s	22 2m 39s	25 2m 47s
86/2	Quarry Hill Lane 2	N/A	Queue Aver Delay	0 5 secs	0 5 secs	0 5 secs
M42 Junction 10						
1/1 + 2/1 + 4/1 + 5/1	M42 Northbound Offslip Lane 1	1740	Queue Aver Delay	13 49 secs	14 48 secs	13 48 secs
1/2	M42 Northbound Offslip Lane 2	1740	Queue Aver Delay	6 29 secs	5 29 secs	5 29 secs
1/3	M42 Northbound Offslip Lane 3	1740	Queue Aver Delay	4 1m 7s	4 55 secs	4 1m 3s
3/1	M42 Northbound Offslip Lane 4	1849	Queue Aver Delay	12 43 secs	14 50 secs	15 51 secs
3/2	M42 Northbound Offslip Lane 5	1849	Queue Aver Delay	11 39 secs	11 43 secs	12 43 secs
7/1	M42 Northbound Circulating Lane 1	2039	Queue Aver Delay	7 11 secs	5 11 secs	5 10 secs
7/2	M42 Northbound Circulating Lane 2	1840	Queue Aver Delay	20 24 secs	25 31 secs	20 25 secs

7/3	M42 Northbound Circulating Lane 3	1840	Queue Aver Delay	18 51 secs	22 46 secs	19 49 secs
7/4	M42 Northbound Circulating Lane 4	1840	Queue Aver Delay	1 10 secs	1 9 secs	1 10 secs
8/1 + 9/1 + 11/1	A5 Eastbound Lane 1	1828	Queue Aver Delay	6 42 secs	10 43 secs	17 1m 11s
8/2 + 9/2 + 11/2 + 69/1 + 70/1	A5 Eastbound Lane 2	1900	Queue Aver Delay	34 2m 38s	19 1m 18s	15 57 secs
8/3	A5 Eastbound Lane 3	1900	Queue Aver Delay	8 39 secs	7 31 secs	3 14 secs
8/4 + 9/3 + 11/3 + 69/2 + 70/2	A5 Eastbound Lane 4	1900	Queue Aver Delay	23 1m 55s	8 37 secs	11 32 secs
12/1	A5 Eastbound Circulating Lane 1	1846	Queue Aver Delay	4 19 secs	4 19 secs	4 19 secs
12/2	A5 Eastbound Circulating Lane 2	1878	Queue Aver Delay	2 17 secs	7 19 secs	3 17 secs
12/3	A5 Eastbound Circulating Lane 3	1878	Queue Aver Delay	9 22 secs	4 18 secs	8 21 secs
12/4	A5 Eastbound Circulating Lane 4	1878	Queue Aver Delay	11 26 secs	11 25 secs	11 23 secs
14/1	Green Lane Lane 1	1602	Queue Aver Delay	5 42 secs	6 43 secs	6 42 secs
14/2	Green Lane Lane 2	1602	Queue Aver Delay	20 2m 55s	20 3m 7s	20 3m 15s
15/1	Green Lane Circulating Lane 1	1950	Queue Aver Delay	2 2 secs	5 6 secs	11 8 secs
15/2	Green Lane Circulating Lane 2	1745	Queue Aver Delay	17 16 secs	7 7 secs	12 8 secs
15/3	Green Lane Circulating Lane 3	1745	Queue Aver Delay	16 17 secs	15 18 secs	8 15 secs
15/4	Green Lane Circulating Lane 4	1745	Queue Aver Delay	4 5 secs	1 4 secs	3 6 secs
A13/1	Green Lane Toucan Crossing	2272	Queue Aver Delay	N/A	2 2 secs	2 2 secs
18/1	M42 Southbound Offslip Lane 1	1804	Queue Aver Delay	2 21 secs	2 20 secs	1 21 secs
18/2	M42 Southbound Offslip Lane 2	1813	Queue Aver Delay	2 23 secs	4 36 secs	7 1m 5s
18/3	M42 Southbound Offslip Lane 3	1813	Queue Aver Delay	4 55 secs	9 1m 46s	5 59 secs
A16/1	M42 Northbound Onslip Toucan Crossing	2213	Queue Aver Delay	N/A	2 2 secs	2 2 secs
17/1	M42 Southbound Circulating Lane 1	1956	Queue Aver Delay	13 10 secs	3 6 secs	6 7 secs
17/2	M42 Southbound Circulating Lane 2	1956	Queue Aver Delay	13 11 secs	13 11 secs	9 9 secs
17/3	M42 Southbound Circulating Lane 3	1800	Queue Aver Delay	9 12 secs	14 14 secs	4 8 srecs
17/4	M42 Southbound Circulating Lane 4	1800	Queue Aver Delay	1 9 secs	3 14 secs	6 15 secs
23/1 + 24/1 + A25/1	A5 Westbound Lane 1	1930	Queue Aver Delay	12 1m 29s	20 1m 3s	16 44 secs

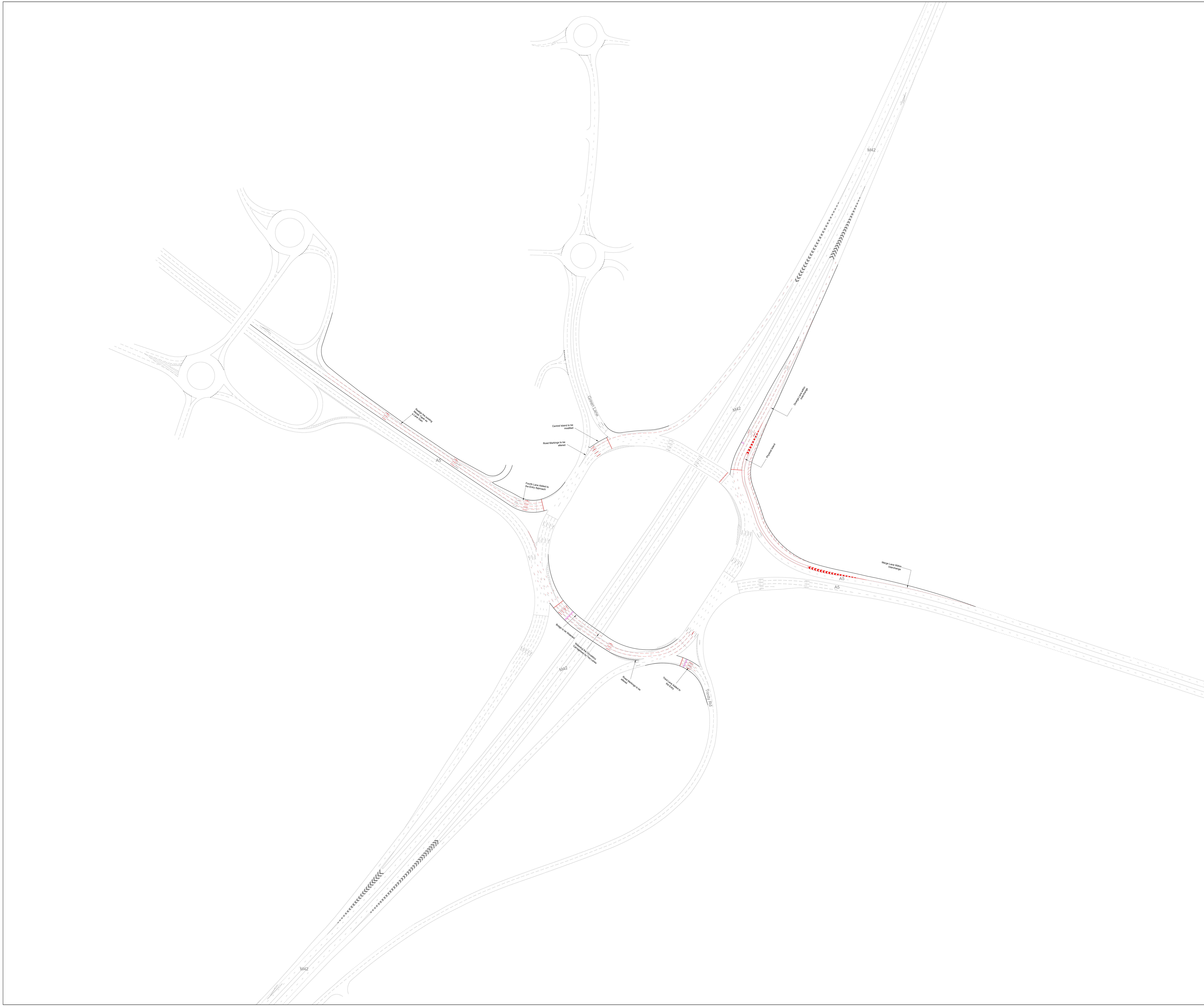
23/2	A5 Westbound Lane 2	1851	Queue Aver Delay	6 34 secs	8 40 secs	3 21 secs
23/3 + 24/2	A5 Westbound Lane 3	1851	Queue Aver Delay	15 1m 47s	15 56 secs	17 55 secs
23/4 + 24/3 + A25/2	A5 Westbound Lane 4	1851	Queue Aver Delay	7 1m 17s	11 2m 12s	12 2m 3s
22/1	A5 Westbound Circulating Lane 1	1797	Queue Aver Delay	15 22 secs	11 20 secs	8 18 secs
22/2	A5 Westbound Circulating Lane 2	1797	Queue Aver Delay	6 15 secs	8 19 secs	12 22 secs
22/3	A5 Westbound Circulating Lane 3	1902	Queue Aver Delay	1 12 secs	2 13 secs	2 13 secs
22/4	A5 Westbound Circulating Lane 4	1902	Queue Aver Delay	5 35 secs	6 36 secs	6 36 secs
28/1	Trinity Road Lane 1	1669	Queue Aver Delay	3 29 secs	3 31 secs	4 32 secs
28/2	Trinity Road Lane 2	1669	Queue Aver Delay	2 26 secs	3 32 secs	2 24 secs
28/3 + 29/1	Trinity Road Lane 3	1669	Queue Aver Delay	14 1m 35s	20 2m 3s	13 1m 58s
27/1	Trinity Road Circulating Lane 1	1846	Queue Aver Delay	6 9 secs	5 8 secs	6 9 secs
27/2	Trinity Road Circulating Lane 2	1846	Queue Aver Delay	9 14 secs	12 17 secs	12 17 secs
27/3	Trinity Road Circulating Lane 3	1878	Queue Aver Delay	2 6 secs	4 9 secs	4 8 secs
27/4	Trinity Road Circulating Lane 4	1878	Queue Aver Delay	7 27 secs	9 26 secs	9 26 secs
A56/1	A5 Eastbound Left & Ahead Lane 1	1677	Queue Aver Delay	N/A	18 15 secs	20 16 secs
A56/2	A5 Eastbound Ahead Lane 2	1738	Queue Aver Delay	N/A	17 16 secs	20 17 secs
A56/3	A5 Eastbound Ahead Lane 3	1995	Queue Aver Delay	N/A	5 7 secs	5 7 secs
A59/1	A5 Westbound Ahead Lane 1	1930	Queue Aver Delay	N/A	4 23 secs	4 22 secs
A59/2	A5 Westbound Ahead Lane 2	1930	Queue Aver Delay	N/A	4 22 secs	4 20 secs
A60/1	A5 Westbound Right Turn Lane	1597	Queue Aver Delay	N/A	1 41 secs	0 42 secs
A54/1	Site Access Left Turn Lane	1624	Queue Aver Delay	N/A	1 36 secs	1 36 secs
A55/1	Site Access Right Turn Lane 1	1619	Queue Aver Delay	N/A	2 1m 21s	2 1m 17s
A55/2	Site Access Right Turn Lane 2	1619	Queue Aver Delay	N/A	2 1m 16s	2 1m 12s
A5/ Birch Coppice						
31/1	A5 Eastbound Ahead Lane 1	1814	Queue Aver Delay	2 13 secs	3 15 secs	5 15 secs
31/2	A5 Eastbound Ahead Lane 2	2082	Queue Aver Delay	2 11 secs	3 12 secs	3 12 secs
32/1	A5 Eastbound Right Turn Lane 3	1960	Queue Aver Delay	6 1m 4s	6 1m 6s	7 1m 8s

32/2	A5 Eastbound Right Turn Lane 4	1667	Queue Aver Delay	4 55 secs	4 56 secs	4 58 secs
37/1	A5 Westbound Left Turn Lane 1	1751	Queue Aver Delay	2 15 secs	2 15 secs	2 15 secs
37/2 + 38/1 + 53/1	A5 Westbound Ahead Lane 2	2015	Queue Aver Delay	13 31 secs	13 35 secs	14 35 secs
37/3 + 38/2 + 53/2	A5 Westbound Ahead Lane 3	2015	Queue Aver Delay	12 32 secs	12 36 secs	13 36 secs
42/1	Birch Coppice Left Turn Lane 1	1695	Queue Aver Delay	6 37 secs	7 42 secs	7 42 secs
42/2	Birch Coppice Left Turn Lane 2	1983	Queue Aver Delay	8 37 secs	7 41 secs	7 41 secs
43/1	Birch Coppice Right Turn Lane 3	1690	Queue Aver Delay	7 47 secs	7 47 secs	8 47 secs
A5/ Core 42						
46/1	A5 Eastbound Ahead Lane 1	1833	Queue Aver Delay	3 4 secs	3 5 secs	3 5 secs
46/2	A5 Eastbound Ahead Lane 2	2082	Queue Aver Delay	2 3 secs	2 3 secs	2 3 secs
47/1	A5 Eastbound Right Turn Lane 3	1667	Queue Aver Delay	2 1m 30s	2 1m 25s	2 1m 27s
49/1	A5 Westbound Ahead & Left Turn Lane 1	1957	Queue Aver Delay	8 14 secs	7 16 secs	8 16 secs
49/2	A5 Westbound Ahead Lane 2	1909	Queue Aver Delay	6 12 secs	5 14 secs	6 14 secs
51/1	Core 42 Left Turn Lane 1	1695	Queue Aver Delay	3 1m 7s	3 1m 9s	3 1m 6s
52/1	Core 42 Right Turn Lane 2	1690	Queue Aver Delay	3 4m 55s	3 4m 45s	3 4m 48s
A5/ Dordon Roundabout						
91/1	A5 Eastbound Lane 1	N/A	Queue Aver Delay	22 22 secs	26 25 secs	28 27 secs
91/2	A5 Eastbound Lane 2	N/A	Queue Aver Delay	24 21 secs	26 24 secs	27 24 secs
92/1 + 92/2 + 93/1	Long Street	N/A	Queue Aver Delay	6 1m 31s	7 1m 30s	6 1m 29s
98/1	A5 Westbound Left Turn Slip	N/A	Queue Aver Delay	0 5 secs	0 5 secs	0 5 secs
97/1 + 98/1	A5 Westbound Ahead Lane 1	N/A	Queue Aver Delay	3 8 secs	3 8 secs	3 8 secs
97/2 + 98/2	A5 Westbound Ahead Lane 2	N/A	Queue Aver Delay	3 7 secs	3 7 secs	3 8 secs
111/1	A5 Westbound Right Turn Lane 3	N/A	Queue Aver Delay	5 1m 3s	5 1m 5s	4 1m 6s
100/1	Gypsy Lane	N/A	Queue Aver Delay	2 37 secs	2 37 secs	2 38 secs

KEY	
#	New traffic lanes as a result of the Local Plan works
#	New traffic lanes as a result of the proposed development mitigation works
	Impact of development results in a reduction in queue of over 10pcu and/ or a reduction in delays of over 1 minute.
	Impact of development results in an increase queue of 10pcu or over and/ or an increase in delay of over 1 minute

Appendix E

PJA Local Plan improvement Scheme for M42 Jn10



Drawing Status:
These drawings have been produced with reference to the CDM Regulations 2015; Regulation 9.

These Drawings are for planning approvals and are not to be used for construction purposes. It is the responsibility of the contractor and client to identify risks associated with the construction stage and to design appropriate measures to mitigate. The risks identified on the PJA Scheme Design Risk Assessment are based on the information available at the time of the design (drawing date) Where shown on PJA Design Drawings, the position of services is based on information provided by other parties at the time of the design and is for guidance only. It is the responsibility of the Client and Contractor to verify the exact position of any services before commencing works on site.

Client Duties:
The client is directed to Regulation 4 of the CDM 2015 Regulations: Client duties in relation to managing projects

Rev / Date	Description	Drn	Chck'd

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Client
Warwickshire County Council (WCC)

Project
02853 M42 Junction 10

Drawing
Indicative Solution.
Level Intervention
2 B+C+D+E+F

Drawn by: AH 24/08/2017
Checked by: MN 24/08/2017
Scale: 1:2000 @ A1

Drawing No. 02853 - 01
Revision A

File: T:\Projects Current\#2800\02853 M42 J10 HS2 Impact\2. Drawings\Design\Preliminary Design\Level Intervention 2B&C&D&E&F\Level Intervention 2B+C+D+E+F.dwg