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9 January 2024

Dear Ms Dowling,

LONDON LUTON AIRPORT EXPANSION – DEADLINE 7 SUBMISSION

Please find attached National Highways' deadline 7 submission.

Having reviewed the outputs of the post-covid 19 modelling, you will see from the attached Technical Note that several outstanding concerns remain and that, consequently, National Highways considers that proposed development continues to pose a risk to the safe operation of the SRN without further mitigation. As such, we must maintain our position on the application. We consider that these concerns must be addressed before development consent may be granted or a method devised for them to be addressed to National Highways' satisfaction before the development may proceed.

I confirm that the mitigation proposed in the draft DCO for Phase 1 and comprised in works 6e (n), (o) and (p) would be acceptable to National Highways (subject to securing provision of a maintenance bay and signage) and that we are satisfied that this phase of the proposed development is able to proceed without an adverse impact on the SRN. This is subject to the mitigation works being secured by suitably worded provisions in requirements and/or the proposed TRIMMA, which is not currently the case.

However, for future phases of development, we remain concerned about residual congestion on the southbound merge and in relation the operation of the northbound mainline, with a particular problem where the 5 lanes reduce to 4, north of Junction 9. Due to the scenarios modelled, and some of the methodology, we cannot be



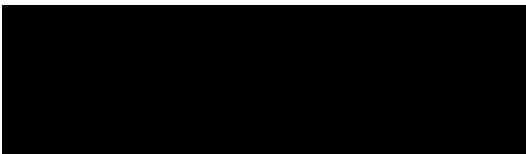
certain about the extent to which the airport expansion is a contributor to congestion, and also about the timing of when those interventions are required. This must be satisfactorily addressed by modelling and/or by mitigation.

Furthermore, these concerns are enhanced because the outputs of the Saturn modelling provided by the applicant suggest that some reassignment of traffic may be taking place due to the presence of congestion, and this could have an adverse impact on the operation of Junction 9, where the model is showing volume/capacity ratios close to or at 100% in forecast scenarios.

National Highways recognises the complexity of the modelling and that it could take substantial time for the Applicant to provide the remedies requested in the Technical Note. Given the approaching deadline for the end of the Examination and, recognising the uncertainties in the modelling and associated risks, National Highways is exploring other options with the Applicant. We are continuing to take a collaborative and constructive approach to find a mutually satisfactory solution that will enable the development to proceed, The intention would be to provide for a scheme for additional modelling and agreement of the method for monitoring of impacts as well as triggers for mitigation between the grant of development consent (if given) and the commencement of works (we do not consider that the draft TRIMMA currently does this).

We will provide an update on the outcome of these discussions for Deadline 8, together with any further proposed amendments to the proposed Development Consent Order.

Yours sincerely,



Kelly Milburn
Spatial Planning Manager

Project: London Luton Airport Expansion Development Consent Order

Stage Deadline 7 (9th January 2023)

Subject: National Highways position on 'Accounting for Covid-19 in Transport Modelling'
(TR020001/APP/8.148)

On Behalf of: National Highways

1. Introduction

As stated in responses submitted at deadlines 4 and 5, National Highways has concerns in relation to the modelling and proposed mitigation, as well as the mechanisms for securing them in respect of the Application.

In response to the Department for Transport (DfT) updated modelling guidance (Transport Appraisal Guidance (TAG) Unit M4 – Forecasting and Uncertainty, May 2023 which was issued after the modelling was undertaken as part of the DCO submission, the Examining Authority (ExA) issued a Rule 9 Letter to the Applicant to take account of the potential impacts of COVID-19 on the traffic modelling.

National Highways and its technical consultant, Jacobs, have reviewed the Applicant's Response to Issue Specific Hearing 7 Action 2 – 'Accounting for Covid-19 in Transport Modelling Final Report (ACTMFR)' submitted by the Applicant on 15th December 2023.

The ExA in their second written questions dated 15th December noted the following action point (TT.2.1) for Relevant Highway Authorities;

'Review the final report summarising the outcome of the accounting for Covid-19 in transport modelling that should be submitted by the Applicant on 15th December 2023 [AS-159]. Provide a summary of any outstanding concerns and what needs to be amended/included in order to satisfactorily address the concern(s) by D7.'

This Technical Note summarises National Highways' position on the ACTMFR, provides a summary of outstanding concerns, and identifies what needs to be amended/included to satisfactorily address those concerns.

National Highways/Jacobs have now reviewed the following to inform our position in light of the recently provided information;

- Applicant's Response to Issue Specific Hearing 7 Action 2 - Accounting for Covid-19 in Transport Modelling Final Report (TR020001/APP/8.148); and
- Applicant's Response to Deadline 5 Submissions Appendix E - National Highways (TR020001/APP/8.127)

The following Luton Rising VISSIM Do-minimum (DM) and Do-something (DS) models have been reviewed:

- 2027 DM and DS;
- 2039 DM and DS; and
- 2043 DM and DS.

This remainder of this Technical Note is split into two sections which cover the relevant modelling – Saturn and VISSIM. It identifies concerns that continue to subsist in spite of the updated modelling supplied in response to the ExA's request.

2. Saturn Modelling

2.1 Introduction

National Highways and Jacobs have undertaken a review of the ACTMFR and several concerns are set out under subsequent headings within this Technical Note. Overall, National Highways remains concerned that important information is still missing and some clarifications will be required in relation to the ACTMFR for National Highways to be fully satisfied with the ACTMFR and the implications of the proposed development on the Strategic Road Network (SRN).

2.2 Queues and Delays

As previously requested in National Highways' response at deadline 5 (REP5-091) and referred to in the Applicants response (REP6-058), comparisons of the level of queues and delays for all approaches to all the M1 junctions and for each year, peak and both the DM and DS scenarios is required.

Although the microsimulation (VISSIM) model shows the M1 junction 10 performance in detail, excessive junction delays in the strategic model could result in traffic re-assignment and hence the traffic flow data that is fed from the strategic model into the VISSIM model could be inaccurate if there are excessive queues/delays.

National Highways considers and requests that information on queues and delays for all approaches to the M1 junctions is provided in a tabular form to enable a clear and more comprehensive understanding of the performance of the SRN in the forecast scenarios. Unless the provision of such information is deferred, the ExA will also require this information to inform its recommendation.

2.3 SRN Flow Differences

National Highways is concerned about the large differences in flows between with and without airport expansion in 2043 PM peak on the approach arm from the A1081. This could constrain the full traffic demand flow through to M1 junction 10 and result in a large queue on the A1081 approach to the junction during the PM peak period.

Figure 1 on the following page of this submission shows a breakdown of the coding sections of the approaches on the A1081 to M1 junction 10. In the network coding of the A1081 approach to the M1 junction 10, it is interpreted that the A1081 westbound has been represented in small segments in the strategic model with the very last link representing the start of the left-turn free-flow up to M1 junction 10 (section 1) and the link prior to this, representing the straight section of A1081 westbound (section 2).

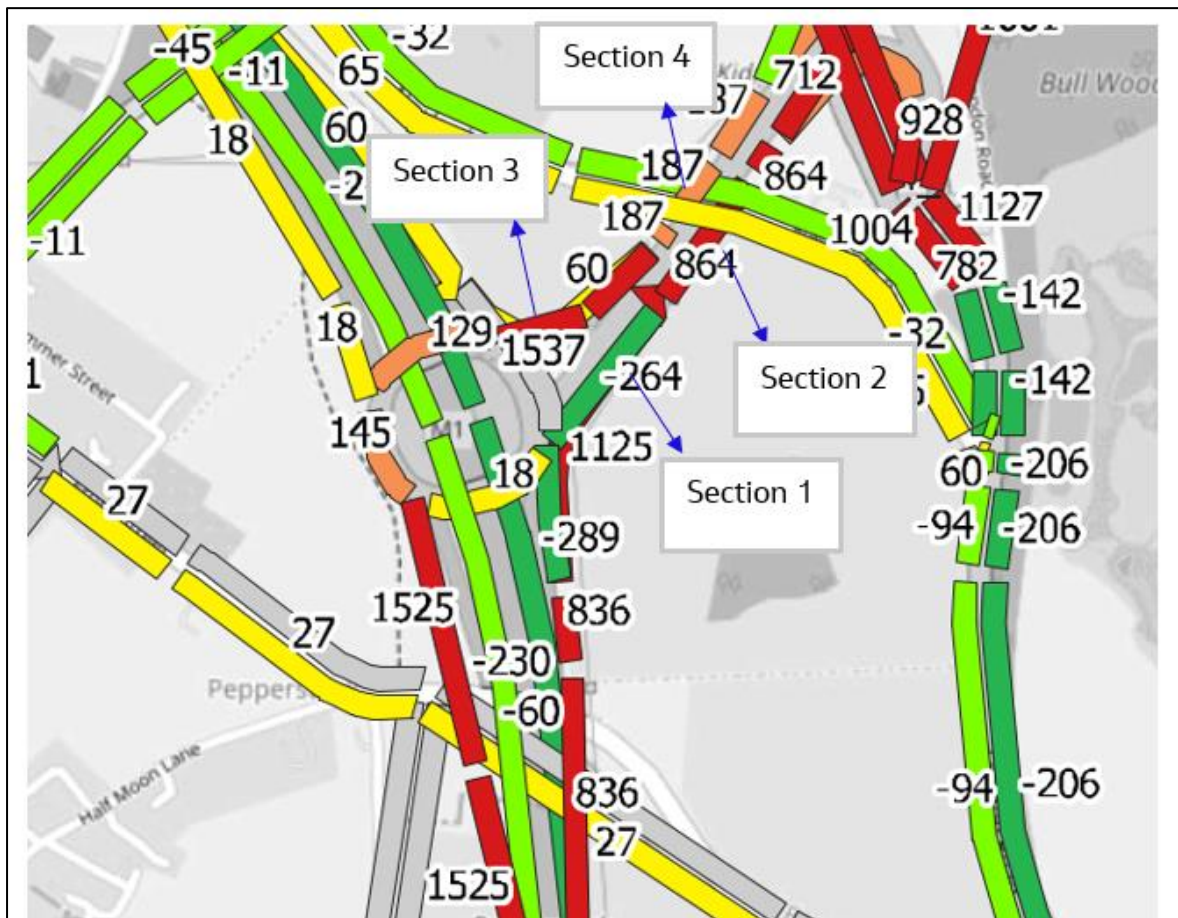
The ACTMFR shows 2043 forecast year volume over capacity (V/C) ratios for M1 J10 (AM and PM peak periods) (Figure 4-11 in the ACTMFR). On the A1081 westbound, during the PM peak, the V/C ratio for the east right turn decreases from 49% without the airport expansion to 42% with the expansion. The corresponding figures for the east left turn free flow are 77% and 64% respectively.

However, looking at comparisons of traffic flow changes during the PM peak with and without the airport expansion (Figure 1 over the page), for section 1 on the A1081 westbound, the difference is -264 veh/hr and for the link immediately prior to this (section 2) the difference is +864 veh/hr. It is believed that the link V/C ratio as shown in the ACTMFR Table 4-11 relates to section 1 on A1081 rather than section 2.

Furthermore, Appendix F of the ACTMFR, shows the 2043 PM link V/C for A1081 westbound approach to M1 J10, and it indicates section 2 has a value between 80%-90% without the airport expansion and a value of between 90% -100% (ie reaching link capacity level) for the scenario with expansion.

There is a similar pattern and differences in the observed flows on the A1081 eastbound as indicated by sections 3 and 4 in Figure 1 below when compared to the V/C ratios in the ACTMFR Figure 4.1 1 and Appendix F.

Figure 1. M1 Junction 10 Flows - 2043



An explanation is required on the reasons for the differences in the flows and V/C ratios on the SRN. Further, as indicated in Section 2.2 of this Technical Note, it is requested that the applicant provides further information on queues and delays on all sections of the A1081 approach to/from the M1 junction 10, to provide a more comprehensive understanding of traffic conditions on the approach to junction 10. Unless the provision of such information is deferred, National Highways are unable to determine the full development impact. The ExA will also require this information to inform its recommendation.

2.4 LRN Flow Differences

As part of assessing the Covid-19 impact on the local road network, comparisons between pre-covid (ie 2016 and 2019) and 2023 observed data were made. The location of these observed data sites is shown in Figure 3-10 in the ACTMFR. Out of nine sites, six sites are located either in the vicinity of the M1 or on a parallel route to it, as detailed below:

- Site B653 between Bower Heath and East Hyde – a large decrease of 22% between April 2016 and 2023;
- Lower Harpenden Road – the traffic in the peak hours reduces by 25% in the AM and PM peaks;
- A1081 New Airport Way - The data was deemed unusable due to unrealistically low volumes. This site was subsequently omitted from the analysis;

- Hatters Way - The traffic in the AM and PM peak hours reduces by 19% and 13% respectively;
- B540 Church Road - The traffic in the AM and PM peak hours reduces by 23% and 32% respectively;
- A5183 East of Markgate – The traffic decreasing between September 2016 and September 2022 by 24%.

For the most important site in respect of the SRN, located on the A1081, the data was unusable. For the remaining five sites, due to their proximity to the SRN, National Highways is concerned that the decrease in flows at these sites when comparing 2016 with 2023 observed flows will have an impact on the SRN. Had the model been adjusted to present year values (lower flows), a different assignment of traffic would be expected, with potentially higher levels of traffic using the SRN. Hence, this puts the predicted model flows on the SRN into question. National Highways requests that post-Covid adjustments are made to allow for the lower traffic flows on these sites or at least sensitivity tests should be undertaken to indicate the likely changes after making these adjustments to understand the reassignment on the SRN. Unless the provision of such information is deferred, the ExA will also require this information to inform its recommendation.

2.5 M1 Junction 9 (east)

In the ACTMFR, Tables 4-1, 4-5 and 4-9 show forecasted flows and V/C ratios for M1 junction 9 (east) – note that this requires consideration *in addition* to junction 10. In the AM peak, the forecast flow for the west approach is 1,640 veh/hr with V/C of 100% in all scenarios and in all forecast years of 2027, 2039 and 2043. The fact that the amount of traffic and the degree of saturation for this approach remain the same in all forecast years, is of concern to National Highways. The implications of this could be that the traffic cannot get through this approach and as such, large queues and delays are formed, which would be a safety concern to National Highways.

It is requested that the applicant provides information on queues and delays on approaches to M1 junction 10 (as set out in section 2.2) and provides comment of any traffic redistribution with airport expansion due to this approach reaching its full capacity. Unless the provision of such information is deferred, the ExA will also require this information to inform its recommendation.

2.6 Model Convergence

No information on the model convergence has been provided within ACTMFR. According to TAG Unit M 3.1, model convergence is required to provide stable, consistent and robust model results and to differentiate real changes due to the assessment scheme and those associated with 'noise' in the model. Table 4 in TAG unit M3-1 recommends the following criteria for Wardrop User Equilibrium assignment to ensure a satisfactory model convergence:

- **Delta** – should be less than 0.1%, or at least stable, with convergence fully documented and all other criteria met. Delta is the measure of convergence of the final assignment to ensure that the alternative routes used in the assignment process do not differ significantly from the final minimum cost. It is the difference between costs on the various multiple assigned routes and those along the final minimum cost routes, as a percentage of minimum cost routes;
- **Flow change (P)** – should be less than 1% for four consecutive iterations for 98% of links. P is the measure of convergence of assignment – simulation loops. It is the percentage of links where assigned flows change by less than 1% between successive assignment simulation loops; and
- **Wardrop Equilibrium** - assignment percentage gap function should also be low as <0.05 for 4 consecutive loops.

For each forecast year and each peak period, it is requested that the Applicant provides the above information, to ensure the figures presented in ACTMFR are based on a fully converged model and to give National Highways confidence in the modelling outputs. Unless the provision of such information is deferred, the ExA will also require this information to inform its recommendation.

2.7 Summary

National Highways is concerned that there is some important Saturn information that has not been provided and some clarifications are sought on the ACTMFR. A summary of the requested information/queries are;

- National Highways requests information to be provided on queues and delays for all approaches to all the relevant M1 junctions (junction 9, 10 and 11) in a tabular form to enable a clear and comprehensive understanding of the performance of the SRN;
- Confirmation is requested on the reasons for the differences in the flow/V/C data provided on the SRN;
- National Highways requires that post-Covid adjustments are made to allow for the lower traffic flows at the count sites, or that sensitivity tests should be undertaken to indicate the likely changes/reassignment on the SRN; and
- Provide model convergence criteria as set out in Table 4 of TAG 3-1.

3. VISSIM modelling

3.1 Introduction

National Highways and Jacobs have undertaken a review of the VISSIM models and the ACTMFR, and several concerns remain, which are set out under subsequent headings in Section 3.2 – 3.5 below. The principal headline is that National Highways remains concerned about the absence of committed or funded mitigation for impacts on south facing slips at M1 junction 10 in the forecast scenarios. Furthermore, some additional information is sought to enable National Highways to have a better understanding of the VISSIM model.

3.2 Transfer of Vehicle Trips from SATURN to VISSIM

The strategic model flows have now been used in the preparation of demands for the VISSIM model. However, there is limited explanation provided into the operation and outputs from the strategic Saturn model.

It is understood that actual flows have been used in the model (rather than demand flows, which reflect latent demand). This means that potentially the model does not reflect all traffic that would wish to get through the network. If the additional airport demand is loaded onto an already congested network, then they may not be included in the actual flows. Therefore, National Highways seeks confirmation that all the development traffic has been included within the VISSIM model.

At present, insufficient information has been presented by the Applicant that would enable National Highways to confirm what proportion of development trips are included in the VISSIM model. National Highways requests that confirmation of the process used to derive the trips from the Saturn model for use in the VISSIM model is set out.

National Highways requests the following deliverables to enable an assessment of development trips to be made:

- A comparison of the actual and demand flows from the Saturn model. This should include a set of trip flow diagrams; and
- A comparison of the development trips included in the VISSIM model with the manual trip generation/characteristics for the development.

Unless the provision of such information is deferred, the ExA will also require this information to inform its recommendation.

3.3 Demand-Supply Convergence

Appendix E of TAG M3.1 specifies that if a tiered modelling approach is being considered, it is a requirement that the demand estimated by the higher tier model and supply estimated by the detailed model meets the guidelines for acceptable demand-supply convergence in TAG unit M2.1. The purpose of this check is that the demand response to a particular price predicted by the Saturn model is consistent with that predicted in the VISSIM model, and especially that the aggregate speed-flow relationship of the Saturn model is fully compatible with the VISSIM model.

TAG 3.1 requests the following comparisons with the detailed model (VISSIM) should be undertaken (as a minimum):

- Assigned flows using base year demand;
- Inter-zonal times using base year demand; and
- Inter-zonal times and time changes using demand factored by 0.9, 1.1, and 1.3.

National Highways requires that the Applicant presents results for the demand-supply convergence assessment as set out above. Unless the provision of such information is deferred, the ExA will also require this information to inform its recommendation.

3.4 Isolation of Development Trip Impact

The DS scenarios have been prepared with the following set-up:

- 2027: Assessment Phase 1, 21.5 million passengers per annum (mppa);
- 2039: Assessment Phase 2a, 27 mppa; and
- 2043: Assessment Phase 2b, 32 mppa.

It is understood that all the DM scenarios have been prepared with an airport demand of 18 mppa.

As set out in National Highways submission at deadline 4 (REP4-197), National Highways requires that DM VISSIM models are presented that include development trips **without** uncommitted network changes (including the mitigations proposed in the draft DCO), in order that it doesn't impede the ability to confirm the impact of the development trips on the SRN without mitigation. This is required to enable an understanding of the impact of the development on the SRN.

Unless the provision of such information is deferred, the ExA will also require this information to inform its recommendation.

3.5 VISSIM Model Set-up and Coding

3.5.1 Assignment and Convergence

The assignment (traffic routing) in the VISSIM model has not been prepared and checked in line with TAG guidance. In technical terms, the convergence and stability of the assignment within each of the VISSIM scenarios has not been assessed. This approach is counter to TAG and introduces uncertainty to the modelling outputs. The outputs imply that the mainline congestion has improved in the post covid modelling. However, without the models being converged and stabilised it is not possible to confirm that this is the case.

Information has been presented to National Highways that demonstrates that VISSIM model stability has been checked with regard to traffic flow volumes. However, no evidence of journey time and convergence checks have been provided. National Highways request that each of the future year VISSIM models are converged and stabilised in line with TAG. The outcomes of this process should be reported to National Highways.

Demonstrating that the VISSIM model has achieved an appropriate level of convergence and stability will be necessary for National Highways to have confidence in the model outputs. Unless the provision of such information is deferred, the ExA will also require this information to inform its recommendation.

3.5.2 Slip Road Coding

The VISSIM model continues to include anomalies in the southbound slip road and merge coding at M1 Junction 10. In particular, vehicles are coded to travel at faster speeds on the parallel merge lane than the M1 itself. This creates the unusual situation in the model where vehicles speed towards the end of the slip road, thus undertaking vehicles before pulling into the main line at the end of the merge lane. This may lead to an overestimate of capacity at the M1 southbound merge.

The slip road coding also leads to instances of overlapping vehicles in congested conditions. The ability for vehicles to overlap leads to an overestimate of capacity at this location.

National Highways requests that the desired speed markers in the model are updated such that vehicles on the southbound parallel merge lane are not able to travel at much faster speeds than the M1 mainline carriageway. Unless the provision of such information is deferred, the ExA will also require this information to inform its recommendation.

3.5.3 VISSIM Model Outputs

Observation of the VISSIM model indicates that the Applicant's proposed mitigation at the circulatory of Junction 10 accommodates the traffic that can reach it within each of the future year scenarios. However, National Highways remains concerned about the operation of the south facing slip roads. As noted previously, it is unclear if all development demand has been passed from the strategic model to the VISSIM model.

A summary of model operation with regard to the M1 j10 slip roads is as follows:

- 2043 DM AM: The southbound merge starts backing up from 8am but doesn't encroach into the roundabout and is clear again by 9am. The northbound lane drop (north of J9 where the number of lanes drop from 5 to 4) has some intermittent queuing and slow moving traffic;
- 2043 DS AM: The southbound merge starts backing up from 8am but doesn't actually cause any queuing on the slip road. The northbound lane drop has some queued traffic, more than

the DM. This is an issue that is worsened by the development traffic given that the congestion increases in the DS scenario. Therefore, National Highways' position is that mitigation on the southbound merge is still required as set out in National Highways submission at deadline 5 (REP5-093);

- 2043 DM PM: The southbound merge has no issues during the PM peak (although not a lot of traffic can get through to it). The signals on the roundabout back up into A1081 and eventually back in other direction, affecting the whole roundabout and slip roads. The northbound lane drop has queuing; and
- 2043 DS PM: On the southbound merge, the desired speed decisions are moved approximately 100m downstream compared to the DM. National Highways request that these are moved location back to the same location as the DM scenario. The merge has no congestion issues. The northbound lane drop has queuing back to the edge of the modelled area. The southbound on-slip also has queuing back from the point at which the two lanes drop to one lane, back onto the roundabout and on to the A1081.

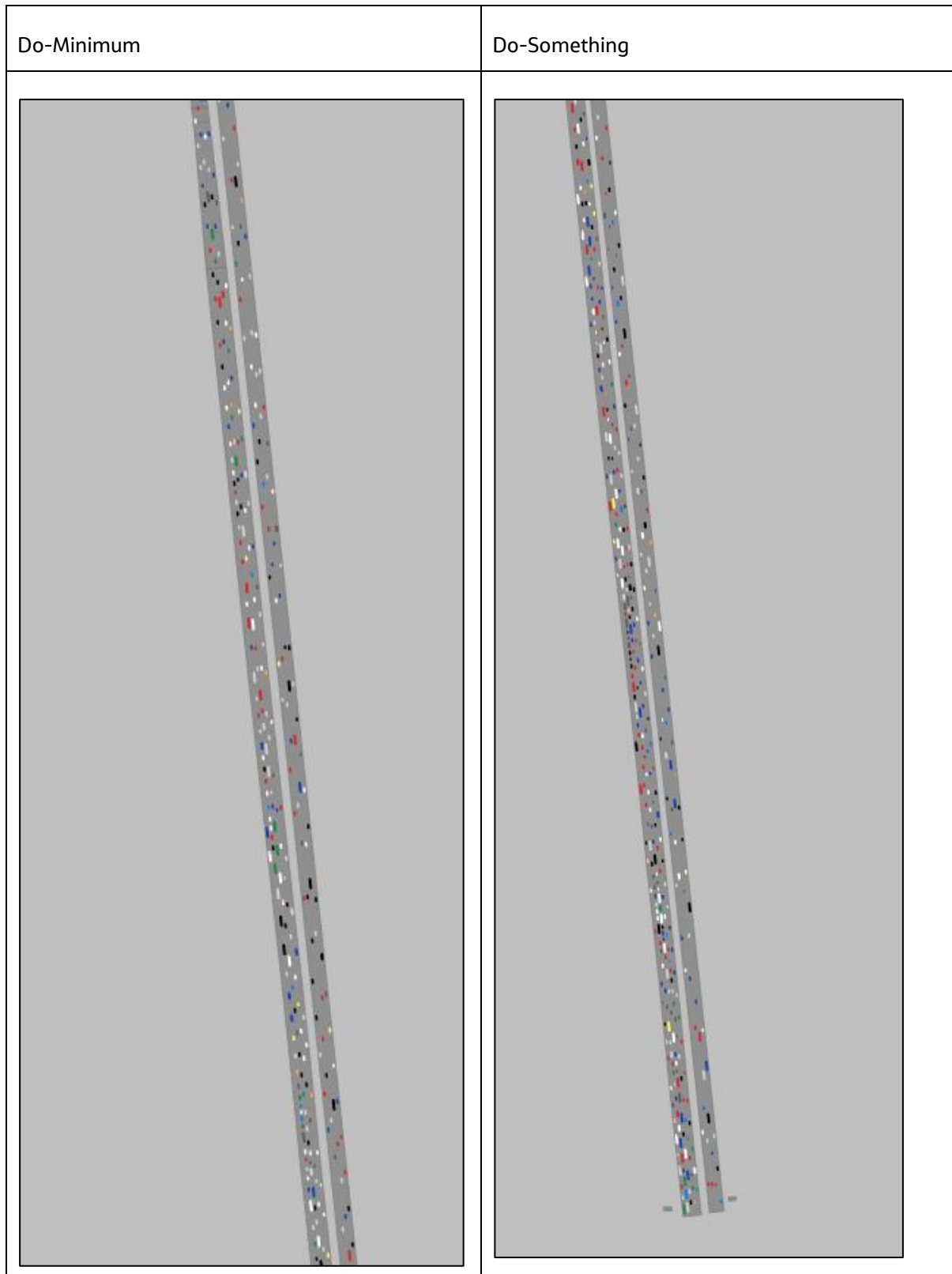
A comparison of 2043 DM and DS model operation is shown in Figure 2. This indicates that the southbound merge operates over capacity in both scenarios. No mitigation is proposed at this location by the Applicant. At present as National Highways is unable to isolate the development traffic (as set out in section 3.3 above), it is unable to determine whether the development traffic causes an adverse impact on the northbound off slip at the point where there is a lane drop from five lanes to four lanes.

Figure 2 Comparison of 2043 AM DM and DS Model Operation – 08:00



The VISSIM model screenshot in Figure 3 demonstrates that queuing still occurs at the lane drop on the northbound carriageway. The congestion at this location causes queuing that extends back to the southern edge of the network. As previously indicated it is not clear whether this is as a result of the development traffic or not as it is not possible to isolate the development traffic in the DM scenario.

Figure 3 2043 PM M1 Northbound at South of VISSIM Model – 17:30



Unless the provision of such information is deferred, the ExA will also require the information and explanations described above to inform its recommendation.

3.5.4 Summary

National Highways has a considerable number of outstanding concerns with the VISSIM modelling. A summary of the issues is as follows;

- A comparison of the actual and demand flows from the Saturn model is required. This should include a set of trip flow diagrams;
- A comparison of the development trips included in the VISSIM model with the manual trip generation/characteristics for the development is required.
- Results are required for the demand-supply convergence assessment;
- The DM VISSIM models are required with the Luton Airport trips and no mitigating infrastructure to enable the development impacts to be isolated;
- Each of the future year VISSIM models should be converged and stabilised in line with TAG. Analysis regarding traffic volumes and journey times should be provided;
- The desired speed markers in the model should be updated such that vehicles on the southbound parallel merge lane are not able to travel at much faster speeds than the M1 carriageway;
- It is requested that on the southbound merge the desired speed decisions are moved location back to the same location as the DM scenario;
- Concerns that the southbound merge operates over capacity in both the DM and DS scenarios, yet no mitigation is proposed by the Applicant. National Highways' position is that mitigation on the southbound merge is still required as set out in National Highways submission at deadline 5 (REP5-093);
- Queuing still occurs at the lane drop on the northbound carriageway. The congestion at this location causes queuing that extends back on to the southern edge of the network. Therefore, National Highways position is that mitigation on the northbound diverge is still required as set out in National Highways submission at deadline 5 (REP5-093);

Unless the provision of such information is deferred, the ExA will also require this information to inform its recommendation.

4. Conclusions

National Highways has a number of outstanding VISSIM and Saturn queries and data requests as detailed in Sections 2 and 3 of this Technical Note.

National Highways remains uncertain about the development impact and is not certain that all the development impacts from the proposed expansion of Luton Airport have been mitigated, or when the mitigation would be required based on the updated modelling to take account of the potential impacts of COVID-19. As a result of the uncertainties with the modelling there is a risk of a residual development impact from Luton Airport on the M1 junction 10 (the northbound mainline and the southbound merge) and potentially junction 9 that at present remain unmitigated by the Applicant.

Therefore, as matters stand National Highways maintains its objections in respect of the application. Without addressing these concerns (which National Highways considers to be difficult to achieve during the examination) or without providing a mechanism for such concerns to be addressed prior to implementation and opening of relevant portions of the airport expansion, that will remain the case. National Highways considers that in the time available the second approach is preferable.