

**East Midlands Gateway
Phase 2 (EMG2)**

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EMFM 2019 Sensitivity Test

APRIL 2026

The East Midlands Gateway Phase 2
and Highway Order 202X and The East Midlands Gateway
Rail Freight and Highway (Amendment) Order 202X

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SEGRO

**The East Midlands Gateway Phase 2 and
Highway Order 202X and The East Midlands
Gateway Rail Freight and Highway (Amendment)
Order 202X**

**EMFM 2019 SENSITIVITY TEST
(DOCUMENT DCO 7.9/MCO 7.9)**

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TRANSPORT & ACCESSIBILITY PLANNING

SEGRO PROPERTIES LTD AND SEGRO (EMG) LTD
East Midlands Gateway 2
VISSIM 2019 EMFM Sensitivity Test Modelling
Technical Note

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1. INTRODUCTION

- 1.1 BWB Consulting Ltd (BWB) has been appointed by SEGRO (the Applicant) to produce a microsimulation traffic model of the M1 Junction 24 and Strategic Road Network in the vicinity, to support a DCO application for the Phase 2 Expansion of East Midlands Gateway 2 development (EMG2).
- 1.2 The EMG2 Project comprises a second phase to SEGRO's EMG1 Logistics Park and Rail Freight Interchange. The applications comprise the following three interrelated component parts:

Development Consent Order (DCO) Application

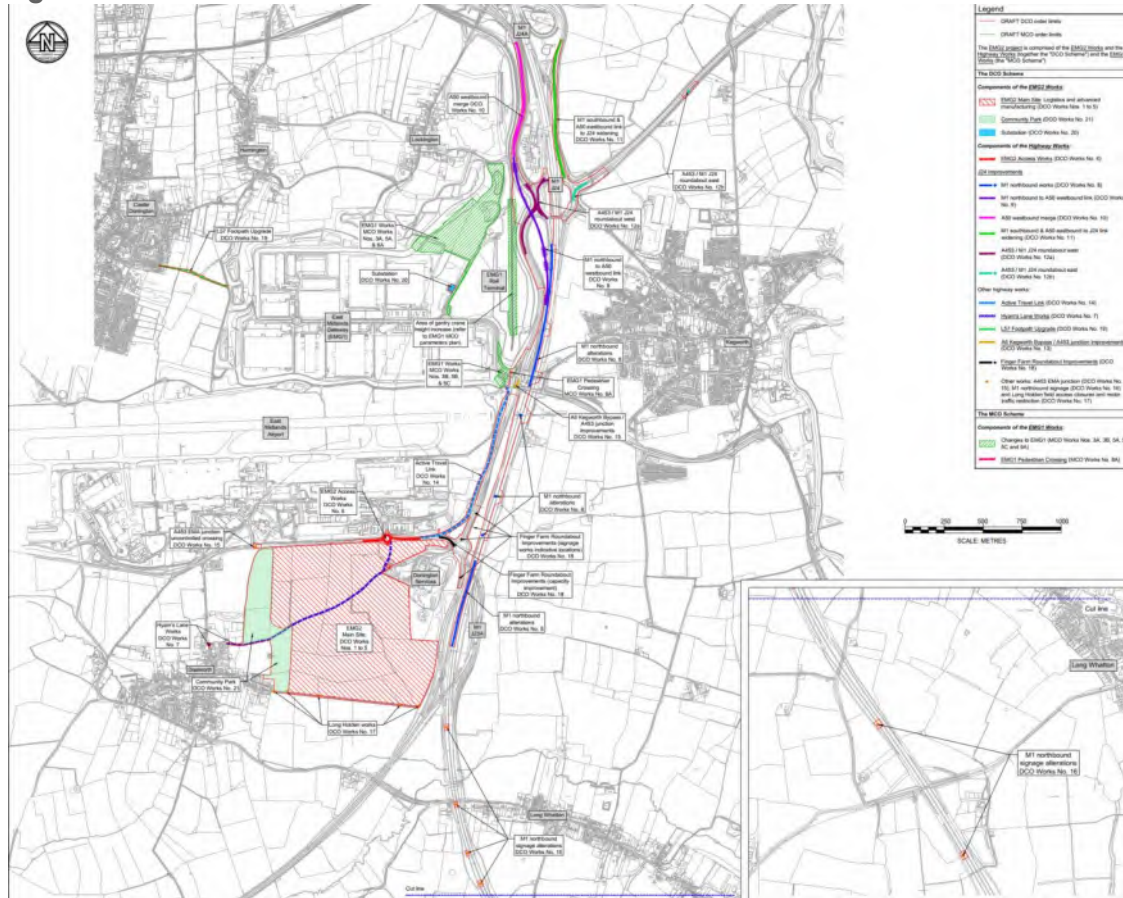
- **EMG2 Works** – A new logistics and advanced manufacturing employment park on the EMG2 Main Site located to the south of East Midlands Airport and the A453, and west of the M1 motorway. This part of the Scheme falls within the 'East Midlands Airport and Gateway Industrial Cluster' (EMAGIC), which is part of the East Midlands Freeport designated by the Government in 2022. It comprises 300,000sqm of B2/B8 Use Class, plus an allowance for 200,000sqm of B8 mezzanine floorspace; together with HGV parking and a bus interchange, an upgrade to the EMG1 substation and the provision of a community park;
- **Highways Works** – the A453 EMG2 access junction works (referred to as the EMG2 Access Works); significant improvements at Junction 24 of the M1 (referred to as the J24 Improvements), works to the wider highway network including the Active Travel Link, Hyam's Lane Works, L57 Footpath Upgrade, A6 Kegworth Bypass/A453 Junction Improvements and Finger Farm Roundabout Improvements; and

Material Change Order (MCO) Application

- **EMG1 Works** – Additional warehousing unit of 26,500sqm plus a mezzanine allowance for 3,500 sqm (Use Class B8) at Plot 16 of EMG1, together with works to increase the permitted height of the gantry cranes at the rail freight terminal, improvements to the EMG1 public transport interchange, and site management building and addition of a pedestrian crossing near the entrance to EMG1.

- 1.3 The location of the proposed development is show in **Figure 1**.

Figure 1: Site Location



- 1.4 A VISSIM model has been developed for the M1 J24 corridor and a Local Model Validation Report (LMVR) was produced within Technical Note EMG2-BWB-GEN-XX-RP-TR-0006 Revision P5 (**Appendix 1**) and issued to the TWG in consultation with National Highways (NH) and Leicestershire County Council (LCountyC). The report concluded that the model calibrates well against observed and modelled turning movements during both peak hours at 15-minute intervals in line with Department for Transport guidelines and as a result satisfied the validation criteria.
- 1.5 The base model was subsequently agreed with NH, including the most recent changes to the forecast calibration which led to the base model being updated for consistency, which was agreed on 28 October 2025. LCountyC and Nottinghamshire County Council (NCountyC) agreed to defer to NH on this element. LCountyC did however subsequently undertake a review of the base VISSIM model and have confirmed it is approved.
- 1.6 As part of the initial DCO submission, the Transport Assessment included a VISSIM Forecasting Report. Since the original DCO submission, NH and LCC have provided comments both on the Stage 2 VISSIM model and the Forecasting Reports contents. As a result, Revision 3 of Forecasting Report now summarises the latest modelling outputs and provides additional reporting on those outputs as requested by LCC.
- 1.7 Alongside NH's comments received on the Stage 1 and 2 modelling undertaken based on the EMFM outputs received to date, NH produced a Technical Note originally dated

19 August 2025, but updated post receipt of further information from AECOM set out in this report to 15 October 2015, included in **Appendix 2**. This includes a number of observations, comments, and nine 'substantive' issues. These primarily relate to the way that EMFM has modelled the A50 westbound merge downstream from the M1 J24A southbound interchange link, which was deemed to be understating the capacity. The location of the A50 westbound merge with the M1 southbound is presented in **Figure 2**.

Figure 2: A50 Westbound / M1 southbound interchange link Merge Location



- 1.8 This Technical Note therefore sets out the findings of a sensitivity test which assesses the merge with unconstrained capacity to in effect provide a 'best case' assessment in terms of how the merge is forecast to operate. That is versus what could be described as a 'worst-case' assessment presented in the formal DCO documentation where it constrained capacity at said merge, thereby leading to NH querying these findings.
- 1.9 Whilst this sensitivity test in effect assesses a 'best case' in terms of the unconstrained capacity of the merge, it results in a higher number of vehicles forecast to use the new M1 northbound to A50 westbound interchange link road. This forms the key piece of mitigation for the EMG2 Project, and hence is the main reason for this sensitivity test, to ensure that, as requested by NH, the modelling work aligns with a robust assessment of the engineering design work.
- 1.10 It should also be noted that this Technical Note sets out the final sensitivity test undertaken using the 2019 version of the East Midlands Freepport Model (EMFM), which is a cordoned part of the Pan Regional Transport Model (PRTM), building on the substantial work undertaken using said version of the model to inform the formal DCO submission. A further sensitivity test, using the 2023 version of EMFM, is being undertaken and will be reported on in a separate Technical Note. The sensitivity test considered in this Technical Note focuses on the Stage 2A modelling – the core Transport Assessment scenario, which includes all proposed local plan allocations, but not their mitigation. It is therefore highly robust as a result. This note does not consider Stage 2B, which excluded the draft Local Plan sites.

1.11 Following this introduction, the remainder of this report is structured as follows:

- **Section 2:** sets out NH's comments and associated background to inform this sensitivity test
- **Section 3:** sets out the 2019 EMFM sensitivity test outputs provided by AECOM
- **Section 4:** sets out the modelling background, modelling extents, assessment scenarios, traffic flows and journey time routes
- **Section 5:** sets out the 2019 EMFM sensitivity test Stage 2A VISSIM modelling results
- **Section 6:** considers the comments received from NH, and nine 'substantive issues' in particular
- **Section 7:** sets out the summary and conclusions.

2. NH COMMENTS AND BACKGROUND TO THIS SENSITIVITY TEST

2.1 NH's Technical Note, included in **Appendix 2**, sets out the following key items which this Technical Note considers in detail and responds to. It should be noted that 'substantive issues' 1 to 5 were originally received in August 2025, with 6 to 9 following post NH's review of AECOM's sensitivity test forecast report and associated outputs:

- i) **Substantive issue 1** considers the reduction in traffic in the morning peak hour using the new M1 northbound to A50 westbound link road between 2028 and 2038 because of the constrained capacity included for within the EMFM modelling at the A50 westbound merge presented in **Figure 2**. NH states that:

"the reduction in flow between 2028 and 2038 on the new link road is a concern given the findings of the more detailed analysis and the likelihood of overstated delay at the A50 M1 J24A merge".

- ii) Hence flows on the new link road in 2038 may be understated. NH therefore conclude that:

"the Applicant should take a considered view of the flows used to inform the design and account for any traffic rerouting and/or queuing".

- iii) NH then summarise a previous sensitivity test undertaken with unconstrained capacity at both the A50 westbound merge and the link road, assuming that two links were introduced, rather than the one proposed. NH suggest that the results:

"are reassuring in so far as a 393 PCUs increase at the A50 M1 J24A merge itself is lower than what might have been the case given the capacity added in the test".

- iv) However, they also raise a concern in:

“that 241 PCUs of the 393 PCUs increase is on the proposed new bridge increasing flows on it up to or over its designed capacity”.

- v) As a result of the above, **substantive issue 2** states that:

“building upon Substantive Issue 1, the Applicant should incorporate the results of this additional test when evaluating the adequacy of the proposed mitigation package to accommodate future traffic demand. JSJV urges the Applicant to conduct appropriate tests and assessments of the suggested mitigation using the VISSIM model, with particular attention given to the capacity of upstream merges (on the A50) and diverges (on the M1) to safely manage anticipated demand. Regardless of the outcomes of the additional test described above, it is crucial to note that the predicted flow on the new bridge in 2028 exceeds 1,800 PCUs, which is close to the upper limit of the theoretical maximum capacity for a single lane (as highlighted in Substantive Issue 1). The Applicant's engineering team should factor this into their evaluation and design, thereby ensuring the proposed infrastructure can adequately accommodate anticipated traffic demands while maintaining safety and efficiency, and give due consideration to future proofing. The Applicant has attributed the drop in flow on the new link in the AM peak hour between 2028 and 2038 to capacity issues at the downstream A50 M1 J24A merge. Modelled delays at the merge are also likely overstated. Where modelled delays and capacities at the A50 M1 J24A merge do not reflect actual delays and capacities, flows on the new link in 2028 and 2038 more particularly, may be understated (as noted in Substantive Issue 1)”.

- vi) **Substantive issue 3** states that:

“there are mainline constraints on the M1 at numerous locations in the vicinity of the EMA. However, the new link attracts additional traffic to the M1 northbound between J23a and J24. Accordingly, the Applicant should undertake engineering, safety evaluation and assessment of the mainline for discussion with National Highways”.

- vii) **Substantive issue 4** states that:

“VISSIM modelling should be employed to explore capacity issues and constraints at M1 J24 roundabout and Kegworth Bypass junction”.

- viii) **Substantive issue 5** states that :

“JSJV believes that a constrained network in the EMFM is either holding significant volumes of traffic up in queues or distorting natural traffic routing (possibly both), especially in the longer term (i.e. 2038) resulting in varying rather than comparable traffic flow changes across the network. This may have implications for future traffic flows through the EMFMA if and when capacity constraints are addressed. The Applicant is requested to take this into consideration when analysing and designing proposed mitigation”.

ix) **Substantive issue 6** states that:

*“As noted above in **Substantive Issue 1**, there was previously a reduction in traffic flows on the new link in 2038 compared to 2028; 2028 AM peak hour is 1,832 PCUs and in 2038 is 1,481; a difference of 351 PCUs. The ‘2a NH3’ scenario now shows that this reduction occurs to a lesser extent; 1,904 in the 2028 AM peak hour and 1,863 in the 2038 AM peak. This is a difference of 41 PCUs. This indicates that the previous reduction of 351 PCUs was largely, but not fully, attributed to the constraint at the A50 M1 J24A merge. The previous concern outlined in Substantive Issue 1 was that where delays at the merge do not occur to the same degree as predicted, flow on the new link in 2038 may be understated. The most recent testing (‘2a NH3’) indicates that the predicted flows in both 2028 and 2038 remain at the upper limit of the theoretical capacity for a single lane. The Applicant’s engineering team should continue to factor this into their evaluation and design, thereby ensuring the proposed infrastructure can adequately accommodate anticipated traffic demands while maintaining safety and efficiency, and give due consideration to future proofing “.*

x) **Substantive issue 7** states that:

“with the constraint at the A50 M1 J24A merge removed as part of this testing, a secondary constraint becomes apparent. As noted above, the total demand on the link between M1 Junction 24 and the A50 Derby Southern Bypass is 3,886 PCUs during the AM peak in 2028; 4,024 in the PM peak. In 2038, this is 4,035 in the AM and 3,981 in the PM. This indicates this link could become a constraint. The Applicant’s engineering team should factor this into their evaluation and design, thereby ensuring the proposed infrastructure can adequately accommodate anticipated traffic demands while maintaining safety and efficiency, and give due consideration to future proofing”.

xi) Tied to **Substantive issue 7**, NH state on page 21 that:

*“there are now increases in the delay at the link between M1 Junction 24 and the A50 Derby Southern Bypass where the link reduces from three-lanes to two-lanes”, which “should be taken into consideration as part of **Substantive Issue 7**”.*

xii) NH also state on page 22 that:

*“there is a high V/C node on the link between M1 Junction 24 and the A50 Derby Southern Bypass link as well as the A50 Derby Southern Bypass itself”, which should also “be taken into consideration as part of **Substantive Issue 7**”.*

xiii) **Substantive Issue 8** states that:

“there remain mainline constraints on the M1 at numerous locations in the vicinity of the EMA. However, the new link attracts additional traffic to the M1 northbound between J23a and J24. Accordingly, the Applicant should undertake engineering, safety evaluation and assessment of the mainline

constraints for discussion with National Highways". This is in effect a repeat of **substantive Issue 3**.

xiv) In the lead up to **Substantive issue 9**, NH states that:

"there is a high V/C node on the A453 west of Finger Farm Roundabout (Local Road Network) during the 2038 PM peak. It is understood that this is the proposed signalised crossing. There is a concern that traffic may be artificially constrained at this location and therefore understating impacts on the SRN. The Applicant should investigate and confirm this is not resulting in a significant understatement of traffic on the SRN particularly Finger Farm Roundabout".

- 2.2 'Substantive issues' 1 to 5 were originally considered by the Applicant team when NH's original report was received, and discussed with them. Whilst NH did not request any further EMFM modelling work, it was proposed that one final 2019 EMFM sensitivity test modelling run was undertaken by AECOM to help respond to their Technical Note. This final test would reduce the new M1 northbound to A50 westbound interchange link road back down to one lane, as proposed, but include for unconstrained capacity at the A50 westbound merge presented in **Figure 2**.
- 2.3 The relevant correspondence with NH is included in **Appendix 3**. Whilst the 2038 future year morning peak hour is the critical test, NH also asked for 2028 and 2038 sensitivity tests, for both the morning and evening peak hours, for completeness.
- 2.4 This therefore sets the scene for this 2019 EMFM sensitivity test Technical Note; NH do not view the original EMFM coding as incorrect, but rather one of many possible approaches to modelling the A50 westbound merge. The 'unconstrained' testing is therefore not a correction, but a sensitivity test of what could arise if that merge had significantly more capacity.
- 2.5 As a result, the next section presents the findings of AECOM, including the information requested by NH in **Appendix 3**. Subsequent sections reiterate the modelling approach undertaken, so that said information is contained in one report, the updated 2019 EMFM sensitivity test Stage 2A VISSIM modelling findings, and hence the responses to NH's 'substantive issues'.

3. SENSITIVITY TEST EMFM OUTPUTS PROVIDED BY AECOM

- 3.1 **Appendix 4** contains the sensitivity test outputs provided by AECOM, including the information requested by NH. This consists of an addendum to the Stage 2A forecasting report and associated spreadsheets.
- 3.2 In summary, Section 4 of sensitivity test forecasting report sets out the following:
- i) The forecast trip distribution from this sensitivity test (referenced as '2a NH3' in the AECOM report) is very similar to the core TA Stage 2A assessment work, with traffic routing through the network remaining largely unchanged.
 - ii) The forecast flow changes from the '2a NH3' scenario to the 'Without Development (1a)' scenario are very similar to the core TA Stage 2A findings,

particularly in the vicinity of M1 Junction 24, the A453/A6 Kegworth bypass roundabout, the A453 Finger Farm Roundabout and the EMG2 access roundabout.

- iii) Due to the increased capacity at the A50 merge point within this sensitivity test, there is an increase (~300-400 PCUs) in traffic forecast on the A50 westbound in the '2a NH3' scenario versus that in the core TA Stage 2A findings, coupled with an increase of up to 400 PCUs on the proposed M1 northbound to A50 westbound link. This increase reflects traffic diverting from other routes such as via M1 J25, which in turn results in a reduction in traffic along routes such as the M1 northbound and the A52 westbound towards Derby.
 - iv) The forecast delay changes from '2a NH3' to 'Without Development (1a)' are very similar to that in the core TA Stage 2A findings, particularly in the vicinity of M1 Junction 24, the A453/A6 Kegworth Bypass roundabout, the A453 Finger Farm Roundabout and the EMG2 access roundabout.
 - v) Due to the increased capacity at the A50 westbound merge in this sensitivity test, a reduction in delay is forecast to occur on the A50 westbound at this point. An increase in delay is expected on the A50 westbound off-slip to A50 Junction 1 in all forecast years and time periods as a result of additional traffic passing through the merge. In addition, delays are forecast to increase at the merge point to the north of the new link road where it meets the existing A50 access from M1 Junction 24 in the PM Peak in both years.
 - vi) The forecast node volume-capacity ratios in the '2a NH3' scenario are very similar to that in the core TA Stage 2A findings, particularly in the vicinity of M1 Junction 24, the A453/A6 Kegworth Bypass roundabout, the A453 Finger Farm Roundabout and the EMG2 access roundabout.
 - vii) Due to the increased capacity at the A50 merge, there is a slight improvement in the node volume-capacity at this location. However, the node volume-capacity is forecast to increase at nodes upstream and downstream of this location due to increased flow.
- 3.3 The information provided by AECOM, and cordon matrices in particular, have been used to inform the 2019 EMFM sensitivity test Stage 2A VISSIM modelling presented in this Technical Note. The AECOM information included in **Appendix 4** was shared with the TWG, which led to NH's updated Technical Note included in **Appendix 2**. Section 4 of said report covers NH's review of the AECOM information, which led to the inclusion of the additional substantial issues 6 to 9.
- 3.4 In terms of the EMFM modelling findings, it should be noted that in reality, the highway network will no doubt operate somewhere in between that presented in the core TA Stage 2A findings, which includes for some delay at the A50 westbound merge, and that presented in the '2a NH3' sensitivity test scenario, which in effect removes it and models it with unconstrained capacity.
- 3.5 The assessment included for within this sensitivity test note therefore presents a 'best case' assessment of the operation of the A50 westbound merge, but a 'worst-case' in

terms of the operation of the network in the immediate vicinity of the merge because of the higher number of vehicles expected to use the proposed M1 northbound to A50 westbound link road, which is higher than that considered in the assessment work contained within the Transport Assessment.

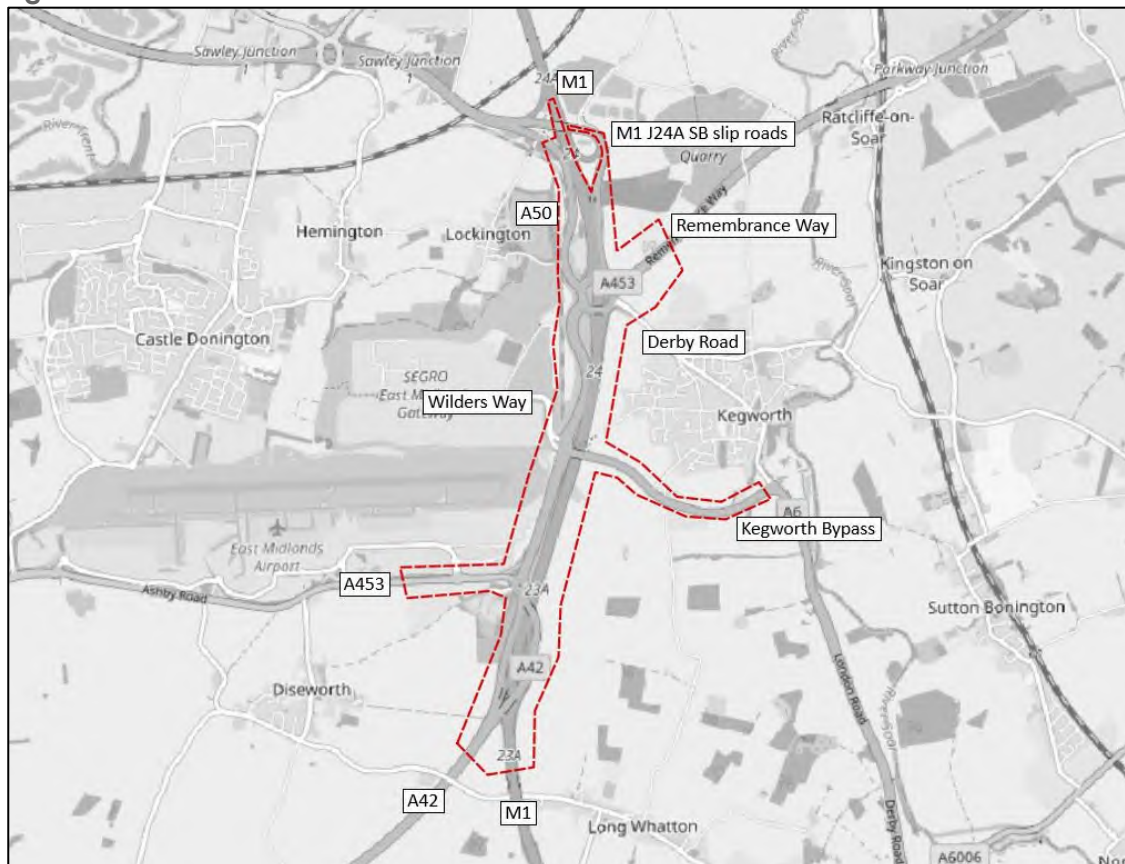
4. MODELLING BACKGROUND

VISSIM Modelling

4.1 It was agreed with the TWG that the following four junctions are tested using microsimulation VISSIM modelling because of their proximity to the SRN. The VISSIM model extent is shown at **Figure 3**.

- A453/Hunter Road Roundabout
- Finger Farm Roundabout
- A453/A6 Kegworth Bypass Roundabout
- M1 Junction 24.

Figure 3: VISSIM Model Extent



Forecast Years & Assessment Criteria

- 4.2 It has been agreed with the TWG for a forecast base year of 2022 to be adopted (aligning with the year traffic surveys were undertaken) and forecast years of 2028 and 2038, reflecting the year of opening and post 10 years. The forecast year modelling has been undertaken in four stages in the DCO submission, referred to as 'Stage 1A/2A modelling' and 'Stage 1B/2B modelling'. this 2019 EMFM sensitivity test only considers Stage 2A, which forms the core scenario for the TA, albeit compared against the Stage 1A modelling outputs as set out in document reference **EMG2-BWB-GEN-XX-RP-TR-0019-S2-P3**.
- 4.3 It should be noted that the Stage 1A modelling has not been updated to account for this unconstrained capacity sensitivity test modelling of the A50 westbound merge with the M1 southbound. Comparing these two scenarios therefore provides a worst-case assessment in terms of the operation of the EMG2 mitigation proposals because the Stage 1A modelling presented in the TA includes for capacity constraints at the A50 westbound merge.
- 4.4 Planned development growth is accounted for within the 'without development' scenarios as per the agreed Uncertainty Log v7. PRTM proforma v14 and Uncertainty Log v7 have been formally agreed with NH and NCountyC within the Stage 1A Modelling sign off sheet, whilst LCountyC confirmed they were accepted by email on 11 December 2024.
- 4.5 The 'with development' scenarios include the development on both EMG2 Main Site and Plot 16 of EMG1. A scenario has not been undertaken that considers EMG1 traffic in isolation, which is being applied for as a Material Change of Use (MCO) to the current DCO. Plot 16 is expected to generate 53 two-way trips in the morning peak hour and 67 two-way trips in the evening peak hour, circa one per minute. This would have a negligible impact on the network and would not trigger the requirement for further VISSIM modelling.

Deriving Future Forecast Traffic Flows

- 4.6 The EMFM model is validated at link flow level but not turning movement level and therefore a furnishing process has been carried out to derive future forecast traffic flows to be input into the VISSIM model.
- 4.7 BWB prepared Technical Note EMG2-BWB-GEN-XX-RP-TR-0004 S2 P7 (Appendix 49 of the TA) setting out the methodology for deriving the future forecast traffic flows, which in summary involved the following process:
- Column adjustment: calculate turning counts across columns using survey data proportions in combination with the target link flow out of each arm.
 - Sum row: calculate the sum of each arm row total.
 - Row adjustment: calculate turning counts across rows using survey data proportions in combination with the target link flow into each arm.
 - Sum column: calculate the sum of each column.

- Round all values in the matrix to the closest integer.
 - Update sums for column and row total.
 - Repeat the above 'x' number of iterations until the flows converge.
- 4.8 The macro has been built to run the furnessing 20 times for each matrix, however it should be noted that every time the macro is executed, it runs an additional 20 times. The furnessing spreadsheet therefore has been run for at least 20 iterations. The furnessing methodology has been double constrained, i.e. both origin and destination and the traffic flow matrices are furnessed until link flows are within a GEH of 5. This has been calculated by taking the absolute difference between the calculated target link flow and furnessed link flow. Should these be higher than a GEH of 5, the macro is executed until convergence is achieved. The furnessing process has been undertaken for the assessment years 2028 and 2038.
- 4.9 Due to high volumes of traffic that travel on the motorways and major A-roads there is the potential for these numbers to affect the furnessing outputs. As the furnessing process is based on turning proportions, the large motorway flows could cause the furnessing to assign traffic that would use the junctions to the motorway mainline movements instead.
- 4.10 Therefore, the M1 and A42 mainline flows were removed and furnessed separately to avoid any re-assignment and subsequently added back into the matrix after the furnessing process was complete.
- 4.11 EMFM, as a strategic highway model, re-routes traffic in response to congestion. To ensure the true impact of the development is modelled and fully mitigated, the development traffic was extracted from the EMFM model, and assigned manually to exclude the effects of any rerouting. The modelling therefore presents a highly robust assessment of the full impact of the proposed development trips.

Post Stage 2 Modelling

- 4.12 Stage 2 modelling comprises of 2028/38 forecast years with committed development, proposed development and Local Plan allocations with the proposed mitigation scheme that have been determined as a result of the Stage 1 VISSIM Modelling.
- 4.13 Upon receiving the Stage 2 EMFM outputs, furnessing was carried out using the above methodology but because the original methodology was based on the survey turning proportions it was not encapsulating the re-routing of traffic due to the mitigation strategy and provided unrealistic O-D Matrices.
- 4.14 Therefore, an alternative methodology has been used for the Stage 2 furnessing, which retains the Stage 1A furnessed flows and applies the difference between EMFM forecast flows for Stage 1A and Stage 2A. This accounts for the re-routing as a result of the mitigation while maintaining consistency in the matrix build process from Stage 1A. This approach has been discussed and agreed with NH.

Journey Time Routes

4.15 To determine the impact of the development on the highway network, journey time routes utilised for the validation have been retained to provide a comparison between the “with” and “without development” scenarios.

4.16 **Figures 4 and 5** show the routes utilised for journey time results.

Figure 4: Journey Time Routes (1 - 10)

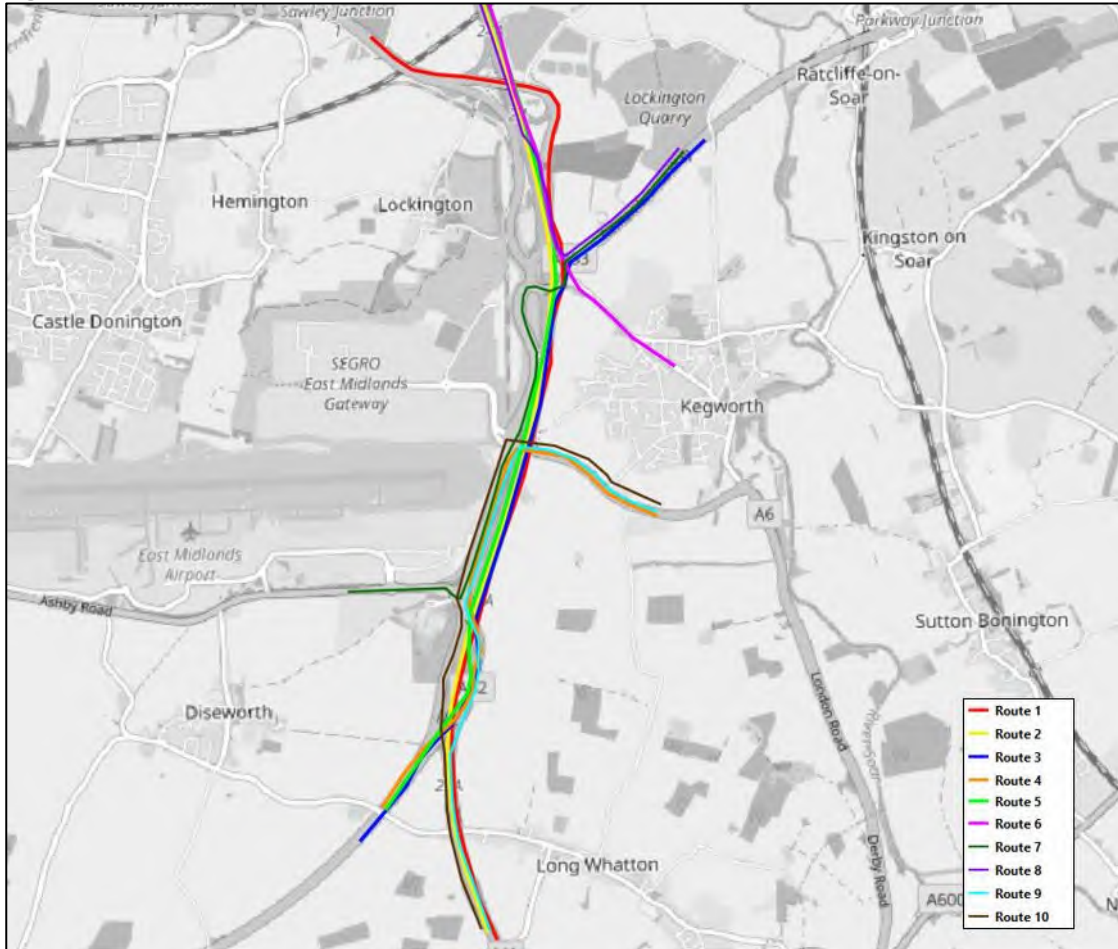
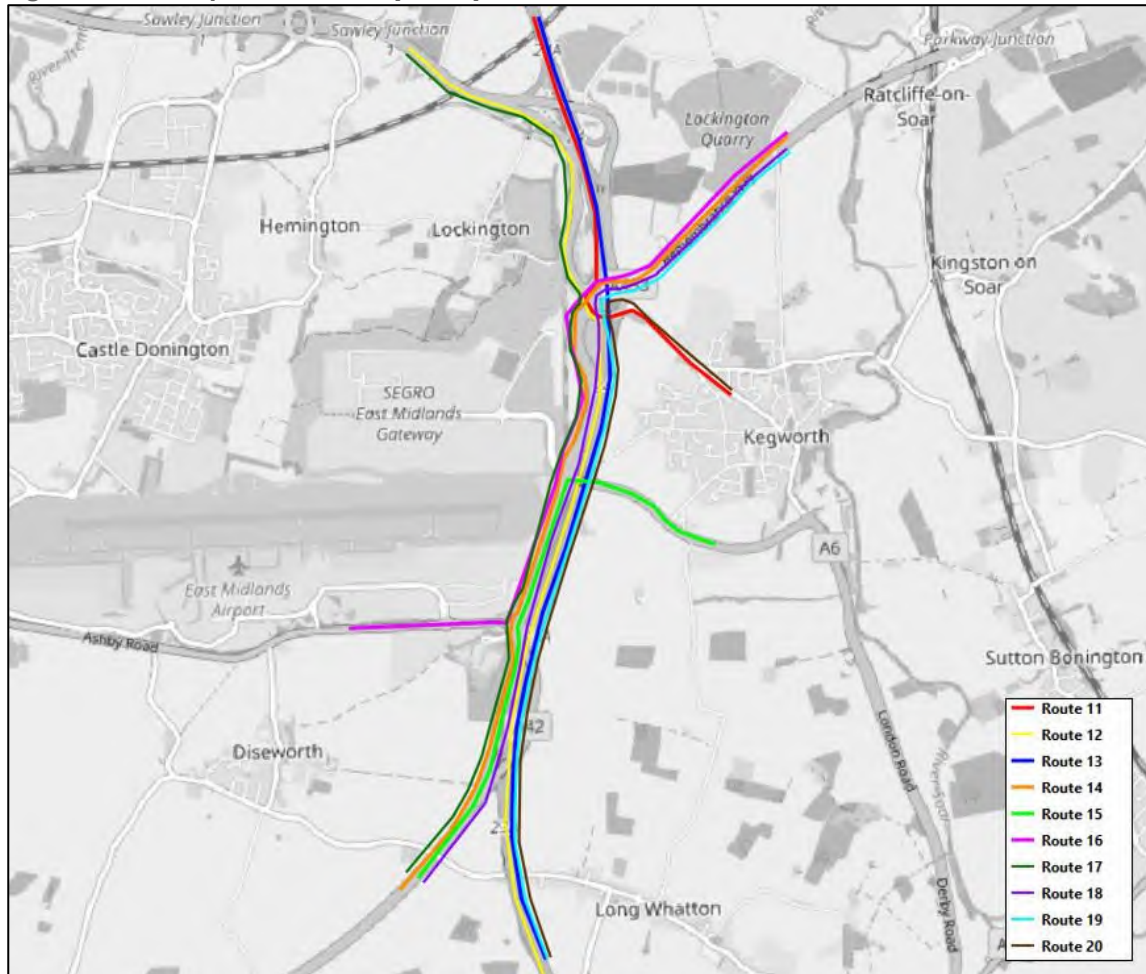


Figure 5: Journey Time Routes (10-20)



4.17 Details of the origin and destination of the routes identified above is provided below:

- Route 1 – A50 to M1 South
- Route 2 – M1 North to M1 South
- Route 3 – A453 Remembrance Way to A42
- Route 4 – Kegworth Bypass to A42
- Route 5 - M1 North to A42
- Route 6 – M1 North to Derby Road
- Route 7 – A453 Remembrance Way to A453 EMA
- Route 8 – M1 North to A453 Remembrance Way
- Route 9 – Kegworth Bypass to M1 South
- Route 10 - M1 South to Kegworth Bypass
- Route 11 – Derby Road to M1 North
- Route 12 – M1 South to A50
- Route 13 – M1 South to M1 North
- Route 14 – A42 to A453 Remembrance Way via A453

- Route 15 - A42 to Kegworth Bypass
- Route 16 – A453 EMA to A453 Remembrance Way
- Route 17 – A42 to A50 via A453
- Route 18 – A42 to A453 Remembrance Way via M1
- Route 19 – M1 South to A453 Remembrance Way via M1
- Route 20 - M1 South to Derby Road via M1

5. STAGE 2A SENSITIVITY TEST VISSIM MODELLING RESULTS

Introduction

- 5.1 This section sets out the results of the Stage 2A sensitivity test VISSIM modelling with the mitigation in place to determine if the mitigation scheme can still accommodate the re-routing of traffic under this test and help provide 'worst-case' traffic flows to inform the engineering design review, which will be reported back on under separate cover.

Stage 2A VISSIM Results

Journey Time Comparison

- 5.2 **Tables 1** and **2** show the journey time comparison between the "without development" and "with development" scenarios for the forecast years 2028 and 2038 respectively (NB WoD = without development and WD = with development in all relevant tables):

Table 1: Stage 2A 2028 Journey Time Comparison (Seconds)

Route	AM				PM			
	2024 Base	2028 WoD	2028 WD + Mit	(WD + Mit) - WoD	2024 Base	2028 WoD	2028 WD + Mit	(WD + Mit) - WoD
Route 1	353	358	433	77	331	341	348	6
Route 2	339	356	365	8	317	324	325	1
Route 3	308	311	311	0	301	413	319	-94
Route 4	306	307	298	-9	295	290	286	-4
Route 5	323	338	350	12	309	315	316	1
Route 6	272	294	461	167	253	259	298	39
Route 7	400	399	351	-48	365	473	346	-127
Route 8	278	302	470	168	254	262	298	36
Route 9	316	319	309	-10	300	295	293	-1
Route 10	355	337	322	-15	317	333	344	11
Route 11	349	379	357	-22	339	374	357	-18
Route 12	354	650	318	-332	346	454	333	-121
Route 13	337	431	376	-55	349	397	407	9
Route 14	423	489	437	-52	387	396	393	-3
Route 15	333	312	294	-18	284	284	288	4
Route 16	397	471	416	-55	361	371	381	10
Route 17	354	378	396	18	338	334	349	15
Route 18	357	665	407	-258	332	465	363	-103
Route 19	375	659	433	-225	364	517	433	-84
Route 20	377	659	457	-202	370	519	454	-66

Table 2: Stage 2A 2038 Journey Time Comparison (Seconds)

Route	AM				PM			
	2024 Base	2038 WoD	2038 WD + Mit	(WD + Mit) - WoD	2024 Base	2038 WoD	2038 WD + Mit	(WD + Mit) - WoD
Route 1	353	485	594	230	331	345	436	92
Route 2	339	364	501	16	317	327	329	2
Route 3	308	565	528	-37	301	896	574	-322
Route 4	306	331	310	-20	295	303	298	-6
Route 5	323	342	487	145	309	319	320	1
Route 6	272	323	676	353	253	266	390	124
Route 7	400	650	568	-82	365	959	602	-357
Route 8	278	331	685	354	254	269	388	118
Route 9	316	344	320	-24	300	308	305	-3
Route 10	355	490	323	-168	317	333	344	11
Route 11	349	406	367	-39	339	380	366	-15
Route 12	354	712	326	-386	346	388	340	-49
Route 13	337	457	386	-70	349	390	420	29
Route 14	423	806	495	-312	387	413	404	-10

Route	AM				PM			
	2024 Base	2038 WoD	2038 WD + Mit	(WD + Mit) - WoD	2024 Base	2038 WoD	2038 WD + Mit	(WD + Mit) - WoD
Route 15	333	469	291	-178	284	286	291	5
Route 16	397	1028	480	-549	361	395	425	30
Route 17	354	579	383	-196	338	340	356	16
Route 18	357	830	460	-370	332	404	368	-36
Route 19	375	809	487	-322	364	454	443	-11
Route 20	377	810	523	-287	370	461	475	14

- 5.3 **Tables 1 and 2** show that there are significant reductions in journey times between scenario 2038 'without development' and 2038 'with development + mitigation', particularly at Finger Farm roundabout, A453/A6 Kegworth Bypass roundabout, and M1 J24, in the morning peak hour, which is the busier of the two peak hours.
- 5.4 A review of the VISSIM simulation indicates that in the morning peak period the M1 northbound off-slip becomes significantly less congested with slight queuing back onto the mainline, but still allows vehicles to access the proposed link road.
- 5.5 There are also reductions in journey times in the evening peak hour which show that the mitigation provides significant benefit to the Strategic Road Network.
- 5.6 This is shown in **Tables 3 and 4** which summarises the average and maximum queues for the 2028 without and with development scenarios.

Table 3: Stage 2A 2028 Average Queue Comparison (Metres)

	Location		AM				PM			
	Junction	Approach	2024 Base	2028 WoD	2028 WD Mit	Miti - WoD	2024 Base	2028 WoD	2028 WD Mit	Miti - WoD
1	Finger Farm	A453 W	24	50	46	-5	22	21	24	4
2	Finger Farm	A453 N	20	28	40	12	13	15	26	11
3	Finger Farm	M1/A42 S	35	63	63	0	19	17	18	0
11	M1 J24	M1/A50	194	292	1242	949	90	120	286	166
12	M1 J24	Remembrance Way	86	61	53	-9	94	515	177	-338
13	M1 J24	Deby Road	41	68	71	3	31	47	54	7
15	M1 J24	A453 S	41	81	107	25	70	95	92	-4
16	M1 J24	Hilton Hotel Lane	23	690	459	-230	16	46	29	-17
17	M1 J24	M1 NB South of Slip	2	1235	11	-1223	0	372	2	-370
20	M1 J24	M1 NB Off Slip	95	916	72	-844	51	496	50	-446
24	EMG1 Gyratory	Kegworth By-Pass	192	170	197	27	138	123	127	5
25	EMG1 Gyratory	A453 S	128	257	123	-135	102	75	68	-7
26	EMG1 Gyratory	Wilders Way L-Turn	4	6	4	-2	6	8	12	4
27	EMG1 Gyratory	Wilders Way Ahead	3	7	6	-1	6	8	9	1
28	EMG1 Gyratory	A453 S Left turn	65	82	70	-12	38	44	47	3
29	EMG1 Gyratory	Kegworth By-Pass Left Turn	105	129	174	45	73	70	91	22
30	EMG1 Gyratory	A453 N	109	65	64	-2	33	38	40	2

Table 4: Stage 2A 2028 Maximum Queue Comparison (Metres)

Location			AM				PM			
	Junction	Approach	2024 Base	2028 WoD	2028 WD Mit	Miti - WoD	2024 Base	2028 WoD	2028 WD Mit	Miti - WoD
1	Finger Farm	A453 W	30	65	71	7	32	25	31	5
2	Finger Farm	A453 N	29	32	51	19	27	20	32	12
3	Finger Farm	M1/A42 S	44	84	85	1	25	22	21	-1
11	M1 J24	M1/A50	448	505	1678	1173	114	144	342	198
12	M1 J24	Remembrance Way	124	69	58	-11	127	744	212	-532
13	M1 J24	Deby Road	53	73	80	7	37	52	63	12
15	M1 J24	A453 S	61	91	133	42	115	129	102	-27
16	M1 J24	Hilton Hotel Lane	33	937	603	-335	23	52	37	-15
17	M1 J24	M1 NB South of Slip	8	1924	94	-1830	0	804	8	-796
20	M1 J24	M1 NB Off Slip	169	1185	85	-1100	64	608	53	-555
24	EMG1 Gyratory	Kegworth By-Pass	431	227	283	56	207	187	211	25
25	EMG1 Gyratory	A453 S	153	390	158	-231	138	95	77	-19
26	EMG1 Gyratory	Wilders Way L-Turn	12	10	8	-2	17	11	19	8
27	EMG1 Gyratory	Wilders Way Ahead	7	10	11	0	9	10	12	1
28	EMG1 Gyratory	A453 S Left turn	104	124	102	-22	55	53	56	4
29	EMG1 Gyratory	Kegworth By-Pass Left Turn	246	178	257	79	136	105	149	43
30	EMG1 Gyratory	A453 N	176	79	70	-9	43	47	48	1

5.7 **Table 5** and **6** sets the average and maximum queues for the 2038 'without' and 'with development' scenarios.

Table 5: Stage 2A 2038 Average Queue Comparison (Metres)

Location			AM				PM			
	Junction	Approach	2024 Base	2028 WoD	2028 WD Mit	Miti - WoD	2024 Base	2028 WoD	2028 WD Mit	Miti - WoD
1	Finger Farm	A453 W	24	579	62	-517	22	57	157	100
2	Finger Farm	A453 N	20	27	49	22	13	21	28	7
3	Finger Farm	M1/A42 S	35	238	72	-166	19	24	24	-1
11	M1 J24	M1/A50	194	1631	1709	78	90	146	1185	1039
12	M1 J24	Remembrance Way	86	951	743	-208	94	1791	1153	-638
13	M1 J24	Deby Road	41	72	73	1	31	52	59	7
15	M1 J24	A453 S	41	554	103	-450	70	105	99	-6
16	M1 J24	Hilton Hotel Lane	23	1362	1421	59	16	223	108	-115
17	M1 J24	M1 NB South of Slip	2	1611	8	-1604	0	0	0	0
20	M1 J24	M1 NB Off Slip	95	609	72	-537	51	182	53	-129
24	EMG1 Gyratory	Kegworth By-Pass	192	321	366	46	138	205	178	-26
25	EMG1 Gyratory	A453 S	128	1025	115	-911	102	105	97	-8
26	EMG1 Gyratory	Wilders Way L-Turn	4	18	4	-14	6	11	16	5
27	EMG1 Gyratory	Wilders Way Ahead	3	10	5	-4	6	10	11	1
28	EMG1 Gyratory	A453 S Left turn	65	184	59	-126	38	41	43	1
29	EMG1 Gyratory	Kegworth By-Pass Left Turn	105	280	333	53	73	143	145	2
30	EMG1 Gyratory	A453 N	109	74	65	-9	33	38	43	5

Table 6: Stage 2A 2038 Maximum Queue Comparison (Metres)

Location			AM				PM			
	Junction	Approach	2024 Base	2028 WoD	2028 WD Mit	Miti - WoD	2024 Base	2028 WoD	2028 WD Mit	Miti - WoD
1	Finger Farm	A453 W	30	1062	108	-953	32	104	443	339
2	Finger Farm	A453 N	29	37	65	28	27	29	34	5
3	Finger Farm	M1/A42 S	44	314	87	-227	25	37	36	-1
11	M1 J24	M1/A50	448	1990	1757	-233	114	172	1824	1652
12	M1 J24	Remembrance Way	124	1346	980	-366	127	2010	1707	-303
13	M1 J24	Deby Road	53	91	104	12	37	62	70	8
15	M1 J24	A453 S	61	912	135	-778	115	131	115	-16
16	M1 J24	Hilton Hotel Lane	33	1645	1645	0	23	302	138	-164
17	M1 J24	M1 NB South of Slip	8	1984	57	-1928	0	2	2	0
20	M1 J24	M1 NB Off Slip	169	610	80	-530	64	330	56	-274
24	EMG1 Gyratory	Kegworth By-Pass	431	389	521	132	207	333	305	-27
25	EMG1 Gyratory	A453 S	153	1231	136	-1095	138	126	141	15
26	EMG1 Gyratory	Wilders Way L-Turn	12	32	8	-24	17	19	23	5
27	EMG1 Gyratory	Wilders Way Ahead	7	12	8	-3	9	13	13	0
28	EMG1 Gyratory	A453 S Left turn	104	206	71	-135	55	46	50	5
29	EMG1 Gyratory	Kegworth By-Pass Left Turn	246	386	461	75	136	232	220	-11
30	EMG1 Gyratory	A453 N	176	82	75	-7	43	45	56	12

5.8 The tables above shows that the proposed mitigation provides a significant reduction in both the average and maximum queues for both 2028 and 2038. That is apart from the M1SB/A50EB approach, which increases in the PM.

5.9 This is a result of the proposed mitigation allowing more circulating traffic into J24 which in turn allows more traffic to access the A453 Remembrance Way resulting in more green time to the circulatory. It is however worth noting that the model accounts for large, committed developments, and the associated traffic but **not** the mitigation strategies (Uniper in this case).

Network Performance

5.10 **Table 7** below sets out the network performance comparison for all scenarios during the 2028 forecast year.

Table 7: Stage 2A 2028 Network Performance Comparison

Peak Hour	Scenario	Delay (secs)	Speed (mph)	Veh Arr	Latent Delay	Latent Demand
AM	2024 Base	52	48.6	18740	1401	1
	WoD	120	40.2	21028	2577	2
	WD	152	36.5	21586	11345	40
	WD Mit	100	42.2	22133	3018	2
	WoD Minus WD	33	-3.7	558	8769	38
	Mit Minus WoD	-20	2.0	1105	441	0
PM	2024 Base	41	52	18541	2336	1
	WoD	80	45.8	21231	60070	15
	WD	98	42.6	22176	133807	44
	WD Mit	69	47.0	22334	171390	83
	WoD – WD	18	-3.2	945	73736	30
	Mit – WoD	-11	1.1	1103	111320	68

5.11 When comparing the results of the 'with development' scenario including for mitigation against the 'without development' scenario, the average delay reduces significantly in the morning peak hour (20 seconds), and the average speed and vehicles arriving increases significantly (+2.0mph and 1,105 vehicles respectively). The latent demand would remain at 2 vehicles.

5.12 In the evening peak hour, the average delay decreases slightly by 11 seconds, but from a low base (the evening peak operates far better overall than the morning peak hour, which has always been the key peak hour of the two assessed). The average speed increases slightly by 1.1mph, albeit from a high base at (46mph). The number of vehicles arriving in the network increases by 1,103 vehicles, and the latent demand increases by 68 vehicles, which is a positive overall, in that the Strategic Road Network is able to accommodate a higher number of vehicles.

5.13 The benefit of the mitigation is also shown in the journey time tables which show a number of routes reducing in time once the mitigation scheme is introduced which reinforces the above.

5.14 **Table 8** sets out the network performance comparison for all scenarios at the 2038 forecast year.

Table 8: Stage 2A 2038 Network Performance Comparison

Peak Hour	Scenario	Delay(secs)	Speed (mph)	Veh Arr	Latent Delay	Latent Demand
AM	2024 Base	52	48.6	18740	1401	1
	WoD	211	32.3	21932	98417	133
	WD	260	28.7	22342	391723	404
	WD Mit	202	32.4	22628	592913	442
	WoD – WD	50	-3.5	410	293306	271
	Mit – WoD	-9	0.1	696	494496	309
PM	2024 Base	41	52	18541	2336	1
	WoD	125	40.3	22284	732609	474
	WD	155	36.7	22857	1559332	894
	WD Mit	118	40.8	23221	1115630	539
	WoD – WD	30	-3.6	573	826724	420
	Mit – WoD	-7	0.5	937	383022	65

5.15 Similarly to the 2028 assessment, the 2038 results show that the average delay reduces, still in the morning peak hour (9 seconds), which results in higher average speeds and an additional 696 vehicles arriving through the network area.

5.16 In the evening peak hour, there is a marginal decrease in delay of 7 seconds with average speeds increasing slightly by 0.5mph. Whilst this is a small change, they are again from a very low base and the junction performance overall would be much better compared to the morning peak hour, which is the key time period.

5.17 Also journey times for the 2038 with mitigation scenarios show a number of routes decreasing in time taken which is a positive and illustrates that the mitigation scheme provided a significant benefit to the Strategic Road Network.

5.18 Therefore, the results show that the proposed mitigation scheme provides sufficient betterment in terms of the operation of the Strategic Road Network, especially at M1 J24 when considering this sensitivity test.

6. RESPONSE TO NH'S 'SUBSTANTIVE ISSUES'

Introduction

6.1 **Section 5** above sets out the positive betterment once more when considering the Stage 2A 2019 EMFM unconstrained sensitivity test versus the Stage 1A 2019 constrained base model, which provides a worst-case comparison for the reasons set out in paragraph 4.3 above.

6.2 This section therefore builds on this and considers the nine substantive issues raised by NH in greater detail.

Substantive issue 1

- 6.3 As set out in Section 2 above, substantive issue 1 considers the reduction in traffic in the morning peak hour using the new M1 northbound to A50 westbound link road between 2028 and 2038 because of the constrained capacity included for within the EMFM modelling at the A50 westbound merge presented in **Figure 2**. NH states that:

“the reduction in flow between 2028 and 2038 on the new link road is a concern given the findings of the more detailed analysis and the likelihood of overstated delay at the A50 M1 J24A merge”.

- 6.4 Hence flows on the new link road in 2038 may be understated. NH therefore conclude that:

“the Applicant should take a considered view of the flows used to inform the design and account for any traffic rerouting and/or queuing”.

- 6.5 NH then summarised a previous sensitivity test undertaken with unconstrained capacity at both the A50 westbound merge and the link road, assuming that two links were introduced, rather than the one proposed. NH suggest that the results:

“are reassuring in so far as a 393 PCUs increase at the A50 M1 J24A merge itself is lower than what might have been the case given the capacity added in the test”.

- 6.6 However, they also raise a concern in:

“that 241 PCUs of the 393 PCUs increase is on the proposed new bridge increasing flows on it up to or over its designed capacity”.

- 6.7 With regards to substantive issue 1, the reduction in traffic flow using the new link road is the reason why it was suggested that this sensitivity test was undertaken and hence why this Technical Note has been produced, This has therefore resulted in the EMFM and VISSIM modelling work being sensitivity tested, and the outcome of this work feeding into the vehicle numbers agreed by NH to be used in the subsequent engineering design review, thereby addressing this issue.

Substantive issue 2

- 6.8 As set out in Section 2 above, substantive issue 2 states that:

“building upon Substantive Issue 1, the Applicant should incorporate the results of this additional test when evaluating the adequacy of the proposed mitigation package to accommodate future traffic demand. JSJV urges the Applicant to conduct appropriate tests and assessments of the suggested mitigation using the VISSIM model, with particular attention given to the capacity of upstream merges (on the A50) and diverges (on the M1) to safely manage anticipated demand. Regardless of the outcomes of the additional test described above, it is crucial to note that the predicted flow on the new bridge in 2028 exceeds 1,800 PCUs, which is close to the upper limit of the theoretical maximum capacity for a single lane (as highlighted in Substantive Issue 1). The Applicant's engineering team should factor this into their evaluation and design,

thereby ensuring the proposed infrastructure can adequately accommodate anticipated traffic demands while maintaining safety and efficiency, and give due consideration to future proofing. The Applicant has attributed the drop in flow on the new link in the AM peak hour between 2028 and 2038 to capacity issues at the downstream A50 M1 J24A merge. Modelled delays at the merge are also likely overstated. Where modelled delays and capacities at the A50 M1 J24A merge do not reflect actual delays and capacities, flows on the new link in 2028 and 2038 more particularly, may be understated (as noted in Substantive Issue 1)".

- 6.9 With regards to substantive issue 2, the agreed furnishing methodology for Stage 2 has been utilised to derive forecast flow matrices for the Stage 2A sensitivity test the subject of this Technical Note. Subsequently the 2019 EMFM sensitivity test Stage 2A VISSIM model was converged and re-run to examine the impact on the proposed link road on this basis. A review of the 2019 EMFM sensitivity test Stage 2A VISSIM model indicates that the satisfactory operation of the link road, together with the upstream merges and diverges, safely manage anticipated demand in this test also.

Substantive issue 3

- 6.10 As set out in Section 2 above, substantive issue 3 states that:

"there are mainline constraints on the M1 at numerous locations in the vicinity of the EMA. However, the new link attracts additional traffic to the M1 northbound between J23a and J24. Accordingly, the Applicant should undertake engineering, safety evaluation and assessment of the mainline for discussion with National Highways".

- 6.11 With regards to substantive issue 3, a review of the morning peak hour 2019 EMFM sensitivity test Stage 2A VISSIM modelling does not illustrate any issues on the M1 mainline between M1 J23A and J24; however, there are delays noted on the northbound movement in the evening peak hour scenario. The slight delay is located at the A42 merge onto the M1 at J23A with A42 vehicles merging onto the M1. This is linked to the heavy mainline flows as a result of the agreed furnishing methodology.
- 6.12 The surveyed northbound M1 flow is approximately 2,900 vehicles compared to EMFM base of approximately 2,000 vehicles in the evening peak hour. The EMFM forecast 2038 mainline flow increases to approximately 2,600 which is still less than the surveyed base flow.
- 6.13 In accordance with the agreed furnishing methodology, the difference in EMFM is added to the surveyed flow which equates to approximately 3,500 vehicles travelling northbound on the M1. It is considered that this overstates the number of vehicles anticipated to utilise the northbound movement and therefore presents a worst-case assessment with the mitigation results showing overall network improvements over the future year base assessment. This includes the significant reduction in queuing on the M1 to the south of J24.
- 6.14 Further to the above assessment, the engineering design is being assessed using an average of the constrained and unconstrained VISSIM model flows as has been agreed with NH. Departures from standard are required and will be submitted in the near future for detailed consideration by the relevant specialist team within NH. **Appendix 5**

includes an email trail with NH setting out the approach agreed to be adopted from a traffic flow perspective.

Substantive issue 4

6.15 As set out in Section 2 above, substantive issue 4 states that:

“VISSIM modelling should be employed to explore capacity issues and constraints at M1 J24 roundabout and Kegworth Bypass junction”.

6.16 With regards to substantive issue 4, this has been included for in the 2019 EMFM sensitivity test Stage 2A VISSIM modelling and reported on in this Technical Note. The reduction in volume over capacity (VoC) at Hilton Hotel Lane is a result of optimising the M1 southbound approach arm. Initially the traffic flows were diverting away from the M1 southbound and travelling via the A50 and subsequently onto Hilton Hotel Lane, causing the VoC to exceed on the Hilton Hotel Lane arm. By optimising the signal timing on the M1 southbound approach, the traffic diverts back onto the original (and appropriate) route via the M1 southbound.

6.17 It should also be noted that the Stage A scenarios include for committed development traffic but not their mitigation, because it is unknown at this stage. As a result, delays on some approaches are naturally to be expected; however, as agreed with the Transport Working Group, EMG2 should not have to mitigate all future development traffic requested to be assessed in the Stage A modelling work. The conclusion of the 2019 EMFM sensitivity test Stage 2A VISSIM modelling work confirms that, overall, the delays on the highway network reduce when compared to the forecast base scenario, and the proposed mitigation associated with EMG2 provides sufficient betterment still.

6.18 There are increases in journey times primarily noted on the M1 southbound and A453 Remembrance Way approach arms; however, this is as a result of unreleased traffic on the M1 northbound now being able to enter the circulatory carriageway thereby increasing the throughput of vehicles travelling through the junction. These delays would have also been present in the base model if vehicles were able to access J24 from the M1 northbound approach.

6.19 For the avoidance of doubt, observation 5 included in Appendix 2 after substantive issue 4 states that:

“as advised to the Applicant on 12th March 2025, localised assessments are required at A42/J14 Eastbound off slip, A453/ Kegworth Road Slip Road/ Ratcliffe on Soar and A453/ Barton Lane/ West Leake Lane Slip Road “.

6.20 These are junctions 11, 16 & 17 respectively, and have been assessed in Sections 13 and 14 of the TA, and no issues were found.

Substantive issue 5

6.21 As set out in Section 2 above, substantive issue 5 states that:

“JSJV believes that a constrained network in the EMFM is either holding significant volumes of traffic up in queues or distorting natural traffic routing (possibly both), especially in the longer term (i.e. 2038) resulting in varying rather than comparable traffic flow changes across the network. This may have implications for future traffic flows through the EMFM if and when capacity constraints are addressed. The Applicant is requested to take this into consideration when analysing and designing proposed mitigation”.

- 6.22 With regards to substantive issue 5, It appears that in general there is an increase in flows between 2028 and 2038 at the points shown in the diagram at section 3.6 of NH's Technical Note included in **Appendix 2**. Even though there may be a capacity constraint between locations 1 and 6 of said diagram on the M1 in EMFM, the updated 2019 EMFM sensitivity test Stage 2A VISSIM modelling utilises flows from the extents of the network, primarily from locations 2 and 5 for M1 southbound and northbound movement respectively. These appear to operate at a reasonable VoC. Furthermore, any distortion in routing along the M1 is assumed to be routing via the A453 instead. Because the VISSIM model utilises dynamic assignment, it can take into account such routing choices.
- 6.23 A review of the forecast flow change between Stage 2a and Stage 1A indicates that there is a reduction in traffic flows on the A453 between Finger Farm and M1 J24, with a similar increase noted on the M1. As a result, whilst there's a constraint on the M1, there is sufficient capacity on the A453 to allow an equilibrium to be achieved in terms of traffic flows. Given that there is this route choice within the EMFM model, it should have allowed for all traffic wanting to route through the network to be accounted for, either via the M1 or A453.

Substantive issue 6

- 6.24 As set out in Section 2 above, substantive issue 6 states that:

“as noted above in Substantive Issue 1, there was previously a reduction in traffic flows on the new link in 2038 compared to 2028; 2028 AM peak hour is 1,832 PCUs and in 2038 is 1,481; a difference of 351 PCUs. The '2a NH3' scenario now shows that this reduction occurs to a lesser extent; 1,904 in the 2028 AM peak hour and 1,863 in the 2038 AM peak. This is a difference of 41 PCUs. This indicates that the previous reduction of 351 PCUs was largely, but not fully, attributed to the constraint at the A50 M1 J24A merge. The previous concern outlined in Substantive Issue 1 was that where delays at the merge do not occur to the same degree as predicted, flow on the new link in 2038 may be understated. The most recent testing ('2a NH3') indicates that the predicted flows in both 2028 and 2038 remain at the upper limit of the theoretical capacity for a single lane. The Applicant's engineering team should continue to factor this into their evaluation and design, thereby ensuring the proposed infrastructure can adequately accommodate anticipated traffic demands while maintaining safety and efficiency, and give due consideration to future proofing “.

- 6.25 With regards to substantive issue 6, this is in effect covered in the response to substantive issue 1 above, and why this sensitivity test was undertaken and this Technical Note has been produced. This has therefore resulted in the EMFM and VISSIM modelling work being sensitivity tested, and the outcome of this work feeding into the vehicle numbers

agreed by NH to be used in the subsequent engineering design review. With regards to the associated engineering evaluation and design work, as set out above, this is being undertaken and reported back upon separately,

Substantive issue 7

6.26 As set out in Section 2 above, substantive issue 7 states that:

“with the constraint at the A50 M1 J24A merge removed as part of this testing, a secondary constraint becomes apparent. As noted above, the total demand on the link between M1 Junction 24 and the A50 Derby Southern Bypass is 3,886 PCUs during the AM peak in 2028; 4,024 in the PM peak. In 2038, this is 4,035 in the AM and 3,981 in the PM. This indicates this link could become a constraint. The Applicant's engineering team should factor this into their evaluation and design, thereby ensuring the proposed infrastructure can adequately accommodate anticipated traffic demands while maintaining safety and efficiency, and give due consideration to future proofing”.

6.27 Tied to Substantive issue 7, NH state on page 21 that:

“there are now increases in the delay at the link between M1 Junction 24 and the A50 Derby Southern Bypass where the link reduces from three-lanes to two-lanes”, which “should be taken into consideration as part of Substantive Issue 7”.

6.28 NH also state on page 22 that *“there is a high V/C node on the link between M1 Junction 24 and the A50 Derby Southern Bypass link as well as the A50 Derby Southern Bypass itself”, which should also “be taken into consideration as part of Substantive Issue 7”.*

6.29 With regards to substantive issue 7, the updated 2019 EMFM sensitivity test Stage 2A VISSIM modelling does not raise any issues at these locations in the unconstrained scenario. In terms of the EMFM modelling findings, as set out in paragraph 3.4 above, it should also be reiterated that in reality, the highway network will no doubt operate somewhere in between that presented in the core TA Stage 2A findings considered in detail to date, and that presented in the sensitivity test scenario the subject of this report.

Substantive issue 8

6.30 As set out in Section 2 above, substantive issue 8 states that:

“there remain mainline constraints on the M1 at numerous locations in the vicinity of the EMA. However, the new link attracts additional traffic to the M1 northbound between J23a and J24. Accordingly, the Applicant should undertake engineering, safety evaluation and assessment of the mainline constraints for discussion with National Highways”.

6.31 With regards to substantive issue 8, this is in effect a repeat of substantive Issue 3. This is considered in paragraphs 6.9 to 6.13 above.

Substantive issue 9

6.32 As set out in Section 2 above, substantive issue 8 states that:

“there is a high V/C node on the A453 west of Finger Farm Roundabout (Local Road Network) during the 2038 PM peak. It is understood that this is the proposed signalised crossing. There is a concern that traffic may be artificially constrained at this location and therefore understating impacts on the SRN”.

6.33 **Substantive issue 9** therefore states that:

“The Applicant should investigate and confirm this is not resulting in a significant understatement of traffic on the SRN particularly Finger Farm Roundabout”.

6.34 With regards to substantive issue 9, as set out in paragraph 6.14, the Stage A scenarios include for committed development traffic but not their mitigation, because it is unknown at this stage. Regardless, the results of this sensitivity test assessment are not showing anything new versus that presented to date in the core assessment modelling.

6.35 In discussing this matter further with AECOM, the collective view is that from an EMFM perspective, the proposed signalised crossing is not resulting in a significant understatement of traffic on the SRN and Finger Farm Roundabout in particular. Whilst it forms a constraint, and if not included for would alter the pattern of flows to a degree, this is not a new issue, nor indeed a substantial one in terms of the EMFM modelling outputs.

7. SUMMARY & CONCLUSIONS

7.1 BWB Consulting Ltd (BWB) has been appointed by SEGRO (the Applicant) to produce a microsimulation traffic model of the M1 Junction 24 and Strategic Road Network in the vicinity to support a DCO application for the Phase 2 Expansion of East Midlands Gateway 2 development (EMG2).

7.2 A VISSIM model had been developed for the M1 J24 corridor and it was agreed with the TWG that the following four junctions are tested using microsimulation VISSIM modelling because of their proximity to the SRN:

- i. A453/Hunter Road Roundabout
- ii. Finger Farm Roundabout
- iii. A453/EMGP1 Signal Gyratory
- iv. M1 Junction 24

7.3 Alongside NH's comments received on the Stage 1 and 2 modelling undertaken based on the EMFM outputs received to date, NH produced a Technical Note originally dated 19 August 2025. That note was updated following receipt of further information from AECOM (**Appendix 4**). The updated report is dated 15 October 2025 (**Appendix 2**). This includes for a number of observations, comments, and nine 'substantive' issues. These primarily related to the way that EMFM has modelled the A50 westbound merge at the downstream end of the M1 J24A southbound interchange link.

- 7.4 This Technical Note therefore sets out the findings of the sensitivity test which assesses the merge with unconstrained capacity to in effect provide a 'best case' assessment in terms of how the merge is forecast to operate. That is versus what could be described as a 'worst-case' assessment presented in the formal DCO documentation where it constrained capacity at said merge, thereby leading to NH querying these findings.
- 7.5 The 2019 EMFM sensitivity test Stage 2A VISSIM modelling results show overall, the delays on the highway network reduce when compared to the forecast base scenario, and the proposed mitigation associated with EMG2 provides sufficient betterment still, especially at M1 J24.
- 7.6 In terms of the EMFM and 2019 EMFM sensitivity test Stage 2A VISSIM modelling findings, it should be noted that in reality, the highway network will no doubt operate somewhere in between that based on the core TA Stage 2A findings, which includes for some delay at the A50 westbound merge, and that based on the '2a NH3' sensitivity test scenario, which in effect removes the delay.
- 7.7 The nine substantive comments raised have been considered and in summary:
- i) With regards to substantive issue 1, the reduction in traffic flow using the new link road is the reason why it was suggested that this sensitivity test was undertaken and hence why this Technical Note has been produced, This has therefore resulted in the EMFM and VISSIM modelling work being sensitivity tested, and the outcome of this work feeding into the vehicle numbers agreed by NH to be used in the subsequent engineering design review, thereby addressing this issue.
 - ii) The 2019 EMFM sensitivity test Stage 2A VISSIM modelling did not raise any issues at the locations highlighted by NH.
 - iii) the Stage A scenarios include for committed development traffic but does not include for their mitigation, because it is unknown at this stage;
 - iv) the proposed signalised crossing is not resulting in a significant understatement of traffic on the SRN and Finger Farm Roundabout in particular; whilst it forms a constraint, and if not included for would alter the pattern of flows to a degree, this is not a new issue, nor indeed a substantial one in terms of the EMFM modelling outputs.
- 7.8 To conclude, even when considering this sensitivity test, the mitigation scheme still provides a benefit to the SRN. As a result, together with the updated 'core scenario' VISSIM modelling work already shared with NH, this should help draw a positive line under the 2019 EMFM and associated VISSIM modelling work.

APPENDICES

APPENDIX 1: BWB Technical Note EMG2-BWB-GEN-XX-RP-TR-0006_VISSIM_LMVR-S2-P5

TRANSPORT & INFRASTRUCTURE PLANNING

SEGRO

East Midlands Gateway, Phase 2
Local Model Validation Report (LMVR)

TRANSPORT & INFRASTRUCTURE PLANNING

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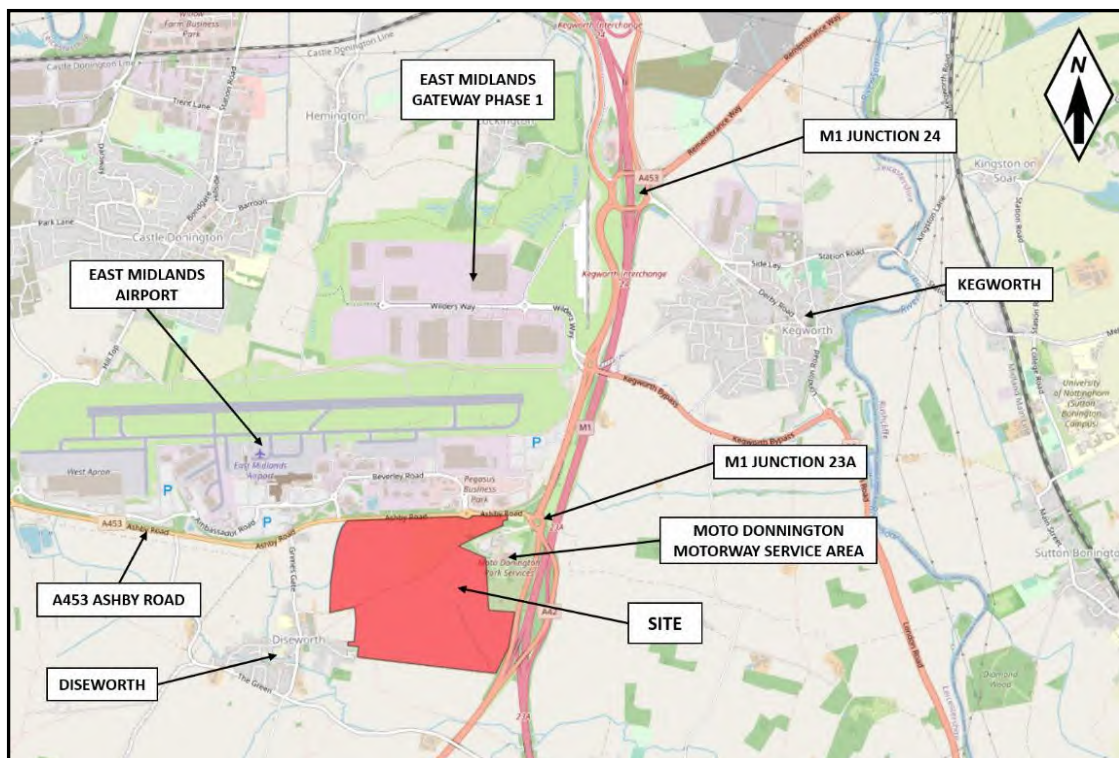
APPENDIX 1: TURNING COUNT CALIBRATION

APPENDIX 2: JOURNEY TIME SEGMENTS

1. INTRODUCTION

- 1.1 BWB Consulting Ltd (BWB) has been appointed by SEGRO (the Applicant) to produce a microsimulation traffic model of the M1 Junction 24, in support of an outline planning application for the Phase 2 Expansion of East Midlands Gateway (EMG) site.
- 1.2 The gross floor area (GFA) of the proposed scheme is approximately 3.23 million sqft (300,000sqm) comprising of 80% B8 use and 20% for B2 use, all with ancillary office use. The location of the proposed development is show in **Figure 1**.

Figure 1. Site Location



- 1.3 As part of East Midlands Gateway Phase 1, BWB obtained a copy of the M1 J24 VISSIM model network from National Highways in 2014. The model was validated and calibrated by AECOM to a base year of 2012. This model was utilised by BWB to assess the proposed highway network changes including improvements to M1 J24 as part of the EMG Phase 1. However, the model is now outdated and the proposed mitigation as well as the scheme have been constructed on site since and is operational.
- 1.4 Therefore, to assess the impact of EMG Phase 2, a revalidation of the base model was required, this technical note has been produced to outline the modelling methodology undertaken as well as provide details of model calibration and validation.

Report Structure

- 1.5 Following this introduction, the remainder of this report is structured as follows:

-
- **Section 2:** Network Development, sets out the modelling parameters associated with the baseline model;
 - **Section 3:** Model calibration, including comparison of manual turning count data against modelled flows.
 - **Section 4:** Model validation comparing surveyed journey times with modelled journey times.
 - **Section 5:** Summary and Conclusions.

2. NETWORK DEVELOPMENT

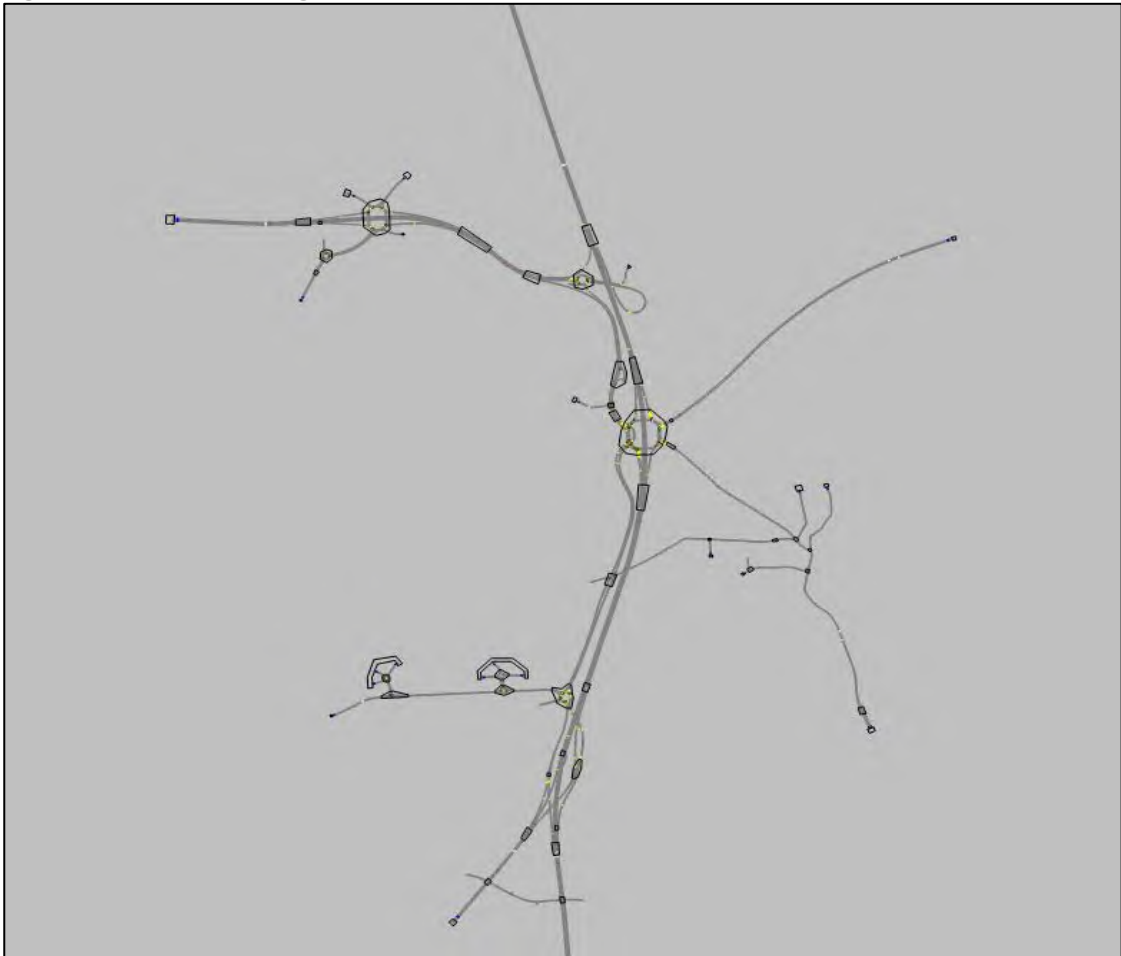
Model Approach

- 2.1 The PTV software package VISSIM is a microscopic, time-step, behaviour-based simulation tool developed to model traffic and public transport operations. VISSIM models individual vehicles and presents these movements visually, assisting in model validation and in the assessment of the performance of network improvement options.
- 2.2 VISSIM provides output information such as queues, delays, and journey times on identified routes and other specific information. VISSIM also enables 3D videos to be produced providing a powerful visual simulation of the highway network.
- 2.3 The existing VISSIM model has utilised dynamics assignment for traffic flow input, therefore the this has been retained.

Model Coverage

- 2.4 The extents of the existing VISSIM model has been illustrated in **Figure 2** below.

Figure 2 Model Coverage



2.5 The existing model comprises of the following junctions.

- i. A50 junction 1 Sawley Interchange;
- ii. M1 J24a;
- iii. M1 J24;
- iv. A453/EMG Phase 1/Kegworth Bypass signal controlled gyratory;
- v. M1 J23a Finger Farm roundabout (including M1/A42 on and off slip roads);
- vi. A453/Hunter Road/minor EMG Phase 2 access roundabout
- vii. A453 East Midlands airport internal roundabouts.

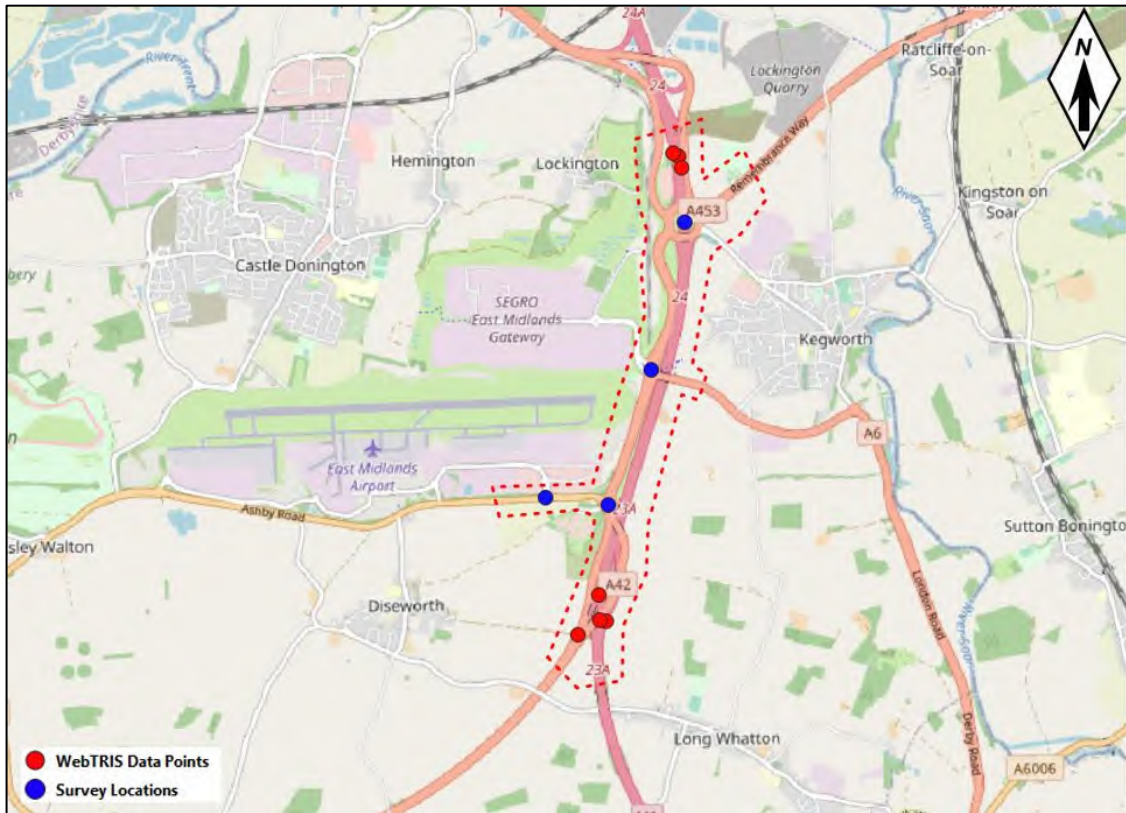
2.6 Following discussions with NH, it was agreed that the model will be cordoned off to the following junctions:

- i. M1 J24;
- ii. M1 J24a southbound merge onto the M1 and M1 junction 24;
- iii. A453/EMG Phase 1/Kegworth Bypass signal controlled gyratory;
- iv. M1 J23a Finger Farm roundabout (including M1/A42 on and off slip roads);
- v. A453/Hunter Road/minor EMG Phase 2 access roundabout;
- vi. A453/EMG Phase 2 site access roundabout.

Survey Data

2.7 Manual turning count surveys were undertaken on 3rd November 2023 for all junctions outlined in Paragraph 2.4. with the exception of the A453/Kegworth Bypass junction which was undertaken on 23rd November 2023. **Figure 3** illustrates locations of surveys undertaken and data points that are available on the WebTRIS website.

Figure 3: Survey and WebTRIS Data Locations



2.8 The survey data has been compared to a neutral month which was obtained from the Webtris website for a number of available data points around J24. The **Tables 1** and **2** sets out the GEH comparison between the survey data and the Webtris data.

Table 1: Survey Comparison AM

Approach/Exit	Traffic Flows (Veh)			GEH Comparison	
	Survey	2022 (Webtris)	2023 (Webtris)	2022 vs Survey	2023 vs Survey
M1 S Approach	1876	1811	1859	1.51	0.39
M1 S Exit	655	689	691	1.31	1.39
A453 Exit Towards EMG1	944	954	1014	0.32	2.24

Table 2: Survey Comparison PM

Approach/Exit	Traffic Flows (Veh)			GEH Comparison	
	Survey	2022 (Webtris)	2023 (Webtris)	2022 vs Survey	2023 vs Survey
M1 S Approach	1712	1715	1769	0.07	1.37
M1 S Exit	955	984	1002	0.93	1.50
A453 Exit Towards EMG1	615	666	699	2.02	3.28

- 2.9 The tables above illustrate that the survey data is within a GEH 5 when comparing the neutral month from webtris and therefore, the survey data is acceptable.
- 2.10 The network peak hours were calculated as 0730-0830 and 1700-1800 in the morning and evening period respectively.
- 2.11 TomTom journey time data was obtained for all neutral days within the month of November 2022. This has been utilised for journey time validation purposes.

Model Time Periods

- 2.12 The modelled time periods include half an hour warm up and cool down period either side of the peak hours. Subsequently, the model covers the following time periods:
 - Weekday morning period from 0700-0900; and
 - Weekday evening period from 1630-1830.

Traffic Flow Calculations

- 2.13 The traffic survey were utilised to generate traffic flow diagrams for each 15 minute interval with the time periods set out above for both light and heavy vehicles respectively. As the EMG gyratory junction was surveyed on a different day, there were significant discrepancies in flows northbound/southbound along the A453 therefore the flows have factored in accordance with flows approaching M1 J24 and Finger Farm Roundabout to ensure consistency for OD matrix estimation
- 2.14 The flows for the ahead and merge/diverge proportions have been calculated using counts that are available on the WebTRIS website. **Tables 3, 4 and 5** illustrate the calculations undertaken to derive the flows along the motorway as well as the split of traffic at the merges and diverges.

Table 3: Hourly WebTRIS Flows

Time Periods	WebTRIS				Divided By 4 (each 15 interval)			
	Northbound		Southbound		Northbound		Southbound	
	Lights	Heavies	Lights	Heavies	Lights	Heavies	Lights	Heavies
07:00-08:00	2275	605	4471	643	569	151	1118	161
08:00-09:00	2463	442	4069	581	616	111	1017	145
16:00-17:00	4132	502	3740	518	1033	126	935	130
17:00-18:00	4127	416	3863	491	1032	104	966	123
18:00-19:00	3307	290	3113	410	827	73	778	103

Table 4: 15-minute WebTRIS Flows (LGVs)

Time Periods	WebTRIS				% Split				Inputs into VISSIM			
	Northbound		Southbound		Northbound		Southbound		B-G	B-H	G-B	H-B
	A42	M1	A42	M1	A42	M1	A42	M1				
07:00 - 07:15	463	942	446	1028	33%	67%	30%	70%	780	338	381	187
07:15 - 07:30	441	895	477	1024	33%	67%	32%	68%	763	355	381	188
07:30 - 07:45	466	926	455	937	33%	67%	33%	67%	752	365	378	190
07:45 - 08:00	428	794	455	921	35%	65%	33%	67%	748	370	370	199
08:00 - 08:15	374	777	432	790	32%	68%	35%	65%	658	360	416	200
08:15 - 08:30	360	727	388	714	33%	67%	35%	65%	659	358	412	204
08:30 - 08:45	368	688	395	760	35%	65%	34%	66%	669	348	401	215
08:45 - 09:00	358	645	371	719	36%	64%	34%	66%	671	346	396	220
16:30 - 16:45	646	1148	547	902	36%	64%	38%	62%	582	353	661	372
16:45 - 17:00	525	1079	517	945	33%	67%	35%	65%	604	331	695	338
17:00 - 17:15	545	1145	542	944	32%	68%	36%	64%	614	352	699	333
17:15 - 17:30	571	1196	539	974	32%	68%	36%	64%	622	344	698	333
17:30 - 17:45	497	1301	579	887	28%	72%	39%	61%	584	381	747	285
17:45 - 18:00	615	1140	494	829	35%	65%	37%	63%	605	361	670	362
18:00 - 18:15	524	1040	442	795	34%	66%	36%	64%	500	278	550	277
18:15 - 18:30	464	945	417	718	33%	67%	37%	63%	492	286	554	272

Table 5: 15-minute WebTRIS Flows (HGVs)

Time Periods	HGVs											
	WebTRIS				% Split				Inputs into VISSIM			
	Northbound		Southbound		Northbound		Southbound		B-G	B-H	G-B	H-B
A42	M1	A42	M1	A42	M1	A42	M1					
07:00 - 07:15	75	102	68	96	42%	58%	41%	59%	94	67	87	64
07:15 - 07:30	62	115	66	105	35%	65%	39%	61%	99	62	98	53
07:30 - 07:45	57	119	56	115	32%	68%	33%	67%	108	53	102	49
07:45 - 08:00	65	102	54	112	39%	61%	33%	67%	108	52	92	59
08:00 - 08:15	40	120	58	129	25%	75%	31%	69%	100	45	83	28
08:15 - 08:30	55	108	60	125	34%	66%	32%	68%	98	47	73	37
08:30 - 08:45	58	121	85	123	32%	68%	41%	59%	86	59	75	36
08:45 - 09:00	80	103	71	104	44%	56%	41%	59%	86	59	62	48
16:30 - 16:45	80	107	64	89	43%	57%	42%	58%	75	54	72	54
16:45 - 17:00	55	88	55	81	38%	62%	40%	60%	77	52	77	48
17:00 - 17:15	49	108	54	116	31%	69%	32%	68%	84	39	72	32
17:15 - 17:30	41	92	45	117	31%	69%	28%	72%	89	34	72	32
17:30 - 17:45	47	83	50	89	36%	64%	36%	64%	79	44	66	38
17:45 - 18:00	43	91	57	104	32%	68%	35%	65%	79	43	71	33
18:00 - 18:15	36	59	58	88	38%	62%	40%	60%	62	41	45	27
18:15 - 18:30	49	51	40	77	49%	51%	34%	66%	67	35	37	36

2.15 Each 15-minute interval has been inputted into a skeleton LinSig model of the assessment area for both lights and heavies vehicles to allow LinSig's matrix estimation function to generate OD matrices that can be inputted into VISSIM.

Traffic Signals

2.16 A copy of the MOVA files for M1 J24 and the EMG gyratory were obtained from NH and the model has been updated to utilise the latest files.

2.17 PCMOVA has been utilised to replicate the the signal operation of the M1 J24 and EMG gyratory. The video footage of the junction was compared with the signal operation in VISSIM and it was concluded that this was reflective of on site behaviour.

2.18 MOVA data sets were not available for EMG West Steam 3, East Stream 3 and M1 J24 West Stream 4, therefore, VisVAP program has been utilised to set up the exit/crossing signal controllers and subsequently link them to the respective MOVA junctions using detectors.

3. Network Development

- 3.1 A number of changes have been made to the original base model to ensure calibration & validation of the model. These include changes to reduced speed areas, desired speed distributions, priority rules, conflict area and link/flare usage. Details of these have been provided below.

Desired Speed Distribution And Reduced Speed Area

- 3.2 Initial review of the desired speed distributions utilised in the EMG Phase 1 model had been undertaken and it was noted that the speed distributions for 30, 60 and 70mph were affecting the journey times of vehicles in the model. Therefore, DfT data for the most recent year available (2021) has been obtained and new desired speed distributions have been calculated in coded into VISSIM.
- 3.3 Reduced speed areas have been retained and checked in accordance streetview, from the initial model apart from the road that connects the A50 to the M1/M1 J24. The TomTom Journey Data has been review and it was noted that the average speed traveling along this link is lower than what is sign posted and therefore amended to reflect this in the model.
- 3.4 A number of reduced speed area have been coded on to EMG gyratory around the bus stops.

Priority Rules & Conflict Areas

M1 J24

- 3.5 The existing priority rules and conflict areas have largely been unaltered apart from a small number of priority rules at the M1 J24 on the M1 northbound Off-Slip entry. The priority rules that have been amended are as follows:

- 495, 496, 497, 498

- 3.6 A few priority rules have been added on the M1 southbound Off-Slip entry. The priority rules that have been added are as follows:

- 501, 502, 502, 504

EMG Gyratory

- 3.7 The existing priority rules and conflict areas have largely been unaltered apart from a small number of priority rules at the EMG gyratory. The priority rules that have been amended are as follows:

- 469, 489, 509

- 3.8 The above alterations have been undertaken to ensure no overrunning of vehicles along the circulatory carriageway.

Public Transport

3.9 A number of bus services were identified within the study area therefore these have been coded into VISSIM in accordance with the respective timetables and route maps. The following services are included within the model:

- EMG Shuttle Bus
- 9 – EMA – Queens Hospital
- Skylink Derby – Leicester – Derby
- Skylink Derby – Derby – Leicester
- Skylink Nottingham – Nottingham – Loughborough
- Skylink Nottingham – Loughborough – Nottingham
- Skylink Express – Nottingham – EMA
- Skylink Express – Nottingham – EMA

4. Model Changes

- 4.1 A copy of the VISSIM model was submitted to National Highways on 31 March 2023 subsequently comments were received on 3 May 2023. Following this, a revised copy of the VISSIM models were submitted on 11 July 2023 to ensure network parameters were acceptable prior to rerunning the models for validation. Details of the changes made are provided below.

Comment 1: "Driver behaviour parameter should retain default values unless a reasonable justification for the changes made is provided."

Amendment 1: The driver behaviour parameters have been reverted back to default

Comment 2: "It is considered that Wiedemann 74 is not suitable for use on motorway, or even dual carriageway links (away from junctions) and that a behaviour type based on Wiedemann 99 should be used."

Amendment 2: Motorway link and dual carriageway links have been amended to Wiedemann 99

Comment 3: "The Behaviour at Amber/Red Signal for Driver Behaviour types should be changed to 'stop' rather than 'go' as current modelled."

Amendment 3: Behaviour at Amber/Red Signal for Driver Behaviour types set to 'stop'

Comment 4: "The various discrepancies between the on-street highway layout and that in the model should be reviewed and corrected."

Amendment 4: Link arrangements have been reviewed and amended to reflect exactly what's on the ground.

Comment 5: "The coded vehicle entry speed from Parking Lots and DSDs throughout the network need to be revised to ensure consistent implied vehicle speeds on the same stretch of highway."

Amendment 5: All Parking Lots and DSD have been reviewed and amended where needed to provide more realistic vehicle speeds throughout the network.

Comment 6: "The omission of RDAs in the locations listed in this review should be investigated and appropriate RDAs added to the network."

Amendment 6: RDAs have been reviewed and added/amended throughout the network

Comment 7: "All discrepancies between the controller information and the modelled controller parameters, in particular the inter-green values, should be checked and corrected as appropriate."

Amendment 7: All Signal spec checked and amended where required including intergreens

Comment 8: "There appears to be differences in the call/cancel times between the controller information and those used in the model. These should be checked and corrected as appropriate."

Amendment 8: call/cancel times have been amended

Comment 9: "The dummy connector on the AS453 eastbound entry to Hunter Roundabout should be deleted, mainly to ensure vehicles entering the roundabout correctly give-way."

Amendment 9: call/cancel times have been amended

- 4.2 Further to the above, some slight modifications were requested for the models, and these changes have been incorporated into the updated VISSIM model.

5. ADDITIONAL MODEL CHANGES

- 5.1 Initial runs of the forecast modelling indicated some calibration issues, therefore, additional changes have been made to the base model. These amendments are set out below.

VISSIM Version

- 5.2 VISSIM base model revalidated in VISSIM 24. VISSIM 24 utilises all cores therefore this will reduce computation time of forecast modelling runs.

Links

M1 J24

- 5.3 M1 NB exit altered (Link 10079) to one lane to reflect existing layout.
- 5.4 Altered the M1 south approach circulatory from 2 x 2-lane links (Link 17 & Link 194) to 1 x 4-lane link (Link 17). This allows better lane utilisation.
- 5.5 M1 N approach lane connectors (Link 10016) to A453 Remembrance Way from 1 lane connectors to a 2-lane connector to reflect video observation as well as road markings.

EMG Gyratory

- 5.6 Altered the EMG approach from 2x2-lane links to 1x4-lane link as the former caused convergence issues in the forecast modelling scenarios.

- Links Amended: 48, 70, 83, 576, 10481, 10482, 10487

Flare lengths

- 5.7 Flare lengths and alignments have also been reviewed and amended, the northbound approach to Finger Farm Roundabout (Link 136) and the eastbound approach to Hunters Road Roundabout (Link 212).

Signals

- 5.8 MOVA changes at M1 J24 special conditioning amended from call/cancel to delay/persistence. Signal linkage issues were noted in the forecast modelling scenarios.

A review of the video footage indicated that the call/cancel special conditioning did not reflect the signal operation well, particularly on the southwestern quadrant of the junction. Therefore special conditioning was amended to delay/persistence which reflected the operation better.

- 5.9 BWB have had discussions with a MOVA engineer who indicated that typically if links are set to simple traffic, these are not utilised on-site. Therefore detectors associated with simple traffic at the EMG gyratory have been removed.

Priority Rules

- 5.10 Some of the priority were slightly misaligned at the Finger Farm Roundabout causing vehicles to change lanes at the approach to the circulatory. Therefore, these have been repositioned to ensure no unnecessary lane changes.

Route Closures

- 5.11 When undertaking the forecast modelling a calibration issue presented itself where traffic coming from the M1 south would come off the M1 travel up the A453 to Junction 24 in the AM. This is not realistic and therefore a route closure has been added to stop vehicles doing this movement. This route closure will be used in all AM forecast modelling to remain consistent.

Route Costs

- 5.12 There are 2 routes to access the A50 via Junction 24 for vehicles travelling northbound from the the M1 and the A42, one route is to travel up the M1 and the other route is via the A453. As the model is a dynamic model and when running the models for calibration VISSIM assigns flows to each of these routes depending on where delay is in the model.
- 5.13 The GEH at Junction 24 for the 2 routes were unbalanced where VISSIM was assigning too many vehicles to use the A453 compared to the M1 and therefore, as a result a cost has been assigned to link number 184 of 75/km. this value provides the best split of traffic between the 2 routes and provides a cohesive GEH at J24. The will remain consistent between all forecast modelling scenarios.

Driving Behaviours

- 5.14 Upon undertaking the future year modelling, due to the higher level of traffic a number of merges throughout the model were generating unnecessary delay due to driver behaviour being too harsh for the 'Merge' Link type. Therefore driving behaviour had been reviewed and two separate merge/diverge behaviours have been utilised in the model, 'Wiedemann 99' for motorway merge/diverge and 'Wiedemann 74' for urban link roads.

6. MODEL CALIBRATION

Traffic Data

- 6.1 A skeleton LinSig model of the VISSIM network was built and Lights/Heavies turning movements were input into LinSig at 15-minute intervals. LinSig matrix estimation was subsequently used to generate synthetic OD matrices for input into the VISSIM model.

Convergence

- 6.2 The base model has been developed using dynamic assignment therefore models have been converged prior to extracting results from the model. TfL traffic modelling guidelines indicates that a model is converged if:

- 95% of all path traffic volumes change by less than 5% for at least four consecutive iterations; and
- 95% of travel times on all paths change by less than 20% for at least four consecutive iterations.

- 6.3 A summary of the convergence is presented in **Table 6** below.

Table 6: Model Convergence Summary

Sim Run	Traffic Volume		Travel Time on Paths	
	AM	PM	AM	PM
1	97%	99%	99%	98%
2	92%	98%	93%	97%
3	97%	98%	99%	96%
4	97%	97%	99%	95%
5	97%	96%	99%	97%
6	99%	95%	100%	96%
7	97%	98%	99%	98%
8	97%	99%	99%	99%
9	98%	97%	98%	99%
10	99%	98%	97%	99%

- 6.4 Based on the above, it is considered that both morning and evening peak hour models are converged.

Simulation

- 6.5 Ten iterations of each of the models were run starting at a random seed of 42 and increasing by 5 each interaction. The network performance parameter 'average delay per vehicle' was obtained for each run. The mean of the 10 runs was found for each option and the average was selected for calibration. The results of this process are presented in **Table 7** below.

Table 7: Network Performance

Seed Value	AM PEAK	PM PEAK
	Average Delay per Vehicle	Average Delay per Vehicle
42	52.412	41.506
47	53.376	42.010
52	50.479	40.319
57	51.802	41.685
62	55.465	41.704
67	53.672	38.995
72	50.094	40.294
77	52.522	40.239
82	52.268	40.799
87	51.492	40.939
Average	52.36	40.85
SD	1.49	0.87
Confidence	0.92	0.54

6.6 The stability of the models was judged using the Chi2 goodness of fit test which seeks to demonstrate that statistically the different model runs pass the goodness of fit null hypothesis that there is no significant difference in average delays between the seed values, thus demonstrating stability.

6.7 **Table 8** below demonstrate that, using the Chi2 distribution, in the morning and evening peak models pass the Chi2 goodness of fit test for respective degrees of freedom. The models therefore exhibit suitable stability/repeatability and are fit for purpose.

Table 8: Summary of Seed Stability Assessment

Seed	MORNING PEAK					EVENING PEAK					
	Observed	Expected	o-e	(o-e)2	(o-e)2/e	Observed	Expected	o-e	(o-e)2	(o-e)2/e	
42	53.267	51.107	2.160	5	0.091	41.506	40.849	0.657	0.431	0.011	
47	50.350	51.107	-0.758	1	0.011	42.010	40.849	1.161	1.348	0.033	
52	50.585	51.107	-0.522	0	0.005	40.319	40.849	-0.530	0.281	0.007	
57	48.954	51.107	-2.153	5	0.091	41.685	40.849	0.836	0.700	0.017	
62	52.342	51.107	1.234	2	0.030	41.704	40.849	0.855	0.731	0.018	
67	51.300	51.107	0.192	0	0.001	38.995	40.849	-1.854	3.438	0.084	
72	48.923	51.107	-2.184	5	0.093	40.294	40.849	-0.555	0.308	0.008	
77	52.584	51.107	1.477	2	0.043	40.239	40.849	-0.610	0.372	0.009	
82	52.408	51.107	1.300	2	0.033	40.799	40.849	-0.050	0.003	0.000	
87	50.361	51.107	-0.747	1	0.011	40.939	40.849	0.090	0.008	0.000	
					0.409						0.187
chi critical		0.05				chi critical		0.05			
DF		(n-1)	9	=	16.919	DF		(n-1)	9	=	16.919

Pass as 0.409 is less than 16.919

Pass as 0.187 is less than 16.919

Network Performance

6.8 **Table 9** presents a summary of the average Network Performance information.

Table 9: Network Performance

	AM	PM
Average Delay (s)	52	41
Average Speed (mph)	49	52
Vehicles Arrived	18740	18541
Latent Demand	1	0.6

6.9 **Table 9** illustrates that there is minimal latent demand in the morning peak hour period however a review of the error logs indicate that by the end of the cool down period, all vehicles are able to enter the VISSIM network.

Calibration Methodology

6.10 The Design Manual for Roads and Bridges (DMRB) defines model calibration as “the process of adjusting the parameters used in the various mathematical relationships within the model to reflect the data as well as is necessary to reflect the model objectives”. The model calibration process ensures that model has the ability to exhibit characteristics that accurately compare with observed data.

6.11 The model calibration has been undertaken over a model period of 1.0 hour in the morning peak (07:30 – 08:30) and 1 hour in the evening peak (17:00 – 18:00). These periods of calibration do not include the ‘warm up’ and ‘cool down’ period before and after the identified 07:30 – 08:30 and 17:00 – 18:00 morning and evening peak hours.

Traffic Flow Calibration

6.12 The Design Manual for Roads and Bridges (DMRB) defines model calibration as “the process of adjusting the parameters used in the various mathematical relationships within the model to reflect the data as well as is necessary to reflect the model objectives”. The model calibration process ensures that the model has the ability to exhibit characteristics that accurately compare with observed data.

6.13 DfT Transport Analysis Guidance (TAG) states that the calibration of traffic data in a model should be based on the Geoffrey E.Havers (GEH) statistic, and states that modelled flows must have a GEH value of less than 5 in at least 85% of the cases.

6.14 The turning count calibration for the base model has been based on the average of all simulation runs. **Table 10** provides a summary of the comparison between the observed and modelled total turning movements within the model.

Table 10: Summary of Traffic Flow Calibration

	Total Turns	Counts GEH<5
Morning Peak	59	90%
Evening Peak	59	92%

3.1 The above table represent a pass rate of over 85% for a GEH of less than 5 in both peak hour periods. The model is therefore considered to be fit for purpose. A copy of the full output is presented in **Appendix 1**.

7. MODEL VALIDATION

Introduction

7.1 TAG Unit M3.1 states that “for journey time calibration, the measure which should be used is: the percentage difference between modelled and observed journey times, subject to an absolute maximum difference”. Subsequently, Table 3 of TAG states that the “modelled times along routes should be within 15% of surveyed times or 1 minute, if higher than 15%.”

Travel Time Survey

7.2 TomTom journey time survey was obtained at 15 minute intervals for the neutral days within the month of November 2023 during the peak hours.

7.3 **Figure 4** and **5** provides routes utilised for journey time validation.

Figure 4: Journey Time Routes (1 - 10)

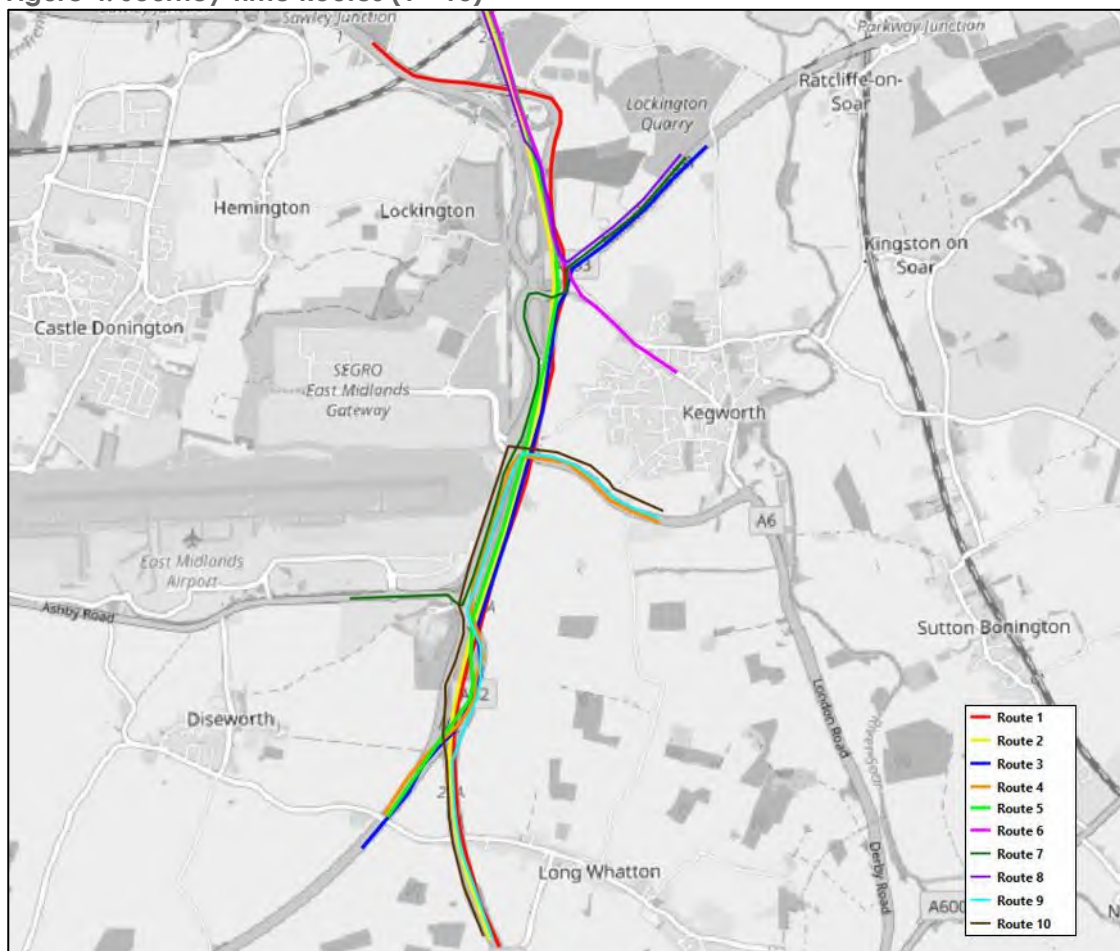
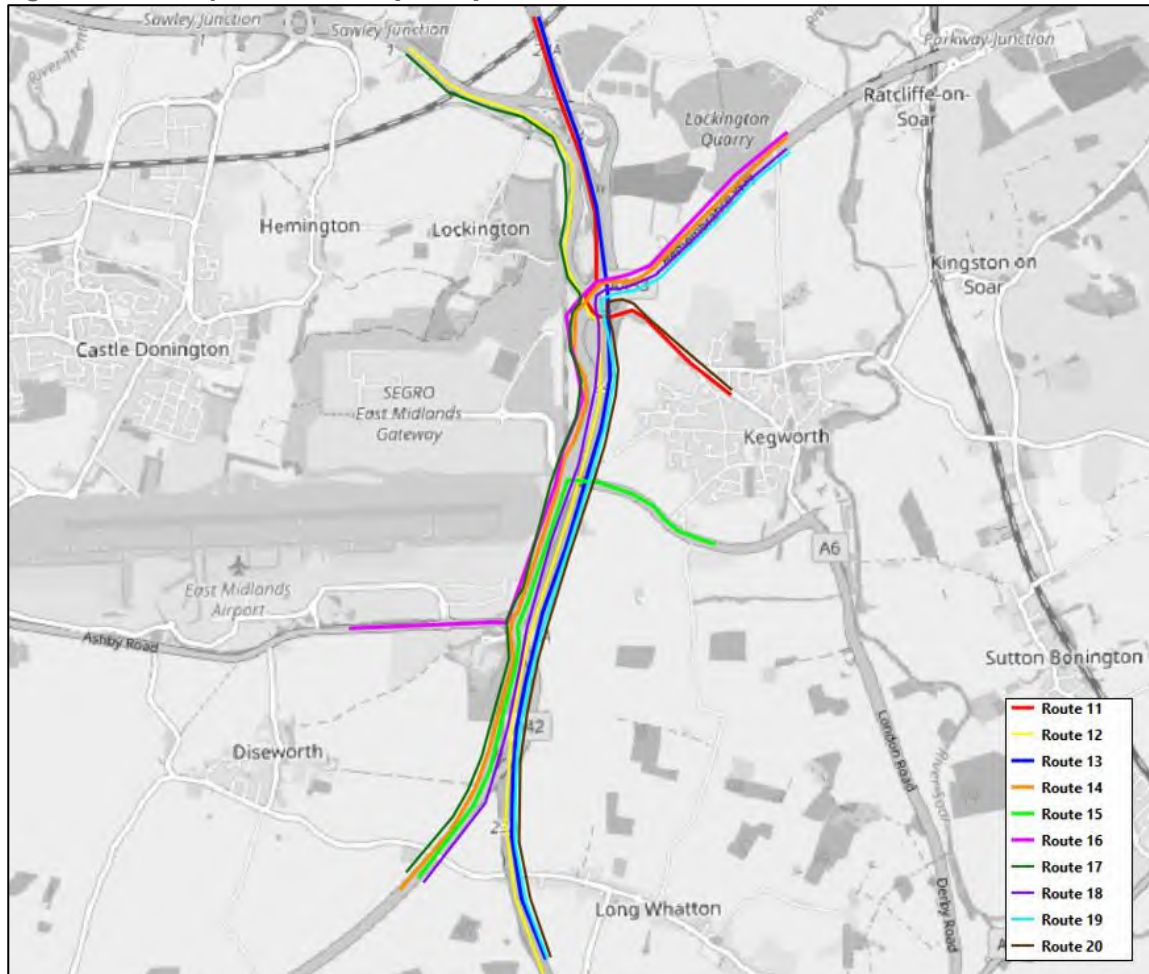


Figure 5: Journey Time Routes (10-20)



7.4 Details of the origin and destination of the routes identified above is provided below:

- Route 1 – A50 to M1 South
- Route 2 – M1 North to M1 South
- Route 3 – A453 Remembrance Way to A42
- Route 4 – Kegworth Bypass to A42
- Route 5 - M1 North to A42
- Route 6 – M1 North to Derby Road
- Route 7 – A453 Remembrance Way to A453 EMA
- Route 8 – M1 North to A453 Remembrance Way
- Route 9 – Kegworth Bypass to M1 South
- Route 10 - M1 South to Kegworth Bypass
- Route 11 – Derby Road to M1 North
- Route 12 – M1 South to A50
- Route 13 – M1 South to M1 North
- Route 14 – A42 to A453 Remembrance Way via A453

- Route 15 - A42 to Kegworth Bypass
- Route 16 – A453 EMA to A453 Remembrance Way
- Route 17 – A42 to A50 via A453
- Route 18 – A42 to A453 Remembrance Way via M1
- Route 19 – M1 South to A453 Remembrance Way via M1
- Route 20 - M1 South to Derby Road via M1

Validation Results

7.5 Model validation has been undertaken using 10 simulation seed runs as illustrated in **Table 8**. The average journey time for each full route has been compared with the surveyed journey times and the resultant output is presented in **Table 11** below. The breakdown of individual route segments IDs that make up each full journey time route is presented **Appendix 2**.

Table 11: Travel Time Validation

Route	AM			PM		
	Observed	Modelled	% Difference	Observed	Modelled	% Difference
1	489	353	-27.8%	413	331	-20.0%
2	358	339	-5.4%	352	317	-9.9%
3	318	308	-3.2%	353	306	-13.3%
4	271	306	12.8%	269	298	10.8%
5	377	323	-14.3%	359	310	-13.8%
6	311	272	-12.6%	299	255	-14.8%
7	397	400	0.8%	445	380	-14.7%
8	271	278	2.5%	255	266	4.2%
9	293	316	7.8%	294	303	3.0%
10	318	355	11.7%	338	322	-4.6%
11	325	349	7.3%	394	338	-14.2%
12	374	354	-5.4%	408	352	-13.7%
13	331	337	1.9%	397	357	-10.0%
14	393	423	7.5%	427	404	-5.4%
15	293	333	13.6%	314	281	-10.4%
16	389	397	2.1%	443	379	-14.5%
17	343	354	3.1%	414	332	-19.8%
18	372	357	-3.9%	370	346	-6.4%
19	393	375	-4.6%	394	387	-1.9%
20	433	377	-12.9%	438	381	-13.1%

Table 12: Travel Time Validation Summary

	<15%	
	AM	PM
Fail	1	2
Pass	19	18
Total	20	20

%	95%	90%
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7.6 **Table 12** illustrates that the over 85% of the journey times validate within 15% therefore it is considered the model is fit for purpose for future year assessment.

8. SUMMARY & CONCLUSIONS

8.1 BWB Consulting Ltd (BWB) has been appointed by SEGRO (the Applicant) to produce a microsimulation traffic model of the M1 Junction 24, in support of an outline planning application for the Phase 2 Expansion of the East Midlands Gateway (EMG) site.

8.2 The gross floor area (GFA) of the proposed scheme is approximately 3.23 million sqft (300,000sqm) comprising of 80% B8 use and 20% for B2 use, all with ancillary office use.

8.3 Traffic surveys were undertaken in November 2022 and subsequently a base VISSIM model of the study area has been developed by BWB.

8.4 The model was calibrated using observed and modelled turning movements during the peak hours at a 15-minute interval. These were assessed against DfT modelling guidelines and it was concluded that the base model satisfies both criterias.

8.5 Modelled journey times indicate that over 85% of these validate within 15% of observed data therefore it is considered the model is 'fit for purpose'.

APPENDICES

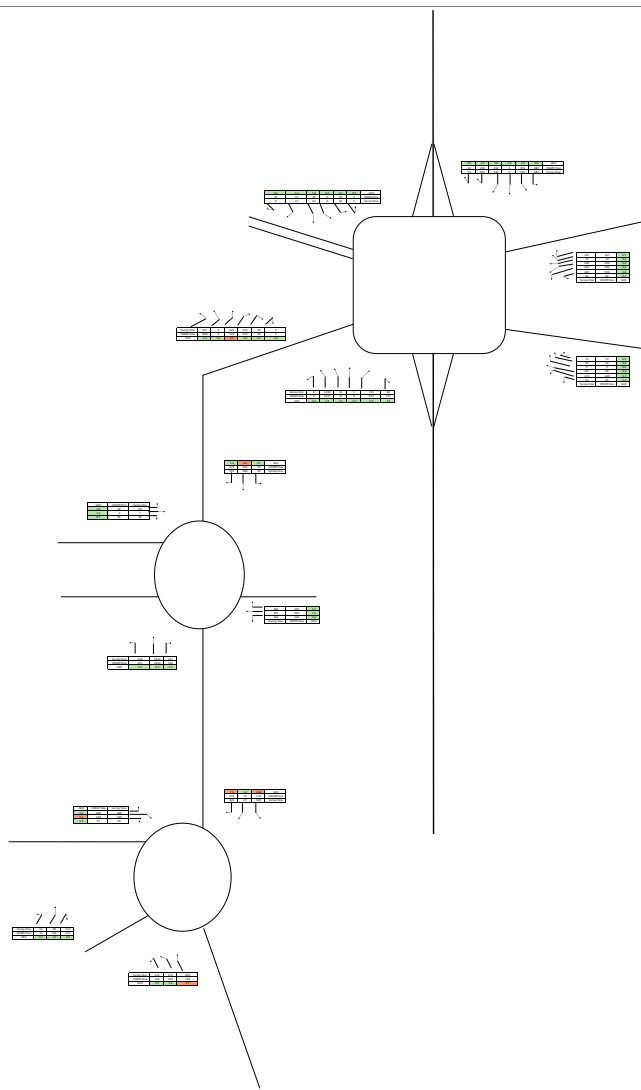
APPENDIX 1: TURNING COUNT CALIBRATION

AM Peak			Survey Flow	VISSIM Flow	Difference (M - C)	% Difference	GEH	GEH <5
Junction	From	To						
Junction 1	A453 (N)	M1 J23A Access	560	178	382	215%	19.89	Fail
Junction 1	A453 (N)	Donington Services Access	67	79	-12	-15%	1.40	Pass
Junction 1	A453 (N)	A453 (W)	420	578	-158	-27%	7.07	Fail
Junction 1	M1 J23A Access	Donington Services Access	134	128	6	5%	0.52	Pass
Junction 1	M1 J23A Access	A453 (W)	475	399	76	19%	3.64	Pass
Junction 1	M1 J23A Access	A453 (N)	952	790	162	21%	5.49	Fail
Junction 1	Donington Services Access	A453 (W)	55	31	24	77%	3.66	Pass
Junction 1	Donington Services Access	A453 (N)	89	102	-13	-13%	1.33	Pass
Junction 1	Donington Services Access	M1 J23A Access	112	117	-5	-4%	0.47	Pass
Junction 1	A453 (W)	A453 (N)	408	498	-90	-18%	4.23	Pass
Junction 1	A453 (W)	M1 J23A Access	249	169	80	47%	5.53	Fail
Junction 1	A453 (W)	Donington Services Access	23	13	10	77%	2.36	Pass
Junction 2	M1 J24 (N)	A453 (N)	900	980	-80	-8%	2.61	Pass
Junction 2	M1 J24 (N)	To Derby Road	526	550	-24	-4%	1.03	Pass
Junction 2	M1 J24 (N)	To M1 J24 (S)	0	0	0	0%	0.00	Pass
Junction 2	M1 J24 (N)	A453 (S)	542	518	24	5%	1.04	Pass
Junction 2	M1 J24 (N)	A50	321	342	-21	-6%	1.15	Pass
Junction 2	M1 J24 (N)	Hilton Hotel Lane	14	16	-2	-13%	0.52	Pass
Junction 2	A453 (N)	Derby Road	60	56	4	7%	0.53	Pass
Junction 2	A453 (N)	M1 J24 (S)	483	550	-67	-12%	2.95	Pass
Junction 2	A453 (N)	A453 (S)	424	356	68	19%	3.44	Pass
Junction 2	A453 (N)	A50	246	239	7	3%	0.45	Pass
Junction 2	A453 (N)	Hilton Hotel Lane	14	14	0	0%	0.00	Pass
Junction 2	A453 (N)	M1 J24 (N)	187	197	-10	-5%	0.72	Pass
Junction 2	Derby Road	M1 J24 (S)	54	65	-11	-17%	1.43	Pass
Junction 2	Derby Road	A453 (S)	174	140	34	24%	2.71	Pass
Junction 2	Derby Road	A50	107	98	9	9%	0.89	Pass
Junction 2	Derby Road	Hilton Hotel Lane	2	2	0	0%	0.00	Pass
Junction 2	Derby Road	M1 J24 (N)	61	64	-3	-5%	0.38	Pass
Junction 2	Derby Road	A453 (N)	75	73	2	3%	0.23	Pass
Junction 2	M1 J24 (S)	A453 (S)	5	0	5	0%	3.16	Pass
Junction 2	M1 J24 (S)	A50	1150	1047	103	10%	3.11	Pass
Junction 2	M1 J24 (S)	Hilton Hotel Lane	21	27	-6	-22%	1.22	Pass
Junction 2	M1 J24 (S)	M1 J24 (N)	5	0	5	0%	3.16	Pass
Junction 2	M1 J24 (S)	A453 (N)	731	812	-81	-10%	2.92	Pass
Junction 2	M1 J24 (S)	Derby Road	98	117	-19	-16%	1.83	Pass
Junction 2	A453 (S)	A50	957	1064	-107	-10%	3.37	Pass
Junction 2	A453 (S)	Hilton Hotel Lane	6	5	1	20%	0.43	Pass
Junction 2	A453 (S)	M1 J24 (N)	240	149	91	61%	6.53	Fail
Junction 2	A453 (S)	A453 (N)	232	214	18	8%	1.21	Pass
Junction 2	A453 (S)	Derby Road	30	18	12	67%	2.45	Pass
Junction 2	Hilton Hotel Lane	M1 J24 (N)	5	4	1	25%	0.47	Pass
Junction 2	Hilton Hotel Lane	A453 (N)	63	62	1	2%	0.13	Pass
Junction 2	Hilton Hotel Lane	Derby Road	9	9	0	0%	0.00	Pass
Junction 2	Hilton Hotel Lane	M1 J24 (S)	23	28	-5	-18%	0.99	Pass
Junction 2	Hilton Hotel Lane	A453 (S)	17	13	4	31%	1.03	Pass
Junction 2	Hilton Hotel Lane	A50	9	10	-1	-10%	0.32	Pass
Junction 3	A453 (N)	A6 Kegworth Bypass	54	53	1	2%	0.14	Pass
Junction 3	A453 (N)	A453 (S)	393	584	-191	-33%	8.64	Fail
Junction 3	A453 (N)	Wilders Way	323	378	-55	-15%	2.94	Pass
Junction 3	A6 Kegworth Bypass	A453 (S)	142	164	-22	-13%	1.78	Pass
Junction 3	A6 Kegworth Bypass	Wilders Way	415	391	24	6%	1.20	Pass
Junction 3	A6 Kegworth Bypass	A453 (N)	369	346	23	7%	1.22	Pass
Junction 3	A453 (S)	Wilders Way	219	257	-38	-15%	2.46	Pass
Junction 3	A453 (S)	A453 (N)	1014	1023	-9	-1%	0.28	Pass
Junction 3	A453 (S)	A6 Kegworth Bypass	127	142	-15	-11%	1.29	Pass
Junction 3	Wilders Way	A453 (N)	107	88	19	22%	1.92	Pass
Junction 3	Wilders Way	A6 Kegworth Bypass	7	4	3	75%	1.28	Pass
Junction 3	Wilders Way	A453 (S)	80	86	-6	-7%	0.66	Pass

	<5
Fail	6
Pass	53
Total	59
%	90%

AM Peak			Survey Flow	VISSIM Flow	Difference (M - C)	% Difference	GEH	GEH <5
Junction	From	To						
Junction 1	A453 (N)	M1 J23A Access	367	189	178	94%	10.68	Fail
Junction 1	A453 (N)	Donington Services Access	88	81	7	9%	0.76	Pass
Junction 1	A453 (N)	A453 (W)	178	189	-11	-6%	0.81	Pass
Junction 1	M1 J23A Access	Donington Services Access	138	133	5	4%	0.43	Pass
Junction 1	M1 J23A Access	A453 (W)	420	392	28	7%	1.39	Pass
Junction 1	M1 J23A Access	A453 (N)	771	962	-191	-20%	6.49	Fail
Junction 1	Donington Services Access	A453 (W)	53	58	-5	-9%	0.67	Pass
Junction 1	Donington Services Access	A453 (N)	88	73	15	21%	1.67	Pass
Junction 1	Donington Services Access	M1 J23A Access	124	122	2	2%	0.18	Pass
Junction 1	A453 (W)	A453 (N)	587	498	89	18%	3.82	Pass
Junction 1	A453 (W)	M1 J23A Access	253	282	-29	-10%	1.77	Pass
Junction 1	A453 (W)	Donington Services Access	51	61	-10	-16%	1.34	Pass
Junction 2	M1 J24 (N)	A453 (N)	907	881	26	3%	0.87	Pass
Junction 2	M1 J24 (N)	To Derby Road	545	524	21	4%	0.91	Pass
Junction 2	M1 J24 (N)	To M1 J24 (S)	4	0	4	0%	2.83	Pass
Junction 2	M1 J24 (N)	A453 (S)	182	110	72	65%	5.96	Fail
Junction 2	M1 J24 (N)	A50	240	199	41	21%	2.77	Pass
Junction 2	M1 J24 (N)	Hilton Hotel Lane	10	10	0	0%	0.00	Pass
Junction 2	A453 (N)	Derby Road	74	70	4	6%	0.47	Pass
Junction 2	A453 (N)	M1 J24 (S)	813	866	-53	-6%	1.83	Pass
Junction 2	A453 (N)	A453 (S)	294	356	-62	-17%	3.44	Pass
Junction 2	A453 (N)	A50	405	342	63	18%	3.26	Pass
Junction 2	A453 (N)	Hilton Hotel Lane	11	11	0	0%	0.00	Pass
Junction 2	A453 (N)	M1 J24 (N)	263	259	4	2%	0.25	Pass
Junction 2	Derby Road	M1 J24 (S)	51	57	-6	-11%	0.82	Pass
Junction 2	Derby Road	A453 (S)	88	86	2	2%	0.21	Pass
Junction 2	Derby Road	A50	135	124	11	9%	0.97	Pass
Junction 2	Derby Road	Hilton Hotel Lane	2	2	0	0%	0.00	Pass
Junction 2	Derby Road	M1 J24 (N)	87	89	-2	-2%	0.21	Pass
Junction 2	Derby Road	A453 (N)	57	59	-2	-3%	0.26	Pass
Junction 2	M1 J24 (S)	A453 (S)	5	0	5	0%	3.16	Pass
Junction 2	M1 J24 (S)	A50	1089	968	121	13%	3.77	Pass
Junction 2	M1 J24 (S)	Hilton Hotel Lane	14	14	0	0%	0.00	Pass
Junction 2	M1 J24 (S)	M1 J24 (N)	0	0	0	0%	0.00	Pass
Junction 2	M1 J24 (S)	A453 (N)	528	523	5	1%	0.22	Pass
Junction 2	M1 J24 (S)	Derby Road	76	90	-14	-16%	1.54	Pass
Junction 2	A453 (S)	A50	999	1033	-34	-3%	1.07	Pass
Junction 2	A453 (S)	Hilton Hotel Lane	5	3	2	67%	1.00	Pass
Junction 2	A453 (S)	M1 J24 (N)	323	347	-24	-7%	1.31	Pass
Junction 2	A453 (S)	A453 (N)	256	354	-98	-28%	5.61	Fail
Junction 2	A453 (S)	Derby Road	41	33	8	24%	1.32	Pass
Junction 2	Hilton Hotel Lane	M1 J24 (N)	15	16	-1	-6%	0.25	Pass
Junction 2	Hilton Hotel Lane	A453 (N)	20	22	-2	-9%	0.44	Pass
Junction 2	Hilton Hotel Lane	Derby Road	10	10	0	0%	0.00	Pass
Junction 2	Hilton Hotel Lane	M1 J24 (S)	8	8	0	0%	0.00	Pass
Junction 2	Hilton Hotel Lane	A453 (S)	4	3	1	33%	0.53	Pass
Junction 2	Hilton Hotel Lane	A50	11	10	1	10%	0.31	Pass
Junction 3	A453 (N)	A6 Kegworth Bypass	77	74	3	4%	0.35	Pass
Junction 3	A453 (N)	A453 (S)	305	187	118	63%	7.52	Fail
Junction 3	A453 (N)	Wilders Way	243	205	38	19%	2.54	Pass
Junction 3	A6 Kegworth Bypass	A453 (S)	132	130	2	2%	0.17	Pass
Junction 3	A6 Kegworth Bypass	Wilders Way	402	390	12	3%	0.60	Pass
Junction 3	A6 Kegworth Bypass	A453 (N)	389	383	6	2%	0.31	Pass
Junction 3	A453 (S)	Wilders Way	90	121	-31	-26%	3.02	Pass
Junction 3	A453 (S)	A453 (N)	1026	1174	-148	-13%	4.46	Pass
Junction 3	A453 (S)	A6 Kegworth Bypass	187	237	-50	-21%	3.43	Pass
Junction 3	Wilders Way	A453 (N)	221	206	15	7%	1.03	Pass
Junction 3	Wilders Way	A6 Kegworth Bypass	19	19	0	0%	0.00	Pass
Junction 3	Wilders Way	A453 (S)	140	137	3	2%	0.25	Pass

	<5
Fail	5
Pass	54
Total	59
%	92%



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Project

East Midlands Gateway Phase 2

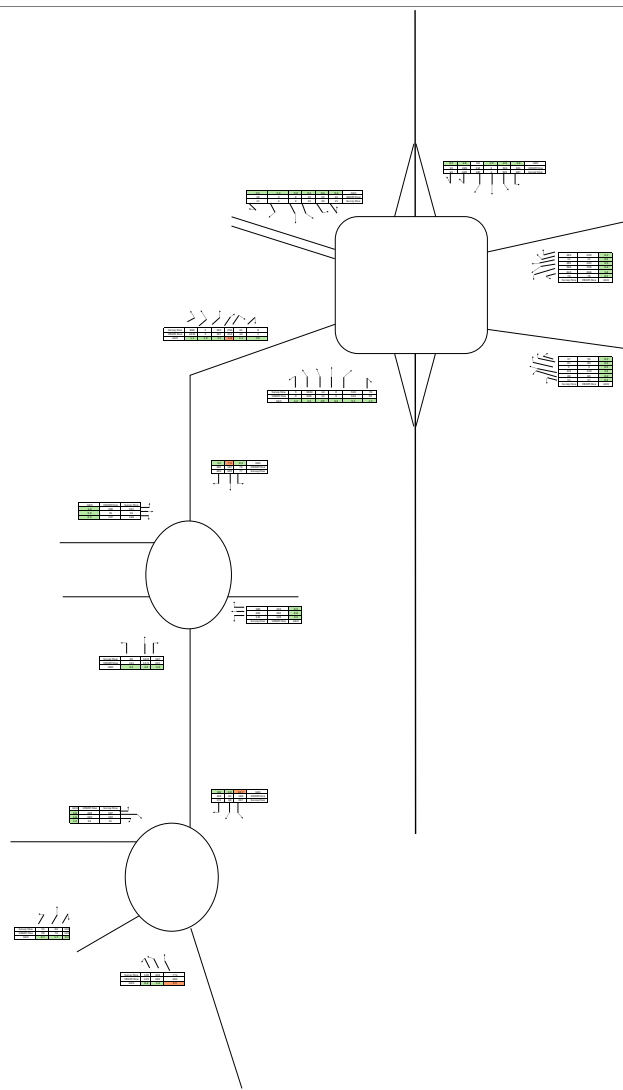
Drawing Title

GEM Comparison AM

Drawn	CC	Approved	VD
Checked	CC	Date	03.03.25

Project Number

220500



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Project

 East Midlands Gateway Phase 2

Drawing Title

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Project Number

 220500

Checked	CC	Date	03.03.25
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APPENDIX 2: JOURNEY TIME SEGMENTS

		Dist
		165: A50 to A50/M1 Fork
		167: A50 to M1 SB Merge
A-I		169: M1 SB Mainline under J24
		170: M1 SB Mainline between J24 Merge and A42 Diverge
		171: M1 SB Mainline between A42 Diverge to End
		163: M1 SB to J24 Diverge
B-I		168: M1 SB Mainline between J24 Diverge and A50 Merge
		169: M1 SB Mainline under J24
		170: M1 SB Mainline between J24 Merge and A42 Diverge
		171: M1 SB Mainline between A42 Diverge to End
		126: M1 J24 A453 Approach
		143: M1 J24 A453 N to M1 S
C-J		132: M1 J24 M1 SB Merge
		170: M1 SB Mainline between J24 Merge and A42 Diverge
		178: M1 SB A42 Diverge
		85: A42/M1 SB Merge to A42
H-J		114: Keg By to A453 S
		74: EMG1 RB to FF
		88: FF Circ S1
		82: FF to M1/A42 Fork
		84: M1/A42 Fork to M1 SB/A42 Merge
		85: A42/M1 SB Merge to A42
		163: M1 SB to J24 Diverge
		168: M1 SB Mainline between J24 Diverge and A50 Merge
B-I		169: M1 SB Mainline under J24
		170: M1 SB Mainline between J24 Merge and A42 Diverge
		178: M1 SB A42 Diverge
		85: A42/M1 SB Merge to A42
		163: M1 SB to J24 Diverge
B-D		164: M1 SB Diverge to M1/A50 Merge
		125: M1 J24 M1/A50 Approach
		137: M1 J24 A50/M1 Arm to Derby Road
		131: M1 J24 Derby Road Exit
		126: M1 J24 A453 Approach
		143: M1 J24 A453 N to A453 S
		108: M1 J24 to EMG1 RB
		112: A453 N to S
		74: EMG1 RB to FF
		88: FF Circ S1
		89: FF Circ S2
		90: FF Circ S3
		91: FF Circ S4
		92: FF Circ S5
		69: FF to SA
		72: SA Circ S3
		67: A453 WB from SA
		163: M1 SB to J24 Diverge
		164: M1 SB Diverge to M1/A50 Merge
		125: M1 J24 M1/A50 Approach
		138: M1 J24 A50/M1 Arm to A453 N
B-C		130: M1 J24 A453 N Exit
		114: Keg By to A453 S
		74: EMG1 RB to FF
		88: FF Circ S1
		82: FF to M1/A42 Fork
		83: M1/A42 Fork to M1 Merge
		87: M1 SB FF Merge to M1 S End
		80: M1 to FF Diverge
		91: M1 Diverge to A42/M1 Merge
		79: A42/M1 Approach to FF
		90: FF Circ S3
		91: FF Circ S4
		92: FF Circ S5
		93: FF Circ S6
		94: FF Circ S7
		75: FF to EMG1 RB
		119: A453 S to Keg By
		127: M1 J24 Derby Road Approach
		150: M1 J24 Derby Road to M1 NB
		129: M1 J24 to M1 NB Merge
		162: M1 NB Merge to M1 End
		80: M1 to FF Diverge
		173: M1 NB to A42/M1 Merge
		174: M1 NB Mainline between A42/M1 Merge and Before J24 Diverge
I-A		175: M1 J24 Diverge
		128: M1 J24 M1 NB Approach
		153: M1 J24 M1 S to A50
		135: M1 J24 to A50 End
		80: M1 to FF Diverge
		173: M1 NB to A42/M1 Merge
		174: M1 NB Mainline between A42/M1 Merge and Before J24 Diverge
		176: M1 Mainline After J24 Diverge
		177: M1 Mainline between After J24 Diverge to J24 Merge
		162: M1 NB Merge to M1 End
		77: A42 to FF Diverge
		78: A42 Diverge to A42/M1 Merge to FF
		79: A42/M1 Approach to FF
		90: FF Circ S3
		91: FF Circ S4
		92: FF Circ S5
		93: FF Circ S6
		94: FF Circ S7
		75: FF to EMG1 RB
		118: A453 S to A453 N
		123: EMG1 RB to M1
		159: M1 J24 A453 S to A453 N
		130: M1 J24 A453 N Exit
		77: A42 to FF Diverge
		78: A42 Diverge to A42/M1 Merge to FF
		79: A42/M1 Approach to FF
		90: FF Circ S3
		91: FF Circ S4
		92: FF Circ S5
		93: FF Circ S6
		94: FF Circ S7
		75: FF to EMG1 RB
		118: A453 S to A453 N
		123: EMG1 RB to M1
		157: M1 J24 A453 S to A50
		135: M1 J24 to A50 End
		77: A42 to FF Diverge
		172: A42 to A42/M1 Merge
		174: M1 NB Mainline between A42/M1 Merge and Before J24 Diverge
		175: M1 J24 Diverge
		128: M1 J24 M1 NB Approach
		155: M1 J24 M1 S to A453 N
		130: M1 J24 A453 N Exit
		80: M1 to FF Diverge
		173: M1 NB to A42/M1 Merge
		174: M1 NB Mainline between A42/M1 Merge and Before J24 Diverge
		175: M1 J24 Diverge
		128: M1 J24 M1 NB Approach
		155: M1 J24 M1 S to A453 N
		130: M1 J24 A453 N Exit
		80: M1 to FF Diverge
		173: M1 NB to A42/M1 Merge
		174: M1 NB Mainline between A42/M1 Merge and Before J24 Diverge
		175: M1 J24 Diverge
		128: M1 J24 M1 NB Approach
		161: M1 J24 A453 S to M1 SB
		131: M1 J24 Derby Road Exit
		156: M1 J24 M1 S to Derby Road



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APPENDIX 2: NH Technical Note dated 15 October 2025

Tech Note

Spatial Planning Framework Commission

Prepared by Jacobs-SYSTRA Joint Venture (JSJV) for the National Highways National Spatial Planning Contract 2022 in relation to the South East Region

Job number:	B2418400		
Job title:	EMG2 DCO		
To:	Paul Wilson, [REDACTED] [REDACTED]	cc:	[REDACTED] [REDACTED] [REDACTED]
Topic:	EMGP2 Forecasting Modelling Review		
	Prepared:	Checked	Approved
Name:	[REDACTED] [REDACTED] [REDACTED]	[REDACTED] [REDACTED]	[REDACTED]
Date:	10/10/2025	13/10/2025	15/10/2025

Introduction

AECOM have been independently commissioned by SEGRO to undertake strategic transport modelling to assess the proposed development at the SEGRO Logistics Park East Midlands Gateway 2. This is linked to the Development Consent Order. Strategic transport modelling is required to provide an evidence base for assessing the impacts and identifying the mitigation needed to support the proposed development.

The Strategic Road Network (SRN) is a critical national asset and as such National Highways work to ensure that it operates safely and is managed in the public interest, both in respect of current activities and needs as well as in providing effective stewardship of its long-term operation and integrity.

In the case of this development proposal, National Highways' primary interest is in the M1 motorway and the A453, A50 and A42 Trunk Roads.

JSJV has been commissioned by National Highways to audit the supporting traffic modelling documents prepared by AECOM and appraise the impact of development on the SRN.

Review Categorisations

Issues are categorised according to the categories in Table 1 below:-

Table 1: Review Categorisations

Classification	Description
Observations	are points for consideration on an issue that would not significantly affect model operation or output.
Comments	main function is to highlight issues for attention in subsequent project stages.
Substantive Issues	are issues which require corrective action. The audit will suggest the detailed action required to address the issue, although there should be freedom for the development team to use alternative approaches in order to achieve the required level of analysis.

Previous Relevant Reviews

The following previous report was provided by the Applicant: -

- EMFM 2019, East Midlands Gateway Phase 2, Forecasting Report, AECOM, 04/02/2025 (The report).

This includes the appraisal of the development impacts without mitigation.

JSJV undertook a review of the received information to appraise the soundness of the conclusions provided within the report and identified areas and next steps for further assessment by the Applicant.

The findings of this review is set out in a Technical Note [B2418400 EMGP2 Forecasting Report TECH NOTE, JSJV, February 2025]. This latest Technical Note should be read in conjunction with the previous one.

Items Reviewed

The following items have been provided: -

- EMFM 2019, East Midlands Gateway Phase 2a, Forecasting Report v4.0, AECOM, 02/07/25 (The report);
- EMGP2 – Response to NH comments on 23 July 2025 v3 (Excel);
- 1a EMG2 CD Flows;
- 2028 AM 2a Difference Plot – NH Increased capacity test.BMP; and
- RE: JSJV follow up to questions posed [16 July 2025] (Email)

This latest Technical Note is an addendum to a Note produced by JSJV in August 2025 which reviewed the items listed above [B2418400 EMGP2 Forecasting Report Addendum (With Mitigation) TECH NOTE, JSJV, August 2025]. Following the submission of the August Note to the Applicant, the following additional items have been submitted:-

- EMFM 2019, East Midlands Gateway Phase 2a, Forecasting Report v5.0, AECOM, 07/010/25 (The report);
- EMGP2 – Response to NH comments on 17th Sept 2025 – For Issue v1 Excel);

The findings of the audit work undertaken in August 2025 are presented in full below. The substantial change between v4.0 and v5.0 of the report relate to an additional chapter; Section

4 – Sensitivity Test of A50 Merge Capacity. The review of this additional chapter and the supporting Excel is presented below in Section: **Review of V5.0 and supplied Excel.**

For ease of reference, the detail of the audit presented below follows the chapter sequencing of the report provided. This latest Technical Note serves as a summary of the comprehensive information presented in the full-length report and submitted items. For a more thorough examination of the subject, readers are invited to consult the full length documents.

Section 1 – Overview

Paragraph 1.1.7 identifies the modelling assessment and the proposed stages of the assessment procedure: -

Stage 1a modelling (Proforma 14)

- 2022/2023/2024 'Without Development';
- 2028/2038 'Without Development (1a)' without EMG Phase 2 development (with all Freeport and Local Plan sites); and
- 2028/2038 'With Development (1a)' with EMG2 development (with all Freeport and Local Plan sites).

Stage 1b modelling (Proforma 14a)

- 28/2038 'Without Development (1b)' without EMG Phase 2 development (without Local Plan sites); and
- 2028/2038 'With Development (1b)' with EMG Phase 2 development (without Local Plan sites).

Stage 2a modelling with mitigation (Proforma 14)

- 2028/2038 'With Development (2a)'. With EMGP2 and with mitigation measures (with all Freeport and Local Plan sites).

Stage 2b modelling with mitigation (Proforma 14a)

- 2028/2038 'With Development (2b)'. With EMGP2 and with mitigation measures (without Local Plan sites).

As noted in paragraph 1.1.8, the reporting presented in v4.0 (now v5.0) of the report relates to the forecast model results for Stage 2a only.

Comment 1:- The scenarios/ assumptions used to test and appraise the impacts of development on the SRN are those provided within the report v4.0 (now v5.0) using the agreed Proforma 14 and not Proforma 14a. This has been confirmed by BWB in writing on 21st November 2024 acting on behalf of SEGRO. In addition, the floorspace modelled includes a total of 430,000sqm. At the time of writing this Technical Note, this includes the floorspace and trip rates which have been agreed with National Highways. Any increases in floorspace above 430,000sqm may require additional traffic modelling and assessment as indicated by National Highways to the Applicant on 1st May 2025.

Section 2 – Forecast Approach and Assumptions

2.2 Mitigation Measures

The list of mitigation measures as described in the report (paragraph 2.1.1) included within this modelling assessment are:-

1. New M1 northbound to A50 westbound interchange link road and A50 westbound merge (as shown Figure 2.1 and Figure 2.2).

- A single lane link road between the M1 northbound and the A50, bypassing M1 J24.
 - This has been represented with a 50 mph speed limit in the EMFM.
 - One lane will diverge from the existing four-lane carriageway on the M1 northbound.
2. M1 southbound link approaching J24 (as shown Figure 2.3).
- An additional M1 southbound lane, from one lane to two lanes, and merging with the A50 eastbound to form three lanes approaching J24.
3. EMGP1 access improvements (as shown Figure 2.4).
- An additional circulatory lane on the eastern side of the Wilders Way / A453 / A6 Keyworth Bypass roundabout.
 - Signal timing adjustment to allow for a pedestrian phase at Wilders Way to improve access to EMGP2. No changes were applied in EMFM as the existing red phase was sufficiently long to allow for the pedestrian phase.
4. A453 Finger Farm Roundabout westbound exit widening (as shown Figure 2.5).
- An additional 42 metres of two lane widening on exit.
5. EMGP2 access junction and toucan crossing (as shown Figure 2.6).
- Additional flare length has been provided at the EMGP2 access roundabout on both the east and west arms.
 - A toucan crossing has been included on the A453 to the east of the proposed access roundabout.
6. M1 J24 minor works (as shown Figure 2.7).
- The central lane has been reallocated for shared use for both M1 northbound traffic and traffic towards the A453. Currently this lane is for A453 traffic only.

Observation 1:- It should be noted that the findings of this Technical Note relate to the strategic modelling assessment as presented in the report. Separate engineering evaluation and more detailed modelling assessments of the proposed mitigation measures listed above are required.

2.3 Signal Optimised with Mitigation Included and 2.4 Approach to Signal Optimisation

Paragraph 2.3.1 notes that two junctions adjacent to the mitigation package have been optimised in the EMFM assessment: -

- The signal head to the south-west of the Wilders Way / A453 / Kegworth Bypass roundabout that controls the A453 northbound traffic and the circulatory traffic.
- The signal head to the north-east of the M1 J24 that controls the M1 southbound and circulatory traffic.

These junctions are projected to reach or exceed capacity in the Stage 2a assessment. It is noted that optimisation aims to unlock the potential of two key mitigation measures:-

1. EMGP1 access improvements.

2. M1 southbound link approaching J24.

Section 2.4 describes the optimisation procedure undertaken which focused on:-

- Balancing demand and delay at congested junctions following the introduction of additional road capacity utilising observed signal time data from the 2019 EMFM Base Year model for Stage 2a timings.
- Incorporating feedback from detailed microsimulation modeling, including minimum and maximum green times.

The optimisation was noted to be conducted methodically over five iterations, adjusting green times and reviewing outputs. A sixth iteration, not documented in the report, involved optimising the signalised junction at Hilton Hotel Lane / M1 J24.

Comment 2:- It is expected that signal time adjustments will be consistently applied to the localised junction and microsimulation modelling. Further assessment of the signal timing and traffic signal configuration will be required as part of the traffic engineering evaluation of the proposed mitigation.

Section 3 – Forecast Model Results

3.2 Forecast Development Traffic

The following PCU conversion factors have been used for the forecasting assessment: -

- Lights = 1 PCU; and,
- Heavies = 2 PCU.

Observation 2:- JSJV are content with the PCU assumptions.

Figures 3.1 - 3.8 show the distribution of development traffic by different modes for the AM and PM peak hours for both the 2028 and 2038 assessment with mitigation.

Comment 3:- The report indicates consistent traffic routing patterns across both the Stage 1a and 2a modelling assessments. HGV development traffic shows similar distributions in the AM and PM peak hours for 2028 and 2038, primarily using the M1, A50, and A453 Remembrance Way northbound, and the M1 and A42 southbound. JSJV is content with the HGV routing.

Light vehicle traffic in the 2028 AM peak hour routes to the development via the M1 northbound and the A42 northbound, with southbound traffic using the M1 or routing via Castle Donington but avoiding the Castle Donington Relief Road.

The report notes that during the AM peak hour, routes via Castle Donington are used to a lesser extent with the M1 seeming to be the primary route. The report goes on to note that with the M1 northbound to A50 westbound interchange link road mitigation, the A50 is forecast to have fewer than 100 development trips in both directions in either the 2028 or 2038.

When considering Figure 3.2, there is a potential risk that traffic currently routing through the centre of Castle Donington (appearing to avoid the Relief Road) would more likely route via the M1. The Applicant has quantified the volume of development traffic routing through Castle Donington at 53 light vehicle trips in the AM peak hour in 2028 and 45 light vehicle trips in the PM peak hour. The potential risk of understated demand on the SRN is therefore considered sufficiently low.

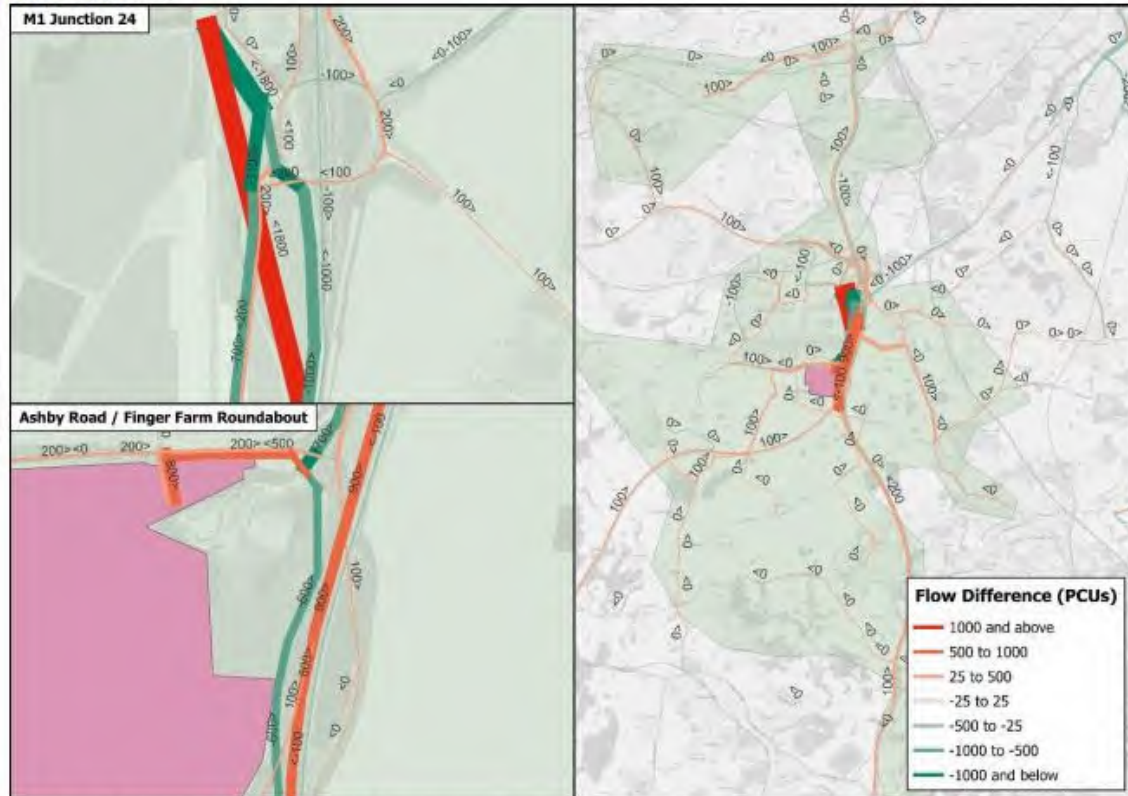
3.3 Forecast Flow Change

Figures 3.9 - 3.10 show the forecast traffic flow changes associated with the addition of development traffic and mitigation in the 2028 and 2038 AM and PM peak hours.

For ease of understanding, Figures 3.9 – 3.10 are replicated below: -

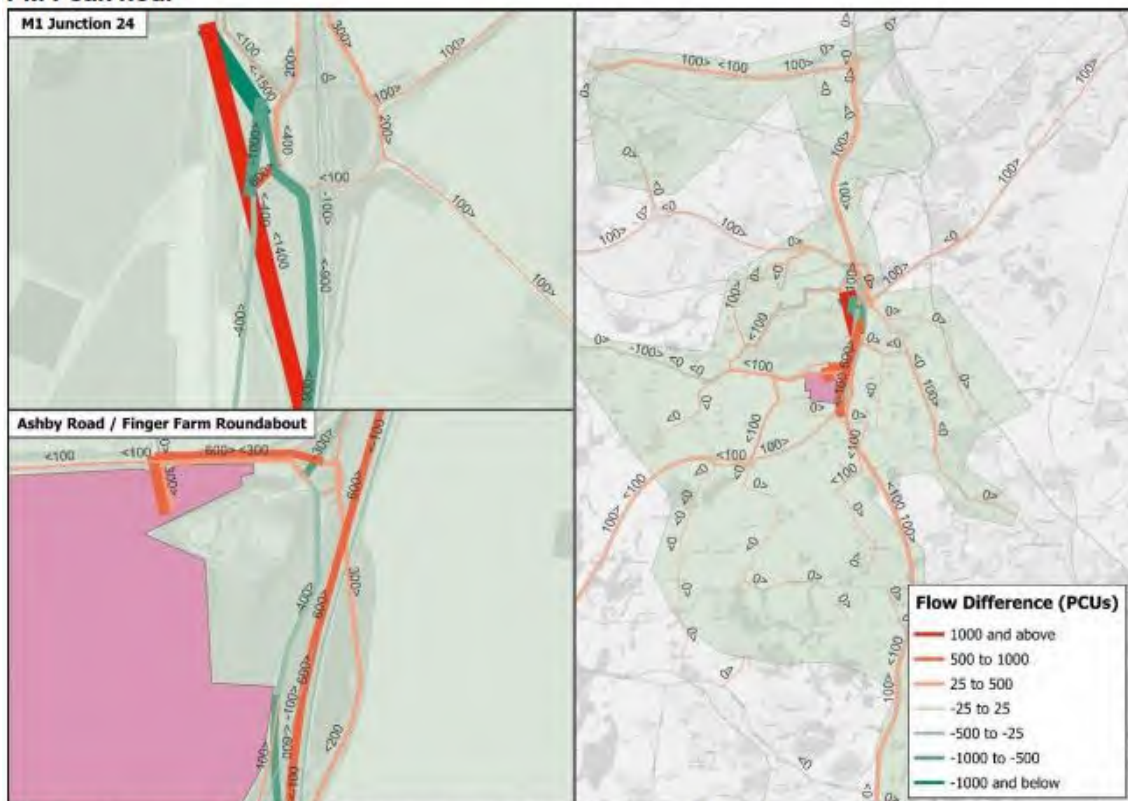
Figure 3.9: Forecast Flow Change for 2028 'Without Development (1a)' minus 'With Development (2a)'

AM Peak hour



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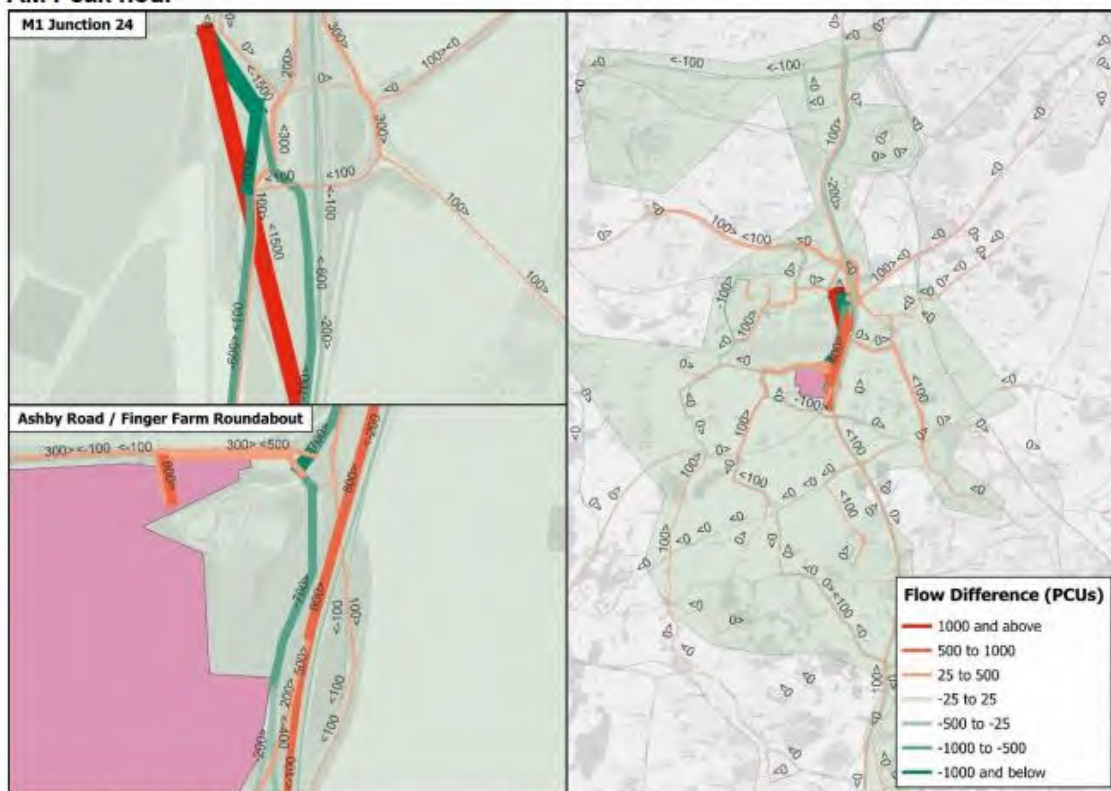
PM Peak hour



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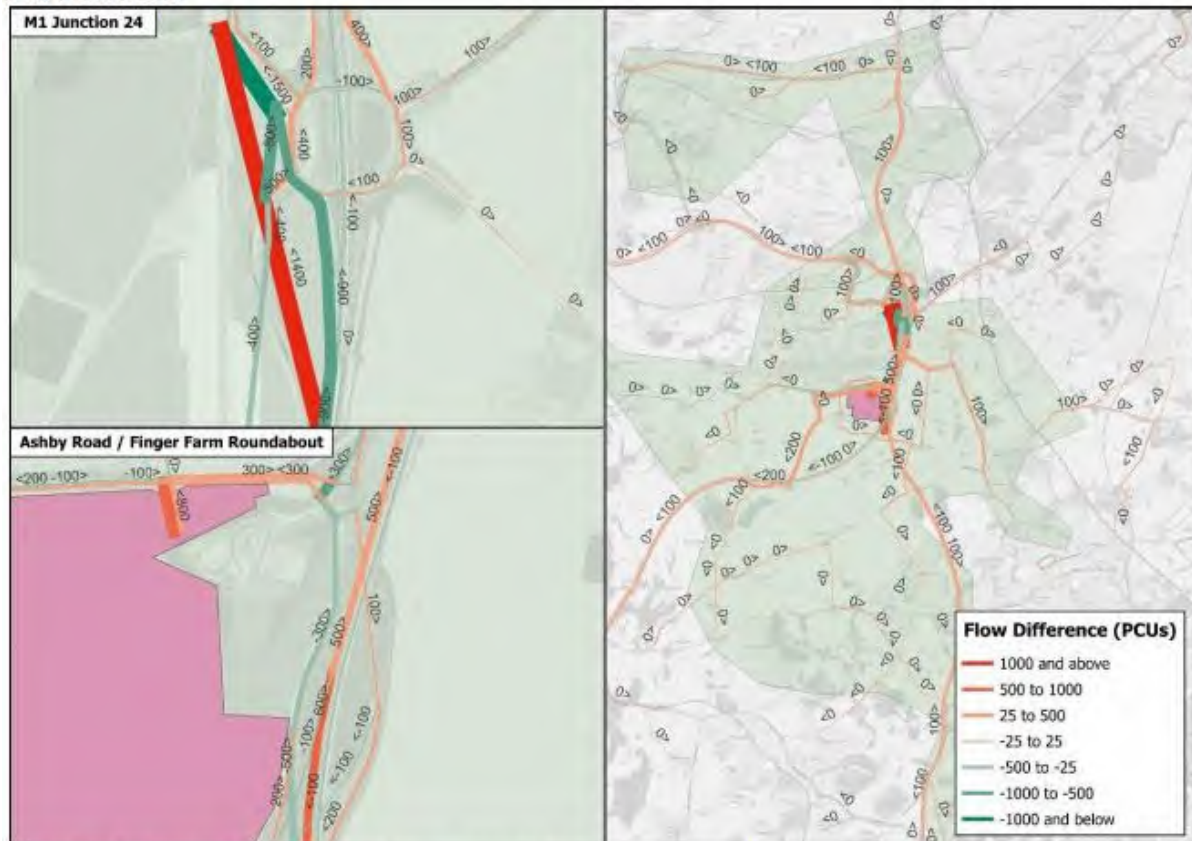
Figure 3.10: Forecast Flow Change for 2038 'Without Development (1a)' minus 'With Development (2a)'

AM Peak hour



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PM Peak hour



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In light of the proposed mitigation, particularly the new single lane link road between the M1 northbound and the A50 westbound, traffic bypasses the circulatory section of M1 J24.

The new M1 northbound link road is projected to experience the most significant increase in traffic flow across all modelled forecast scenarios. This increase is primarily attributed to a redistribution of traffic from the A453, Finger Farm Roundabout and M1 Junction 24. There are significant increases in flow on the M1 in both directions.

The forecast flow on the new link road is >1800 PCUs in the 2028 AM peak hour and >1500 PCUs the 2038 AM peak hour.

Substantive Issue 1:- In scenario 2a, the reduction in AM peak hour flow on the new link in 2038 compared to 2028 is significant. A review of the supplied excel spreadsheets indicates that the predicted flow for the new link in 2028 in the AM peak hour is 1,832 PCUs and in 2038 is 1,481; a difference of 351 PCUs.

JSJV requested the Applicant to explore the AM peak hour flow difference between 2028 and 2038 with consideration of the Origin and Destination patterns using the new link. In response to this query, the Applicant advised:-

“Traffic flows in this area generally increase but flows on this link reduce. This is likely to be due to the downstream merge being at capacity, so that growth in traffic on the A50 mainline, which joins traffic from the new link upstream of the at-capacity merge, pushes the more strategic traffic on the new link (which has greater route choice) onto other routes”

More detailed analysis of the A50 M1 J24A merge (downstream of the merge) has been undertaken (see comments concerning 3.5 Forecast Delay Change below). The reduction in flow between 2028 and 2038 on the new link road is a concern given the findings of the

more detailed analysis and the likelihood of overstated delay at the A50 M1 J24A merge as noted below.

Where such delays at the merge do not occur to the same degree as predicted, flow on the new link in 2038 may be understated. The predicted flow of >1,800 PCUs in 2028 is close to the upper limit of the theoretical capacity for a single lane.

From the information provided, JSJV are not able to fully account for this reduction in flow which may be re-routing elsewhere or simply queuing upstream of the new link (see comments concerning 3.5 Forecast Delay Change below). The Applicant should take a considered view of the flows used to inform the design and account for any traffic rerouting and/or queuing.

3.5 Forecast Delay Change

There are notable delays modelled at the A50 M1 24a merge: -

- 2028 AM: 2 minutes and 9 seconds
- 2028 PM: 3 minutes and 24 seconds
- 2038 AM: 2 minutes and 59 seconds
- 2038 PM: 3 minutes and 44 seconds

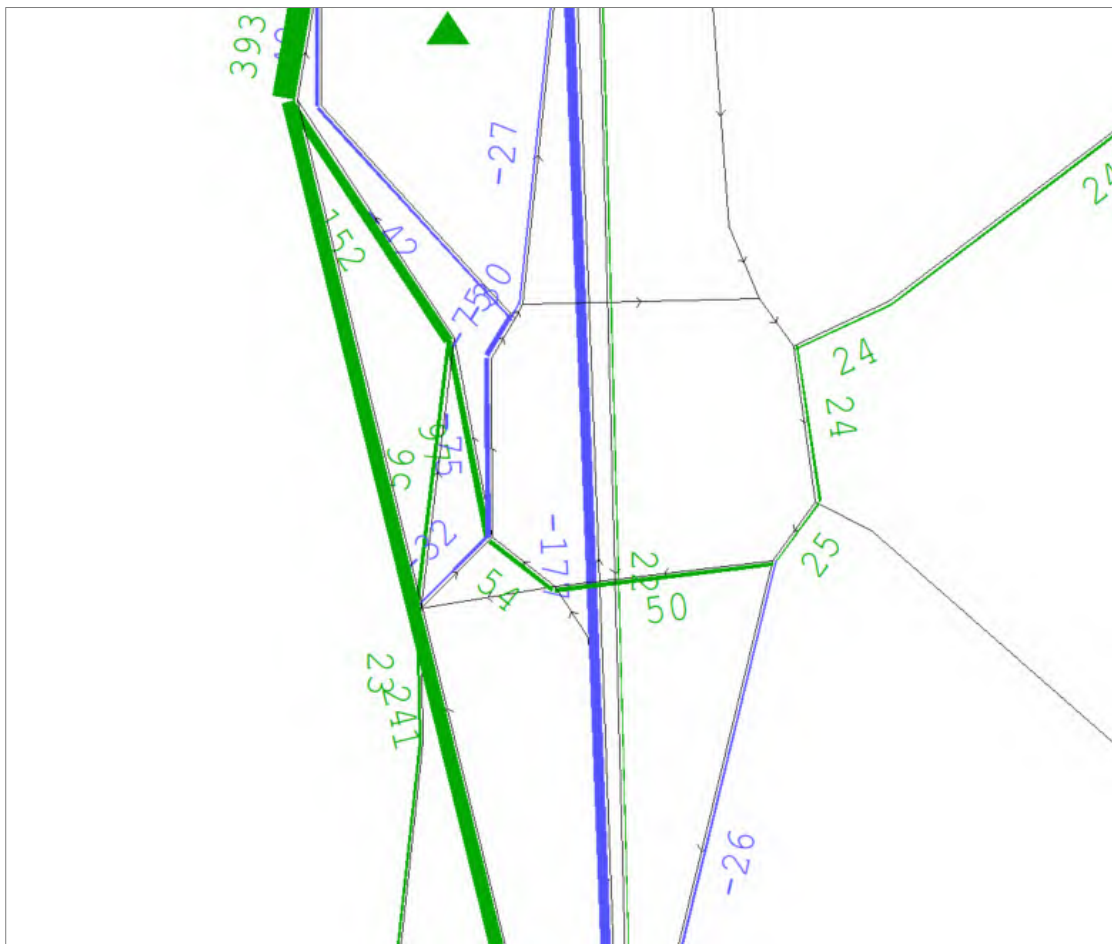
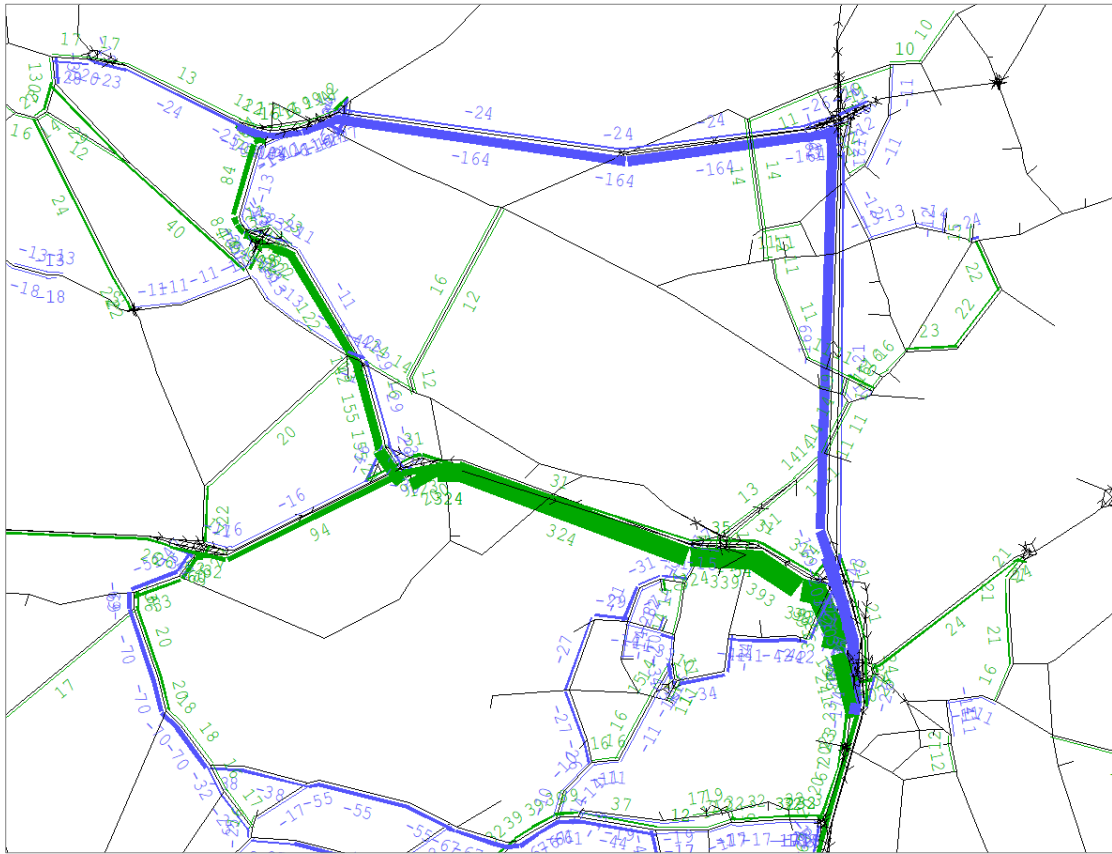
JSJV considered these to be overstated and requested the Applicant to explore a more balanced representation of delay at the merge, and the effect, if any, a more realistic representation of delay might have on the flow using the new link, more particularly the potential scale and nature of the re-routing associated with the modelled delays at the A50 merge. The following additional test was undertaken:-

- A run of the 2028 AM and PM with development (2a) scenarios with (i) the Turn Priority Marker 'M' removed at the A50 M1 J24A merge node and (ii) a two-lane rather than one-lane new link.

The figures below show the impact of the revised coding in the AM peak hour: -

Impact of Revised Coding – 2028 AM Peak Hour Stage 2a – M1 J24

[250728 EMG2 - PRTM follow up information, including A50 merge test, 28 July 2025, email]



The flow changes evident in the figures above are both reassuring and concerning. They are reassuring in so far as a 393 PCU increase at the A50 M1 J24A merge itself is lower than what might have been the case given the capacity added to the network in the test.

The flow changes are a concern given the horizon – 2028 (relatively near term) – and the fact that 241 PCUs of the 393 PCUs increase is on the proposed new bridge increasing flows on it up to or over its designed capacity. The 393 PCUs increase is associated with 2,073 PCUs on the new link.

Inspection of the flow change plot in the above figures suggests the following:-

1. 42% of the increase in traffic at the A50 merge (164 PCUs of the 393 PCUs) re-routes from M1 J25.
2. 18% of the increase in traffic at the A50 merge (70 PCUs of the 393 PCUs) re-routes from A50 J3. Nearly 80% of the 18% (55 PCUs) has origins off the A453 immediately south of EMA.
3. As much as 32% of the increase in traffic at the A50 merge (126 PCUs of the 393 PCUs) represents traffic heading to the A50 via the A50 merge but held up in over-capacity queues.

Closer inspection of traffic flow changes at and near M1 J24 suggests that 80% of this traffic (i.e. 100 PCUs) is held up in queues within or on approaches or exits to the M1 J24 roundabout.

4. 8% of the increase in traffic at the A50 merge (33 PCUs of the 393 PCUs) cannot be attributed to local network queuing or the two routes addressed in 1. and 2. above.

Concerning point 1 above, traffic destined to the north/ northeast of Derby is better suited to remain on the M1 (i.e. not re-route via the A50 M1 J24 merge).

Removal of this traffic from the 241 PCUs increase on the new link reduces the increase on the proposed new bridge to 77 PCUs (241-164) resulting in a total flow of 1,909 PCUs (rather than 2,073 PCUs) on the new link.

Substantive Issue 2:- Building upon **Substantive Issue 1**, the Applicant should incorporate the results of this additional test when evaluating the adequacy of the proposed mitigation package to accommodate future traffic demand.

JSJV urges the Applicant to conduct appropriate tests and assessments of the suggested mitigation using the VISSIM model, with particular attention given to the capacity of upstream merges (on the A50) and diverges (on the M1) to safely manage anticipated demand.

Regardless of the outcomes of the additional test described above, it is crucial to note that the predicted flow on the new bridge in 2028 exceeds 1,800 PCUs, which is close to the upper limit of the theoretical maximum capacity for a single lane (as highlighted in **Substantive Issue 1**).

The Applicant's engineering team should factor this into their evaluation and design, thereby ensuring the proposed infrastructure can adequately accommodate anticipated traffic demands while maintaining safety and efficiency, and give due consideration to future proofing .

The Applicant has attributed the drop in flow on the new link in the AM peak hour between 2028 and 2038 to capacity issues at the downstream A50 M1 J24A merge. Modelled delays at the merge are also likely overstated. Where modelled delays and capacities at the A50

M1 J24A merge do not reflect actual delays and capacities, flows on the new link in 2028 and 2038 more particularly, may be understated (as noted in **Substantive Issue 1**).

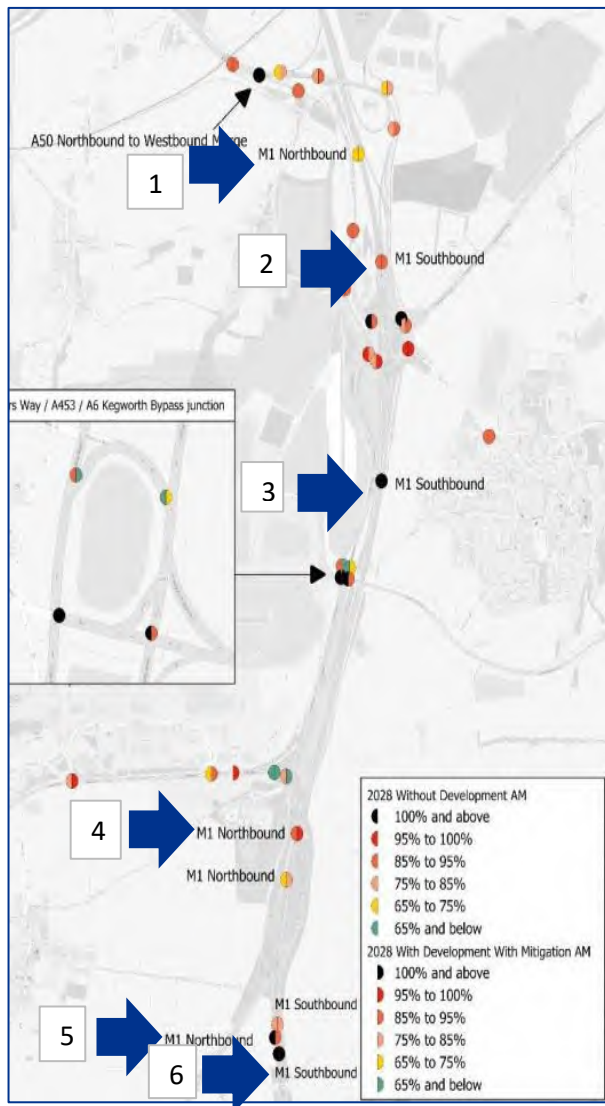
EMGP2 – Response to NH comments on 23 July 2025 v3 (Excel) shows delay decreases around M1 J24, some significant.

Observation 3:- JSJV note that signal optimisation has been conducted for the 2a modelling assessment only. It cannot be determined in all instances whether the decreases in delay are associated with the signal optimisation, the mitigation package or a combination of both.

3.6 Forecast Node Volume-Capacity Ratios

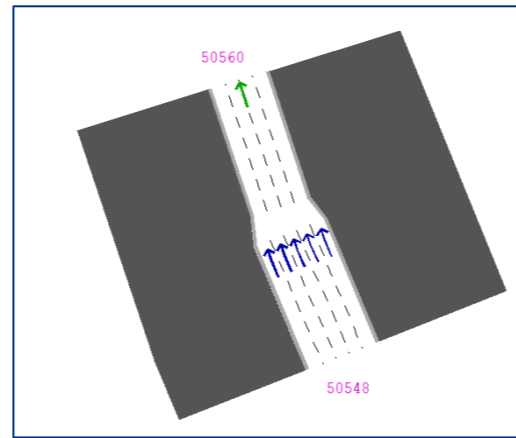
Section 3.6 presents forecast Volume / Capacity ratios at a nodal level. Figures 3.14 – 3.15 more specifically show the performance of nodes in 2028 and 2038 for the with development with mitigation and without development scenarios.

The M1 mainline is near, at or over capacity at numerous locations northbound and southbound in the vicinity of junctions 23a and 24 in Stages 1a and 2a. The figure below shows the location of these points as well as the A50 M1 J24A merge:-

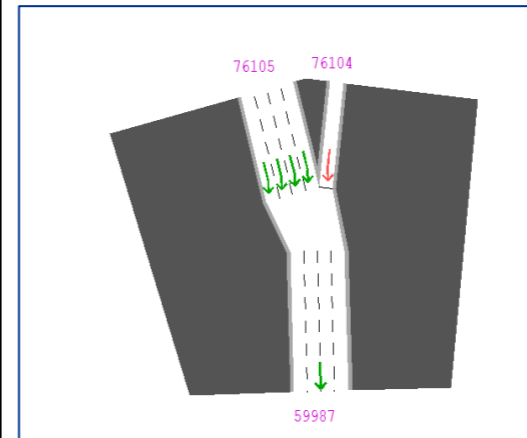


Summaries of 2028 and 2038 link flows, Volume / Capacity ratios (V/C), change in delay and V/C relative to the 'Without Development (1a)' scenario at the six locations shown in the figure above follow below: -

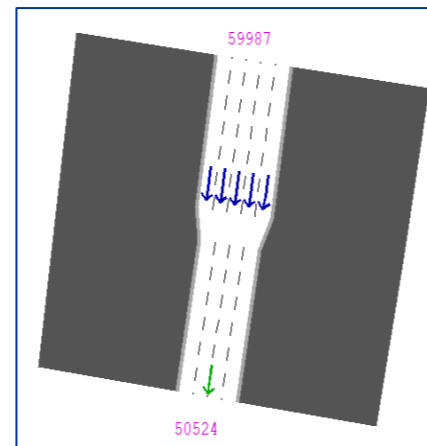
Location 1 – M1 Northbound between J24 and J24a						
Scenario	Year	Peak	Flows (PCU)	Change in Delay (sec)	Approach V/C	V/C Change Relative Stage 1a
Stage 2a	2028	AM	4,432	0	0.67	0.01
		PM	6,022	0	0.92	0.03
	2038	AM	5,129	0	0.78	0.02
		PM	6,319	0	0.96	0.02
Stage 2a_NH	2028	AM	4,229	0	0.64	-0.02
		PM	5,596	0	0.85	-0.04



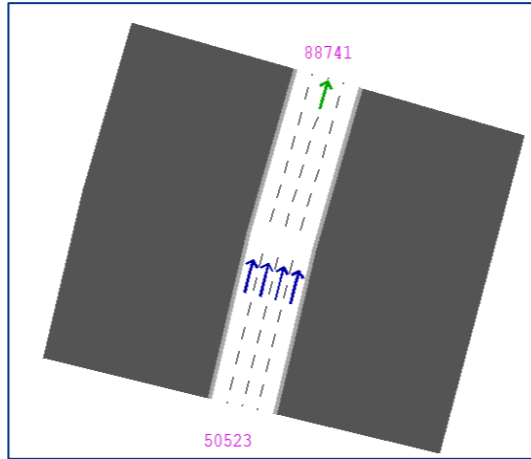
Location 2 – M1 Southbound between J24 and J24a											
Scenario	Year	Peak	Approach 1 – M1 Southbound mainline				Approach 2 – From A50 EB				
			Flows (PCU)	Change in Delay (sec)	Approach V/C	V/C Change Relative Stage 1a	Flows (PCU)	Change in Delay (sec)	Approach V/C	V/C Change Relative Stage 1a	
Stage 2a	2028	AM	4,671	0	0.69	-0.02	1,534	0	0.89	0.00	
		PM	3,840	0	0.56	-0.01	1,524	0	0.88	-0.04	
	2038	AM	4,602	0	0.70	-0.03	1,807	0	1.04	-0.01	
		PM	4,104	0	0.62	-0.01	1,730	0	1.00	-0.01	
Stage 2a_NH	2028	AM	4,693	0	0.69	-0.01	1,534	0	0.89	0.00	
		PM	3,845	0	0.56	-0.01	1,520	0	0.88	-0.04	



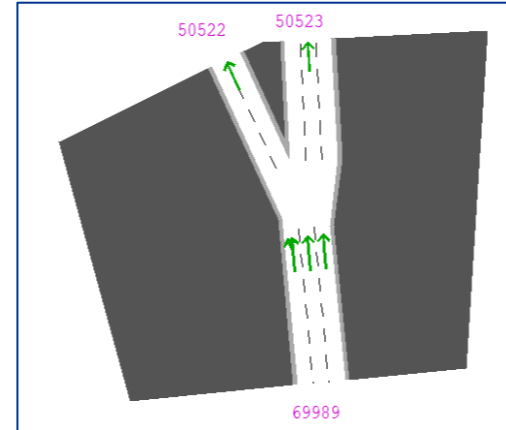
Location 3 – M1 Southbound between J23a and J24						
Scenario	Year	Peak	Flows (PCU)	Change in Delay (sec)	Approach V/C	V/C Change Relative Stage 1a
Stage 2a	2028	AM	6,847	-3	1.04	-0.02
		PM	6,765	-3	1.03	-0.02
	2038	AM	7,464	-5	1.14	-0.03
		PM	7,207	-2	1.10	-0.01
Stage 2a_NH	2028	AM	6,843	-3	1.04	-0.02
		PM	6,760	-3	1.03	-0.02



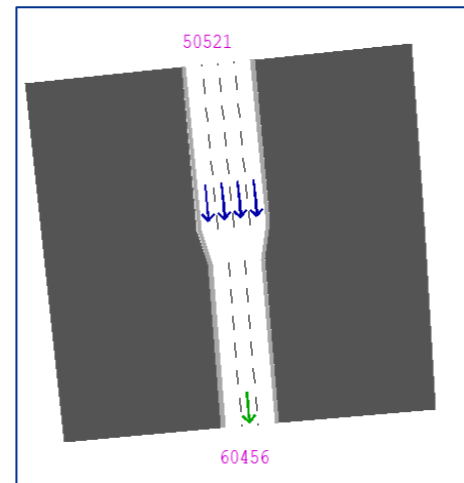
Location 4 – M1 Northbound at J23a						
Scenario	Year	Peak	Flows (PCU)	Change in Delay (sec)	Approach V/C	V/C Change Relative Stage 1a
Stage 2a	2028	AM	6,542	1	1.00	0.13
		PM	6,839	7	1.04	0.09
	2038	AM	6,761	6	1.03	0.12
		PM	7,140	12	1.09	0.07
Stage 2a_NH	2028	AM	6,609	2	1.01	0.14
		PM	6,914	9	1.05	0.10



Location 5 – M1 Northbound between J23 and J23a						
Scenario	Year	Peak	Flows (PCU)	Change in Delay (sec)	Approach V/C	V/C Change Relative Stage 1a
Stage 2a	2028	AM	5,742	0	0.87	0.03
		PM	5,600	2	0.85	0.01
	2038	AM	6,038	-3	0.92	0.02
		PM	5,944	2	0.90	0.01
Stage 2a_NH	2028	AM	5,784	1	0.88	0.03
		PM	5,630	3	0.86	0.02



Location 6 – M1 Southbound between J23 and J23a						
Scenario	Year	Peak	Flows (PCU)	Change in Delay (sec)	Approach V/C	V/C Change Relative Stage 1a
Stage 2a	2028	AM	5,153	-1	1.05	-0.01
		PM	5,560	5	1.13	0.03
	2038	AM	5,462	-2	1.11	-0.01
		PM	5,851	4	1.19	0.02
Stage 2a_NH	2028	AM	5,153	-1	1.05	-0.01
		PM	5,561	5	1.13	0.03



M1 Northbound

With the exception of the M1 northbound at J23a (Location 4), the proposed development and mitigation makes no or little difference in operating conditions at the strategic model level on the M1 mainline.

On the M1 northbound at J23a (Location 4) the proposed development and mitigation results in significant increases in V/C, transforming under capacity conditions in the 2028 and 2038 AM peak hours to near, at or over capacity conditions. In the 2028 and 2038 PM peak hours the proposed development and mitigation aggravates what are already near or at capacity conditions to overcapacity conditions.

This is likely due to the rerouting of traffic using the A453 to get to the A50 westbound to the M1 northbound and the new link but not without the new link exacerbating mainline capacity issues.

Substantive Issue 3:- There are mainline constraints on the M1 at numerous locations in the vicinity of the EMA. However, the new link attracts additional traffic to the M1 northbound between J23a and J24. Accordingly, the Applicant should undertake engineering, safety evaluation and assessment of the mainline for discussion with National Highways.

M1 J24 Roundabout and Kegworth Bypass Junction

The northern (M1 southbound off-slip), northeastern (A453 Remembrance Way) and southeastern (Derby Road) approaches of the M1 J24 roundabout are near, at or over capacity in Stages 1a and 2a. However, the proposed mitigation reduces delays on the northern (M1 southbound off-slip) approach whilst also slightly reducing V/Cs.

The proposed mitigation also reduces V/Cs at the other three approaches – i.e. the southern (M1 northbound off-slip), southwestern (A453) and northwestern (Hilton Lane) approaches. Delays slightly reduce on all but the northwestern (Hilton Lane) approach where delays reduce significantly. The magnitude of the reductions in V/C and delay on the northwestern (Hilton Lane) approach are unexpected.

Mitigation is associated with only one approach at the Kegworth Bypass Junction operating near to or just over capacity and then only in 2038 – namely, the eastern Kegworth Bypass approach.

Unfortunately, the data supplied did not allow JSJV to examine the internal and signalised circulating elements of the M1 J24 roundabouts and the Kegworth Bypass Junction. Figures 3.14 - 3.15 suggest the existence of capacity issues on circulating elements at both roundabouts.

Substantive Issue 4:- VISSIM modelling should be employed to explore capacity issues and constraints at the M1 J24 roundabout and Kegworth Bypass junction.

Modelled conditions at an improved Finger Farm Roundabout and on the A50 mainline between M1 J24 and A50 J1 and between A50 J1 and A50 J2 raise no concerns.

3. 7 Forecast Junction Turning Flows

A list of junctions and areas of the network are identified where data will be extracted from the EMFM model.

Observation 4:- JSJV agree with the area identified for further analysis. The Applicant team should remain engaged with National Highways when undertaking further localised junction modelling assessment and microsimulation modelling on the SRN and employ a critical, robust and agreed methodology for extracting and applying demand from the strategic model. As advised to the Applicant on 12th March 2025, local junction assessments are required at A42/ J14 Eastbound off slip, A453/ Kegworth Road Slip Road/ Ratcliffe on Soar and A453/ Barton Lane/ West Leake Lane Slip Road.

Link Flow Changes

The supplied data provided 2028 and 2038 link flows at the locations shown in the above tables. Comparison of the flow data at the different locations revealed a number of unexpectedly different flow changes on the M1 between 2028 and 2038: -

1. At Location 1 [M1 Northbound] there is 15.7% increase in the AM (4,432 in 2028 and 5,129 in 2038) and a 4.9% increase in the PM (6,022 in 2028 and 6,319 in 2038).
2. At Location 2 [M1 Southbound] there is a 1.5% decrease in the AM (4,671 in 2028 and 4,602 in 2038) and a 6.9% increase in the PM (3,840 in 2028 and 4,104 in 2038).
3. At Location 3 [M1 Southbound between J23a and J24] there is a 9% increase (6,847 in 2028 and 7,464 in the 2038) in the AM and a 6.5% increase (6,765 in 2028 and 7,207 in 2038) in the PM.
4. At Location 4 [M1 Northbound at J23a] there is 3.3% increase in the AM (6,542 in 2028 and 6,761 in 2038) and a 4.4% increase in the PM (6,839 in 2028 and 7,140 in 2038).
5. At Location 5 [M1 Northbound between J23 and J23a] there is a 5.2% increase in the AM (5,742 in 2028 and 6,038 in 2038) and a 6.1% increase in the PM (5,600 in 2028 and 5,944 in 2038).
6. At Location 6 [M1 Southbound between J23 and J23a] there is 6% increase in the AM (5,153 in 2028 and 5,462 in 2038) and a 5.2% increase in the PM (5,560 in 2028 and 5,851 in 2038).

Substantive Issue 5:- JSJV believes that a constrained network in the EMFA is either holding significant volumes of traffic up in queues or distorting natural traffic routing (possibly both), especially in the longer term (i.e. 2038) resulting in varying rather than comparable traffic flow changes across the network. This may have implications for future traffic flows through the EMFA if and when capacity constraints are addressed. The Applicant is requested to take this into consideration when analysing and designing proposed mitigation.

Review of V5.0 and supplied Excel

Section 4 – Overview Sensitivity Test of A50 Merge Capacity

Paragraph 4.1.1 presents the specifics of the *sensitivity test*:-

A sensitivity test, '2a NH3', was requested to assess the impact of increasing capacity at the A50 westbound merge point at M1 Junction 24a. This is a key part of the network where traffic from the M1 southbound merges with traffic from M1 Junction 24, which

includes flows originating from the gyratory as well as traffic using the proposed M1 northbound to A50 link mitigation.

4.2 Forecast Development Traffic

Figures 4.1 - 4.8 show the distribution of development traffic by different modes for the AM and PM peak hours for both the 2028 and 2038 '2a NH3' with mitigation test.

Comment 4:- The report indicates consistent traffic routing patterns across Stages 1a, 2a and '2aNH3' modelling assessment. The audit comments presented in **Comment 3** above remain relevant.

4.3 Forecast Flow Change

Figures 4.9 - 4.10 show the forecast traffic flow changes associated with the addition of development traffic and mitigation in the 2028 and 2038 '2a NH3' AM and PM peak hours.

For ease of understanding, Figures 4.9 – 4.10 are replicated below: -

Figure 4.9: Forecast Flow Change for 2028 '2a NH3' minus 'Without Development (1a)'

AM Peak hour



Contains Ordnance Survey data © Crown copyright and database right 2025

PM Peak hour



Figure 4.10: Forecast Flow Change for 2038 '2a NH3' minus 'Without Development (1a)'

AM Peak hour



Contains Ordnance Survey data © Crown copyright and database right 2025

PM Peak hour



Paragraphs 4.3.2 and 4.3.3 state:-

The forecast flow changes from the '2a NH3' scenario to the 'Without Development (1a)' scenario are very similar to that of the Stage 2a in Section 3.3, particularly in the vicinity of M1 Junction 24, the EMGP1 access roundabout, the A453 Finger Farm Roundabout and the EMGP2 access roundabout.

Due to the increased capacity at the A50 merge point, there is an increase (~300-400 PCUs) in traffic forecast on the A50 westbound in the '2a NH3' scenario, couple with an increase of up to 400 PCUs on the proposed M1 northbound to A50 link. This increase reflects traffic diverting from other routes such as via M1 J25, which in turn results in a reduction in traffic along routes such as the M1 northbound and the A52 westbound towards Derby.

As was previously identified, in light of the proposed mitigation, particularly the new single lane link road between the M1 northbound and the A50 westbound, traffic still bypasses the circulatory section of M1 J24.

It remains as per the previous modelling, that the new M1 northbound link road is projected to experience the most significant increase in traffic flow across all modelled forecast scenarios. This increase is primarily attributed to a redistribution of traffic from the A453, Finger Farm Roundabout and M1 Junction 24. There are significant increases in flow on the M1 northbound south of Junction 24.

The forecast flow on the new link road is 1,904 PCUs in the 2028 AM peak hour and is 1,792 in the PM peak. In 2038, in the AM peak the demand for the new link is 1,863 and in the PM is 1,605.

This creates a total demand on the link between M1 Junction 24 and the A50 Derby Southern Bypass of 3,886 during the AM peak in 2028; 4,024 in the PM peak. In 2038, this is 4,035 in the AM and 3,981 in the PM.

Substantive Issue 6:- As noted above in **Substantive Issue 1**, there was previously a reduction in traffic flows on the new link in 2038 compared to 2028; 2028 AM peak hour is 1,832 PCUs and in 2038 is 1,481; a difference of 351 PCUs.

The '2a NH3' scenario now shows that this reduction occurs to a lesser extent; 1,904 in the 2028 AM peak hour and 1,863 in the 2038 AM peak. This is a difference of 41 PCUs.

This indicates that the previous reduction of 351 PCUs was largely, but not fully, attributed to the constraint at the A50 M1 J24A merge.

The previous concern outlined in **Substantive Issue 1** was that where delays at the merge do not occur to the same degree as predicted, flow on the new link in 2038 may be understated.

The most recent testing ('2a NH3') indicates that the predicted flows in both 2028 and 2038 remain at the upper limit of the theoretical capacity for a single lane.

The Applicant's engineering team should continue to factor this into their evaluation and design, thereby ensuring the proposed infrastructure can adequately accommodate anticipated traffic demands while maintaining safety and efficiency, and give due consideration to future proofing .

Substantive Issue 7:- With the constraint at the A50 M1 J24A merge removed as part of this testing, a secondary constraint becomes apparent.

As noted above, the total demand on the link between M1 Junction 24 and the A50 Derby Southern Bypass is 3,886 PCUs during the AM peak in 2028; 4,024 in the PM peak. In 2038, this is 4,035 in the AM and 3,981 in the PM.

This indicates this link could become a constraint. The Applicant's engineering team should factor this into their evaluation and design, thereby ensuring the proposed infrastructure can adequately accommodate anticipated traffic demands while maintaining safety and efficiency, and give due consideration to future proofing .

4.5 Forecast Node Volume-Capacity Ratios

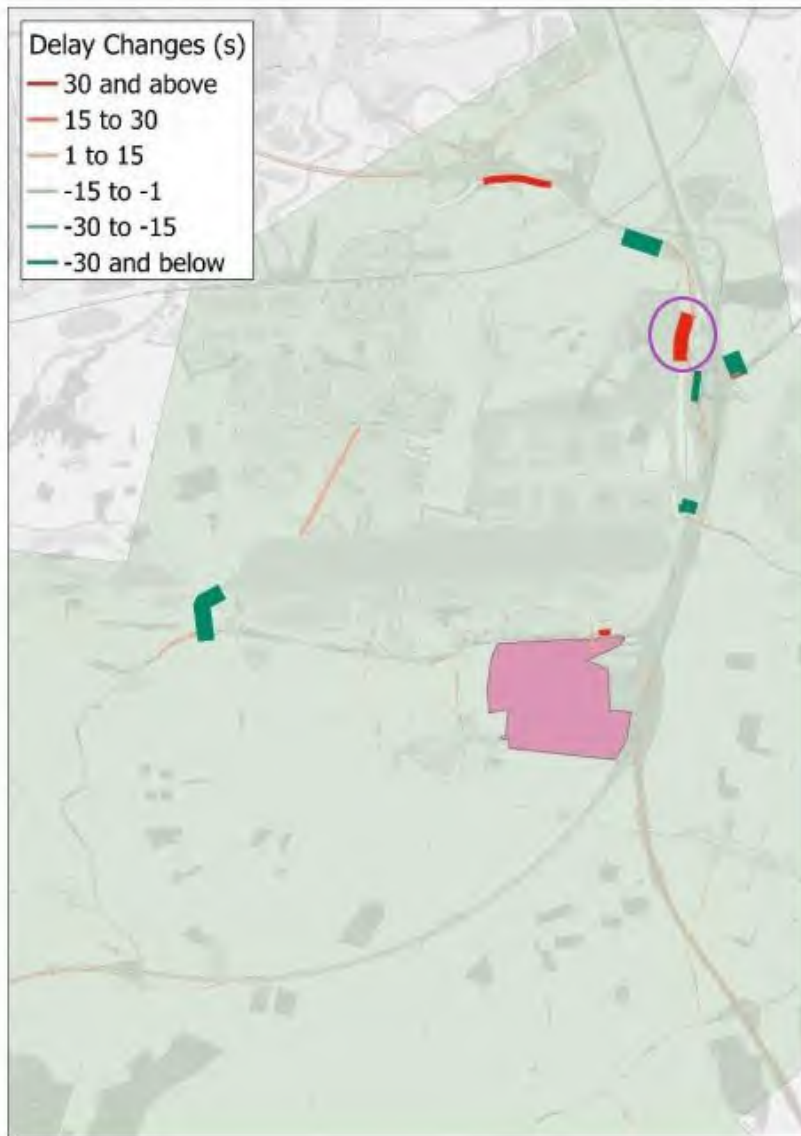
As would be expected in light of the changes made to the network as part of this testing, the previous delays at the A50 M1 24a merge have reduced significantly compared to the previous round of testing:-

- 2028 AM: 13 seconds

- 2028 PM: 28 seconds
- 2038 AM: 28 seconds
- 2038 PM: 28 seconds

However, there are now increases in the delay at the link between M1 Junction 24 and the A50 Derby Southern Bypass where the link reduces from three-lanes to two-lanes. This is noted in paragraph 4.4.3. This is highlighted below:-

PM Peak hour



The delays for the 2028 and 2038 '2a NH3' test on this link are set out below:-

- 2028 AM: 4 seconds
- 2028 PM: 1 minute 24 seconds
- 2038 AM: 20 seconds
- 2038 PM: 55 seconds

This should be taken into consideration as part of **Substantive Issue 7**.

4.6 Forecast Node Volume-Capacity Ratios

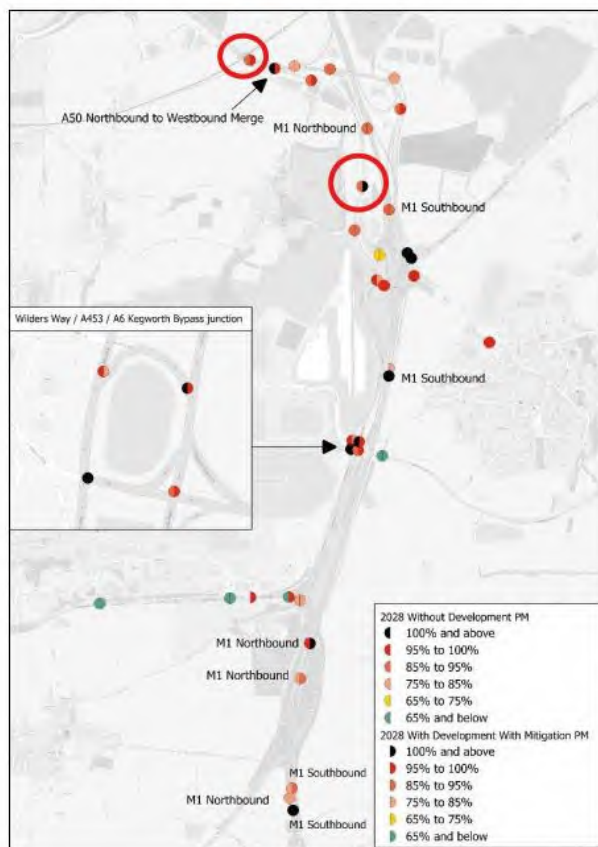
Section 4.6 presents forecast Volume / Capacity ratios at a nodal level. Figures 4.13 – 4.14 more specifically show the performance of nodes in 2028 and 2038 for the with development with mitigation (2a NH3) and without development scenarios.

The M1 mainline remains near, at or over capacity at numerous locations northbound and southbound in the vicinity of junctions 23a and 24 in Stages 1a and 2a NH3.

Substantive Issue 8:- There remain mainline constraints on the M1 at numerous locations in the vicinity of the EMA. However, the new link attracts additional traffic to the M1 northbound between J23a and J24. Accordingly, the Applicant should undertake engineering, safety evaluation and assessment of the mainline constraints for discussion with National Highways.

There is a high V/C node on the link between M1 Junction 24 and the A50 Derby Southern Bypass link as well as the A50 Derby Southern Bypass itself. These are highlighted below: -

PM Peak hour



This should be taken into consideration as part of **Substantive Issue 7**.

In addition to the above, there is a high V/C node on the A453 west of Fingerfarm Roundabout (Local Road Network) during the 2038 PM peak. It is understood that this is the proposed signalised crossing. There is a concern that traffic may be artificially constrained at this location and therefore understating impacts on the SRN.

Substantive Issue 9:- The Applicant should investigate and confirm this is not resulting in a significant understatement of traffic on the SRN particularly Finger Farm Roundabout.

Section 5 – Summary of the Mitigation Assessment

Paragraphs 5.1.4 and 5.1.5 state:-

The forecasts undertaken reflect the forecast impact of the proposed development at East Midlands Gateway Phase 2. It should be noted that the results provided in this report are at a high level. Due to the strategic nature of the EMFM, not all roads are modelled, and the results should be interpreted with that in mind.

Although the EMFM modelling provides the strategic impact and forms part of the proposed East Midlands Gateway Phase 2 assessment evidence packs, the overall assessment should be complemented by local operational assessment and analysis.

Observation 5:- JSJV agrees that the outputs from the strategic modelling should be applied critically by the Applicant during the next stage of assessment. Both local junction modelling and microsimulation modelling are required. The inputs and assumptions of that assessment should be agreed with National Highways prior to assessment being undertaken on the SRN.

Summary and Next Steps

JSJV has been commissioned by National Highways to review the supporting traffic modelling documents prepared for the proposed East Midlands Gateway 2 development and appraise the impact of the development on the SRN.

It is requested that the Applicant considers the findings identified in this Technical Note and undertakes appropriate actions in consultation with National Highways, the Local Highway Authorities and JSJV during the next stage of assessment.

Further assessment is required using local and microsimulation modelling packages to further explore the more focused implications of development on the SRN and develop a suitable package of interventions to mitigate the residual cumulative impacts of development and any unacceptable impacts on highway safety. Critical to this is ongoing engineering and safety evaluation.

APPENDIX 3: NH BWB email correspondence in relation to the sensitivity testing

RE: 250901 EMG2 - query re. next steps in response to NH Tech Note

From Nock, George <George.Nock@jacobs.com>

Date Mon 2025-09-08 1:29 PM

To Paul Wilson <Paul.Wilson@bwbconsulting.com>; Chandler-Hurst, Alain <Alain.ChandlerHurst@jacobs.com>

Cc Doyle, Simon <Simon.Doyle@jacobs.com>; Jeremy Bloom <consulting@jeremybloom.co.uk>; Ahmed, Fiona <Fiona.Ahmed@jacobs.com>; Matt Corner <Matt.Corner@bwbconsulting.com>; Charlie Cresswell <Charlie.Cresswell@bwbconsulting.com>; Vibeeshan Devaharan <Vibeeshan.Devaharan@bwbconsulting.com>; Simon Hilditch <Simon.Hilditch@bwbconsulting.com>; Harry Horsley <Harry.Horsley@leics.gov.uk>; Adrian Whiteman <Adrian.Whiteman@leics.gov.uk>; Davies, Aled <aled.davies@aecom.com>; Laura Good <laura.good@leics.gov.uk>; Wong, Billy (Billy) <billy.wong1@aecom.com>; Dazeley, Mark <mark.dazeley@aecom.com>

This email originated from outside of our organisation. Please exercise caution with content, links and attachments.

Hi Paul

Thanks for your email. Please see [below](#).

Best
George

George Nock, MSc (Eng) | [REDACTED]

| 07875 634322

Multistory (Colmore Square), 7th Floor, 38 Colmore Circus, Birmingham, B4 6BN | UK

Jacobs Challenging today.
Reinventing tomorrow.

Please note I am on annual leave on:-
29th September – 3rd October (Inclusive)

From: Paul Wilson <Paul.Wilson@bwbconsulting.com>

Sent: 08 September 2025 11:17

To: Nock, George <George.Nock@jacobs.com>; Chandler-Hurst, Alain <Alain.ChandlerHurst@jacobs.com>

Cc: Doyle, Simon <Simon.Doyle@jacobs.com>; Jeremy Bloom <consulting@jeremybloom.co.uk>; Ahmed, Fiona <Fiona.Ahmed@jacobs.com>; Matt Corner <Matt.Corner@bwbconsulting.com>; Charlie Cresswell <Charlie.Cresswell@bwbconsulting.com>; Vibeeshan Devaharan <Vibeeshan.Devaharan@bwbconsulting.com>; Simon Hilditch <Simon.Hilditch@bwbconsulting.com>; Harry Horsley <harry.horsley@leics.gov.uk>; Adrian Whiteman <adrian.whiteman@leics.gov.uk>; Davies, Aled <aled.davies@aecom.com>; Laura Good <laura.good@leics.gov.uk>; Wong, Billy (Billy) <billy.wong1@aecom.com>; Dazeley, Mark <mark.dazeley@aecom.com>

Subject: [EXTERNAL] RE: 250901 EMG2 - query re. next steps in response to NH Tech Note

Importance: High

Thanks George

In discussing matters further with AECOM, to help inform decision making, could you please provide further clarity on:

- i) which figures are considered critical?
 - Distribution – Figures 3.1 through to 3.8
 - Forecast Flow Change – Figures 3.9 – 3.10
 - Forecast Delay Change – Figures 3.12 – 3.13
 - V/C – Figures 3.14 – 3.15
 - Appendix A
- ii) whether an updated version of this note (which is already an addendum) which includes an extra chapter on the new test would be acceptable?
 - Makes sense to add a chapter to the existing reporting thereby creating a v5.
- iii) for the avoidance of doubt, I assume you would you be comfortable the said suggested approach, i.e. no capacity constraints on the A50, to inform this final test, were we to proceed?
 - Yes, makes sense for this test.

Critically for NH, it will be updating the supplied spreadsheets as noted below too please.

We look forward to hearing back from you at our earliest convenience. Thanks in advance

Kind regards

Paul Wilson BA(Hons) MCIHT MSoRSA CMILT MInstLM
Director | Head of Transport & Accessibility Planning | BWB Consulting Limited

5th Floor, Waterfront House, Station Street, Nottingham, NG2 3DQ
M: 07889995471 | W: bwbconsulting.com

Thanks for this. That's really helpful.

I have looped in LCC colleagues following our discussion at the TWG yesterday.

We can understand the rationale for this potential testing.

Where you are undertaking this exercise, NH would require:-

- A concise Addendum to the Forecasting Note [v4.], updating critical figures etc.
- Revised spreadsheets quantifying volume, delays, VCs, and comparisons.
- An updated 2028 / 2038 AM/ PM 2a Difference Plot.BMP

This would be for:-

- 2028 AM & PM
- 2038 AM & PM

We believe the PM runs are necessary as part of this assessment due to the higher levels of modelled delays at the A50.

Can you also let us know what your intention is for the VISSIM workstream. Presumably, this would be included in the VISSIM assessment and essentially supersede the 2a flows submitted yesterday. If you could confirm.

I appreciate you will also be taking into consideration the EMFM 2 point following Harry's helpful email yesterday and the discussion at the TWG, so if you could keep us in the loop regarding your intentions, I'd be most grateful.

Best

Multistory (Colmore Square), 7th Floor, 38 Colmore Circus, Birmingham, B4 6BN | UK

Jacobs Challenging today.
Reinventing tomorrow.

**Please note I am on annual leave on:-
29th September – 3rd October (Inclusive)**

Thanks for taking my call earlier.

As discussed, whilst we appreciate you have confirmed that no further PRTM modelling work is required from your perspective in terms of considering the attached Technical Note, we are of the opinion that it may well be worthwhile still getting AECOM to undertake one final test, whereby we stick with the one lane on the new link between the M1 and A50 as proposed, but remove capacity constraints at the A50 merge (with M1 southbound).

The reason for considering this is because the formal DCO submission includes for the PRTM outputs based on one lane and the capacity constraints at the A50 merge, which you queried (and resulted in your question as to why the 2028 flows are higher than the 2038 flows on said link), whereas the sensitivity test modelling undertaken informally, which fed into your attached response, included for two lanes on the link road and no capacity constraints at the A50 merge.

If we are to align the modelling work with the engineering work as far as practically possible to assist Simon H with his more detailed review of the latter in particular, then such a further, and final test, may assist, albeit will require some further work on the part of AECOM and us.

We would be grateful for your thoughts to help inform next steps. Thanks in advance

Kind regards

Paul Wilson BA(Hons) MCIHT MSoRSA CMILT MinstILM
Director | Head of Transport & Accessibility Planning | BWB Consulting Limited

5th Floor, Waterfront House, Station Street, Nottingham, NG2 3DQ
M: [REDACTED] | W: bwbconsulting.com



Please see JSIV's review of the 2a Strategic Modelling Assessment on behalf of National Highways.

We would be pleased to discuss.

With thanks

[REDACTED], MSc (Eng) | Jacobs | Associate Director, Cities & Places

George.Nock@jacobs.com | [REDACTED]

Multistorey (Colmore Square), 7th Floor, 38 Colmore Circus, Birmingham, B4 6BN | UK

Jacobs Challenging today.
Reinventing tomorrow.

Please note I am on annual leave on:-
22nd August [Friday]
29th August [Friday]
29th September – 3rd October (Inclusive)

Further to Paul's email below, please find attached a response from AECOM to your questions 2 to 5.

Hopefully the response is self explanatory but happy to discuss further on Thursday under item 4a of the agenda I circulated earlier.

Kind regards

[REDACTED]
Associate – Transport & Accessibility Planning
5th Floor, Waterfront House, Station Street, Nottingham, NG2 3DQ
T: 0115 924 1100 | M: [REDACTED] | W: bwbconsulting.com



Hi [REDACTED]

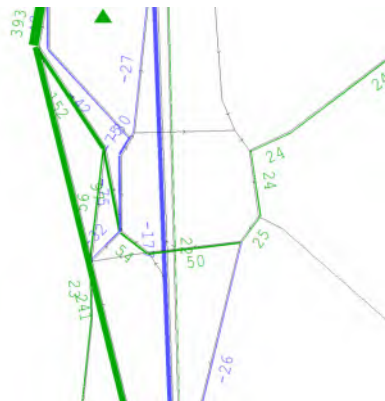
I refer to your email on 16/7/25, which was updated on 21/7/25 (below), and asked for further information from AECOM, with a focus on the A50 WB/M1 J24A merge.

Please find attached the results of the NH Test with higher capacities from the A50 north to A50 Derby Southern Bypass (westbound). This is included in the: "1.0 Summary New M1 NB 2a NHtest" tab.

Also attached is the response to question 1: "Can the original v2 spreadsheet be updated to include the Stage 1a with and without development flows like has been done in tab 1.0 Summary New M1 NB 2a 2b for the A50 WB/M1 J24A merge". This is included in the: "1.1 Summary New M1 NB 1a".

Responses to questions 2 to 5 will follow later in the week.

With regards to your A50 WB/M1 J24A merge query, I attach a screenshot of the change in traffic flows with the test requested. This is also elaborated upon below.



With regards to the screenshots, for the avoidance of doubt, the green bandwidth is an increase in the NH test scenario and blue a decrease in traffic. With the additional capacity available in the NH test, traffic is diverting off the M1 J25 and to a lesser extent the A453 / Swarkestone Road (which joins the A50 J3). Perhaps not unsurprisingly on a congested network, the additional capacity provided in the NH test is being utilised.

Whilst such a test does not provide 'unlimited capacity', it is getting close. This would result in an additional 393 PCU's heading west on the A50 from M1 J24, 241 of which would travel from the link road (with the rest coming from other arms of M1 J24).

The NH test in the AM Peak forecasts 2073 PCUs on the proposed link road if 2 lanes were provided, together with generous saturation flows on the A50/A50 merge and M1 diverge. This link is coded with a saturation flow of 4000 in the NH test (as its 2 lanes) and 2000 in the standard 2a test (as it's only assumed to be 1 lane). So, it's slightly over (73 PCUs) the coded single lane saturation flow of 2000, but only just. One would of course expect additional flow in the test given there is more capacity, so it appears to be a sensible/logical increase, but not one which lends itself to providing a second lane on the M1 S to A50 W link, in our opinion at least!

We trust the above/attached is of use. however, should you, or other members of the TWG to whom I have looped back in, for transparency, have any queries, please do not hesitate to contact us. I am on A/L from close tomorrow for 2 weeks hence please copy in colleagues to any responses etc. Thanks

Kind regards

Paul Wilson BA(Hons) MCIHT MSoRSA CMILT MInstLM
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ADVANCE NOTICE OF A/L; WEDNESDAY 30 JULY TO TUESDAY 12 AUGUST 2025 INCLUSIVE



Hi [REDACTED]

Thanks for responding.

Yes, just to confirm that there is a saturation flow of at least 4,000 (PCUs an hour) from the start of the proposed link road (PRTM node 88741) to where the A50 northbound joins the westbound A50 Derby Southern Bypass (PRTM node 50558).

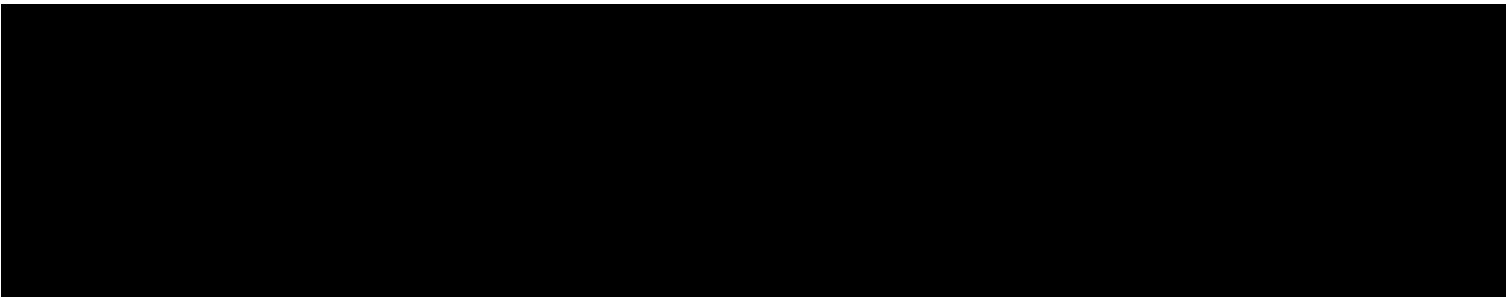
Kind regards,
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Please note I start shared parental week commencing 5th August for 3 months returning in November.



Thanks for the coding, these look good.

As an extra check could you confirm that all links between 7253 and 50550 have at least 4000 capacity in line with the changes made.

Many Thanks and Kind Regards,
Alain Chandler-Hurst

[REDACTED] | Jacobs | Principal Transport Modeller | [REDACTED]
Multistory (Colmore Square), 7th Floor, 38 Colmore Circus, Birmingham, B4 6BN | UK

Jacobs Challenging today.
Reinventing tomorrow.



Regarding the model runs, please find attached the existing and proposed network coding (as set out below and on our call earlier in the week).

This is our understanding of what you'd like to be tested, could you confirm? Also see our note on the first page regarding the saturation flow increase (red circle).

We plan to extract to the two items listed below tomorrow morning, but please let us know if you have any comments.

- 1.0 Summary New M1 NB 2a
- 2.1 Summary M1 Mainline 2a

Kind regards,
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]

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 Hertfordshire
 AL1 3JX

Please note I start shared parental week commencing 5th August for 3 months returning in November.

[Redacted]

Hi Paul,

Thank you for your time earlier.

As discussed, I have corrected a typo in the additional **questions** posed in my email of 16th July 2025.

For completeness, I have replicated but updated the ask below copying in NDI and AECOM colleagues:-

Model Runs

Having reviewed the information supplied in response to Item 1 of our email of 26th June 2025 and using it to undertake our own SATURN-based analyses of potential delays with alternative coding options, we believe that EMFM is likely to be over-stating delay at the A50 WB/M1 J24A merge:-

- 2028 AM 2minutes and 9 seconds
- 2028 PM 3 minutes and 24 seconds
- 2038 AM 2 minutes and 59 seconds
- 2038 PM 3 minutes and 44 seconds

We would therefore like to explore the prospect of a more balanced representation of delay at the merge, and what, if any, effect that has on the demand on the new link.

Given (a) projected flows on the new link (towards 1,800pcus/hr) and (b) the likely over-stating of delay at the A50 WB/M1 J24A merge, we need to rule out a risk that the proposed highway link may be inadequately sized to accommodate projected traffic demands and similarly that the A50 WB/M1 J24A merge is adequate.

On this basis, National Highways request the following:-

- A run of the 2028 AM and PM with development (2a) models with (i) the Turn Priority Marker 'M' removed at the merge node, (ii) a two-lane rather than one-lane new link and (iii) an increase to the saturation flows on mainline A50 (from node 7420)

This will reveal whether modelled delays at the merge and on the link are encouraging traffic to re-route elsewhere and as a result estimating lower flows on the new link than might actually be realised.

In terms of the outputs, we need to understand the total volumes, flow differences and delay as a result of the suggested changes noted above (rather than full reporting). We would request that the following tabs of the supplied *excel* are updated:-

- 1.0 Summary New M1 NB 2a
- 2.1 Summary M1 Mainline 2a

Questions

In addition, please can we also ask you to consider the following for us:-

1. Can the original v2 spreadsheet be updated to include the Stage 1a with and without development flows like has been done in tab 1.0 Summary New M1 NB 2a 2b for the A50 WB/M1 J24A merge.
2. Please can you provide insight as to why the new link flow drops from 1,800 to 1,400 PCUs between the 2028 and 2038 in the AM peak.
3. Can you provide insight into why there is a reduction in flow on the A50 WB (see extract).

A50 WB merge from 3 lanes to 2 lanes

Scenario	Year	Peak	Flows (PCU)		Change	Change %	Delay(sec)	
			M1 NB	A50 WB			M1 NB	A50 WB
Stage 2a	2028	AM	3,503	1,800			2	
		PM	3,405	1,800			2	
	2038	AM	3,420	1,400	-400	-22.2%	2	-53
		PM	3,375	1,400	-400	-11.9%	2	-30
Stage 2b	2028	AM	3,530	1,800			2	
		PM	3,458	1,800			2	
	2038	AM	3,418	1,400	-400	-11.1%	2	-112
		PM	3,432	1,400	-400	-11.7%	2	-26

4. Can you provide insight into why there is a marked increase in flow in the AM peak between 2028 and 2038 at Location 1 M1 NB but much lower increases upstream on the M1 at Location 4 (see extracts).

Location 1 - M1 Northbound between J24 and J24a

Summary of traffic flow (PCU), VC and delay change			Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change compared to the Without Dev	
Scenario	Year	Peak					
Stage 2a	2028	AM	4,432		0	67%	1.3%
		PM	6,022		0	82%	2.7%
2038		AM	5,120	15.7%	0	78%	1.6%
		PM	6,319	4.9%	0	90%	2.4%
Stage 2b	2028	AM	4,325		0	66%	0.4%
		PM	5,783		0	88%	2.3%
2038		AM	5,357	23.8%	0	82%	1.5%
		PM	6,196	7.2%	0	94%	1.9%

Location 4 - M1 Northbound at J23a

Summary of traffic flow (PCU), VC and delay change			Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change compared to the Without Dev	
Scenario	Year	Peak					
Stage 2a	2028	AM	6,542		1	100%	13.0%
		PM	6,839		7	104%	8.5%
2038		AM	6,761	3.3%	6	103%	11.8%
		PM	7,140	4.4%	12	109%	6.9%
Stage 2b	2028	AM	6,220		1	95%	13.9%
		PM	6,856		8	104%	7.7%
2038		AM	6,768	8.8%	6	103%	12.7%
		PM	7,167	4.5%	12	109%	6.9%

5. Can you provide insight into why there is a significant difference in flow changes between 2028 and 2038 at Locations 2 and 3 (M1 SB) (see extracts).

Location 2 - M1 Southbound between J24 and J24a

Summary of traffic flow (PCU), VC and delay change			Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change compared to the Without Dev	
Scenario	Year	Peak					
Stage 1a	2028	AM	4,810		0	71%	0.9%
		PM	3,878		0	58%	0.2%
2038		AM	4,753	-1.2%	0	72%	-0.8%
		PM	4,169	7.5%	0	63%	-0.3%
Stage 1b	2028	AM	4,540		0	66%	0.2%
		PM	3,820		0	56%	0.2%
2038		AM	4,701	3.5%	0	71%	0.7%
		PM	4,249	11.0%	0	64%	0.7%

Location 3 - M1 Southbound between J23a and J24

Summary of traffic flow (PCU), VC and delay change			Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change compared to the Without Dev	
Scenario	Year	Peak					
Stage 2a	2028	AM	6,847		-3	104%	-1.6%
		PM	6,765		-3	103%	-1.6%
2038		AM	7,464	9.0%	-5	114%	-2.7%
		PM	7,207	6.5%	-2	110%	-0.9%
Stage 2b	2028	AM	6,948		-4	106%	-2.4%
		PM	6,621		-2	101%	-1.4%
2038		AM	7,320	5.4%	-5	111%	-3.0%
		PM	7,247	9.5%	-1	110%	-0.5%

With thanks
George

Multistory (Colmore Square), 7th Floor, 38 Colmore Circus, Birmingham, B4 6BN | UK



Please note I am on annual leave on:-

- 1st August [Friday]
- 8th August [Friday]
- 15th August [Friday]
- 22nd August [Friday]
- 29th August [Friday]

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APPENDIX 4: AECOM forecasting report and associated information

EMFM 2019

East Midlands Gateway Phase 2:
Forecasting Report Addendum
Stage 2a

Quality Information

Prepared by

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████████████████████
██████████

Principal Consultant

Checked by

██████████████████
██████████████████
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Associate Director

Approved by

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Revision History

Revision	Revision date	Details	Authorised	Name	Position
v1.0	2025-06-16	For Issue	Yes	Mark Dazeley	Regional Director
v2.0	2025-06-18	Updated following comments from BWB on 2025-06-18	Yes	Mark Dazeley	Regional Director
v3.0	2025-06-24	Updated following comments from National Highways on 2025-06-20. Updates made to Figures 3.14, 3.15, A.1, A.2, A.5 and A.6	Yes	Mark Dazeley	Regional Director
v4.0	2025-07-02	Updates made to Figures 3.9, 3.10, A.1 and A.2. Update to Appendix B	Yes	Mark Dazeley	Regional Director
v4.1	2025-07-04	Definition of 'demand flow' included in Appendix B	Yes	Mark Dazeley	Regional Director
v5.0	2025-10-07	Updated with results from A50 merge sensitivity test.	Yes	Mark Dazeley	Regional Director

Prepared by:

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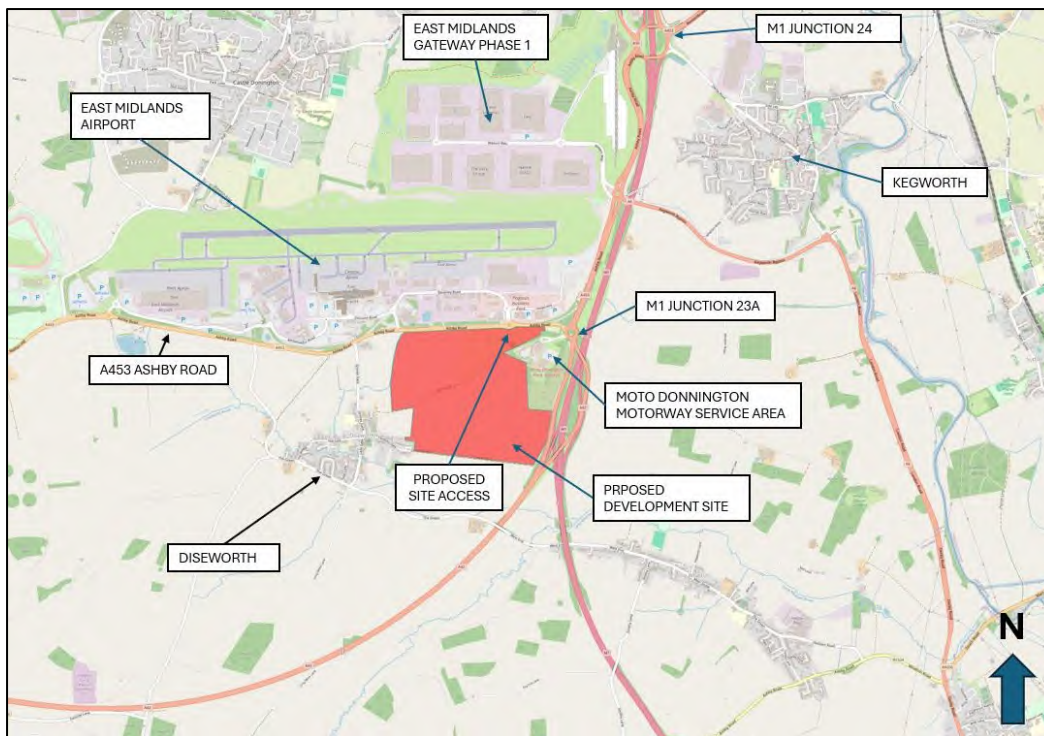
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Section 1 – Overview

1.1 Introduction

- 1.1.1 The East Midlands Gateway Phase 2 (EMGP2) development is a proposed employment development of mixed B2 (general industrial) and B8 (storage or distribution) use, with capacity for 400,000sqm floorspace (300,000sqm ground floorspace and 100,000sqm of B8 mezzanine floorspace) of industrial use, comprising 340,000sqm B8 and 60,000sqm B2. In addition to this, 30,000sqm of B8 floorspace is proposed on EMG Phase 1 (EMGP1) (Plot 16).
- 1.1.2 The development site is located to the south of East Midlands Airport and west of the A42 and is expected to build out by 2031.
- 1.1.3 Figure 1.1 shows an indication of the location of the proposed EMGP2 development, denoted by the area shaded in red. The proposed development has a total area of circa 250 acres located to the south of the A453 and East Midlands Airport itself, to the east of Diseworth village. M1 Junction 23a lies to the east of the site with the Moto Donnington Motorway Service Area (MSA) directly abutting to the north-east.

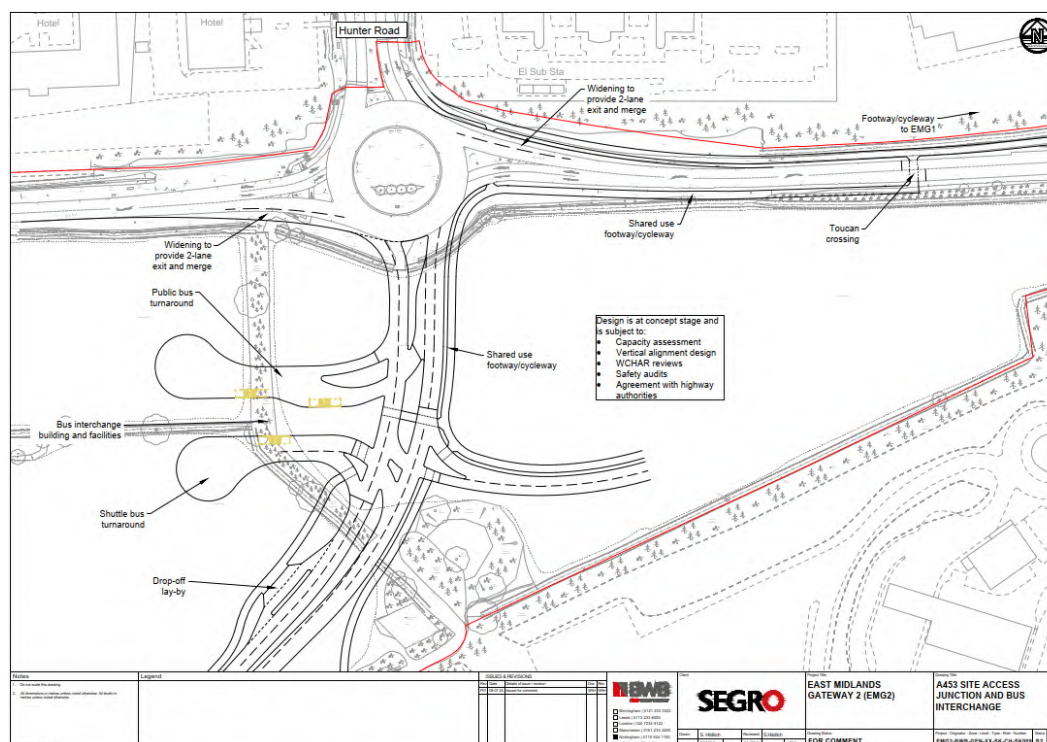
Figure 1.1: Location of Proposed Development¹



© OpenStreetMap Contributors

- 1.1.4 The proposed EMGP2 development will access the highway network via a single point of access:
- a fourth arm off the existing A453 / Hunter Road roundabout, as indicatively shown in Figure 1.2.
- 1.1.5 The proposed EMGP1 (Plot 16) development will access the highway network via:
- the existing access via Wilder's Way.

¹ Location of Proposed Development adapted from Technical Note 1 – Transport Scoping Note, East Midlands Gateway Phase 2 (EMG-BWB-GEN-XX-RP-TR-0001_TN1 Transport Scoping Note-S1-P3.pdf). Provided as part of the information pack with the PRTM Development Form for East Midlands Gateway Phase 2.

Figure 1.2: Site Access Junction²

Shown Indicatively for the purposes of the figure – further changes made are set out in Figure 2.6 later on in this report.

- 1.1.6 AECOM has been commissioned to undertake strategic modelling to assess the potential traffic impacts of the proposed development using the East Midlands Freepoint Model (EMFM) for the AM Peak (08:00 to 09:00) and PM Peak (17:00 to 18:00) hours.
- 1.1.7 The strategic modelling assessment for the proposed EMGP2 development has been undertaken in four stages, as follows:

Stage 1a modelling (Proforma 14)

2022/2023/2024 'Without Development'.

2028/2038 'Without Development (1a)'. Without EMGP2 development (with all Freepoint and Local Plan sites).

2028/2038 'With Development (1a)'. With EMGP2 development (with all Freepoint and Local Plan sites).

Stage 1b modelling (Proforma 14a)

2028/2038 'Without Development (1b)'. Without EMGP2 development (without Local Plan sites).

2028/2038 'With Development (1b)'. With EMGP2 development (without Local Plan sites).

Stage 2a modelling with mitigation (Proforma 14)

2028/2038 'With Development (2a)'. With EMGP2 and with mitigation measures (with all Freepoint and Local Plan sites).

Stage 2b modelling with mitigation (Proforma 14a)

2028/2038 'With Development (2b)'. With EMGP2 and with mitigation measures (without Local Plan sites).

- 1.1.8 This report follows the East Midlands Gateway Phase 2 Base Year Model Review Addendum report³, which details the calibrated 2019 base year model review and performance in the vicinity of the

² EMG2-BWB-GEN-XX-SK-CH-SK009 S2 P01

³ EMFM 2019 – East Midlands Gateway Phase 2: Base Year Model Review Addendum v1.0 (2024-08-19)

proposed development site. It forms an addendum to the Stage 1a forecast results documented in the Forecasting Report⁴. This addendum documents the forecast model results for Stage 2a of the EMFM strategic modelling assessment of the proposed development.

1.1.9 Stage 1b⁵ and Stage 2b forecasts are reported as separate addendums to the Forecasting Report⁴.

1.2 Report Structure

1.2.1 Following the introduction, this report contains the following sections:

- Section 2 – Forecast Approach and Assumptions: this section details the forecast assumptions applied alongside the mitigation measure assumptions.
- Section 3 – Forecast Model Results: this section details the forecast results with the proposed development and mitigation measures included and assigned using EMFM.
- Section 4 – Sensitivity Test of A50 Merge Capacity: this section details the results from the sensitivity test on the A50 merge capacity.
- Section 5 – Summary of the Mitigation Assessment: this section provides a summary of the assessment with the proposed development and mitigation measures included.
- Appendix A: Compares the forecast model results for Stage 2a (with mitigation included) with Stage 1a (no mitigation).
- Appendix B: Compares the forecast model results for sensitivity test '2a NH3' (A50 merge sensitivity) with Stage 1a (no mitigation).
- Appendix C: Presents indicative network statistics within the Aol by motorway and non-motorway links.

⁴ EMFM 2019 – East Midlands Gateway Phase 2: Forecasting Report v1.0 (2025-02-04)

⁵ EMFM 2019 – East Midlands Gateway Phase 2: Forecasting Report Addendum (Stage 1b) v1.0 (2025-03-13)

Section 2 – Forecast Approach and Assumptions

2.1 Introduction

2.1.1 This section sets out the forecast assumptions applied for this application of the EMFM, and the methodology adopted to create the required model forecasts.

2.1.2 The following forecast model scenarios have been produced for this version of the addendum:

Stage 2a modelling with mitigation included (Proforma 14)

2028/2038 'With Development (2a)'. With EMGP2 and with mitigation measures included (with all Freeport and Local Plan sites). Signal timings at junctions adjacent to mitigation measures have been optimised.

2.1.3 To produce the Stage 2a forecasts, the highway mitigation measures for the proposed development have been added to the 'With Development (1a)' scenario and assigned in the EMFM to create the required model forecasts for Stage 2a.

2.1.4 Section 2.2 provides the mitigation measures assumptions applied to the Stage 2a modelling in EMFM. Section 2.3 lists the signal timings at junctions adjacent to the mitigation measures have been optimised in the EMFM assessment and Section 2.4 outlines the methodology applied to optimise signal timings.

2.2 Mitigation Measures

2.2.1 The following list of mitigation measures were provided by the client and included in the Stage 2a EMFM assessment:

1. New M1 northbound to A50 westbound interchange link road and A50 westbound merge (as shown Figure 2.1 and Figure 2.2).
 - A single lane link road between the M1 northbound and the A50, bypassing M1 J24. This has been represented with a 50 mph speed limit in the EMFM.
 - One lane will diverge from the existing four-lane carriageway on the M1 northbound.
2. M1 southbound link approaching J24 (as shown Figure 2.3).
 - An additional M1 southbound lane, from one lane to two lanes, and merging with the A50 eastbound to form three lanes approaching J24.
3. EMGP1 access improvements (as shown Figure 2.4).
 - An additional circulatory lane on the eastern side of the Wilders Way / A453 / A6 Keyworth Bypass roundabout.
 - Signal timing adjustment to allow for a pedestrian phase at Wilders Way to improve access to EMGP2. No changes were applied in EMFM as the existing red phase was sufficiently long to allow for the pedestrian phase.
4. A453 Finger Farm Roundabout westbound exit widening (as shown Figure 2.5).
 - An additional 42 metres of two lanes widening on exit.
5. EMGP2 access junction and toucan crossing (as shown Figure 2.6).
 - Additional flare length has provided at the EMGP2 access roundabout on both the east and west arms.
 - A toucan crossing has been included on the A453 to the east of the proposed access roundabout.
6. M1 J24 minor works (as shown Figure 2.7).
 - The central lane reallocated for shared use for both M1 northbound traffic and traffic towards the A453. Currently this lane is for A453 traffic only.

Figure 2.1: M1 Northbound to A50 Westbound Interchange Link Road

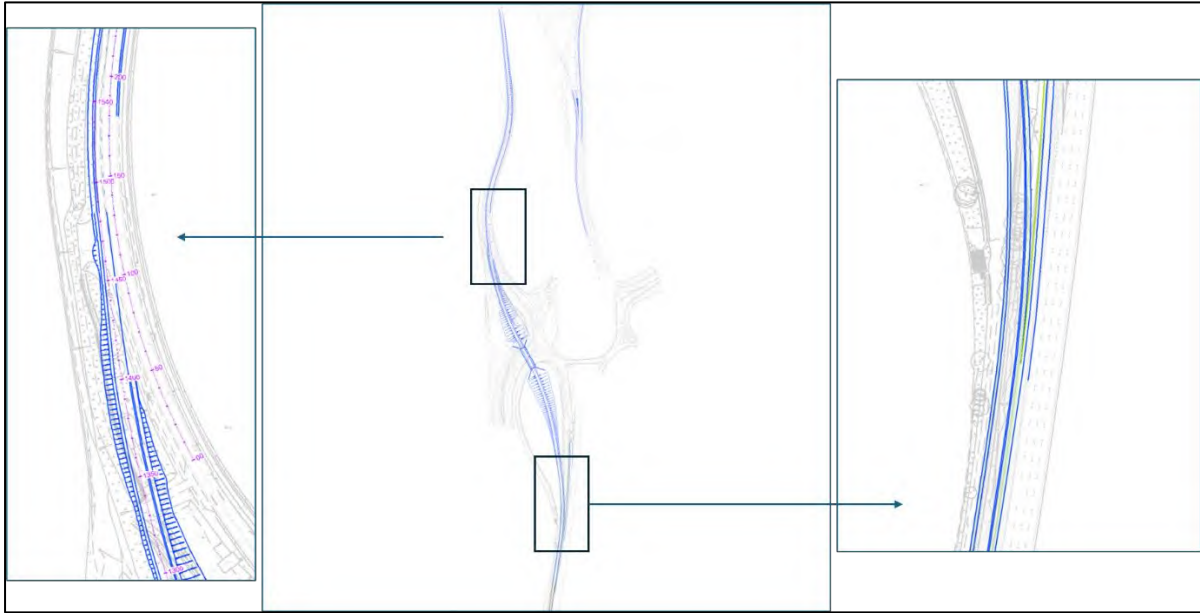


Figure 2.2: M1 Northbound to A50 Westbound Interchange Link Road Diverge Layout

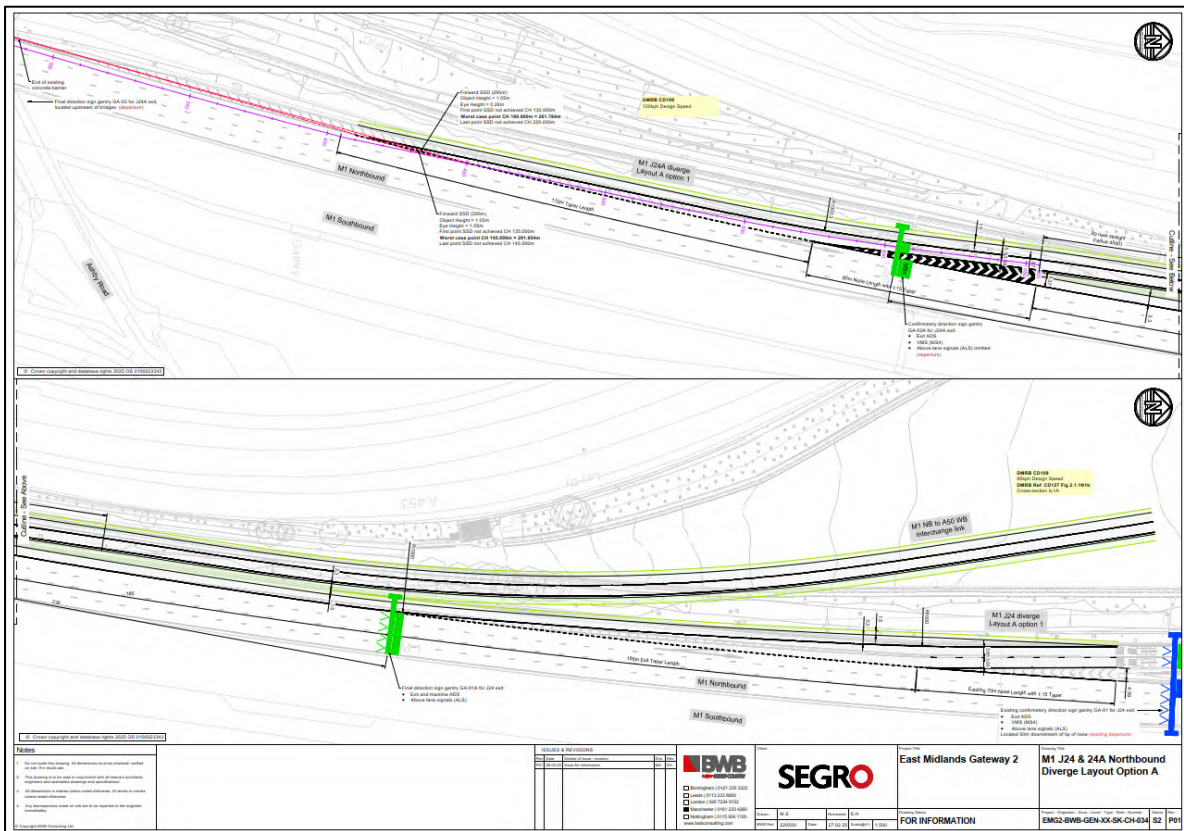


Figure 2.3: M1 Southbound Widening on Approach to J24

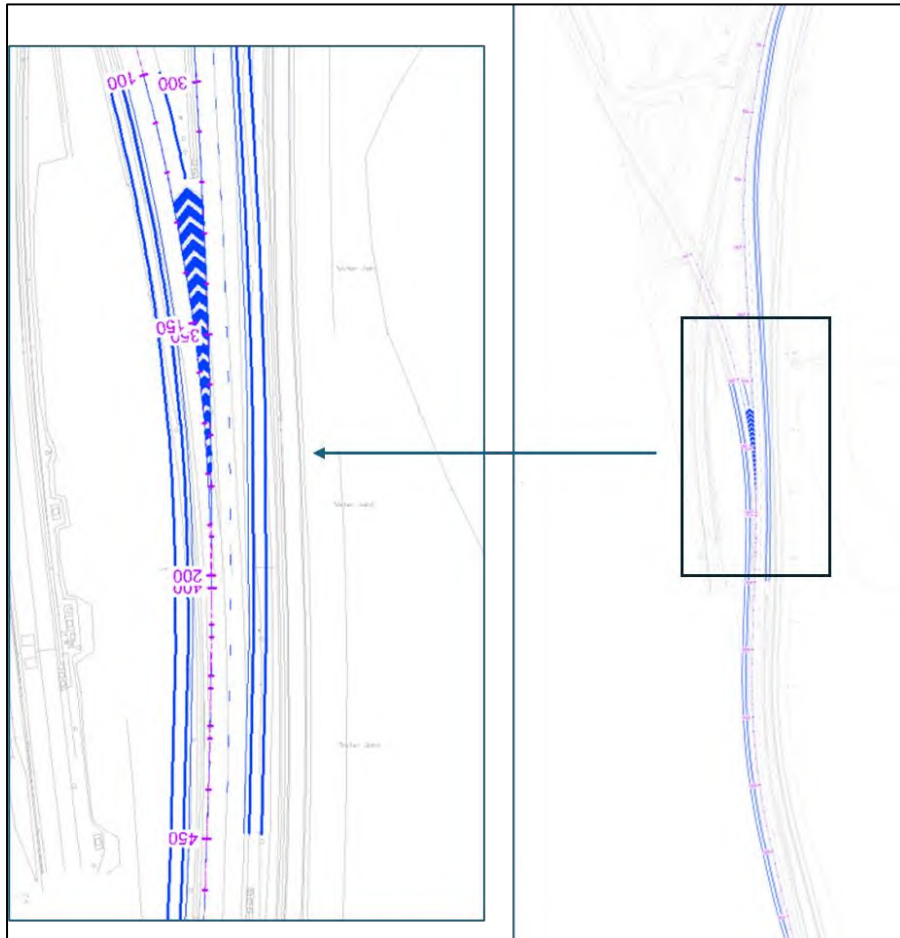


Figure 2.4: EMGP1 Access Improvements

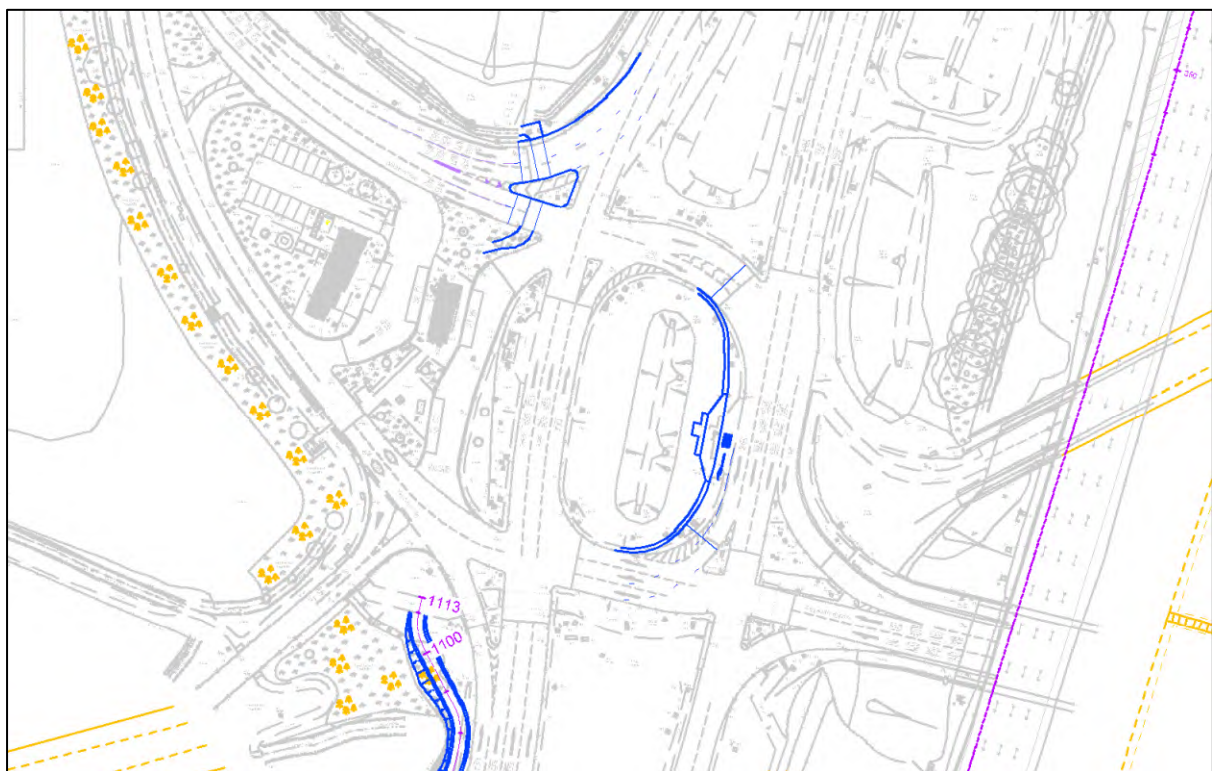


Figure 2.5: A453 Finger Farm Westbound Exit Widening

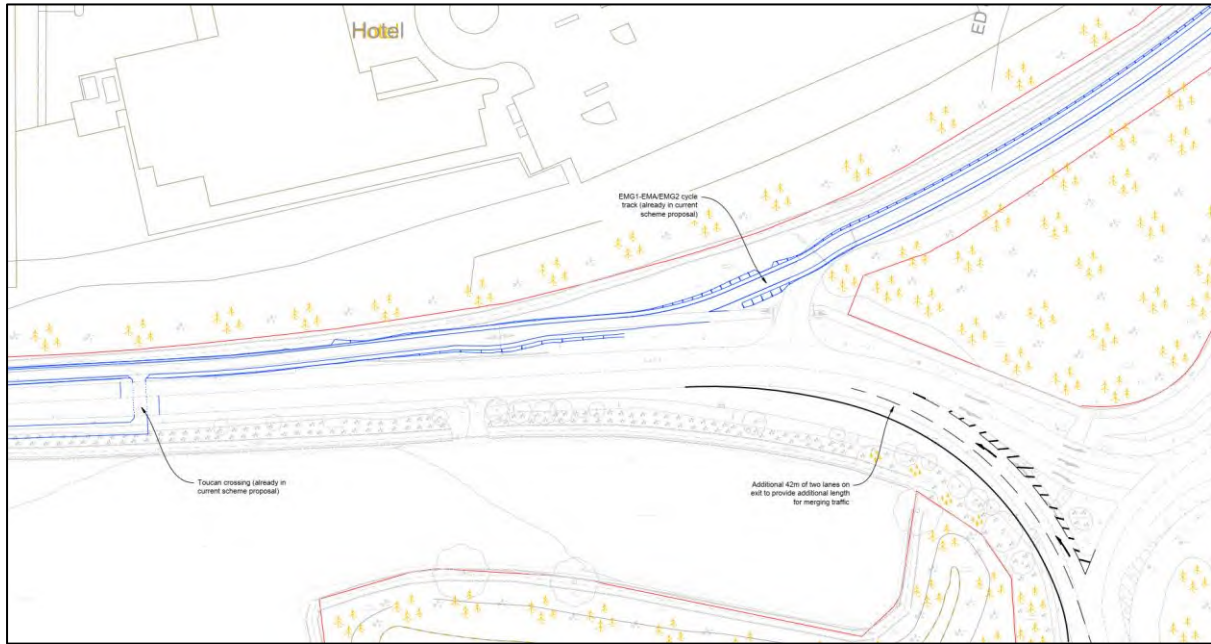
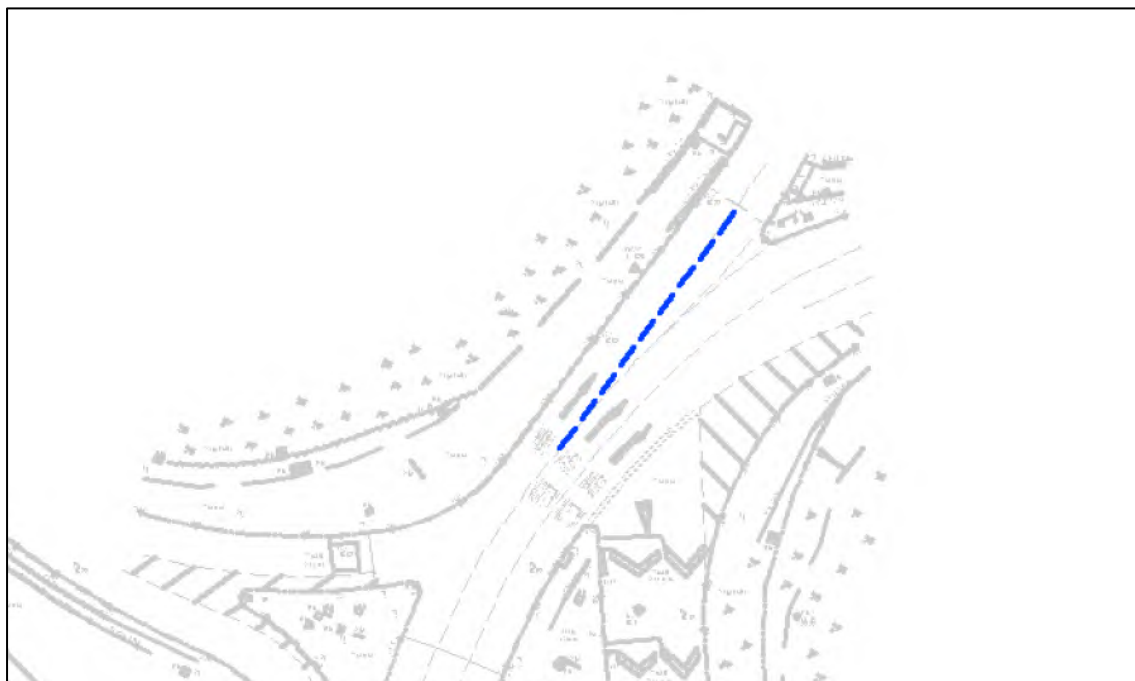


Figure 2.6: A453 EMGP2 Access Junction and Toucan Crossing



Figure 2.7: M1 J24 Minor Works (with Shared Central Lane)

2.3 Signal Optimised with Mitigation Included

2.3.1 Signal timings at two junctions adjacent to the mitigation measures have been optimised in the EMFM assessment at the following locations:

1. The signal head to the south-west of the Wilders Way / A453 / Kegworth Bypass roundabout that controls the A453 northbound traffic and the circulatory traffic.
2. The signal head to the north-east of the M1 J24 that controls the M1 southbound and circulatory traffic.

2.3.2 These two junctions are forecast to be at or over capacity in Stage 2a and have therefore been optimised to 'unlock' the benefits of the mitigation measures, particularly in relation to the two measures listed below:

1. EMGP1 access improvements (see Paragraph 2.2.1 and Figure 2.4).
2. M1 southbound link approaching J24 (see Paragraph 2.2.1 and Figure 2.3).

2.4 Approach to Signal Optimisation

2.4.1 As noted in Section 2.3 two signalised junctions have been optimised to 'unlock' or release the benefits of the proposed mitigation measures that would otherwise not be fully realised, therefore increasing capacity and reducing delay on the Strategic Road Network (SRN). Signals were optimised:

- Such that the demand and delay at congested signalised junctions were better balanced / optimised following the introduction of the additional road capacity provided by the mitigation measures. Note that signal timings for Stage 2a are based on observed signal time data from the EMFM Base Year model (2019), as is the standard approach.
- Based on information or feedback from the detailed Vissim modelling (for example, the minimum / maximum green times). Note that the Vissim model demand was based on outputs from the EMFM.

2.4.2 Optimising these two junctions was performed carefully and systematically such that traffic patterns were not unrealistically changed or distorted due to the additional capacity from the optimised signal timings rather than the mitigation measures themselves. Optimising these junctions was performed over five iterations by carefully reviewing outputs and adjusting green times at each iteration.

- 2.4.3 A sixth iteration was assessed in EMFM that included optimising the signalised junction at the Hilton Hotel Lane / M1 J24. This signal was optimised based on both forecast traffic demand volumes and feedback provided from the detailed Vissim modelling. The forecast outputs from this sixth iteration were considered localised and have not been documented in this report however outputs have been provided to inform the Vissim modelling.

Section 3 – Forecast Model Results

3.1 Introduction

3.1.1 This section details the forecast model results for the proposed EMGP2 development assessment for the AM Peak (08:00 to 09:00) and PM Peak (17:00 to 18:00) hours. The analysis includes:

- routing of the forecast development traffic in the 2028 and 2038 ‘With Development (2a)’ scenarios (Section 3.2);
- forecast flow changes in 2028 and 2038 between the ‘Without Development (1a)’ and ‘With Development (2a)’ scenarios (Section 3.3);
- an assessment of the Area of Influence (AoI) (Section 3.4);
- forecast delay changes in 2028 and 2038 between the ‘Without Development (1a)’ and ‘With Development (2a)’ scenarios (Section 3.5);
- forecast maximum node volume-capacity ratios in the 2028 and 2038 ‘With Development (2a)’ scenarios (Section 3.6); and
- forecast turning flows (and volume-capacity ratios for turns) at selected junctions (Section 3.7).

3.1.2 Appendix A provides a comparison between the ‘With Development (2a)’ and ‘With Development (1a)’ that includes forecast flow changes, delay changes and node volume-capacity ratios in 2028 and 2038.

3.2 Forecast Development Traffic

3.2.1 It was agreed that the development trip distributions are to be based on the PRTM ‘gravity model’ approach. The gravity model approach was applied for Stage 1a and the development trip distribution from Stage 1a has been applied to the Stage 2a modelling.

3.2.2 Figure 3.1 to Figure 3.8 show the forecast development trip distribution separately for HGVs and light vehicles on the highway network for the 2028 and 2038 ‘With Development (2a)’ scenarios in passenger car units (PCUs). For information, the PCU factor for HGV is 2.0 and the PCU factor for the other assignment vehicle types (i.e. cars and LGVs) is 1.0.

3.2.3 As expected, the forecast trip distribution for Stage 2a (with mitigation) is very similar to Stage 1a (without mitigation) as reported in the Forecasting Report⁴. How development traffic routes through the network is also very similar.

3.2.4 These figures show that the forecast HGV development traffic has a broadly similar distribution to and from the proposed development in both the AM Peak and PM Peak hours, and both forecast years (2028 and 2038). HGVs are forecast to use the M1, A50 and the A453 Remembrance Way to and from Derby and the north, and the M1 and A42 to and from Leicester, Birmingham and the south.

3.2.5 For light vehicle traffic, most development-related trips during the AM Peak hour in 2028 are forecast to use the M1 southbound and the A42 towards Birmingham. In the northbound direction development trips are forecast to route via the M1 and Castle Donnington Relief Road towards Derby. By 2038 in the AM Peak hour, a higher proportion of trips is forecast to route south from the A453 towards Diseworth to access Gelscoe Lane and the A42.

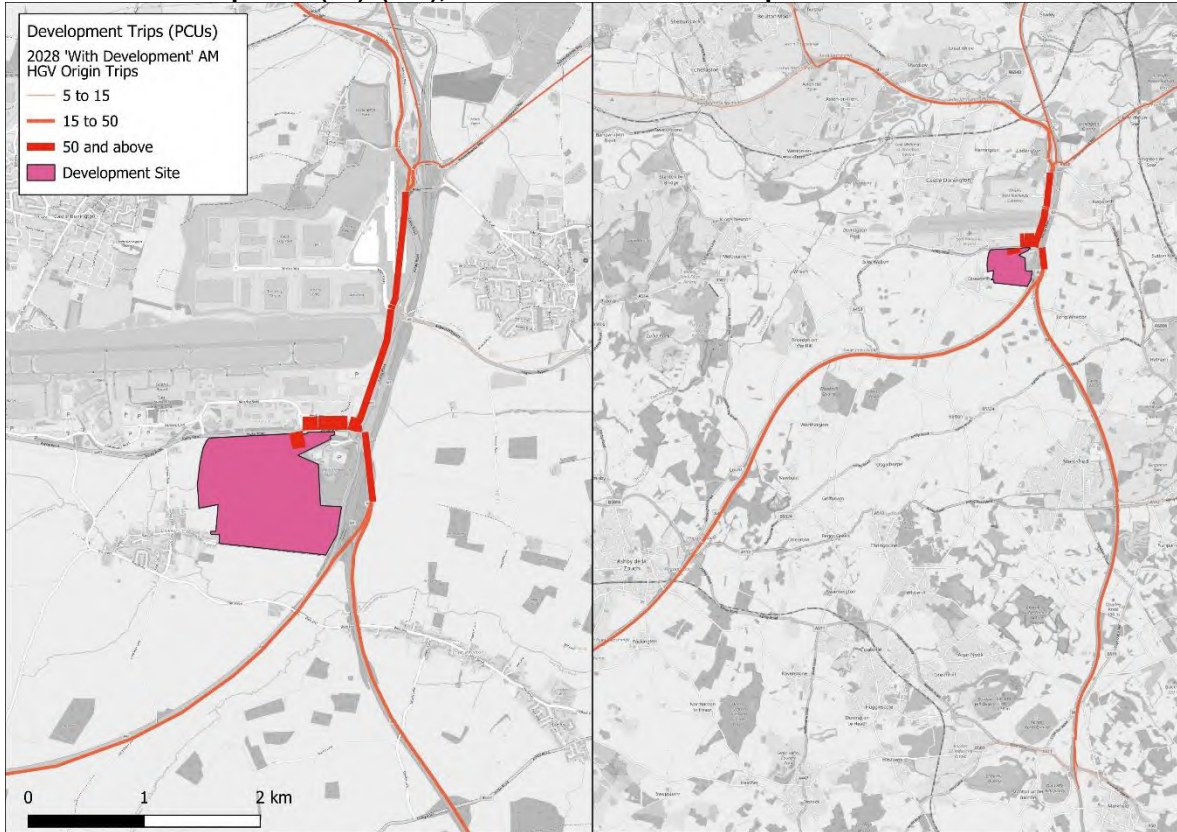
3.2.6 Light vehicle development trips from the development in the PM Peak hour in 2028 are forecast to route north via the M1, the A50, A453 Remembrance Way and south via the M1 and towards Diseworth to access the A42. This pattern is forecast in the reverse for the AM Peak hour development trips to the proposed development but with fewer trips on the M1 northbound and more trips on Castle Donnington Relief Road to avoid the congested M1 J24.

3.2.7 With the M1 northbound to A50 westbound interchange link road included in Stage 2a the development traffic (lights and heavy vehicles combined) on the A50 is forecast to have fewer than 100 vehicles in both directions in either the 2028 or 2038 scenarios for Stage 2a, which are very similar to the equivalent Stage 1a forecasts.

3.2.8 It should be noted that the local networks through Diseworth, Castle Donnington and Kegworth have weight restrictions applied. These restrictions are represented in the EMFM, and the HGV development trips are therefore forecast to route to and from the proposed development site via mainly the SRN.

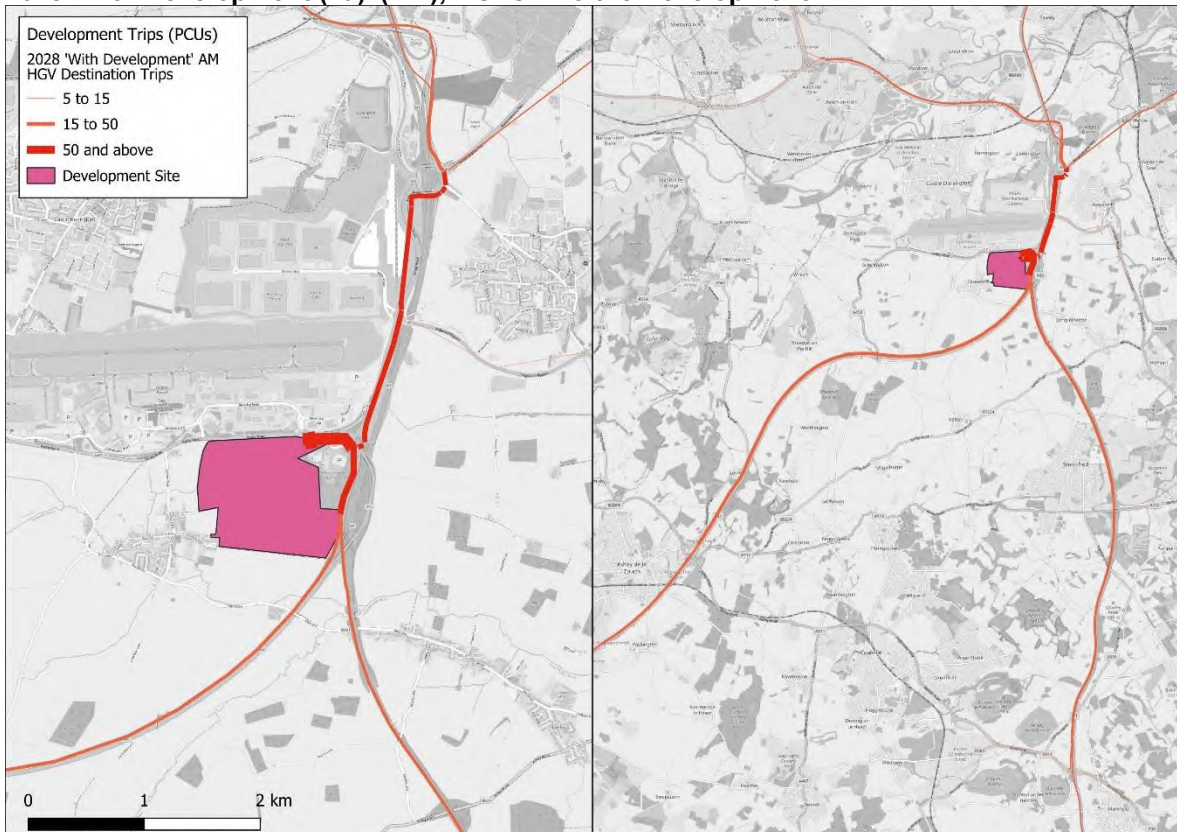
Figure 3.1: HGV Trip Distribution to and from the Proposed Development for 2028 (AM)

2028 'With Development (2a)' (AM), HGVs – From the Development



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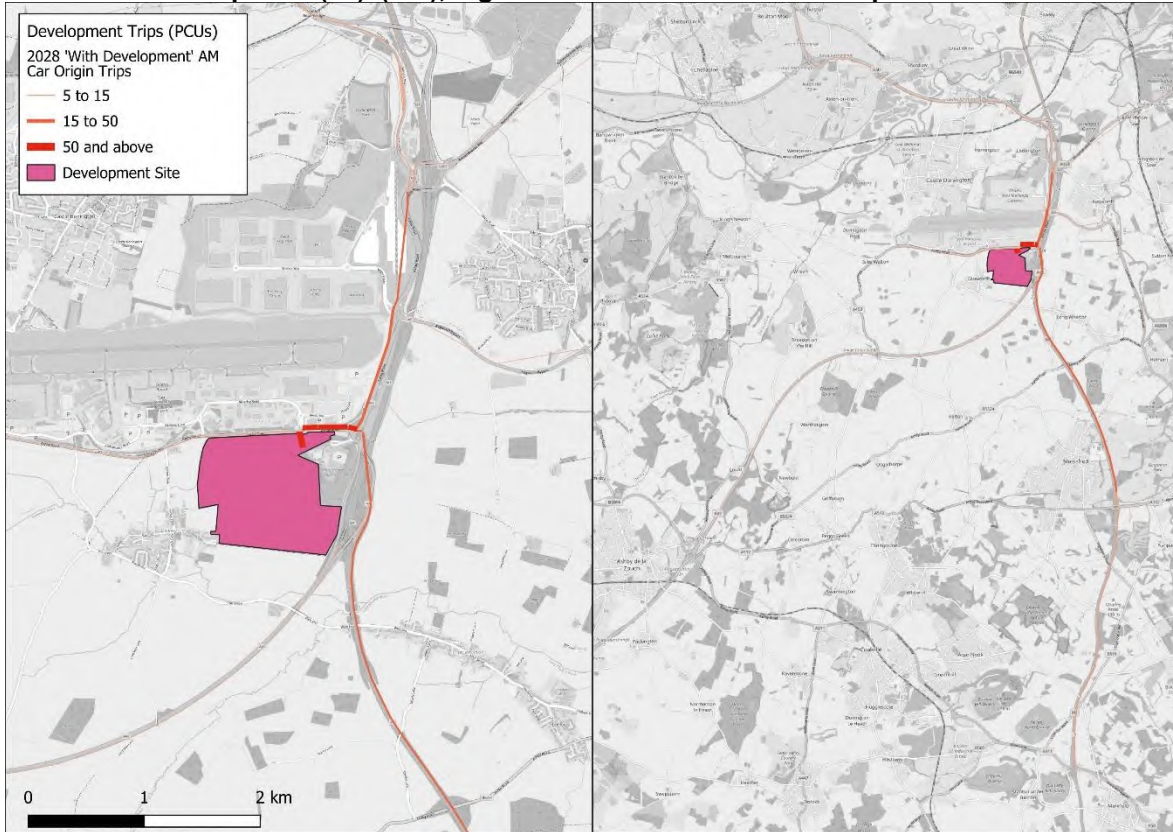
2028 'With Development (2a)' (AM), HGVs – To the Development



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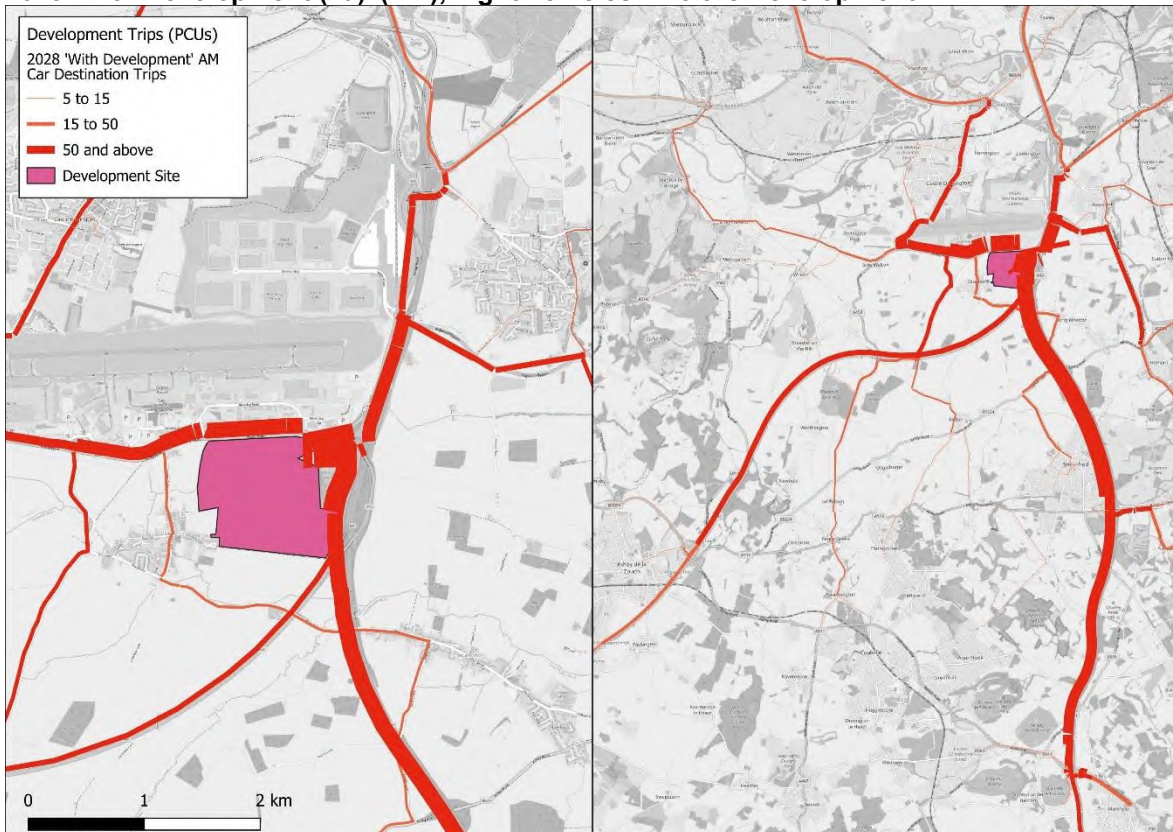
Figure 3.2: Light Vehicle Trip Distribution to and from the Proposed Development for 2028 (AM)

2028 'With Development (2a)' (AM), Light Vehicles – From the Development



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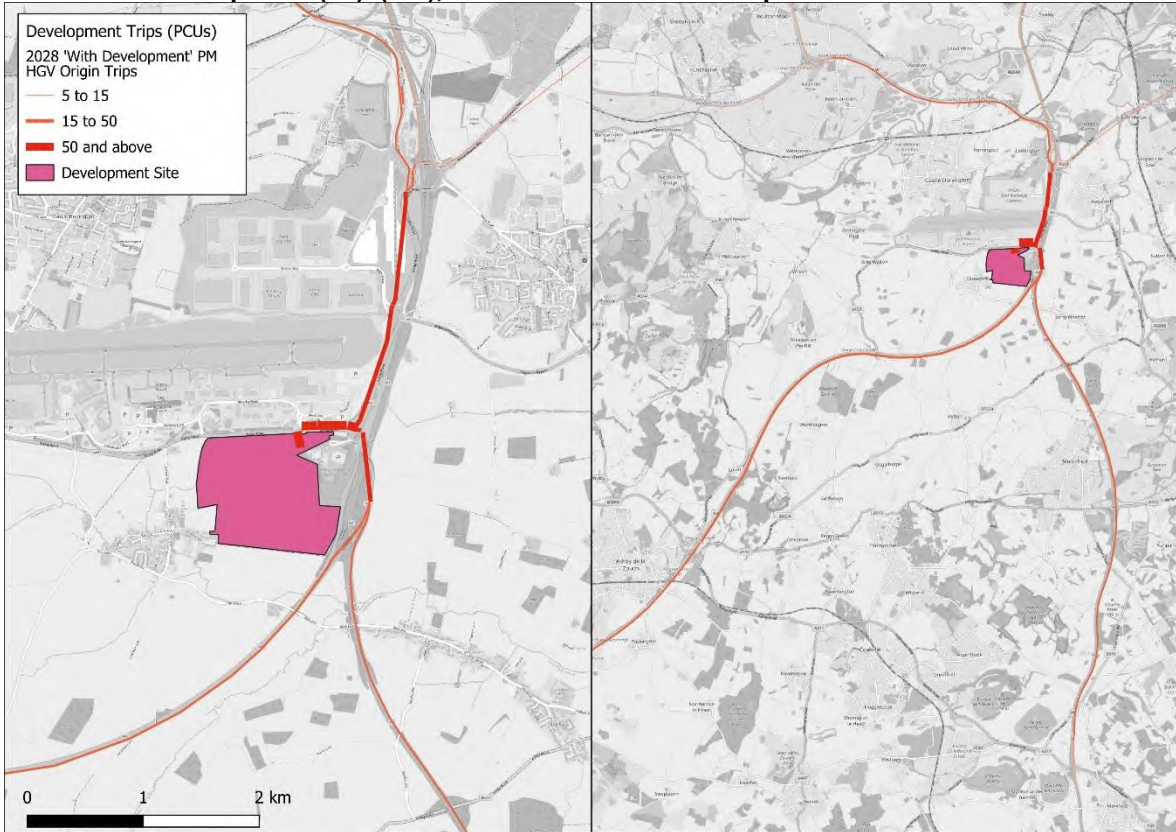
2028 'With Development (2a)' (AM), Light Vehicles – To the Development



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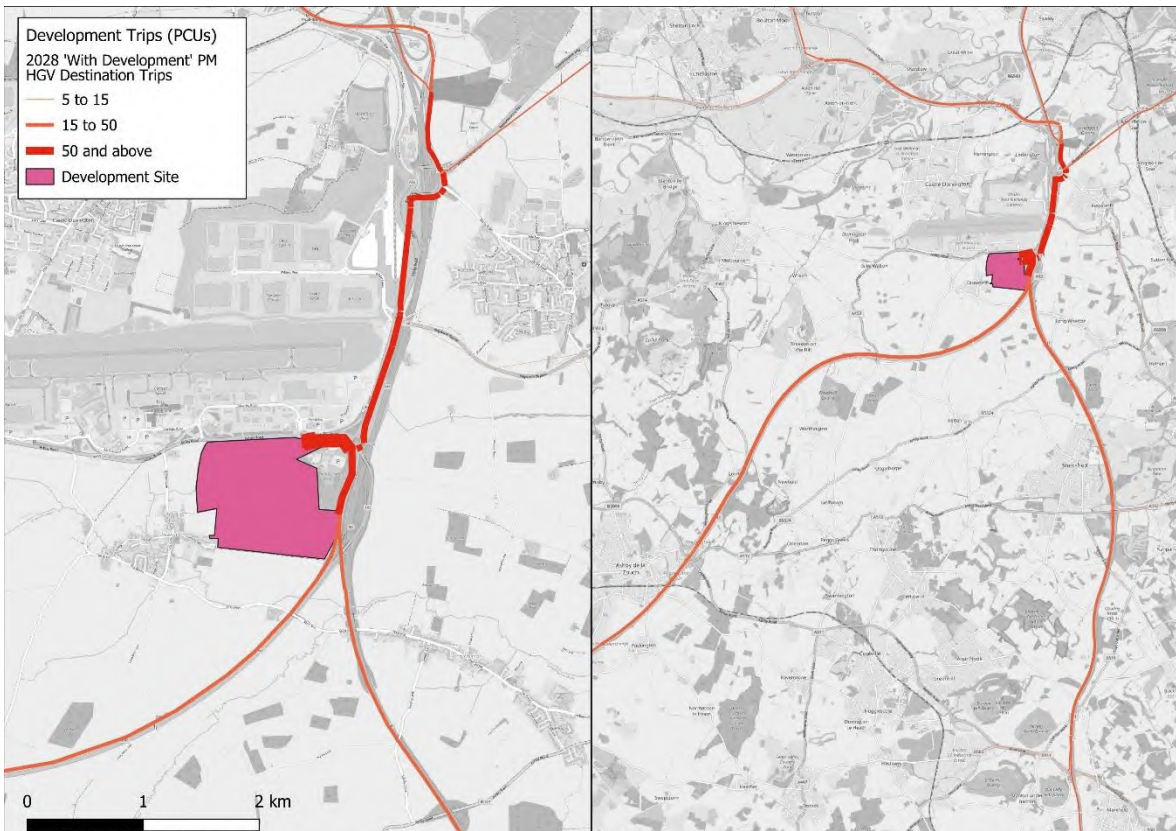
Figure 3.3: HGV Trip Distribution to and from the Proposed Development for 2028 (PM)

2028 'With Development (2a)' (PM), HGVs – From the Development



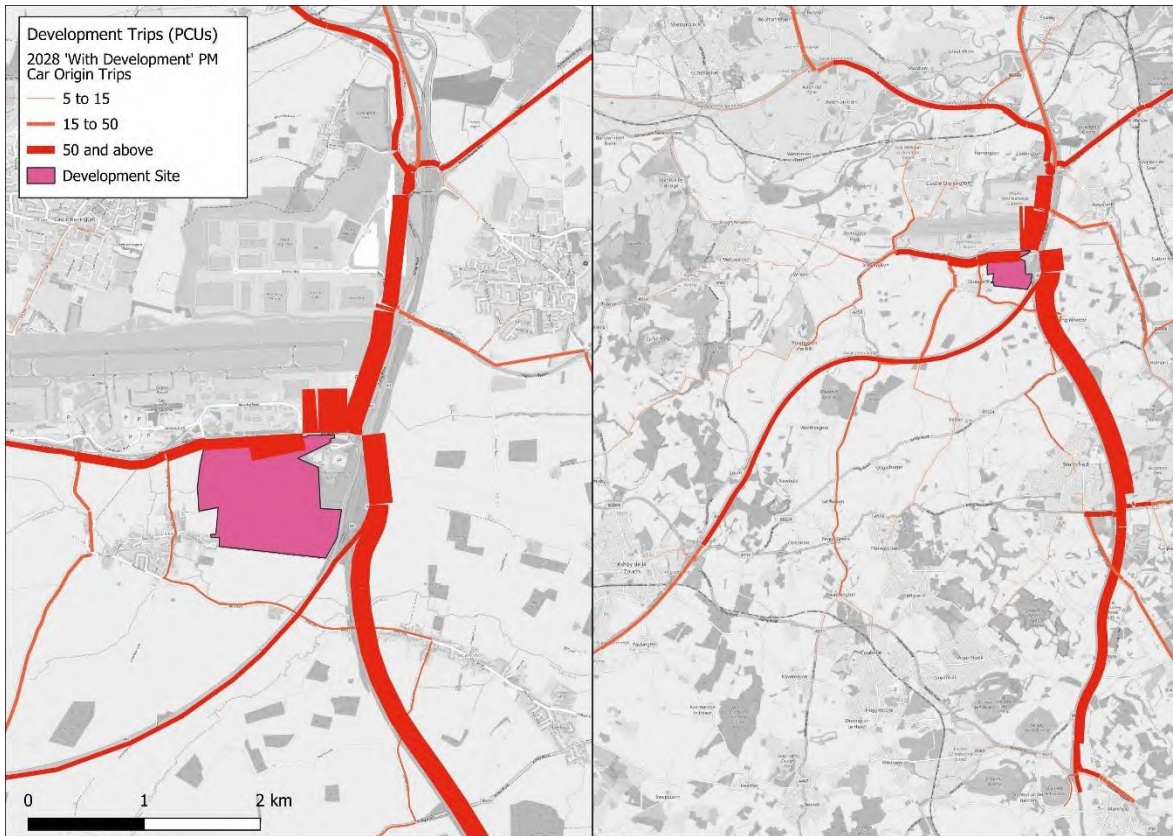
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2028 'With Development (2a)' (PM), HGVs – To the Development



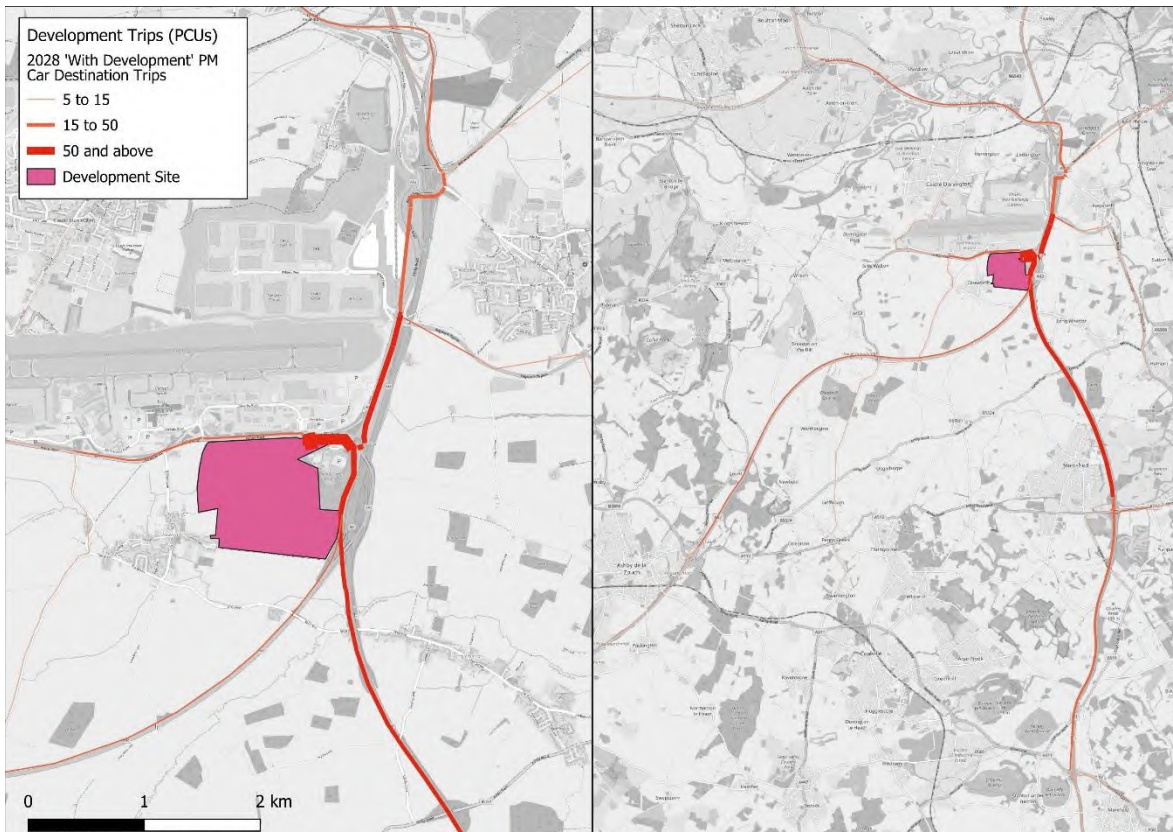
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Figure 3.4: Light Vehicle Trip Distribution to and from the Proposed Development for 2028 (PM)
2028 'With Development (2a)' (PM), Light Vehicles – From the Development



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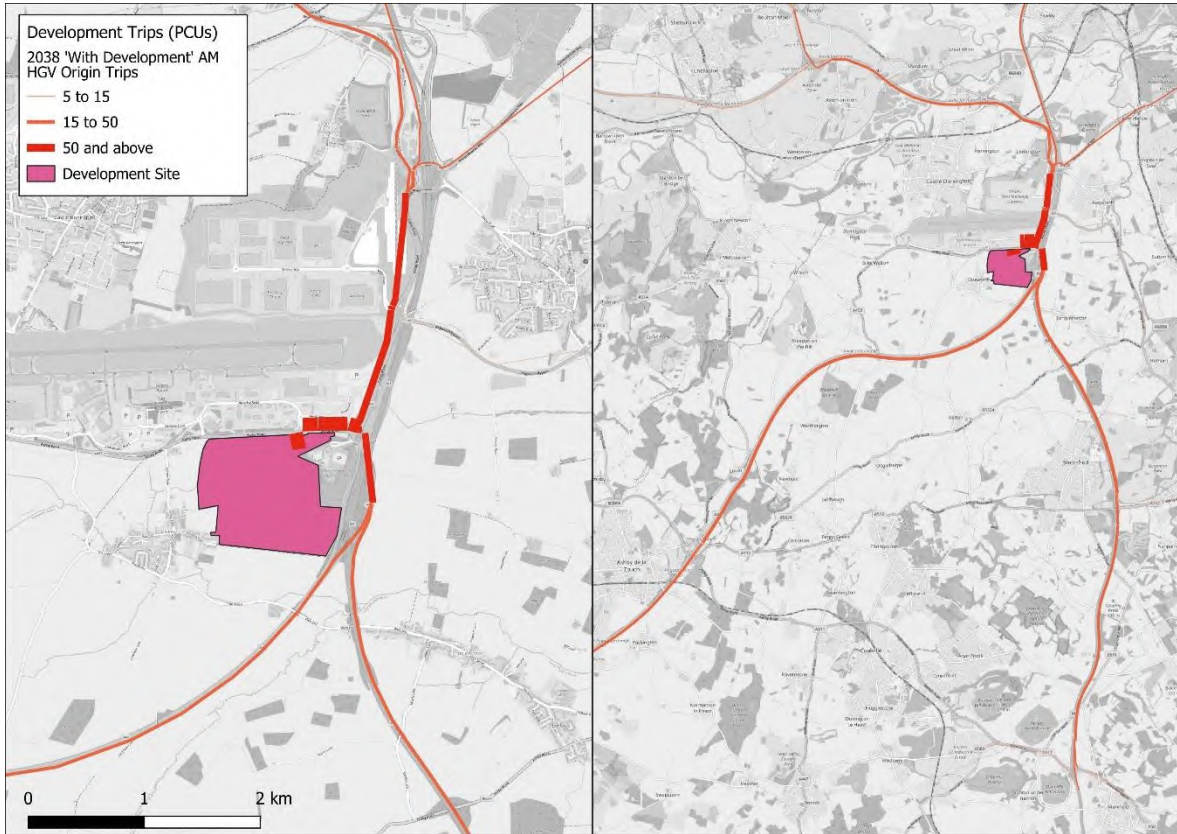
2028 'With Development (2a)' (PM), Light Vehicles – To the Development



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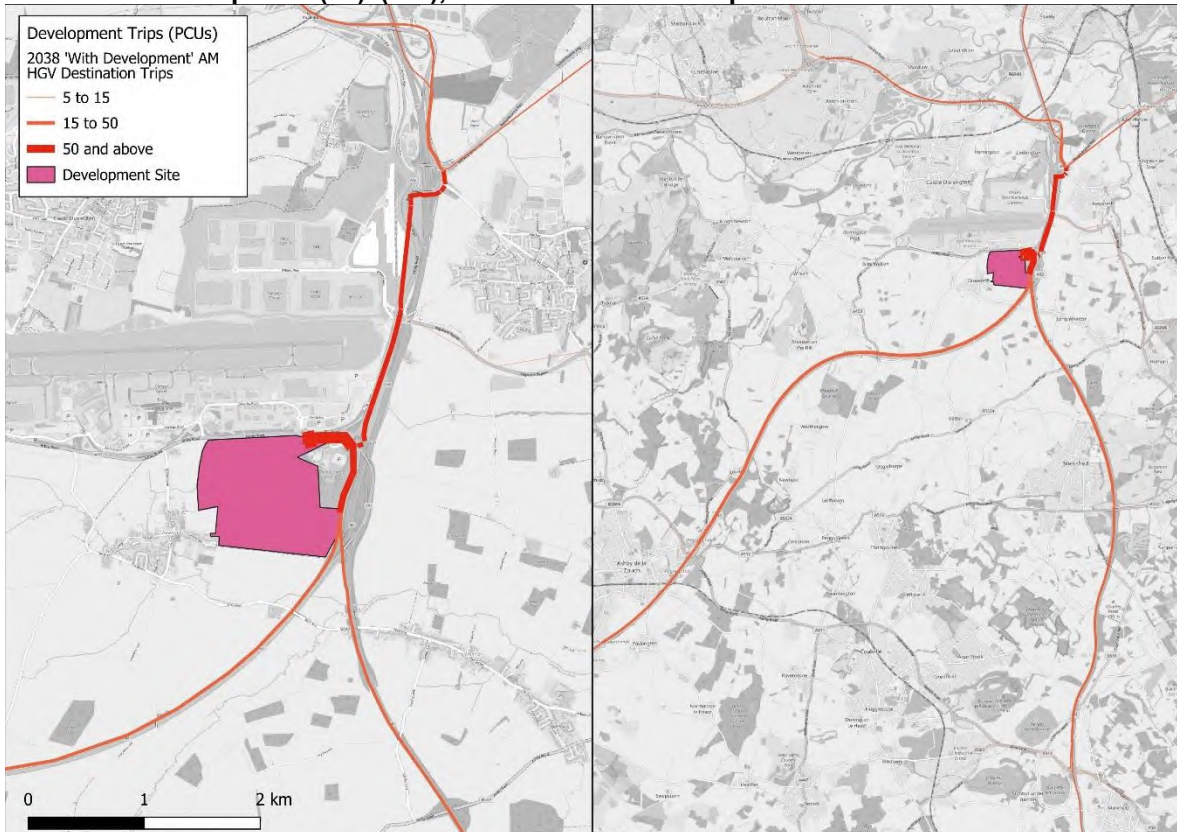
Figure 3.5: HGV Trip Distribution to and from the Proposed Development for 2038 (AM)

2038 'With Development (2a)' (AM), HGVs – From the Development



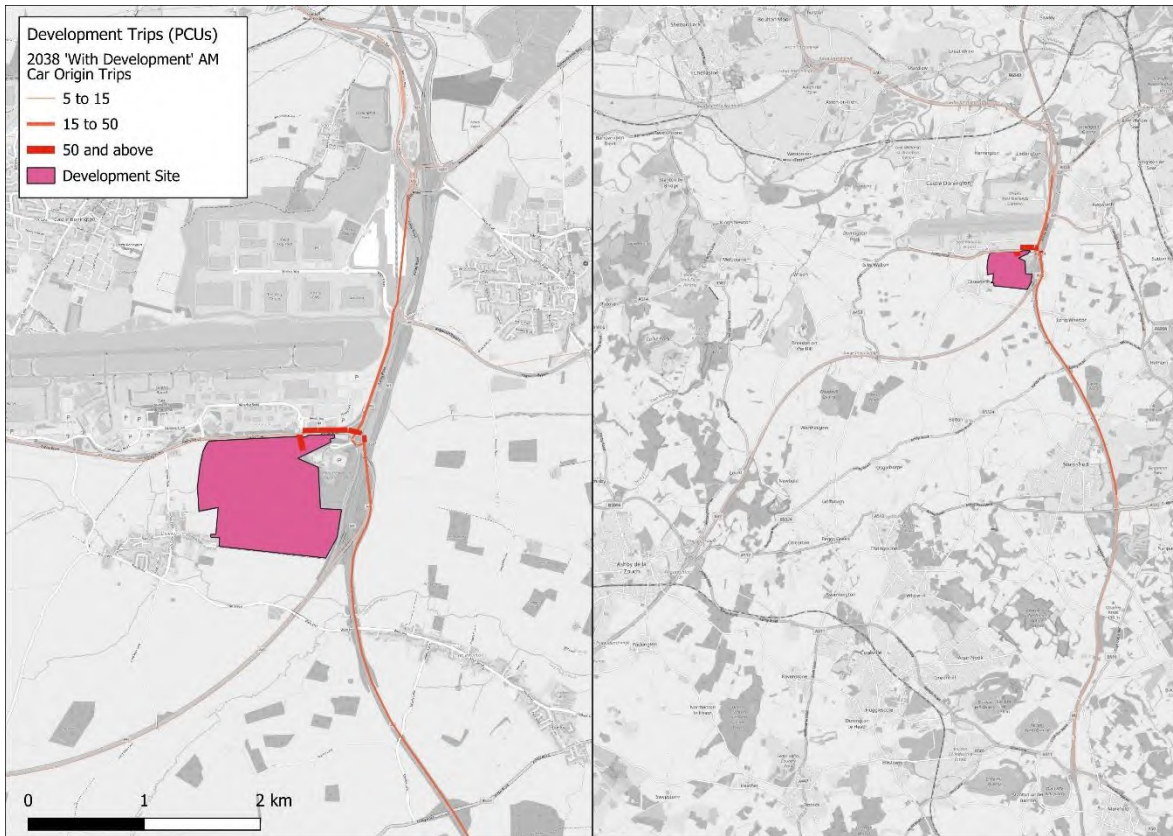
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2038 'With Development (2a)' (AM), HGVs – To the Development



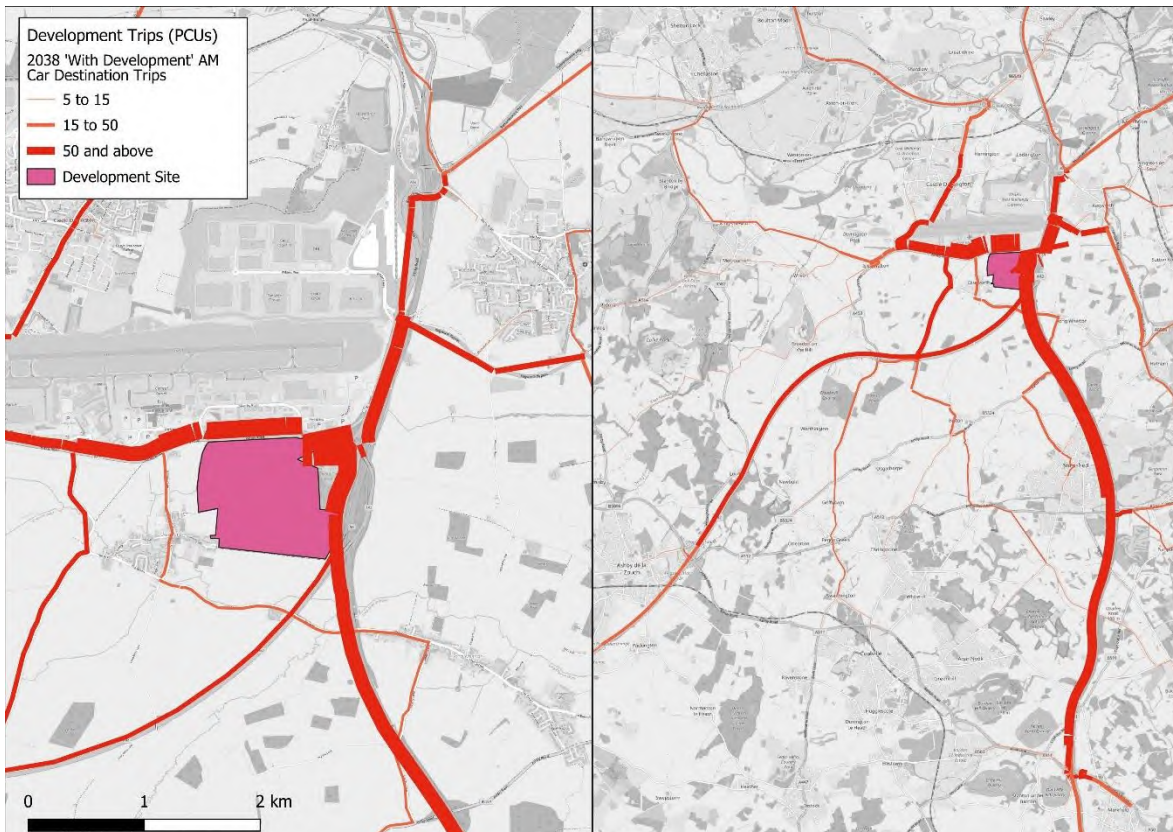
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Figure 3.6: Light Vehicle Trip Distribution to and from the Proposed Development for 2038 (AM)
2038 'With Development (2a)' (AM), Light Vehicles – From the Development



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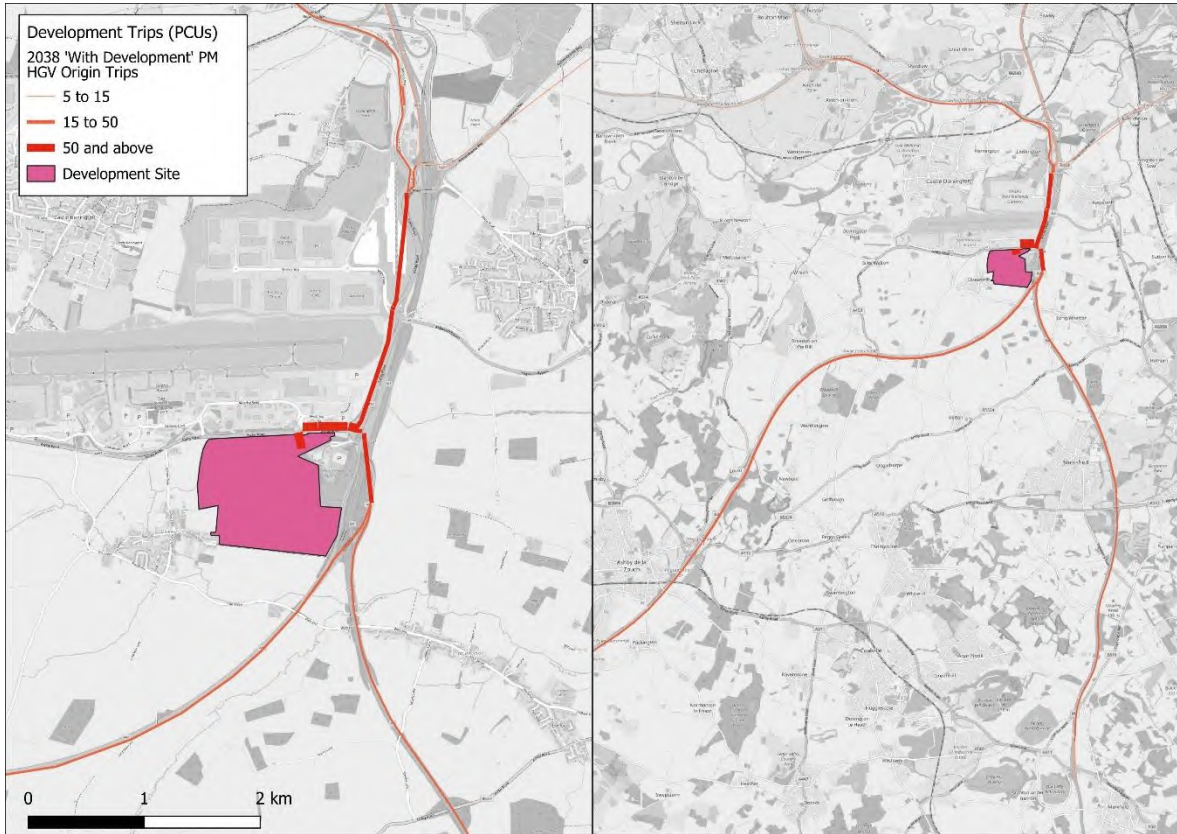
2038 'With Development (2a)' (AM), Light Vehicles – To the Development



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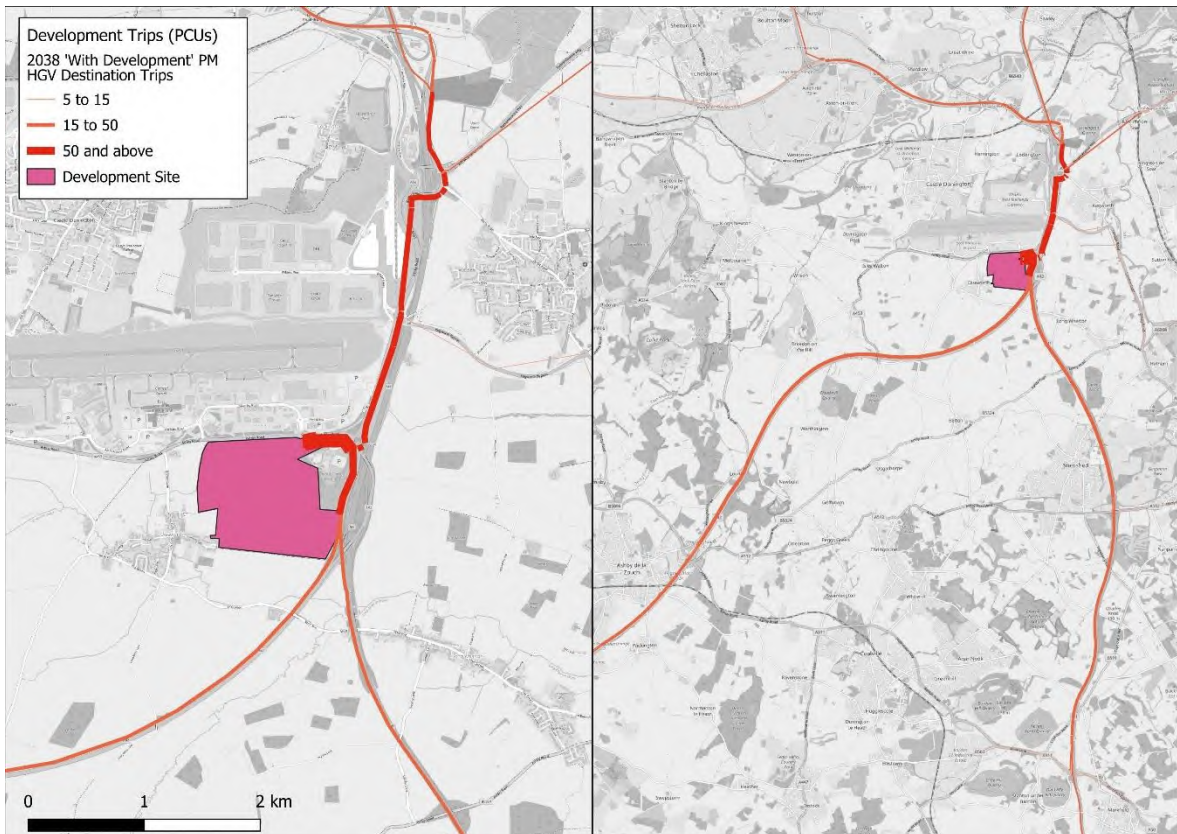
Figure 3.7: HGV Trip Distribution to and from the Proposed Development for 2038 (PM)

2038 'With Development (2a)' (PM), HGVs – From the Development



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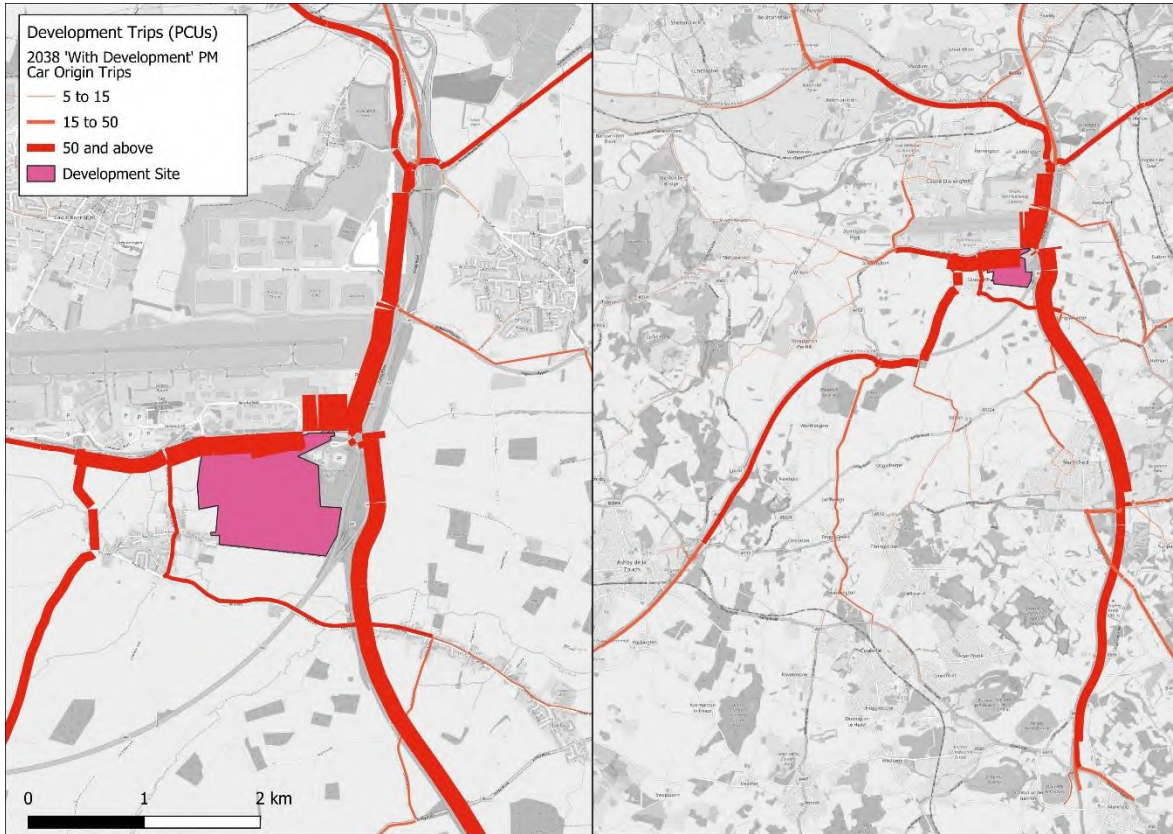
2038 'With Development (2a)' (PM), HGVs – To the Development



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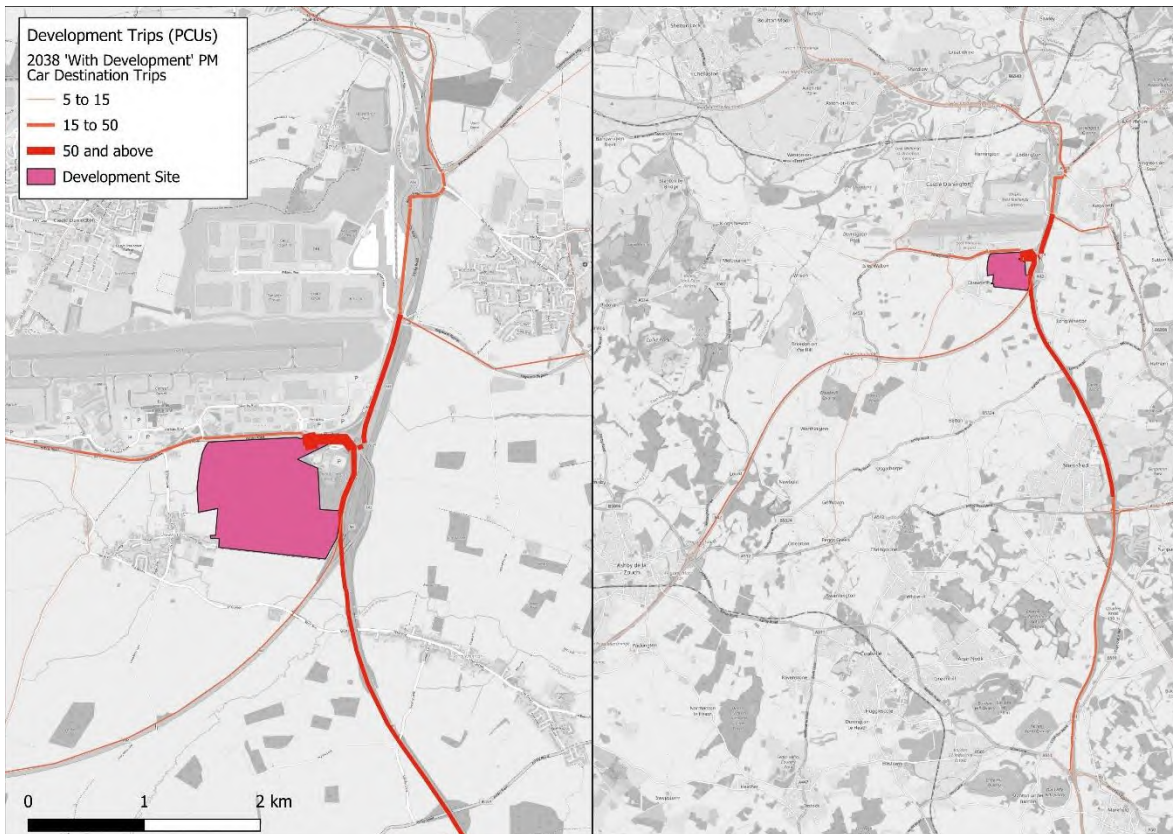
Figure 3.8: Light Vehicle Trip Distribution to and from the Proposed Development for 2038 (PM)

2038 'With Development (2a)' (PM), Light Vehicles – From the Development



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2038 'With Development (2a)' (PM), Light Vehicles – To the Development



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3.3 Forecast Flow Change

3.3.1 Figure 3.9 and Figure 3.10 show the forecast flow changes in 2028 and 2038 between the 'With Development (2a)' and 'Without Development (1a)' scenarios for the AM Peak and PM Peak hours. Red bandwidth represents a proportional increase in traffic flow in the 'With Development (2a)' scenario and green bandwidth represents a decrease.

3.3.2 These figures show that most increases in traffic are forecast on the SRN, namely the A453, M1, A50, A6 Kegworth Bypass and the A42.

New M1 northbound to A50 westbound interchange link

3.3.3 As expected, the largest increase in flow is forecast along the new M1 northbound interchange link road across all modelled forecast scenarios. This traffic has diverted off the A453, Finger Farm Roundabout and M1 J24.

M1 southbound link approaching Junction 24

3.3.4 There is an increase (of approximately 200 and 400 PCUs) in traffic forecast on the M1 southbound towards the M1 J24 with the increase in capacity on the M1 southbound. As noted in Section 2.3 the signalised junction at the M1 southbound / J24 has been optimised to 'unlock' the benefit of this mitigation measure.

EMGP1 access improvements

3.3.5 This mitigation measure is forecast to reduce delays at this junction leading to a forecast increase in traffic from the A6 Kegworth Bypass. As noted in Section 2.3 the signalised junction at the M1 southbound / J24 has been optimised to 'unlock' the benefit of this mitigation measure.

A453 Finger Farm Roundabout westbound exit widening

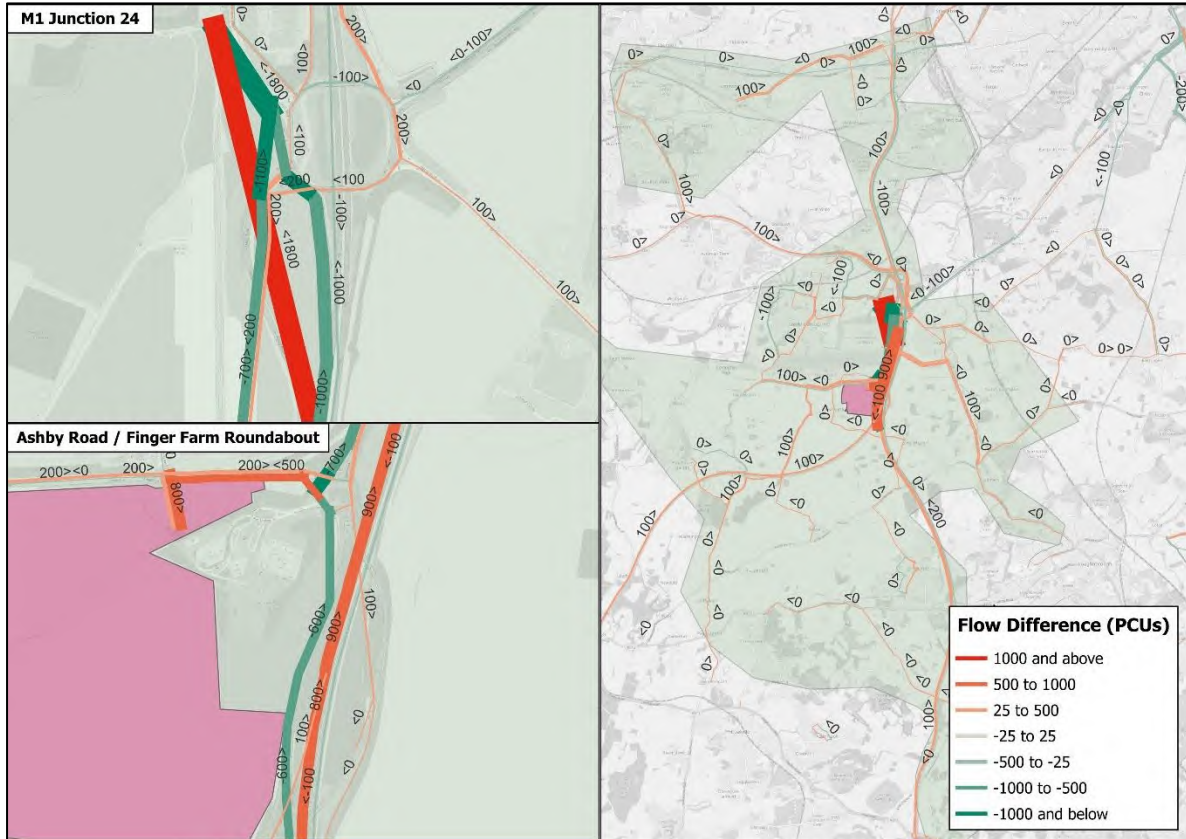
3.3.6 A reduction in northbound traffic on the A453 is forecast at Finger Farm Roundabout primarily as a result of the new link road. There is also an increase (~100 PCUs) on the A453 from the north with the largest increase, as expected, on the A453 to / from the proposed development site.

EMGP2 access roundabout and toucan crossing

3.3.7 As expected, there is an increase in flows along the A453 as traffic accesses the proposed development site. The majority of traffic is forecast to route to and from the east via Finger Farm Roundabout.

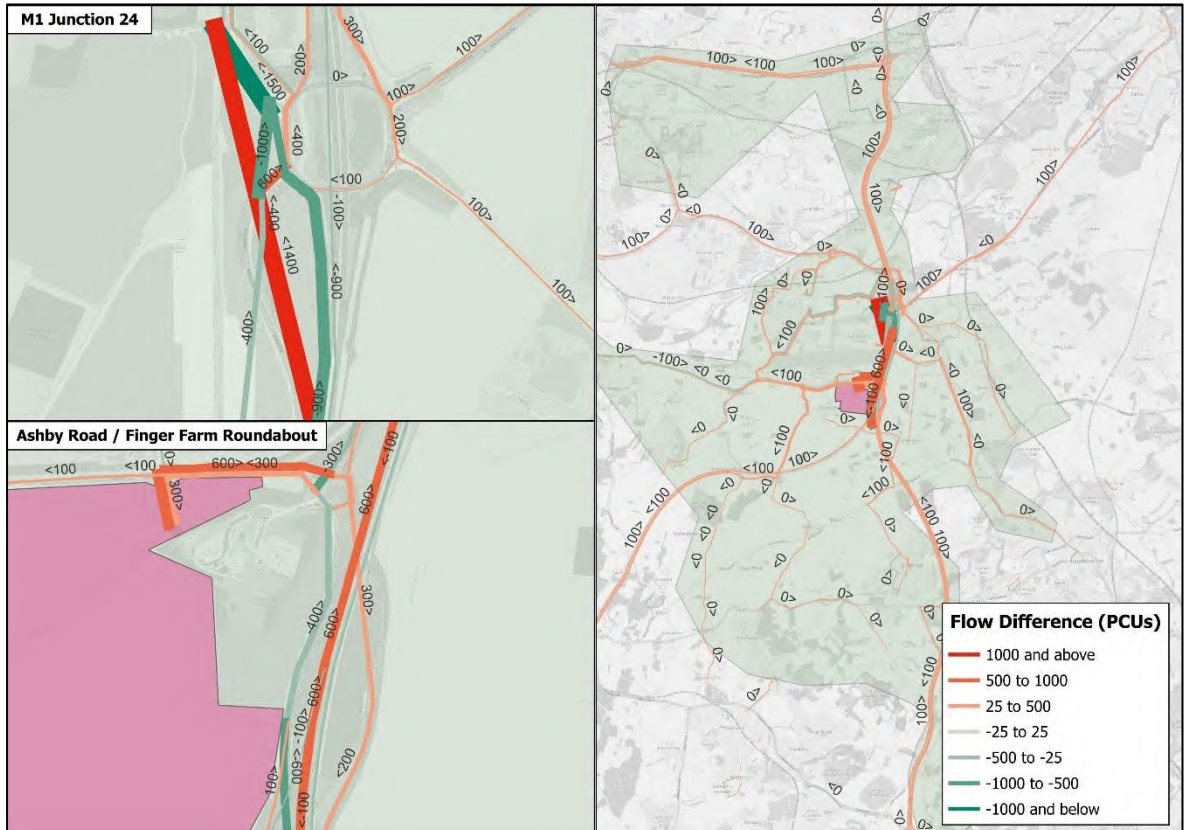
Figure 3.9: Forecast Flow Change for 2028 'With Development (2a)' minus 'Without Development (1a)'

AM Peak hour



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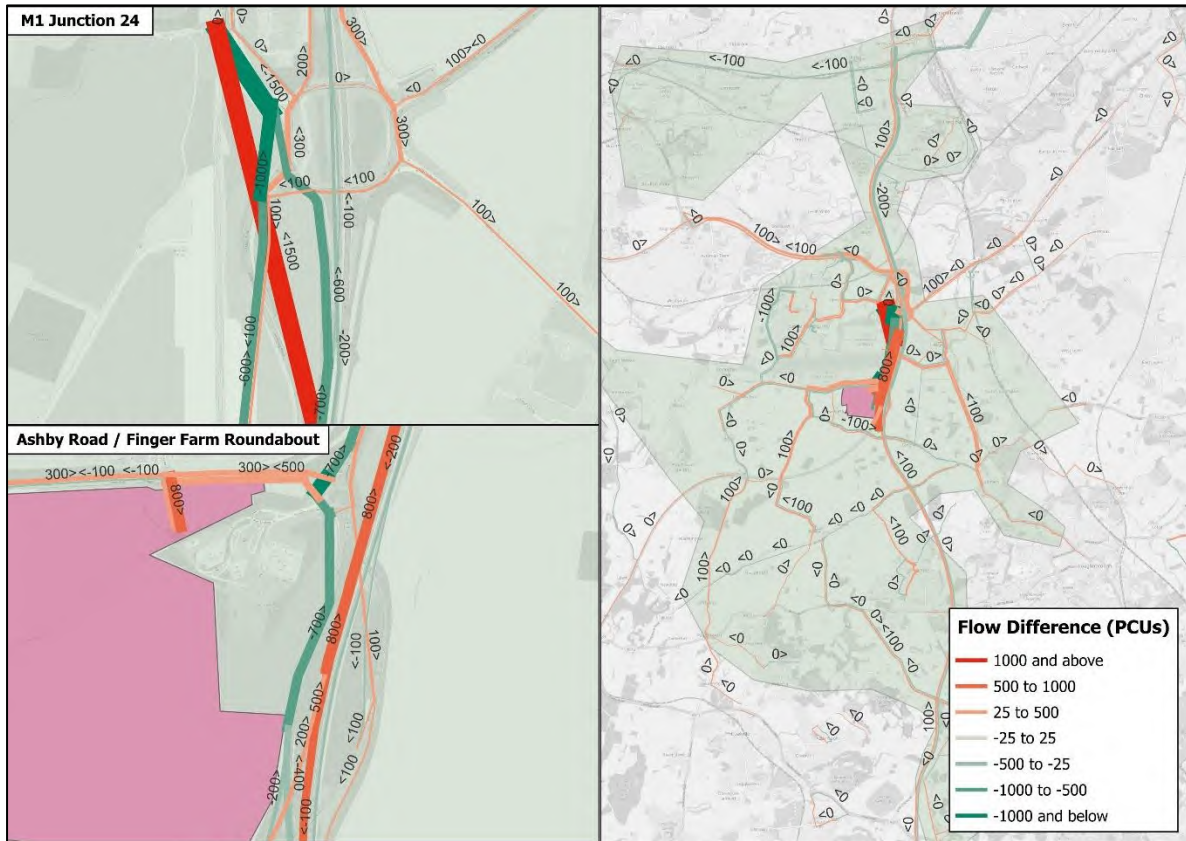
PM Peak hour



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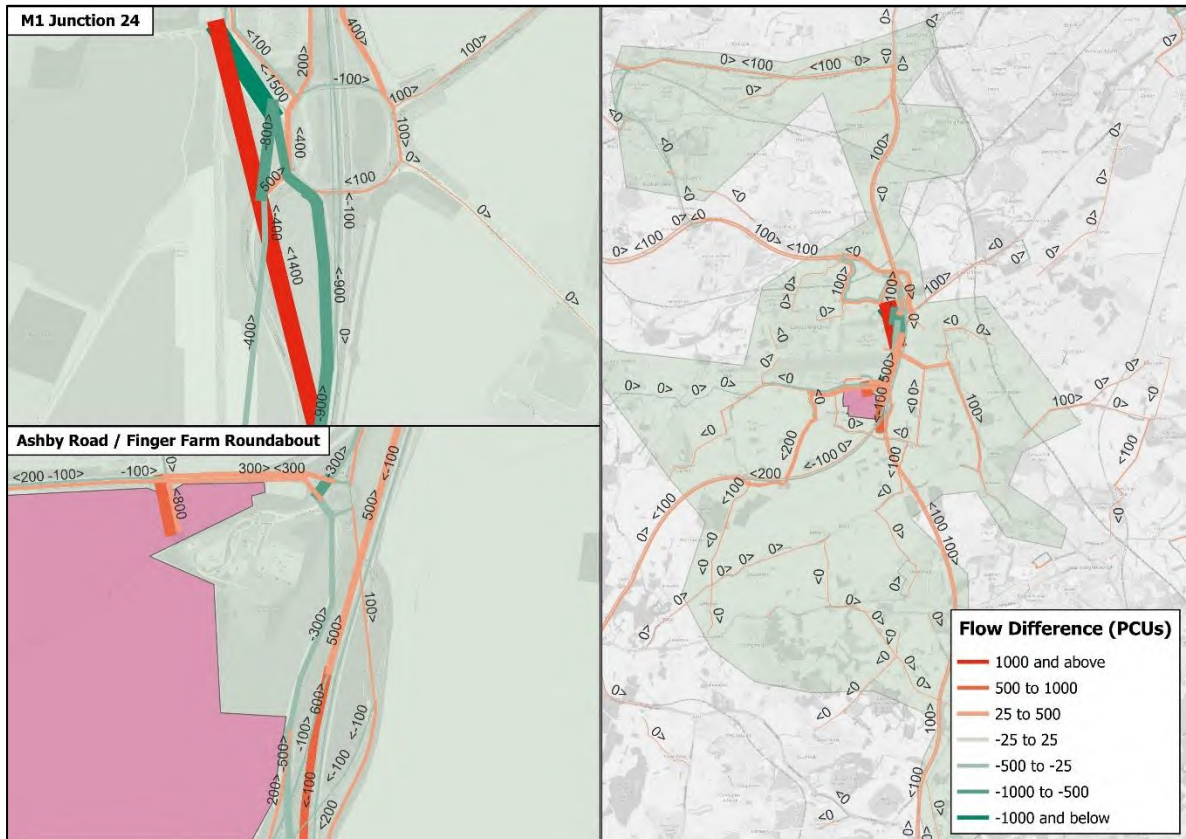
Figure 3.10: Forecast Flow Change for 2038 'With Development (2a)' minus 'Without Development (1a)'

AM Peak hour



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PM Peak hour



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3.4 Area of Influence

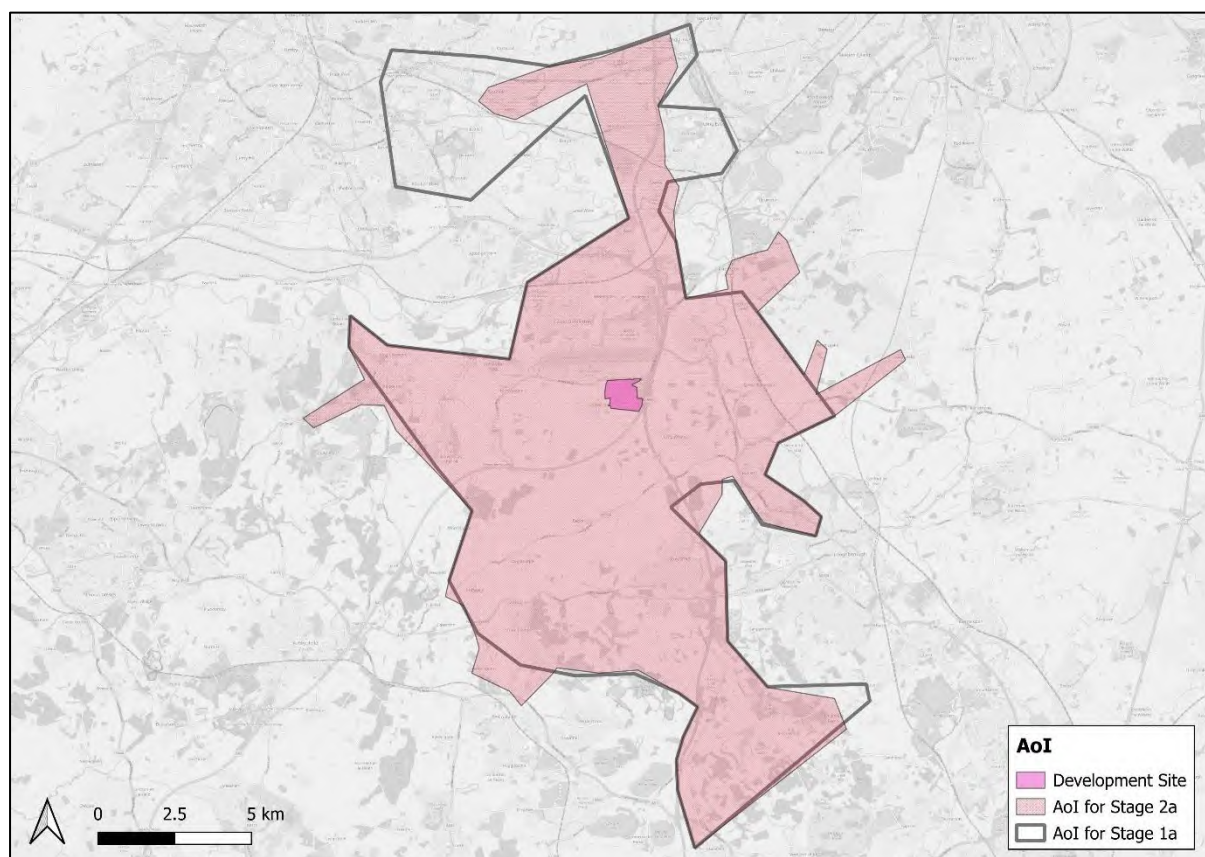
3.4.1 Using the forecast flow changes between the 'With Development (2a)' and 'Without Development (1a)' scenarios, an indication of the AoI in Stage 2a has been defined and is shown in Figure 3.11.

3.4.2 For the proposed development, the AoI has been defined by considering the links which are forecast to change flow by more than $\pm 5\%$ and ± 30 PCUs between the 2028 and 2038 'With Development (2a)' and 'Without Development (1a)' scenarios in either the AM Peak or the PM Peak hours. The links which are forecast to meet these criteria are included in the AoI, as shown in Figure 3.11, and contain the following areas / links:

- the A453 including Finger Farm roundabout;
- the M1 between Junction 23 and Junction 24a;
- the M1 Junction 25;
- the A42 Junction 14;
- the A52 Brian Clough Way between the M1 Junction 25 and Victoria Avenue near Borrowwash; and
- local roads in and around Castle Donnington; Kegworth; Diseworth; Hathern; Thringston and Shepshed.

3.4.3 For comparison, Figure 3.11 also shows the AoI for Stage 1a (without mitigation) and this shows that the AoIs are similar in both stages. To provide consistency with previous Stage 1a outputs, the AoI in Stage 1a has been retained for use for Stage 2a outputs.

Figure 3.11: Area of Influence



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3.5 Forecast Delay Change

3.5.1 As a result of forecast flow changes in the 'With development (2a)' scenario, there are also changes to the forecast delays on the highway network when compared with the 'Without Development 1a)' scenario. These changes in delay can be generated from two sources: link delay based on the speed-flow curve applied to the link; and the junction delay due to capacity constraints for individual turning

movements. The analysis in this section combines the link and junction delays (taking a flow-weighted average of junction delays) to assess the changes in forecast delays with the proposed development traffic.

- 3.5.2 Figure 3.12 and Figure 3.13 show the forecast delay changes (in seconds) in 2028 and 2038 between the 'With Development (2a)' and 'Without Development (1a)' scenarios for the AM Peak and PM Peak hours.

New M1 northbound to A50 westbound interchange link

- 3.5.3 With the new interchange link road included, delay is forecast to occur on the A50 where vehicles join the A50 from the proposed link road. It should be noted that this delay is not an 'increase' compared with the 'Without Development (1a)' scenario as this proposed junction does not exist in without development scenarios. It should also be noted that delays are forecast to reduce at the M1 J24 and Finger Farm Roundabout as this mitigation measure has attracted traffic off these junctions.

M1 southbound link approaching Junction 24

- 3.5.4 A decrease in delay is forecast on the circulatory lanes of M1 J24 for all forecast scenarios in both the AM Peak and PM Peak hours. In addition, there are decreases in delay on the M1 southbound to the north of M1 J24. These reductions in delay are provided by the additional M1 southbound capacity (i.e. extra lane) and the optimisation of the signals at M1 J24 (see Section 2.3).

EMGP1 access improvements

- 3.5.5 The Wilders Way / A453 / A6 Kegworth Bypass junction is forecast to have a reduction in delays in all scenarios. This has been provided by the inclusion of the new interchange link road and the EMGP1 access improvements. As noted in Section 2.3, the benefits of the EMGP1 access improvements have been 'unlocked' by the Wilders Way / A453 signal optimisation.

A453 Finger Farm Roundabout westbound exit widening

- 3.5.6 Delays remain largely unchanged across all scenarios when compared with the 'Without Development (1a)' scenarios, except for a reduction in delays on the A453 eastbound approach during the 2038 AM Peak hour.

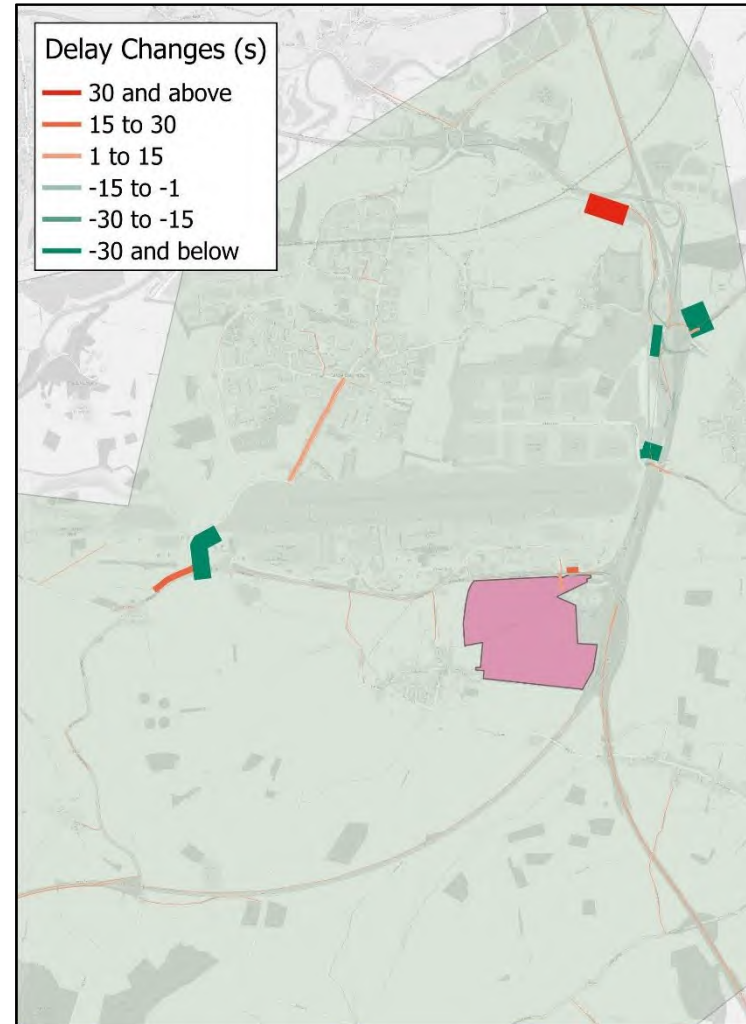
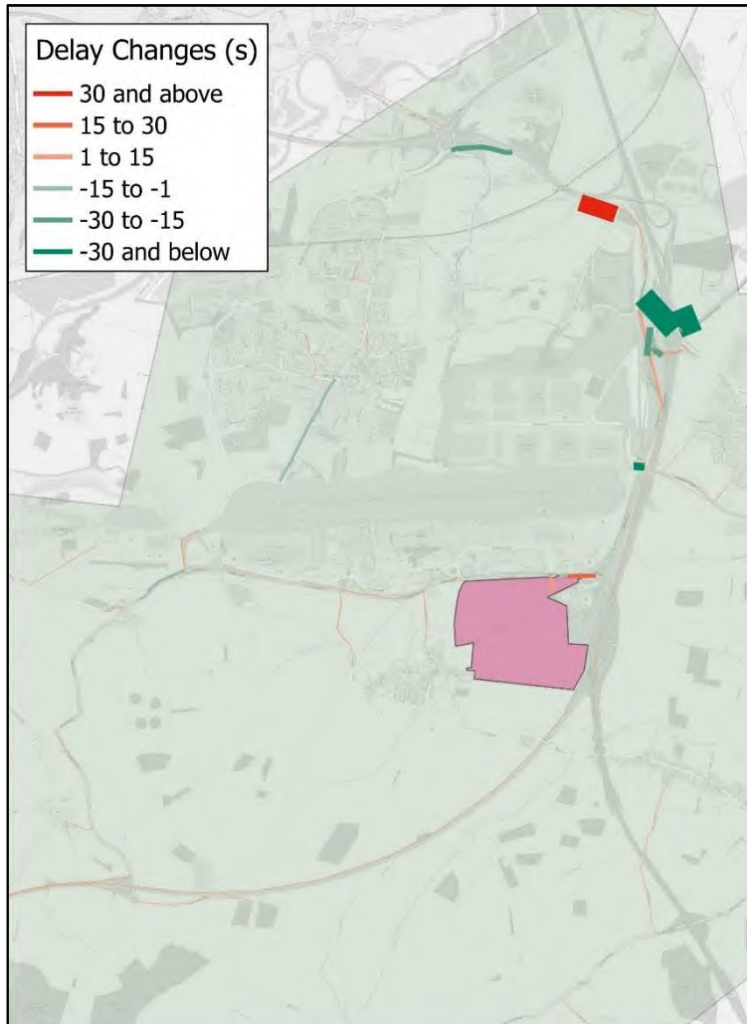
EMGP2 access roundabout and toucan crossing

- 3.5.7 There are increases in delay forecast on the A453 near the proposed development access junction and toucan crossing. This increase has been generated from the development traffic routing to and from the proposed development and the toucan crossing which will generate delay on the A453 to the east of the proposed development site. It should be noted that this delay is not an 'increase' compared with the 'Without Development (1a)' scenario as the toucan crossing has not been included in the without development scenarios. The toucan crossing will generate transient delay as this has been represented as a signalised junction in the EMFM.

Figure 3.12: Forecast Delay Change for 2028 'With Development (2a)' minus 'Without Development (1a)'

AM Peak hour

PM Peak hour

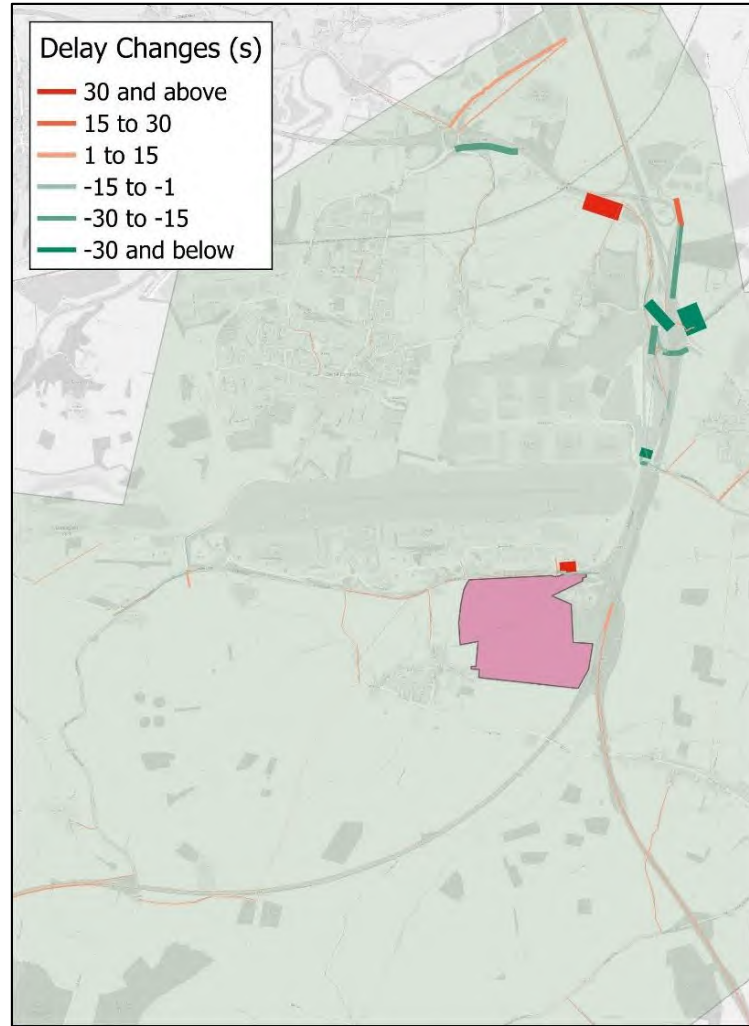
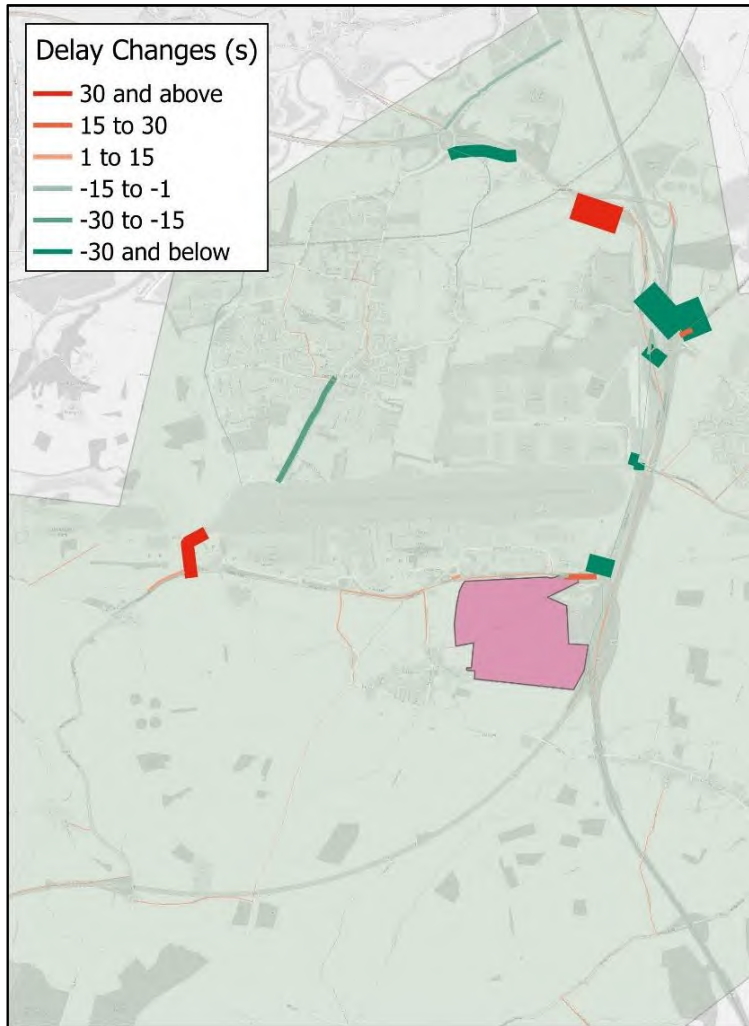


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Figure 3.13: Forecast Delay Change for 2038 'With Development (2a)' minus 'Without Development (1a)'

AM Peak hour

PM Peak hour



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3.6 Forecast Node Volume-Capacity Ratios

- 3.6.1 As a part of the forecast modelling, node / junction capacities are estimated for individual turning movements based on a number of factors including priority of the turn (for example, give-way or merge), the level of green-time at signalised junctions, and the amount of opposing traffic at the junction. Using these calculated capacities and the forecast traffic volumes, node volume-capacity ratios are estimated to identify locations where the forecast flows are approaching or exceeding the forecast capacity.
- 3.6.2 To summarise the forecast-capacity ratios for the individual turning movements at a node, there are two approaches. These are to calculate the flow-weighted average volume-capacity of the node, or to calculate the maximum volume-capacity ratio for all turns within a node. The average volume-capacity ratio provides an overview of how the individual node is performing but may not highlight locations where a limited number of movements at a node are approaching or exceeding capacity. To highlight these locations, the maximum volume-capacity ratio at each node has been used. Node volume-capacity ratios exceeding 85% indicate that the highway network is under stress, and there is likely to be a reduction in speed and increase in delay.
- 3.6.3 Figure 3.14 and Figure 3.15 show the forecast maximum node volume-capacity ratios for the 'With Development (2a)' and 'Without Development (1a)' scenarios in 2028 and 2038. For ease of comparison, the symbology has been designed to show the data for 'With Development (2a)' and 'Without Development (1a)' scenarios on the same plot.
- 3.6.4 The reader should note that Figure 3.14 and Figure 3.15 show a subset of all nodes within the EMFM to reduce the number of data points within the plots. Nodes which do not fall within the AoI, as defined in Figure 3.11, are not shown. Nodes with maximum volume-capacity ratios below 85% in all forecast scenarios are not shown, except for the node which is located at the proposed site access on the A453.
- 3.6.5 The forecast maximum node volume-capacity ratio plots show that the EMGP1 access junction, EMGP2 access junction, M1 J24, and the Finger Farm Roundabout are most affected by the proposed mitigation measures. EMFM forecasts that volume-capacity ratios at these junctions will broadly improve in the 'With Development (2a)' scenarios.

New M1 northbound to A50 westbound interchange link

- 3.6.6 The node volume-capacity ratios forecasts for the M1 J24 are at or approaching capacity in the 'Without Development (1a)' scenarios, with multiple nodes at this junction exceeding 85% in 2028 and 100% in 2038. With the inclusion of the proposed mitigation measures included in the 'With Development (2a)' scenarios the node volume-capacity decrease slightly overall. These improvements are a result of vehicles diverting off the M1 J24 to use the new link road and the additional capacity on the M1 southbound (and the accompanying signal optimisation (see Section 2.3)).
- 3.6.7 Figure 3.14 shows that in the AM Peak hour there are two nodes on the M1 J24 that are forecast to have higher node volume-capacity ratios in the 'With Development (2a)' scenario. These two nodes are located at J24 / A453 Remembrance Way and J24 / M1 northbound off-slip. As noted in Paragraph 3.6.2, the maximum volume-capacity for a turning movement within a node has been reported. In the case of J24 / A453 Remembrance Way this is the turn that continues on the gyratory and in the case of the J24 / M1 northbound off-slip the maximum volume-capacity ratio is from the gyratory towards the A453 southbound.
- 3.6.8 In the case of the J24 / A453 Remembrance Way node the forecast increase is caused by the additional road capacity provided by the mitigation measures, namely the additional lane on the M1 southbound. In the case of the J24 / M1 northbound off-slip node the forecast increase is caused by development traffic routing towards the proposed site as indicated by the increase in flow shown in Figure 3.9 and the distribution of development traffic shown in Figure 3.1 and Figure 3.2.

EMGP1 access improvements

- 3.6.9 The node volume-capacity ratios at Wilders Way / A453 / A6 Kegworth Bypass junction are forecast to generally decrease in both forecast years in the 'With Development (2a)' scenarios. This improvement is caused by traffic diverting off the A453 and onto the new link road and the EMGP1 access improvements and associated signal optimisation.

A453 Finger Farm Roundabout westbound exit widening

- 3.6.10 The node volume-capacity ratios for Finger Farm Roundabout are forecast to decrease in the AM Peak hour in both forecast years as a result of the proposed mitigation measures. The PM Peak is forecast to have nodes with higher node volume-capacity ratios in the 'With Development (2a)' and as shown in Figure 3.9 and Figure 3.10 there are higher volumes of traffic forecast on the A453 to the west of Finger Farm Roundabout.

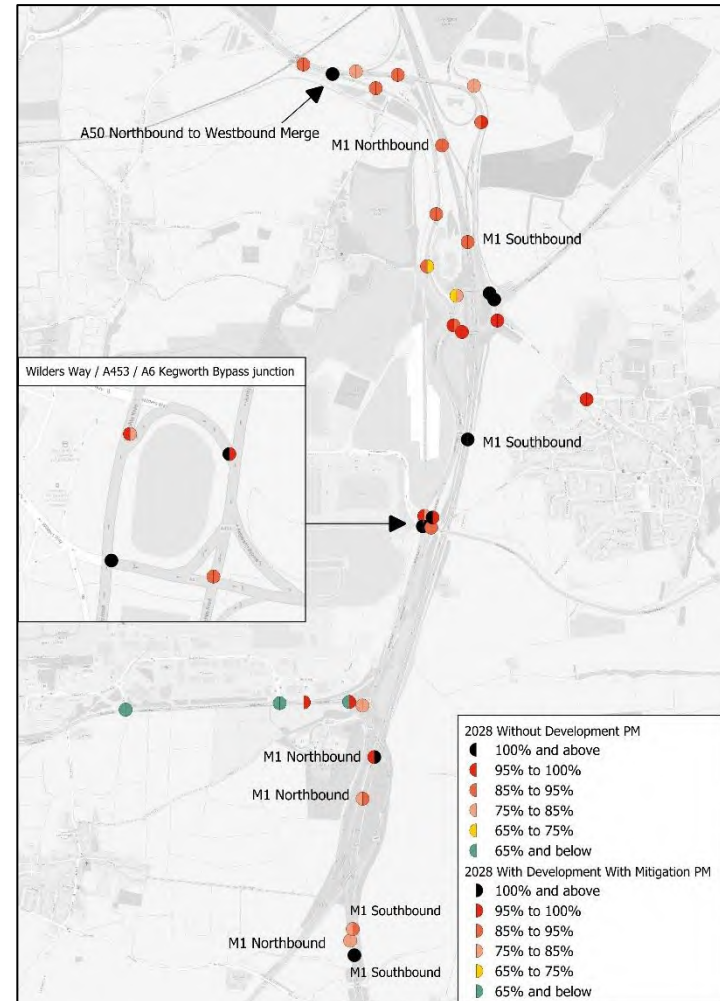
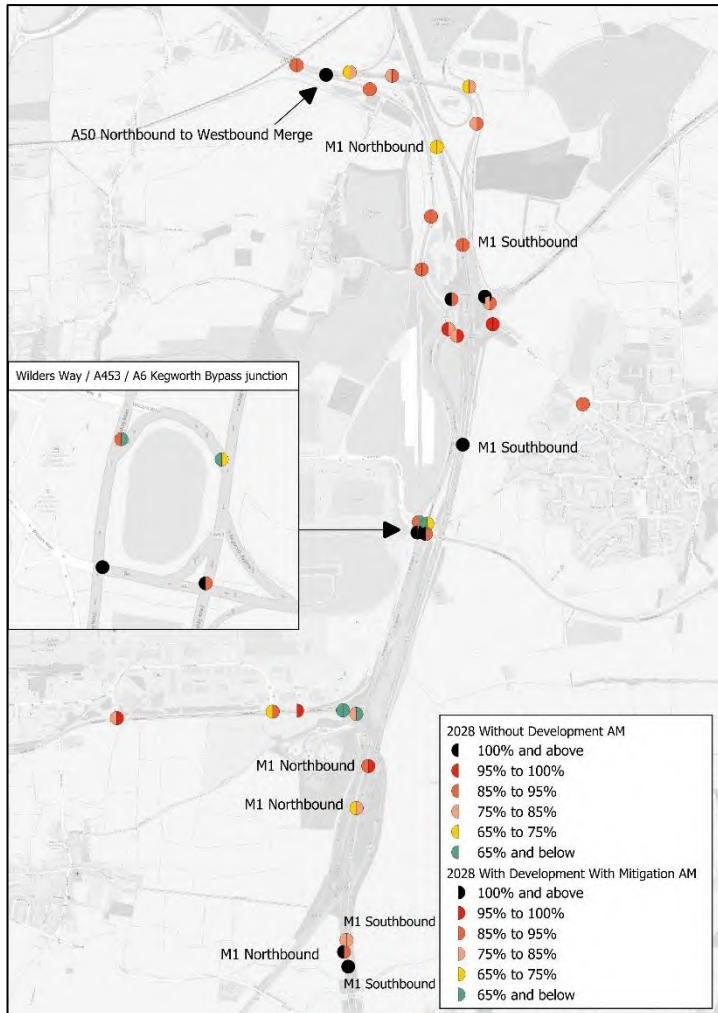
EMGP2 access roundabout and toucan crossing

- 3.6.11 The node volume-capacity ratios at EMGP2 access junction are forecast to increase in the AM Peak hour for both forecast years but remain the same in the PM Peak hour in 2028 and decrease in 2038. The proposed toucan crossing on the A453 is forecast to have a node volume-capacity ratio between 95% and 100% in both peaks and both forecast years. However, it should be noted that the toucan crossing is demand dependant and this demand dependency cannot be accurately reflected in the EMFM.

Figure 3.14: Forecast Node Volume-Capacity Ratio for 2028 'Without Development (1a)' and 2028 'With Development (2a)'

AM Peak hour

PM Peak hour

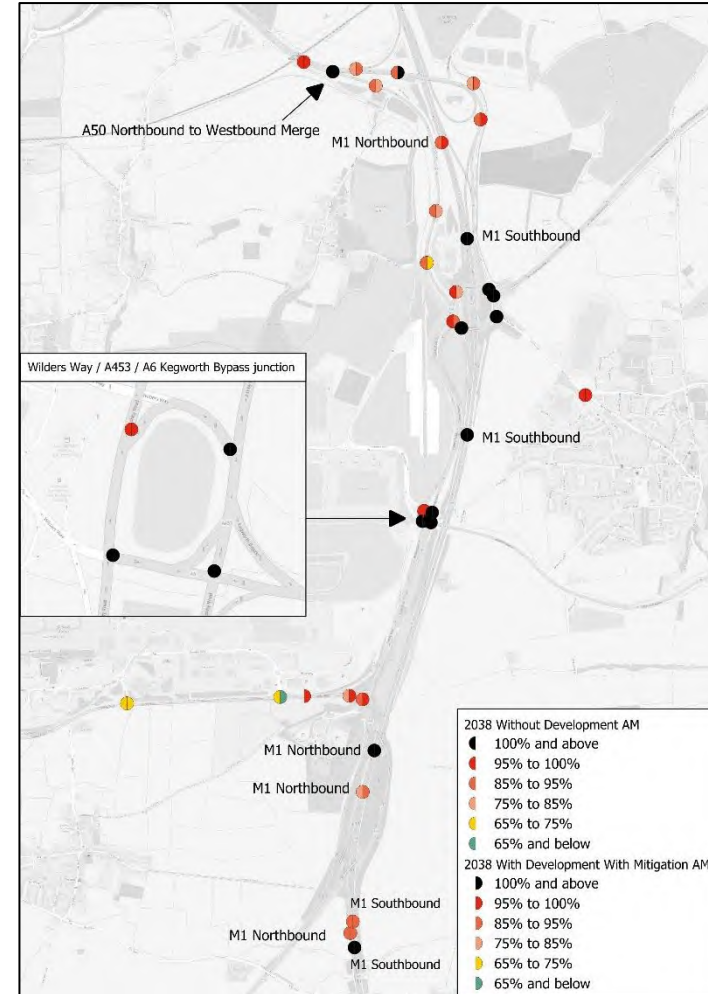
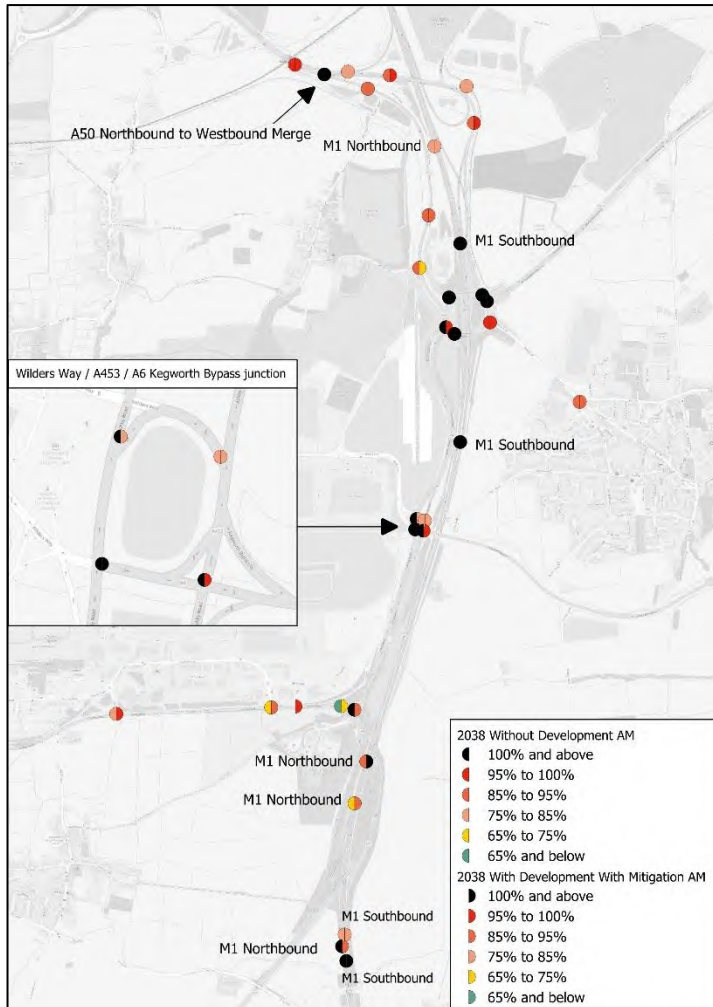


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Figure 3.15: Forecast Node Volume-Capacity Ratio for 2038 'Without Development (1a)' and 2038 'With Development (2a)'

AM Peak hour

PM Peak hour



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3.7 Forecast Junction Turning Flows

3.7.1 Forecast turning flows have been extracted for the following 16 junctions (also shown in Figure 3.16) in the vicinity of the proposed development:

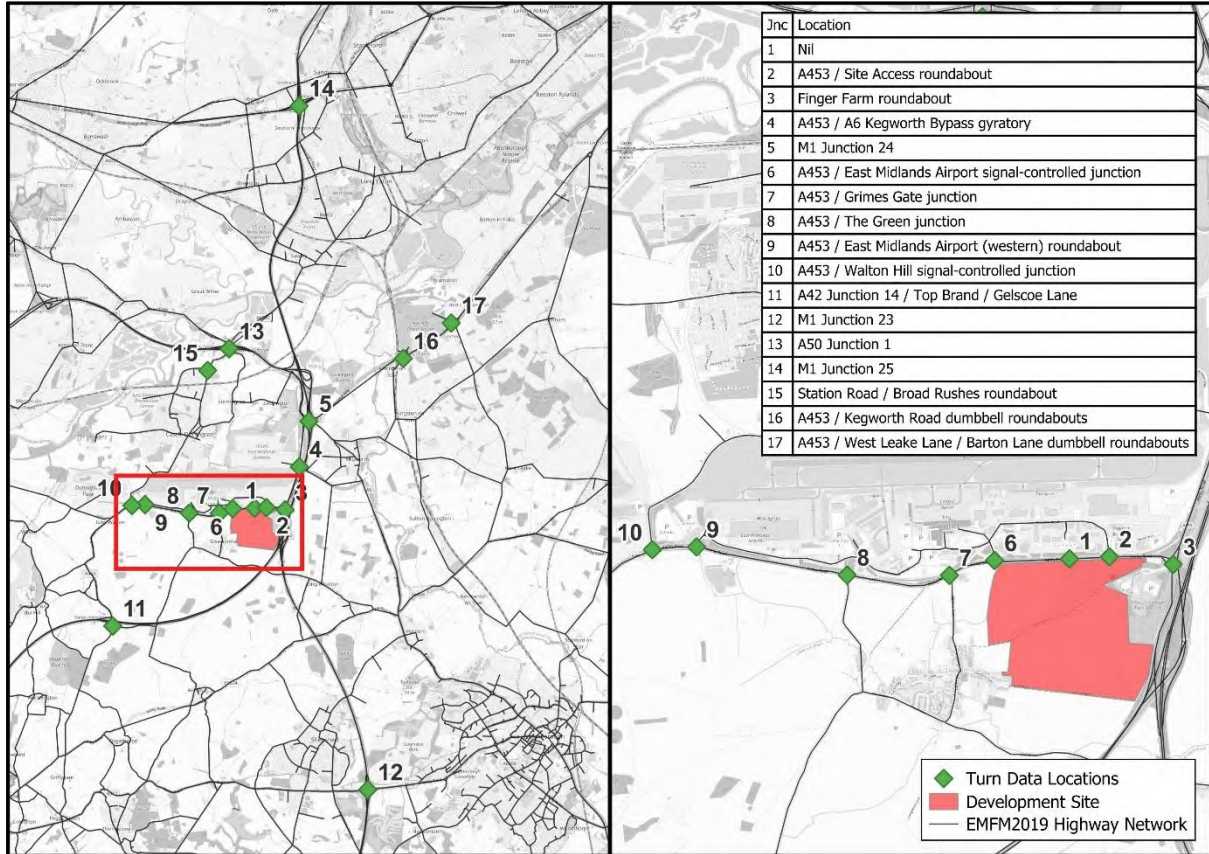
- A453 / Site access Roundabout (Junction 2);
- Finger Farm Roundabout (Junction 3);
- A453 / A6 Kegworth Bypass gyratory (Junction 4);
- M1 Junction 24 (Junction 5);
- A453 / East Midlands Airport signal-controlled junction (Junction 6);
- A453 / Grimes Gate junction (Junction 7);
- A453 / The Green junction (Junction 8);
- A453 / East Midlands Airport (western) roundabout (Junction 9);
- A453 / Walton Hill signal-controlled junction (Junction 10);
- A42 Junction 14 / Top Brand / Gelscoe Lane (Junction 11);
- M1 Junction 23 (Junction 12);
- A50 Junction 1 (Junction 13);
- M1 Junction 25 (Junction 14);
- Station Road / Broad Rushes roundabout (Junction 15);
- A453 / Kegworth Road dumbbell roundabouts (Junction 16); and
- A453 / West Leake Lane / Barton Lane dumbbell roundabouts (Junction 17).

3.7.2 The data have been provided separately in MS Excel spreadsheet format⁶ which contains the forecast turning flows for the AM Peak and PM Peak hours for light and heavy vehicles. Data are provided for the 2028 and 2038 'With Development (2a)' scenarios. In addition to the turning flows, turn volume-capacity ratios have also been provided where available.

3.7.3 By design the EMFM highway model has not been calibrated or validated for individual turning movements, so care should be taken when using forecasts of flows and volume-capacity ratios at this level.

⁶ EMGP2 - Junction Turning Flows (Stage 2a) v1.0 - For Issue.xlsx (provided via email on 16th May 2025)

Figure 3.16: Location of Forecast Turning Flow Data



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Section 4 – Sensitivity Test of A50 Merge Capacity

4.1 Introduction

4.1.1 A sensitivity test, '2a NH3', was requested to assess the impact of increasing capacity at the A50 westbound merge point at M1 Junction 24a. This is a key part of the network where traffic from the M1 southbound merges with traffic from M1 Junction 24, which includes flows originating from the gyratory as well as traffic using the proposed M1 northbound to A50 link mitigation.

4.1.2 This section presents the forecast model results for the sensitivity test during the AM Peak (08:00 to 09:00) and PM Peak (17:00 to 18:00) hours. The analysis includes:

- routing of the forecast development traffic in the 2028 and 2038 '2a NH3' scenarios (Section 4.2);
- forecast flow changes in 2028 and 2038 between the 'Without Development (1a)' and '2a NH3' scenarios (Section 4.3);
- forecast delay changes in 2028 and 2038 between the 'Without Development (1a)' and '2a NH3' (Section 4.4) scenarios; and
- forecast maximum node volume-capacity ratios in the 2028 and 2038 'Without Development (1a)' and '2a NH3' scenarios (Section 4.5).

4.1.3 Appendix B provides a comparison between the '2a NH3' and 'With Development (1a)' scenarios that includes forecast flow changes, delay changes and node volume-capacity ratios in 2028 and 2038.

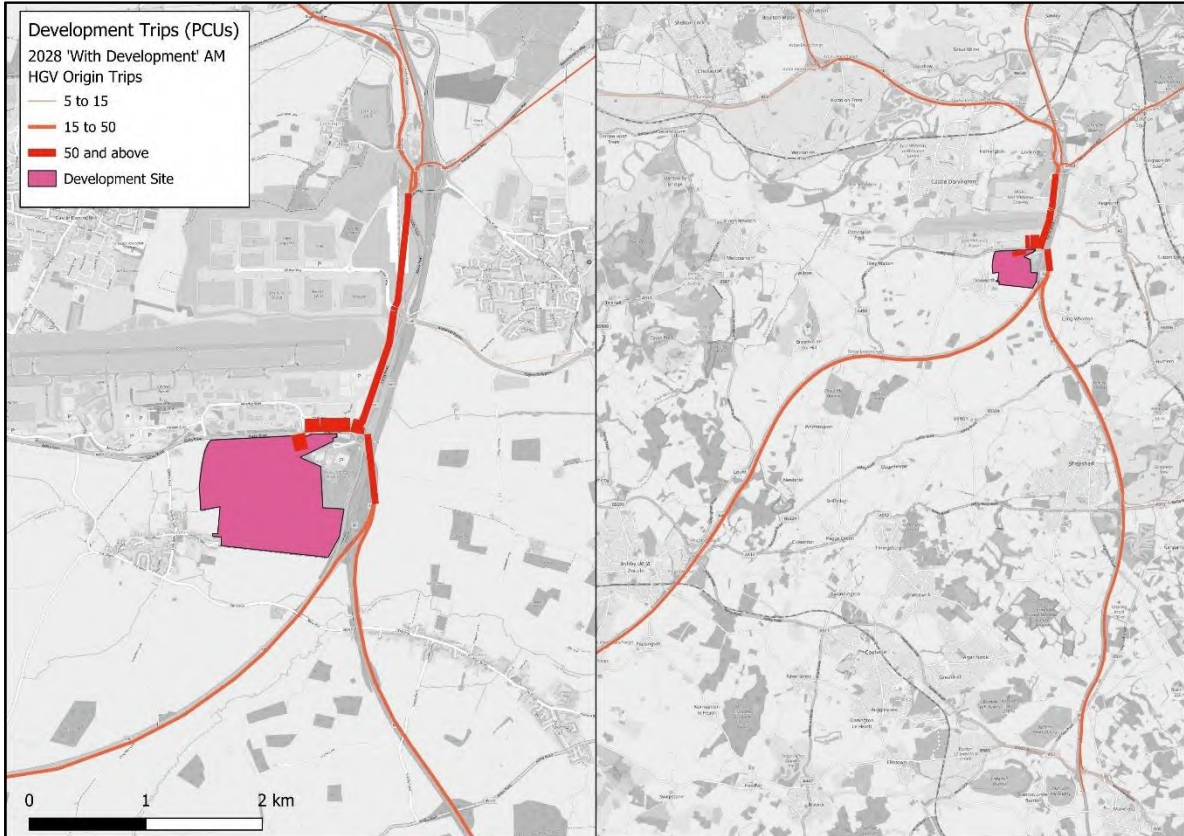
4.2 Forecast Development Traffic

4.2.1 Figure 4.1 to Figure 4.8 show the forecast development trip distribution separately for HGVs and light vehicles on the highway network for the 2028 and 2038 '2a NH3' tests in passenger car units (PCUs).

4.2.2 As expected, the forecast trip distribution for '2a NH3' is very similar to that of Stage 2a, with traffic routing through the network remaining largely unchanged.

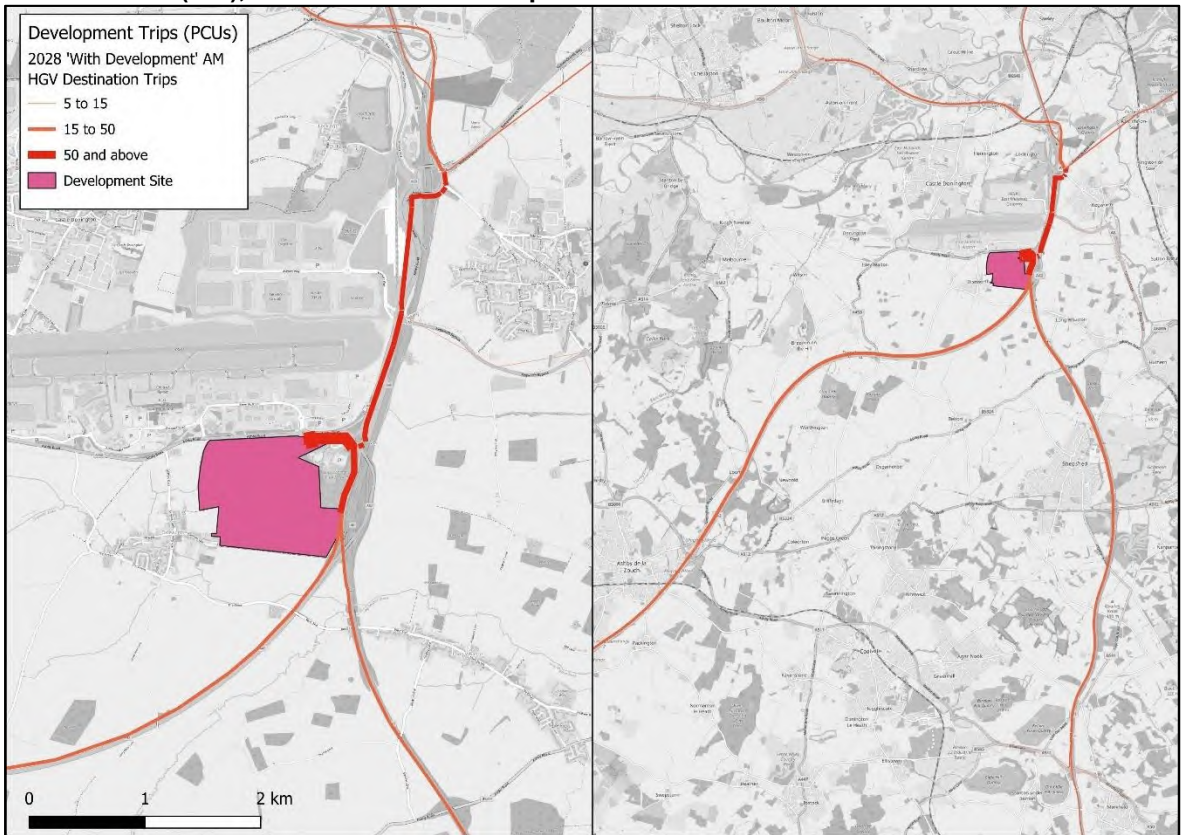
Figure 4.1: HGV Trip Distribution to and from the Proposed Development for 2028 (AM)

2028 '2a NH3' (AM), HGVs – From the Development



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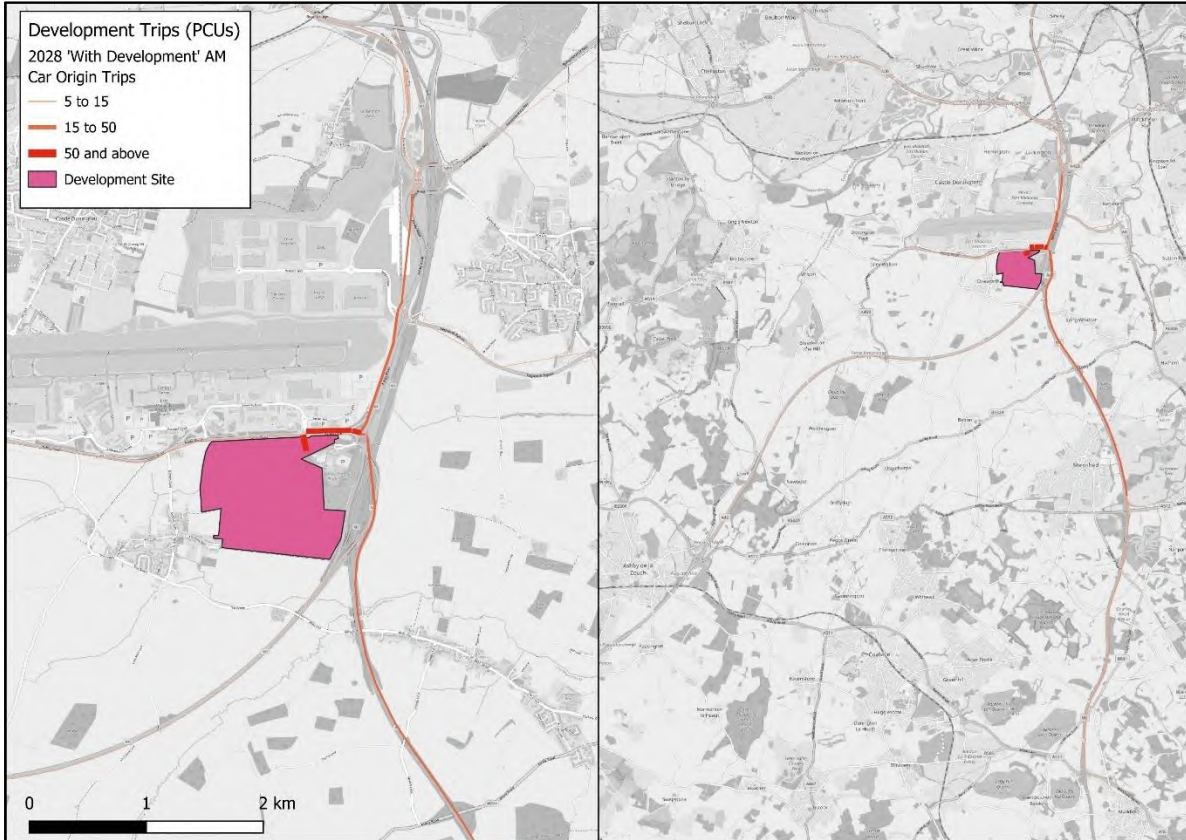
2028 '2a NH3' (AM), HGVs – To the Development



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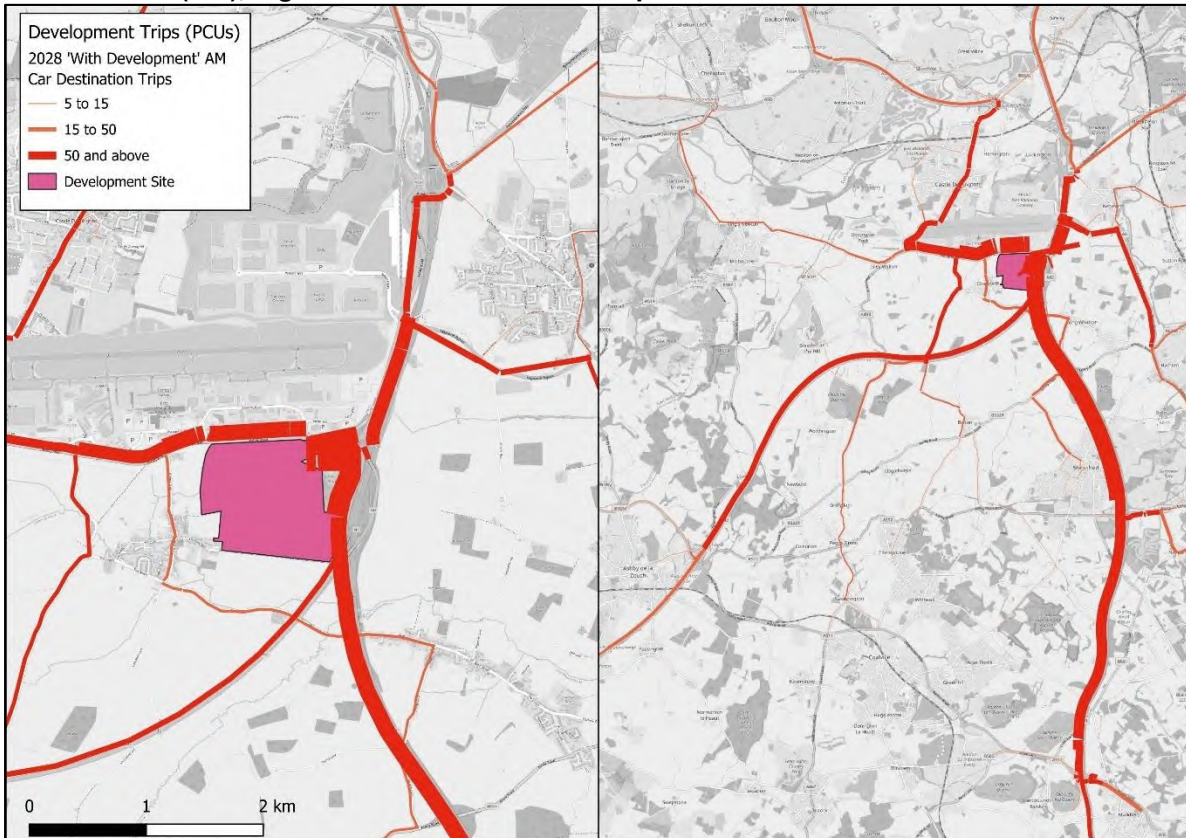
Figure 4.2: Light Vehicle Trip Distribution to and from the Proposed Development for 2028 (AM)

2028 '2a NH3' (AM), Light Vehicles – From the Development



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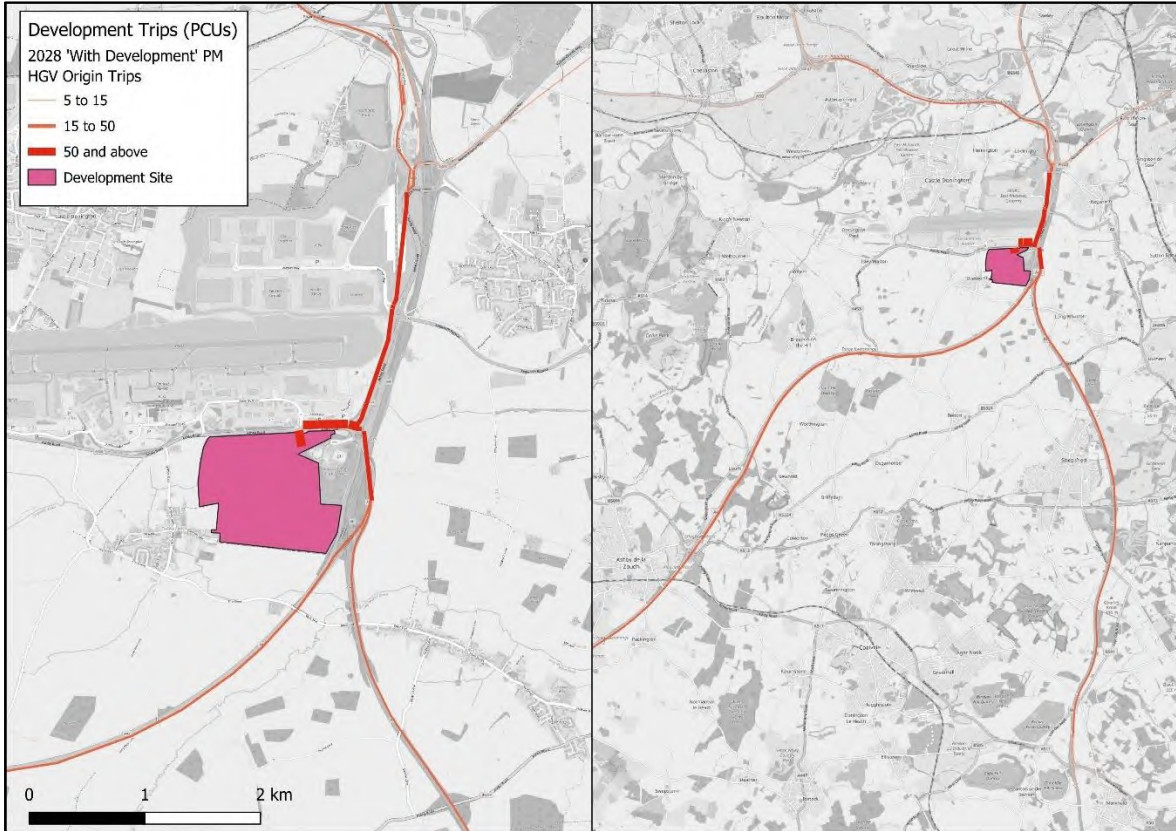
2028 '2a NH3' (AM), Light Vehicles – To the Development



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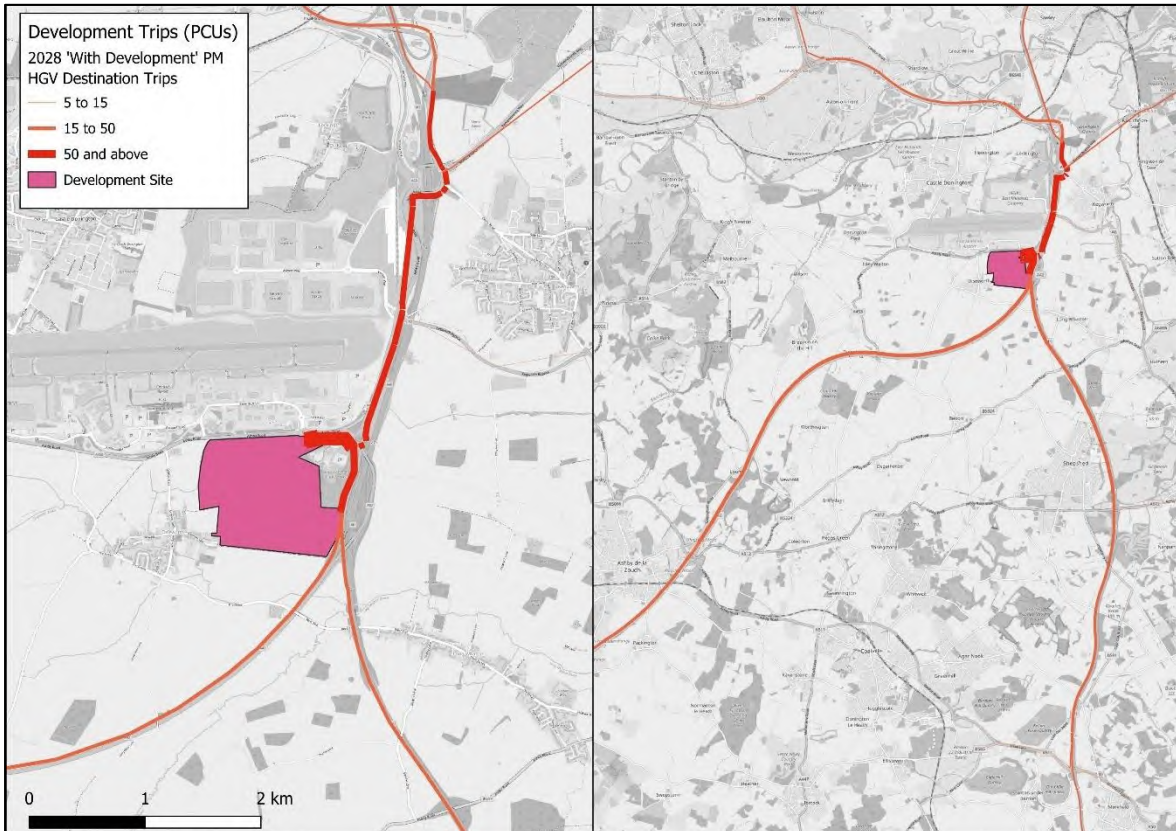
Figure 4.3: HGV Trip Distribution to and from the Proposed Development for 2028 (PM)

2028 '2a NH3' (PM), HGVs – From the Development



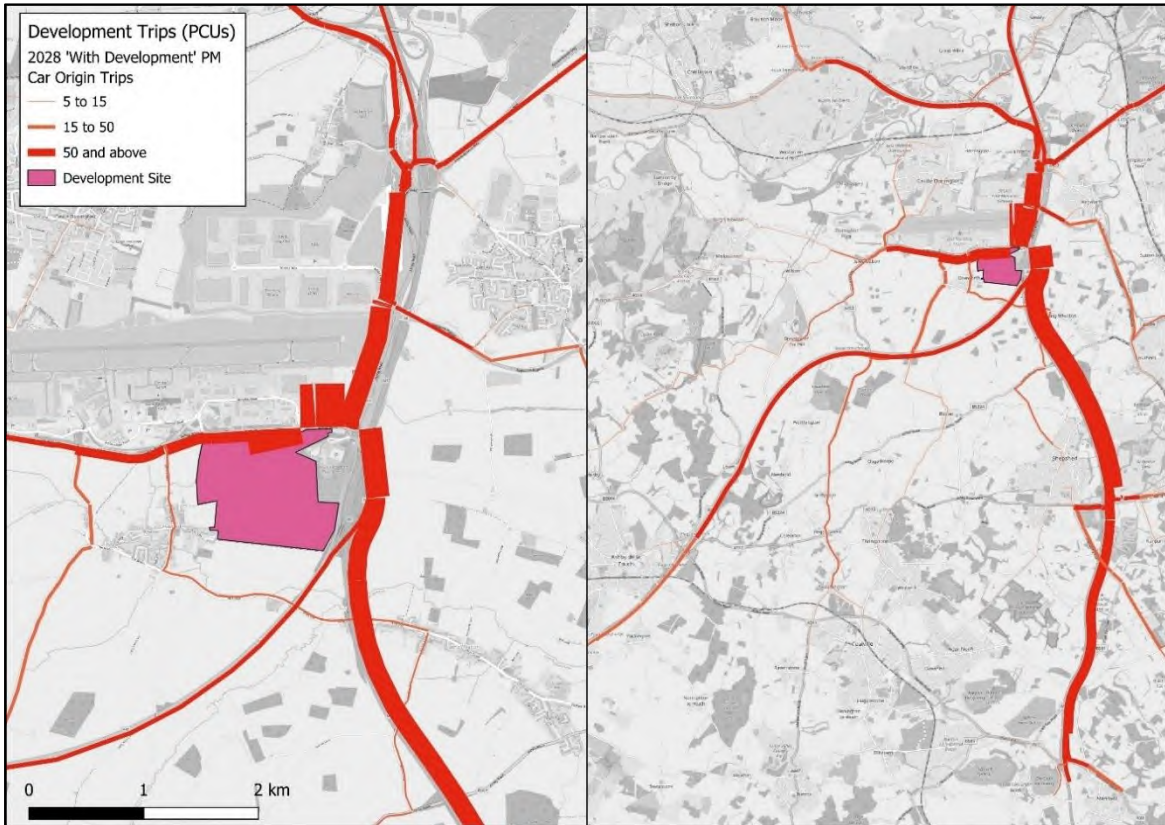
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2028 '2a NH3' (PM), HGVs – To the Development



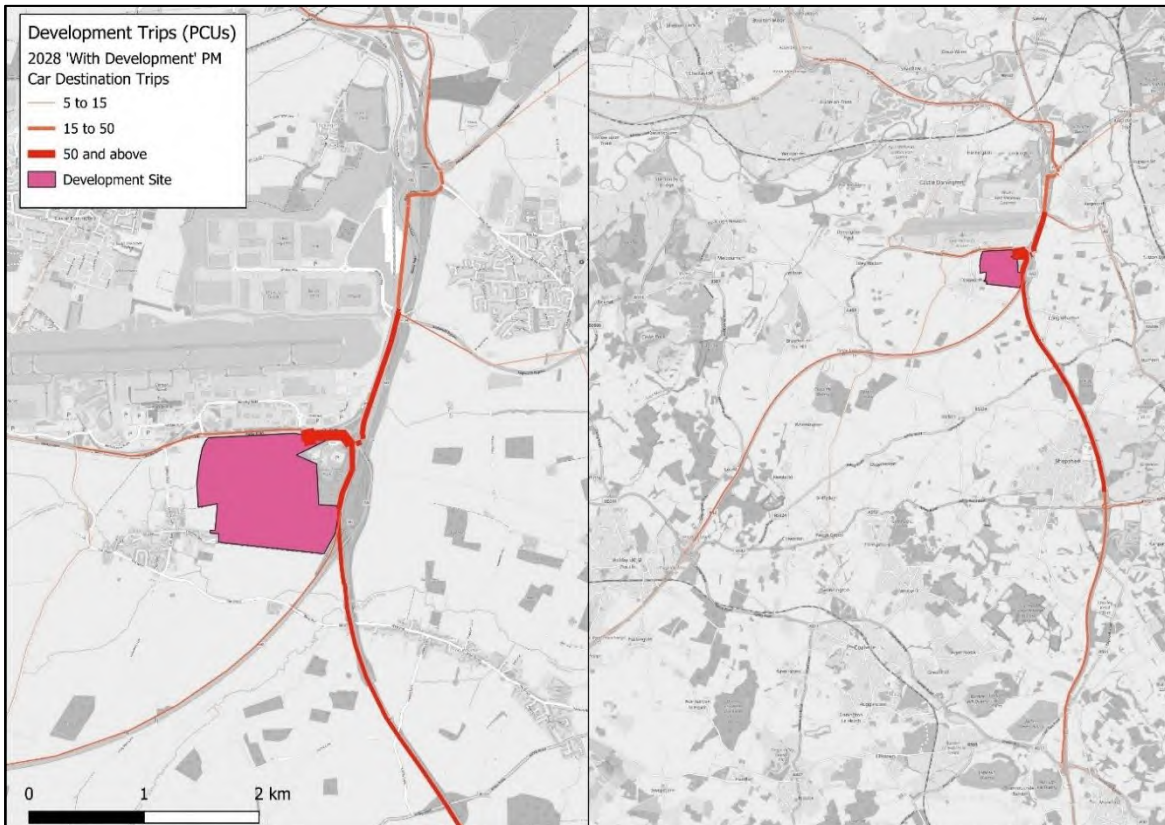
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Figure 4.4: Light Vehicle Trip Distribution to and from the Proposed Development for 2028 (PM)
2028 '2a NH3' (PM), Light Vehicles – From the Development



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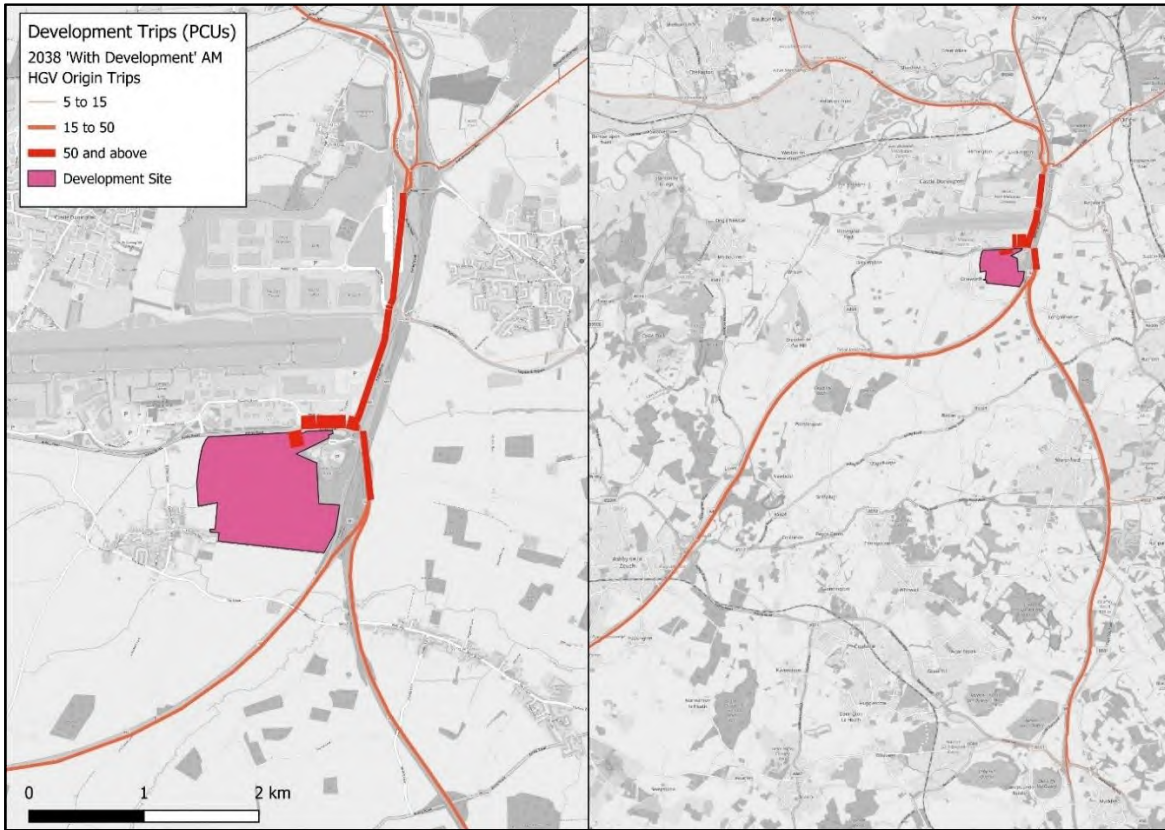
2028 '2a NH3' (PM), Light Vehicles – To the Development



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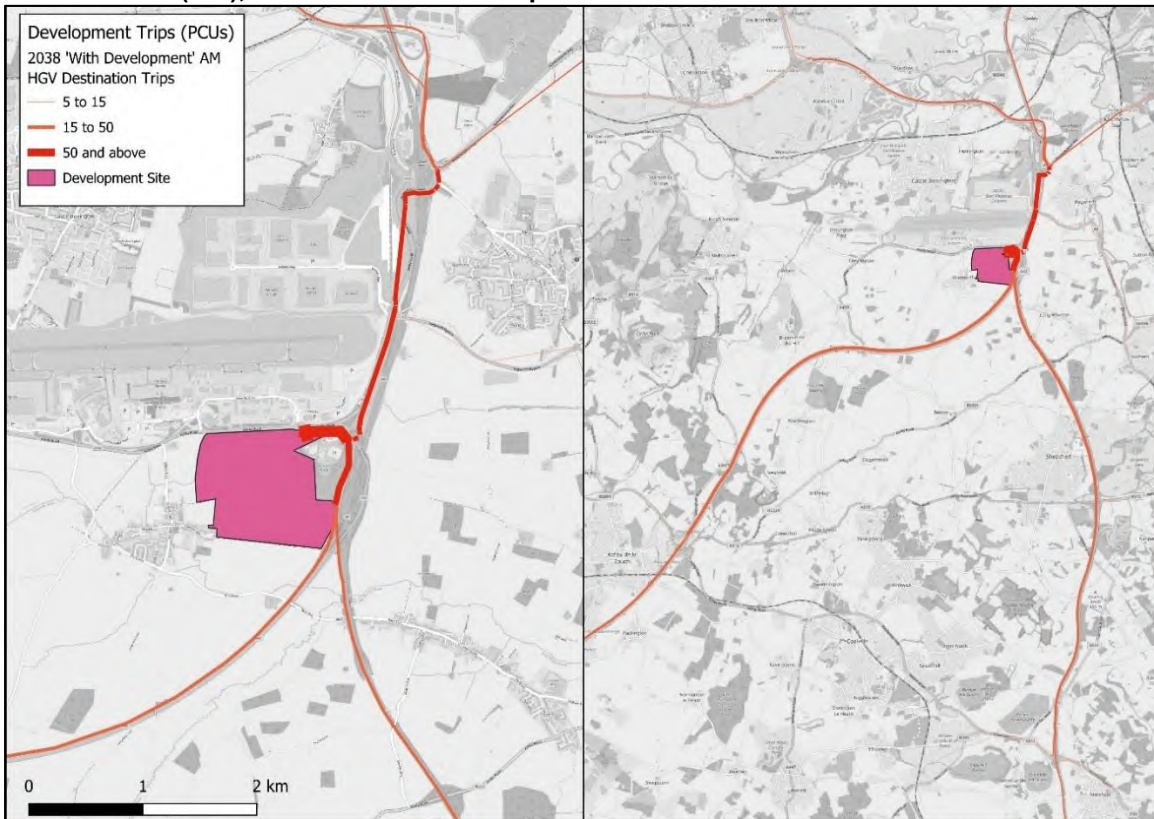
Figure 4.5: HGV Trip Distribution to and from the Proposed Development for 2038 (AM)

2038 '2a NH3' (AM), HGVs – From the Development



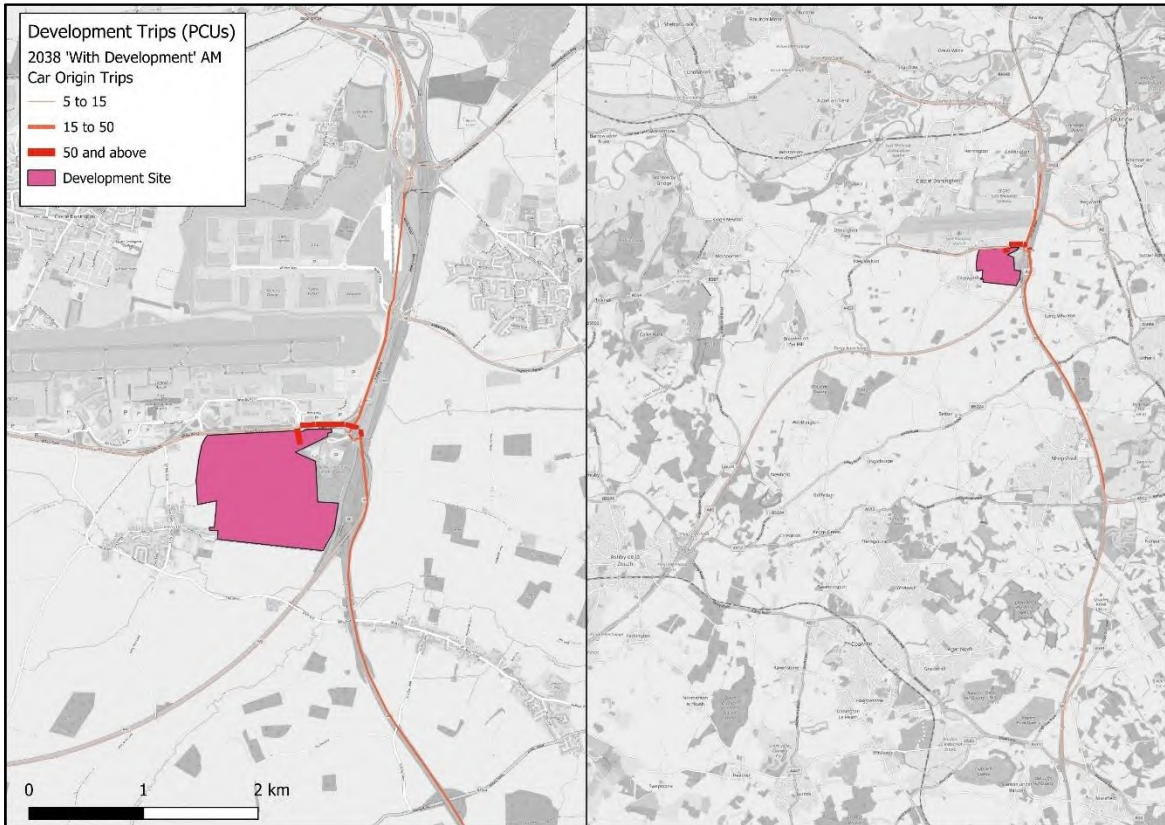
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2038 '2a NH3' (AM), HGVs – To the Development



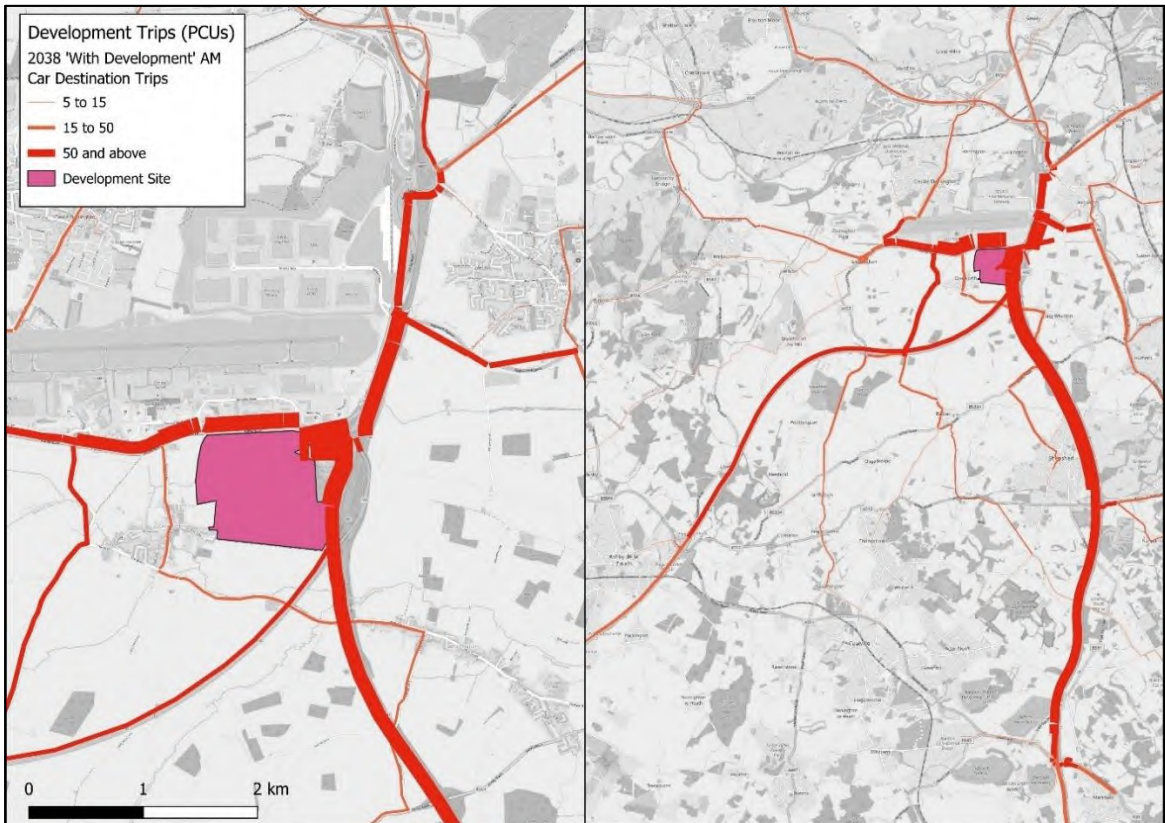
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Figure 4.6: Light Vehicle Trip Distribution to and from the Proposed Development for 2038 (AM)
2038 '2a NH3' (AM), Light Vehicles – From the Development



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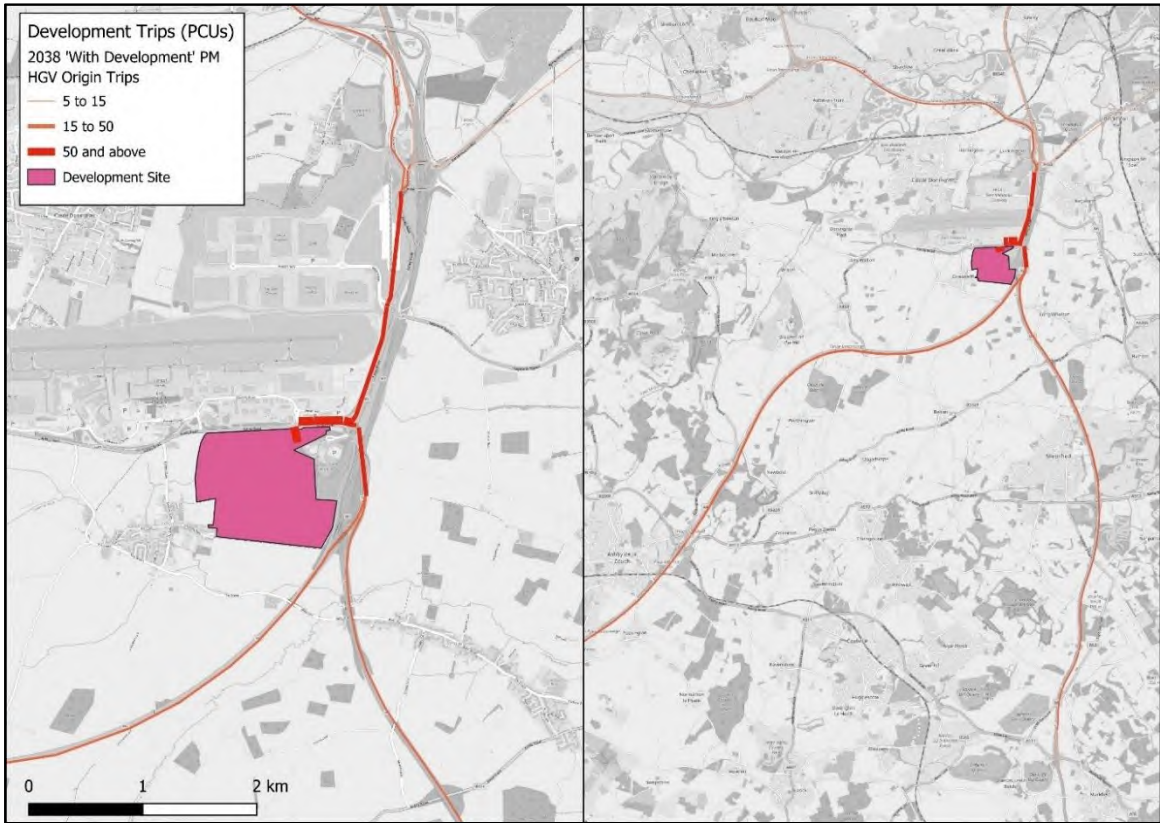
2038 '2a NH3' (AM), Light Vehicles – To the Development



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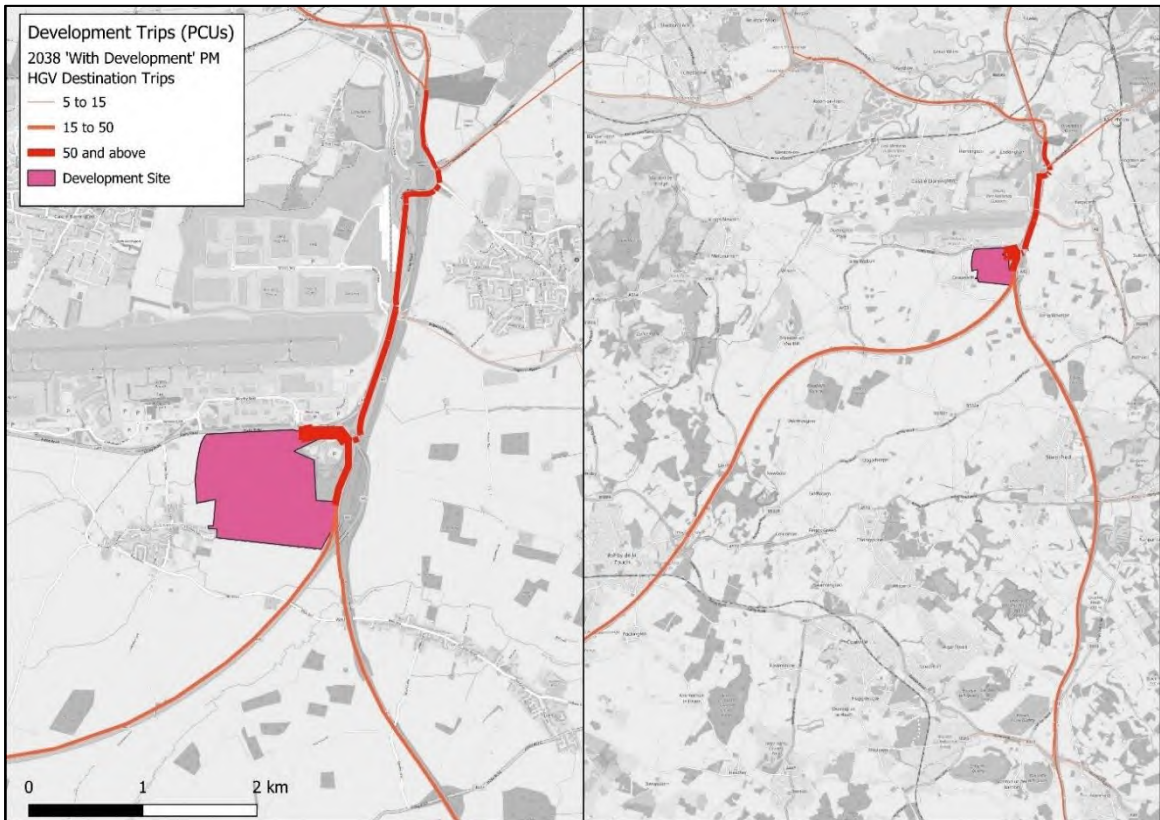
Figure 4.7: HGV Trip Distribution to and from the Proposed Development for 2038 (PM)

2038 '2a NH3' (PM), HGVs – From the Development



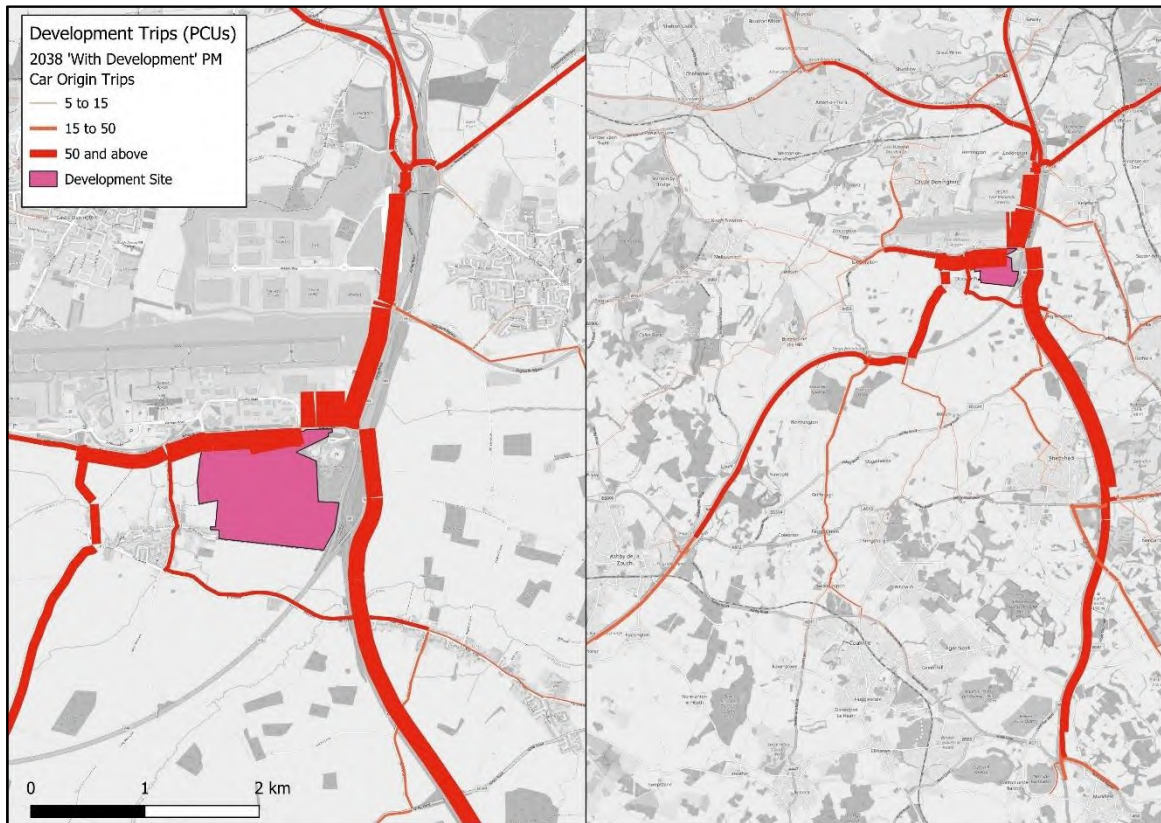
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2038 '2a NH3' (PM), HGVs – To the Development



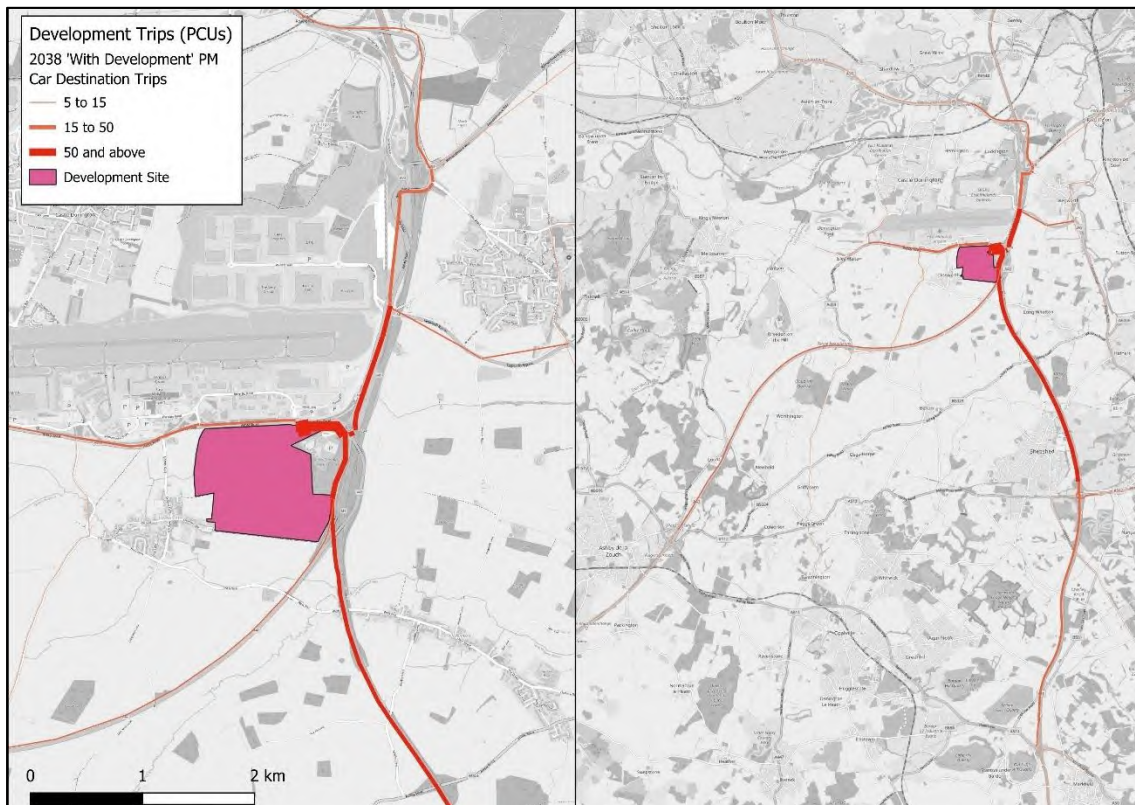
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Figure 4.8: Light Vehicle Trip Distribution to and from the Proposed Development for 2038 (PM)
2038 '2a NH3' (PM), Light Vehicles – From the Development



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2038 '2a NH3' (PM), Light Vehicles – To the Development



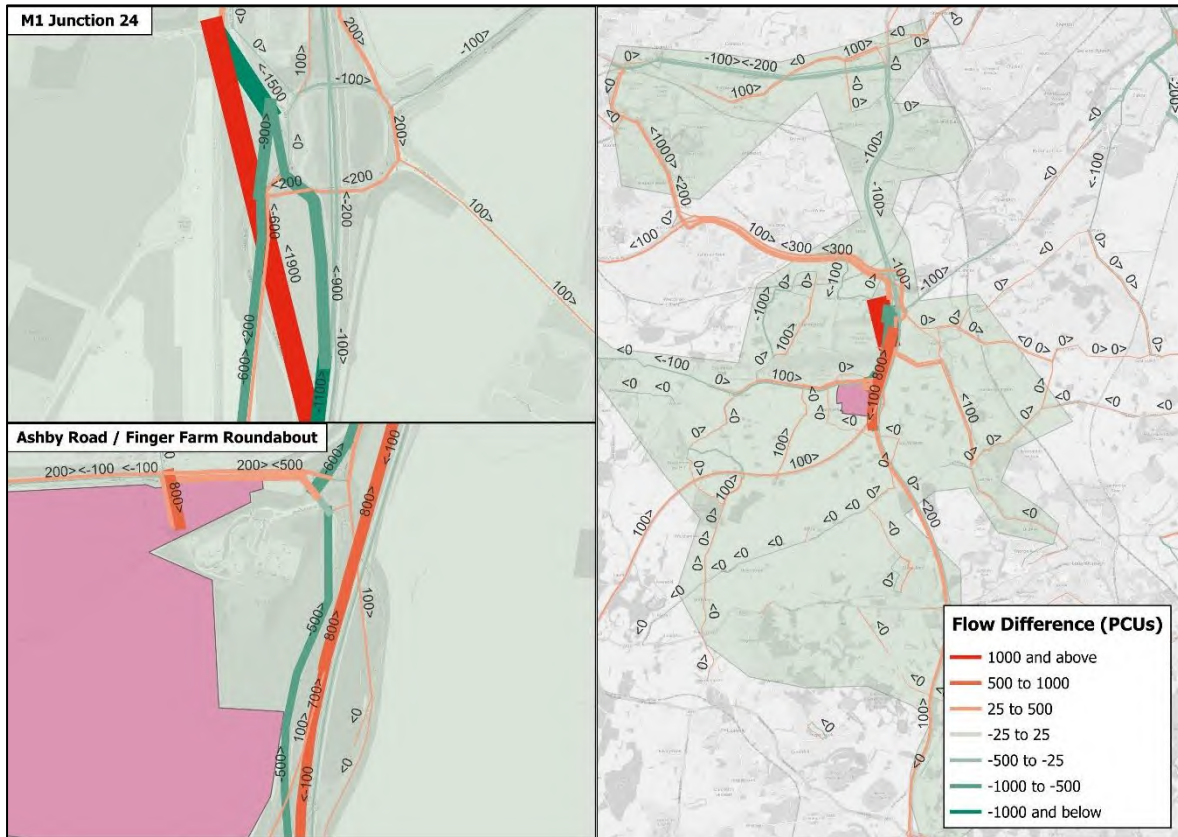
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4.3 Forecast Flow Change

- 4.3.1 Figure 4.9 and Figure 4.10 show the forecast flow changes in 2028 and 2038 between the '2a NH3' and 'Without Development (1a)' scenarios for the AM Peak and PM Peak hours. Red bandwidth represents a proportional increase in traffic flow in '2a NH3' and green bandwidth represents a decrease.
- 4.3.2 The forecast flow changes from the '2a NH3' scenario to the 'Without Development (1a)' scenario are very similar to that of the Stage 2a in Section 3.3, particularly in the vicinity of M1 Junction 24, the EMGP1 access roundabout, the A453 Finger Farm Roundabout and the EMGP2 access roundabout.
- 4.3.3 Due to the increased capacity at the A50 merge point, there is an increase (~300-400 PCUs) in traffic forecast on the A50 westbound in the '2a NH3' scenario, couple with an increase of up to 400 PCUs on the proposed M1 northbound to A50 link. This increase reflects traffic diverting from other routes such as via M1 J25, which in turn results in a reduction in traffic along routes such as the M1 northbound and the A52 westbound towards Derby.

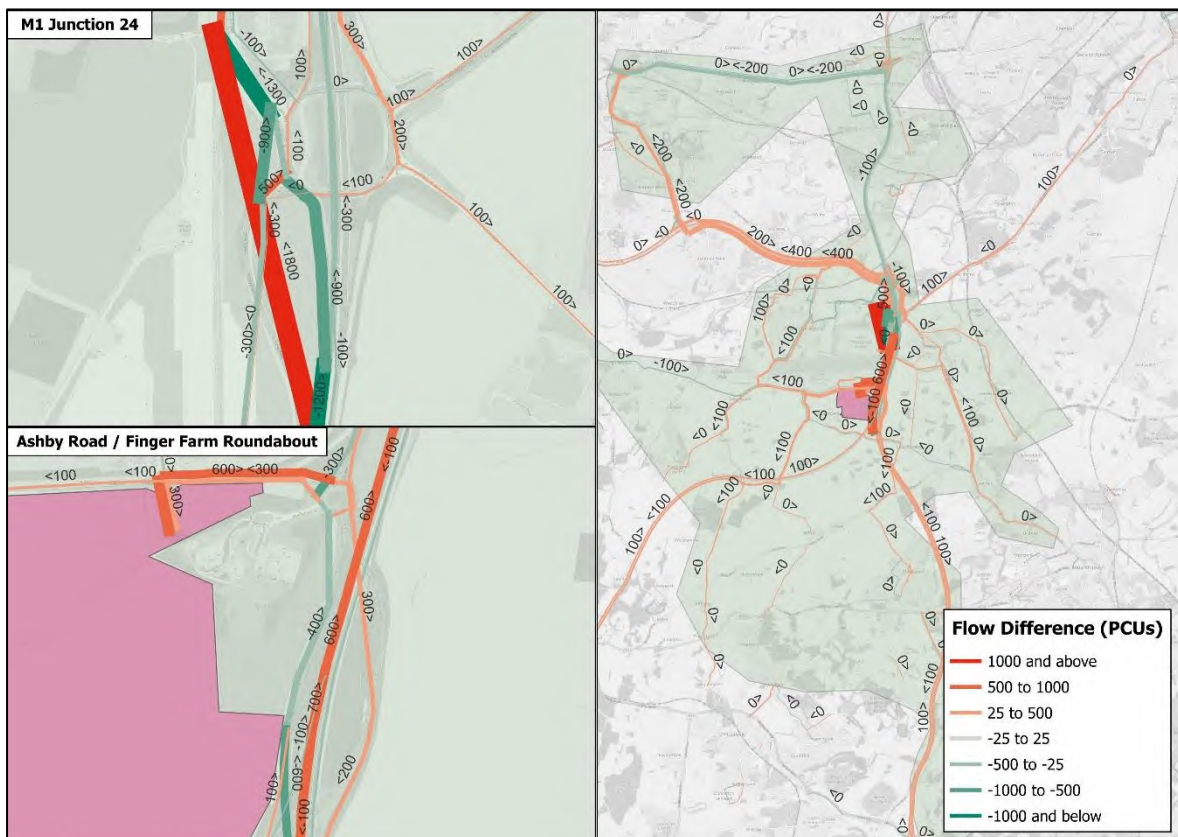
Figure 4.9: Forecast Flow Change for 2028 '2a NH3' minus 'Without Development (1a)'

AM Peak hour



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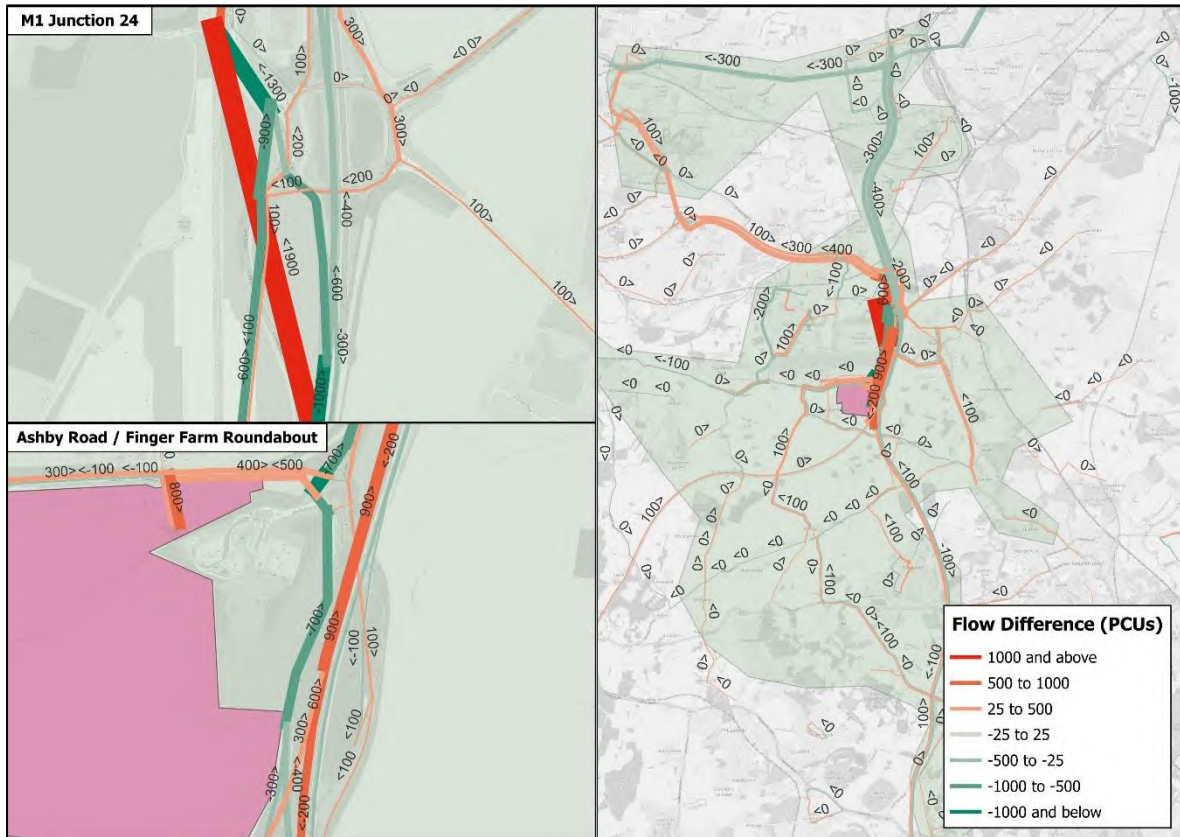
PM Peak hour



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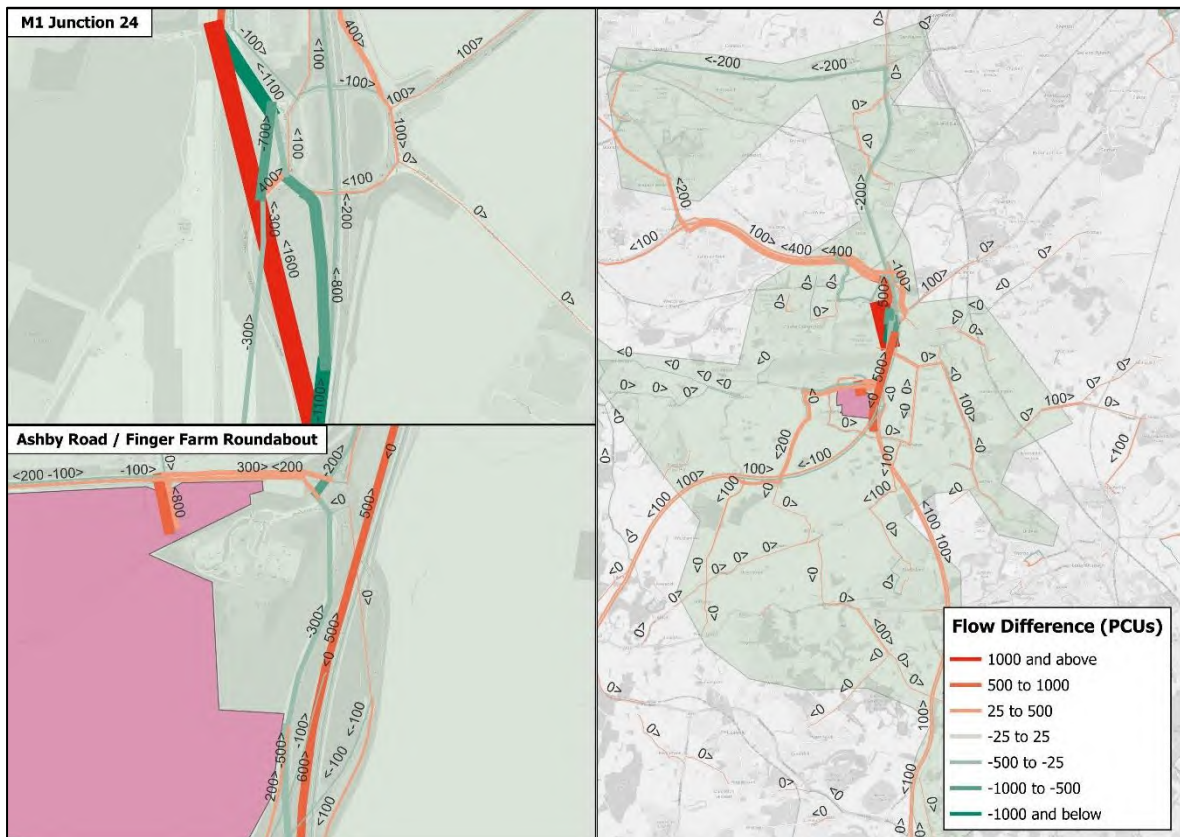
Figure 4.10: Forecast Flow Change for 2038 '2a NH3' minus 'Without Development (1a)'

AM Peak hour



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PM Peak hour



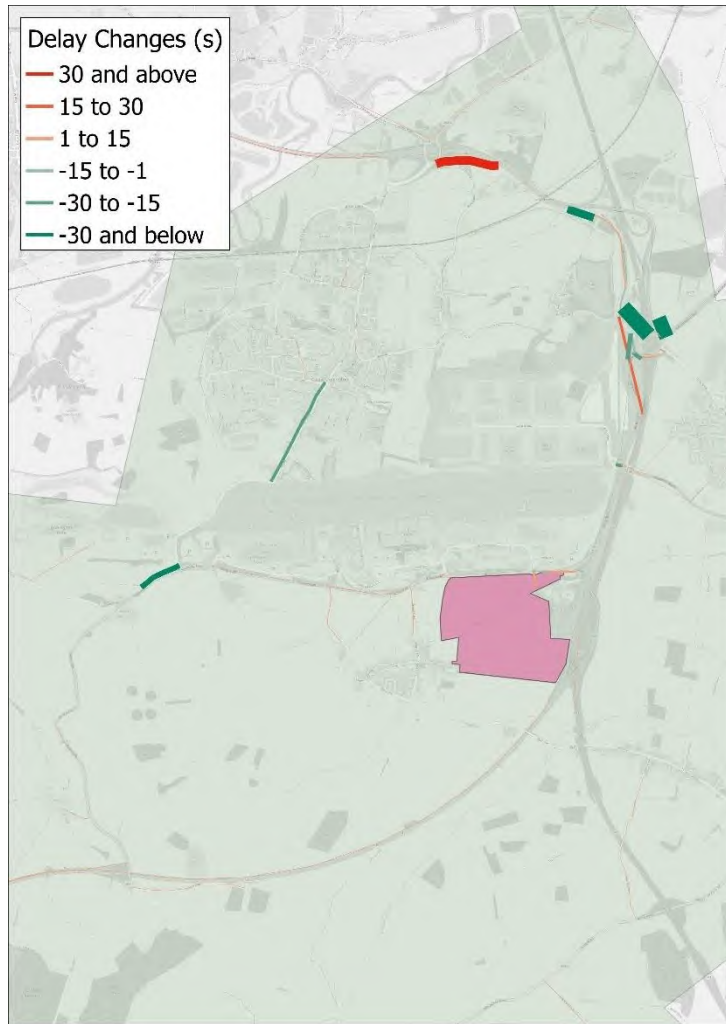
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4.4 Forecast Delay Change

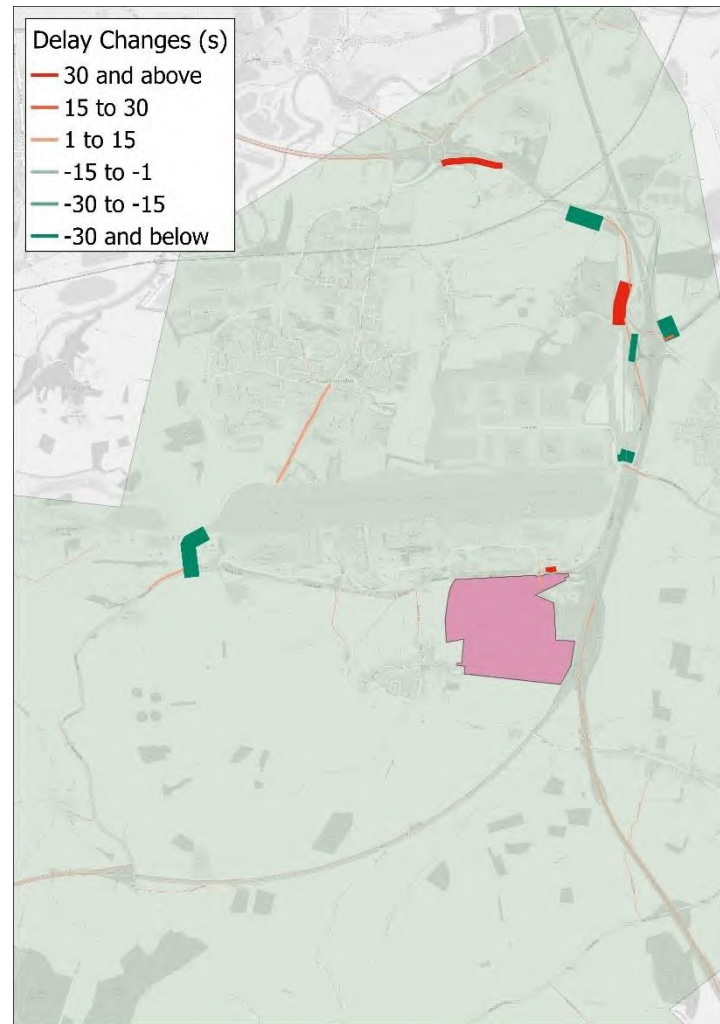
- 4.4.1 Figure 4.11 and Figure 4.12 show the forecast delay changes (in seconds) in 2028 and 2038 between the '2a NH3' and 'Without Development (1a)' scenarios for the AM Peak and PM Peak hours.
- 4.4.2 The forecast delay changes from '2a NH3' to 'Without Development (1a)' are very similar to that of Stage 2a in Section 3.5, particularly in the vicinity of M1 Junction 24, the EMGP1 access roundabout, the A453 Finger Farm Roundabout and the EMGP2 access roundabout.
- 4.4.3 Due to the increased capacity at the A50 westbound merge, a reduction in delay is forecast to occur on the A50 westbound at this point. An increase in delay is expected on the A50 westbound off-slip to A50 Junction 1 in all years and time periods as a result of additional traffic passing through the merge. In addition, delays are forecast to increase at the merge point to the north of the new link road where it meets the existing A50 access from M1 Junction 24 in the PM Peak in both years.

Figure 4.11: Forecast Delay Change for 2028 '2a NH3' minus 'Without Development (1a)'

AM Peak hour



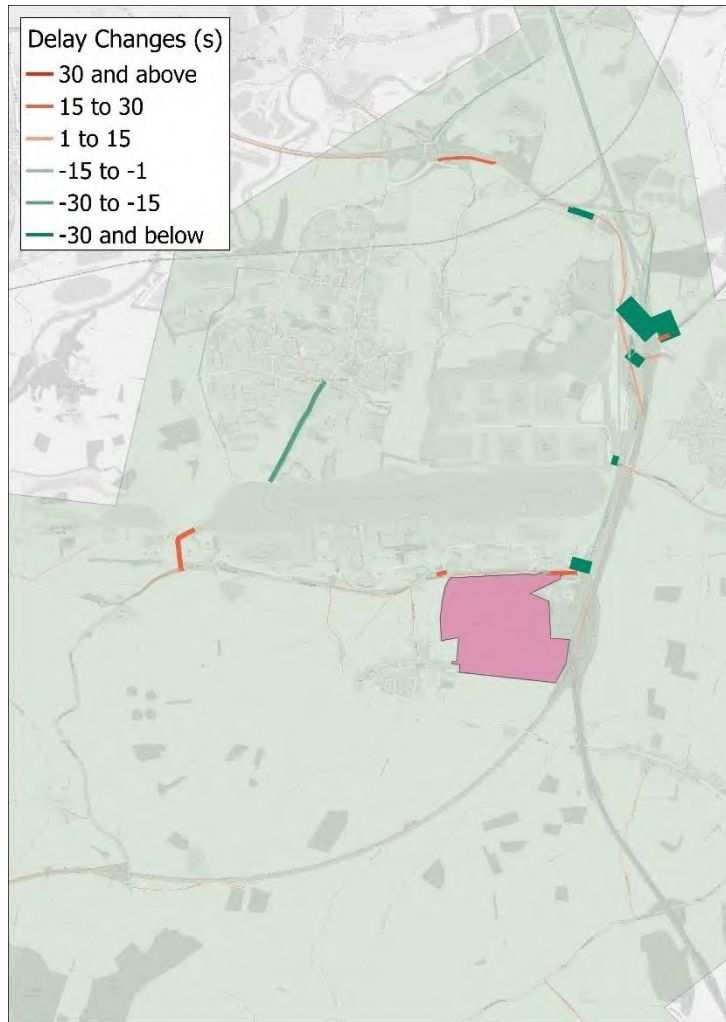
PM Peak hour



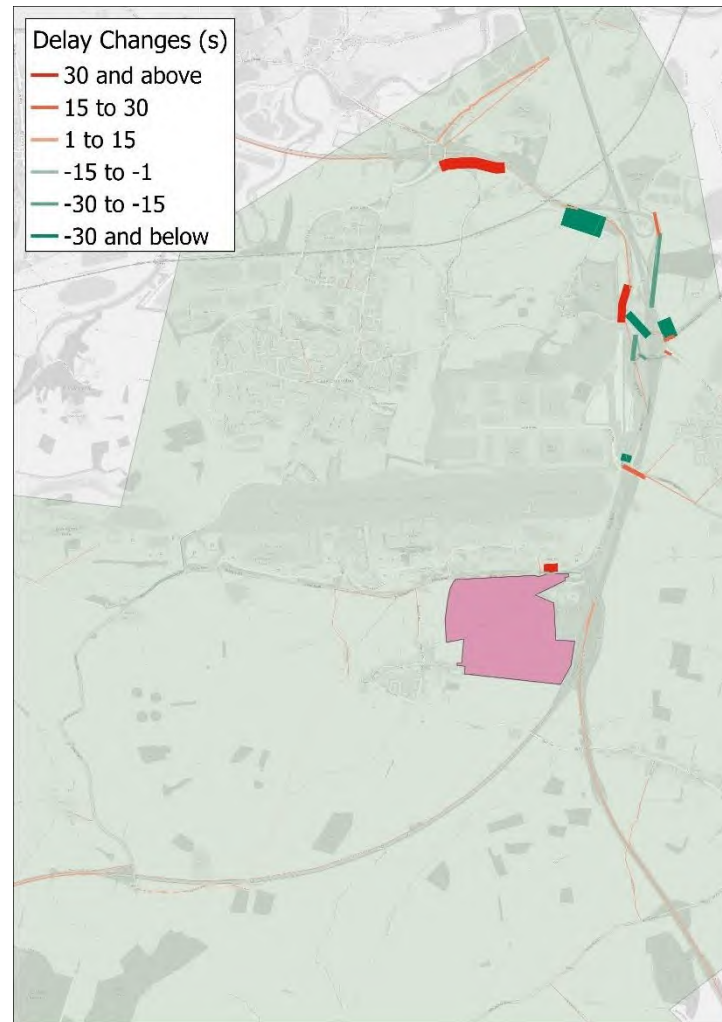
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Figure 4.12: Forecast Delay Change for 2038 '2a NH3' minus 'Without Development (1a)'

AM Peak hour



PM Peak hour



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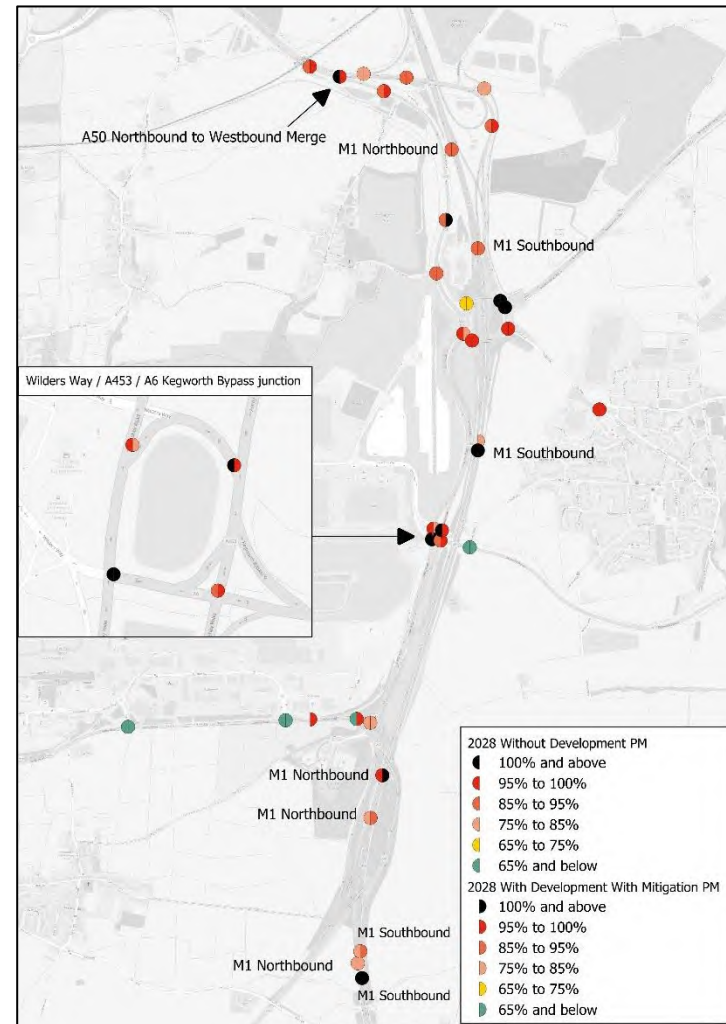
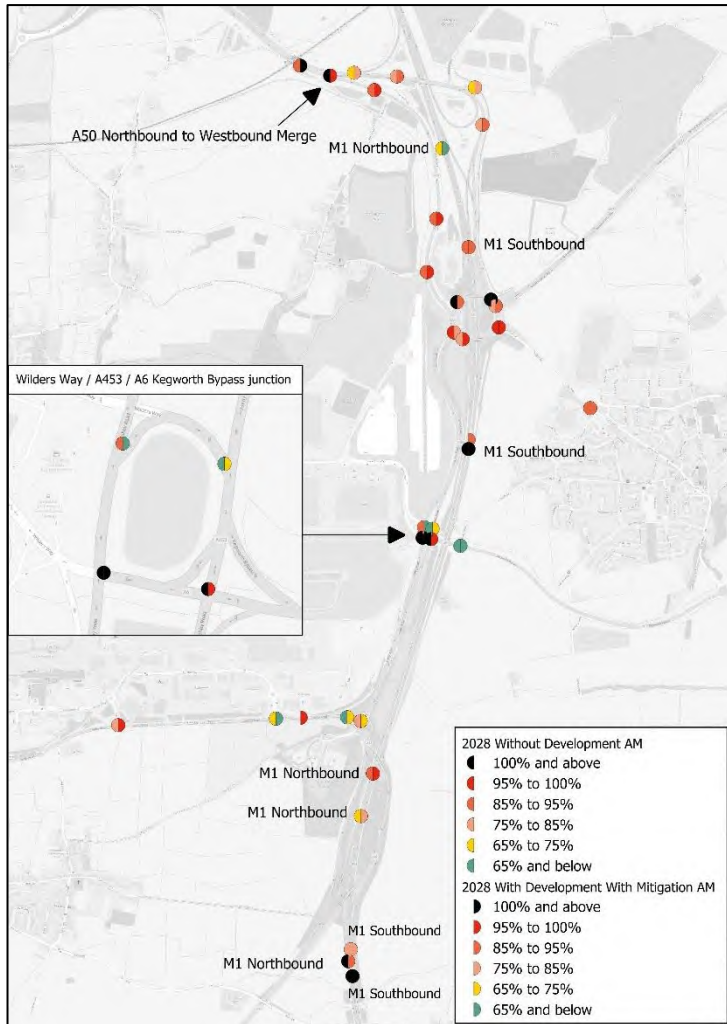
4.5 Forecast Node Volume-Capacity Ratios

- 4.5.1 Figure 4.13 and Figure 4.14 show the forecast maximum node volume-capacity ratios for the '2a NH3' and 'Without Development (1a)' scenarios in 2028 and 2038.
- 4.5.2 The forecast node volume-capacity ratios in the '2a NH3' scenario are very similar to that of Stage 2a presented in Section 3.6, particularly in the vicinity of M1 Junction 24, the EMGP1 access roundabout, the A453 Finger Farm Roundabout and the EMGP2 access roundabout.
- 4.5.3 Due to the increased capacity at the A50 merge, there is a slight improvement in the node volume-capacity at this location. However, the node volume-capacity is forecast to increase at nodes upstream and downstream of this location due to increased flow.

Figure 4.13: Forecast Node Volume-Capacity Ratio for 2028 'Without Development (1a)' and 2028 '2a NH3'

AM Peak hour

PM Peak hour

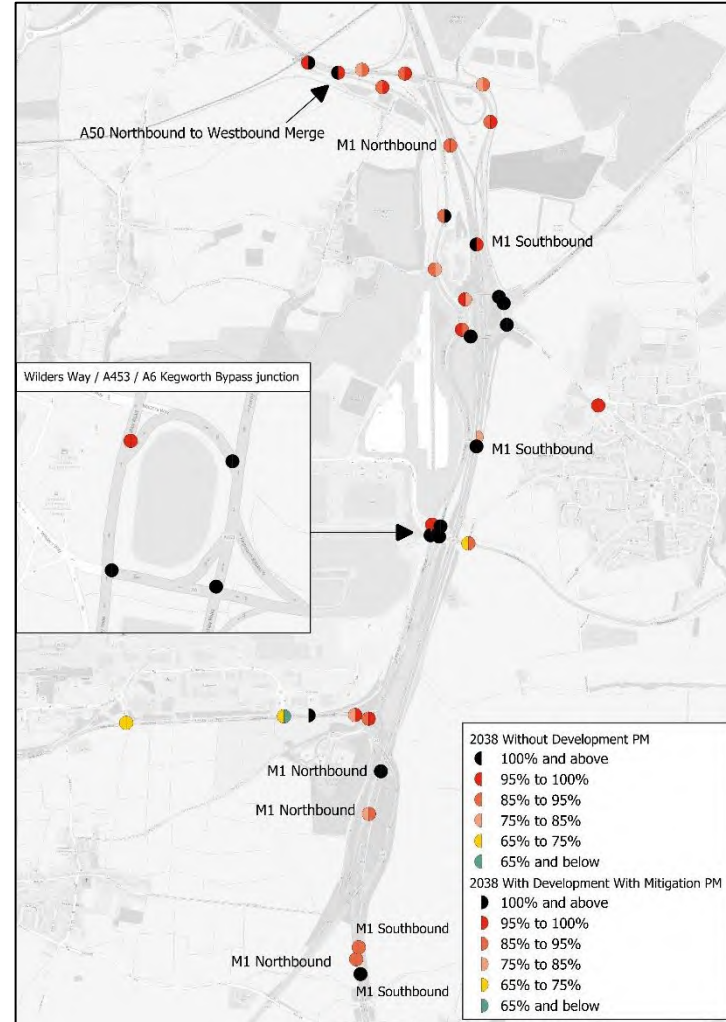
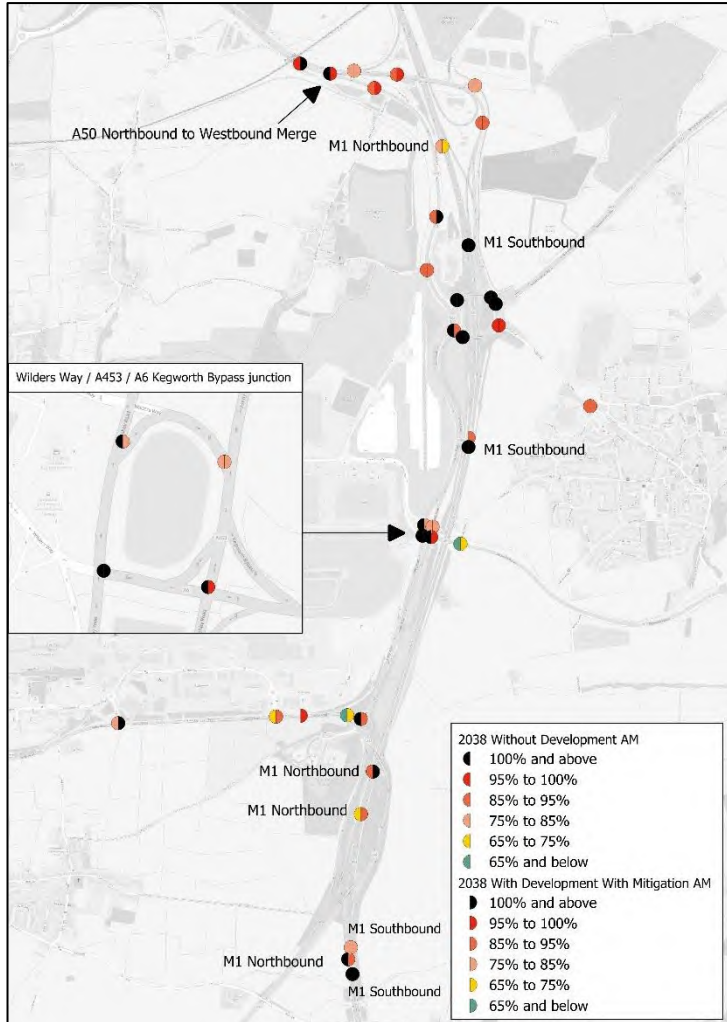


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Figure 4.14: Forecast Node Volume-Capacity Ratio for 2038 'Without Development (1a)' and 2038 '2a NH3'

AM Peak hour

PM Peak hour



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Section 5 – Summary of the Mitigation Assessment

5.1 Summary of Assessment

5.1.1 The East Midlands Freeport Model (EMFM) has been used for the strategic assessment of Stage (2a) for both 2028 and 2038 for the AM Peak and PM Peak hours ('With Development (2a)' scenarios). Stage 2a includes the proposed East Midlands Gateway Phase 2 development and the proposed mitigation measures and accompanying signal optimisation at two junctions adjacent to the mitigation measures.

5.1.2 The client has provided mitigation measures that have been included in the EMFM at the following locations:

- New M1 northbound to A50 westbound interchange link road.
- M1 southbound link approaching Junction 24.
- EMGP1 access improvements.
- A453 Finger Farm Roundabout westbound exit widening.
- EMGP2 access roundabout and toucan crossing.
- M1 J24 Minor Works.

5.1.3 The following is a summary of the key findings for the assessment of the mitigation measures.

- The trip distribution for the proposed development traffic is, as expected, very similar to the 'With Development (1a)' (without mitigation) scenarios. How development traffic routes through the network is also very similar.
- The forecast flow changes in 2028 and 2038 between the 'With Development (2a)' and 'Without Development (1a)' scenarios show that the largest increases in flows are forecast along the new interchange link road. With this proposed interchange link included traffic is forecast to divert off the A453 northbound, the Finger Farm Roundabout, the Wilders Way / A453 / A6 Kegworth Bypass roundabout and the M1 J24.
- There is an increase in traffic forecast on the M1 southbound towards the M1 J24 with the increase in capacity (additional lane) on the M1 southbound and associated signal optimisation (as noted in Section 2.3).
- As expected, there is an increase in flows along the A453 adjacent to the proposed development site as traffic accesses the development site with most traffic routeing to and from the east via Finger Farm Roundabout.
- An Area of Influence has been defined. A comparison between the Aols for Stage 1a and Stage 2a shows that they are broadly similar but with Stage 2a Aol not extending into Derbyshire as much as Stage 1a.
- The forecast delay changes in 2028 and 2038 between the 'With Development (2a)' and 'Without Development (1a)' scenarios show delays are forecast to slightly increase along the A453 in the immediate vicinity of the proposed development in all forecast scenarios due to the proposed development traffic and the proposed toucan crossing.
- With the new interchange link road included, delays are expected to occur on the A50 where vehicles join the A50 from the proposed link road. No delays exist in the 'Without Development (1a)' scenario as this junction does not exist in this scenario. However, delays are forecast to reduce at the M1 J24 and Finger Farm Roundabout as this mitigation measure has reduced traffic volumes at these junctions.
- A decrease in delay is forecast on the circulatory lanes of M1 J24 for all forecast scenarios in both the AM Peak and PM Peak hours. In addition, there are decreases in delays on the M1 southbound to the north of M1 J24. These reductions in delay are caused by the additional M1 southbound capacity (i.e. extra lane) and the optimisation of the signals at M1 J24 (see Section 2.3).
- The node volume-capacity ratios forecasts for the M1 J24 are at or approaching capacity in the 'Without Development (1a)' scenarios, with multiple nodes at this junction exceeding 85% in

2028 and 100% in 2038. With the inclusion of the proposed mitigation measures included in the 'With Development (2a)' scenarios the node volume-capacity overall reduce slightly. These improvements are a result of vehicles diverting off the M1 J24 to use the new link road and the additional capacity on the M1 southbound.

- The node volume-capacity ratios at Finger Farm Roundabout and Wilders Way / A453 / A6 Kegworth Bypass junctions are forecast to generally improve in both forecast years in the 'With Development (2a)' scenarios. This improvement is caused by traffic diverting off the A453 and onto the new link road and the EMGP1 access improvements and associated signal optimisation.
- The node volume-capacity ratios at EMGP2 access junction are forecast to increase in the AM Peak hour for both forecast years but remain the same in the PM Peak hour in 2028 and decrease in 2038. The proposed toucan crossing on the A453 is forecast to have a node volume-capacity ratio between 95% and 100% in both peaks and both forecast years. However, it should be noted that the toucan crossing is demand dependant and this demand dependency cannot be accurately reflected in the EMFM.
- A sensitivity test, '2a NH3', assessing the mitigation scenario assuming increased capacity at the A50 westbound merge point at M1 Junction 24a, was also conducted. The key findings align closely with those of the 'With Development (2a)' scenarios, with an improvement in delay and node volume-capacity ratios at this merge. However, an increase in delay is anticipated on the A50 westbound off-slip to A50 Junction 1 in all forecast years and time periods. Furthermore, delays are forecast to increase at the merge point to the north of the new link road where it meets the existing A50 access from M1 Junction 24 in the PM Peak in both years. This is reflected by increasing node volume-capacity ratios upstream and downstream of the A50 merge.

5.1.4 The forecasts undertaken reflect the forecast impact of the proposed development at East Midlands Gateway Phase 2 with the proposed mitigation measures included. It should be noted that the results provided in this report are at a high level. Due to the strategic nature of the EMFM, not all roads are modelled, and the results should be interpreted with that in mind.

5.1.5 Although the EMFM modelling provides the strategic impact and form part of the proposed East Midlands Gateway Phase 2 assessment evidence packs, the overall assessment should be complemented by local operational assessment and analysis.

Appendix A Comparison of Stage 2a (with mitigation included) and Stage 1a (no mitigation)

Introduction

- A.1.1 Appendix A compares Stage 2a, which includes the proposed mitigation measures ('With Development (2a)'), with Stage 1a that does not include the proposed mitigation measures ('With Development (1a)'). This comparison therefore assesses the impact of the proposed mitigation measures being included on the network. Appendix A should be read in conjunction with Section 2 of this report that details the proposed mitigation measures.

Forecast Flow Change

- A.1.2 Figure A.1 and Figure A.2 show the forecast flow changes in 2028 and 2038 between the 'With Development (2a)' and 'With Development (1a)' scenarios for the AM Peak and PM Peak hours. Red bandwidth represents an increase in traffic flow in the 'With Development (2a)' scenario and green bandwidth represents a decrease.

New M1 northbound to A50 westbound interchange link

- A.1.3 As expected, the largest increase in flow is forecast along the new M1 northbound interchange link road across all modelled forecast scenarios. Traffic has diverted off the A453, the Finger Farm Roundabout, the Wilders Way / A453 / A6 Kegworth Bypass and the M1 J24.

M1 southbound link approaching Junction 24

- A.1.4 There is an increase in traffic forecast on the M1 southbound towards the M1 J24 with the increase in capacity on the M1 southbound. As noted in Section 2.3 the signalised junction at the M1 southbound / J24 has been optimised to 'unlock' the benefit of this mitigation measure.

EMGP1 access improvements

- A.1.5 This mitigation measure is forecast to reduce delays at this junction leading to an increase in traffic from the A6 Kegworth Bypass. As noted in Section 2.3 the signalised junction at the M1 southbound / J24 has been optimised to 'unlock' the benefit of this mitigation measure.

A453 Finger Farm Roundabout westbound exit widening

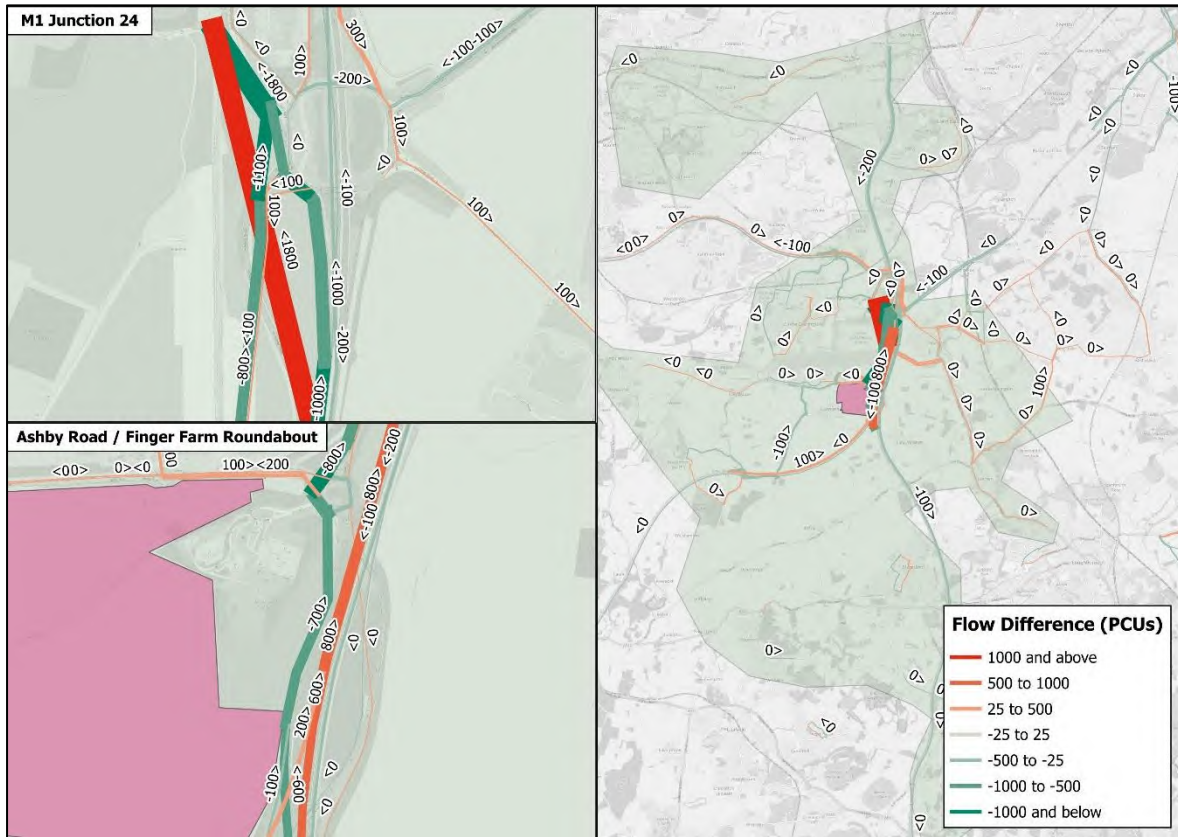
- A.1.6 A reduction in northbound traffic on the A453 is forecast at Finger Farm Roundabout primarily as a result of the new link road that is forecast to divert traffic off the A453 northbound.

EMGP2 access roundabout and toucan crossing

- A.1.7 There is an increase in traffic forecast on the A453 to the east of the proposed site in the 'With Development (2a)' scenario in the AM Peak hours. This increase in traffic is caused by the proposed mitigation measures providing additional capacity at the EMGP2 access roundabout and Finger Farm Roundabout, allowing development traffic to divert off local roads and on to the A453 and more strategic corridors.

Figure A.1: Forecast Flow Change for 2028 'With Development (2a)' minus 'With Development (1a)'

AM Peak hour



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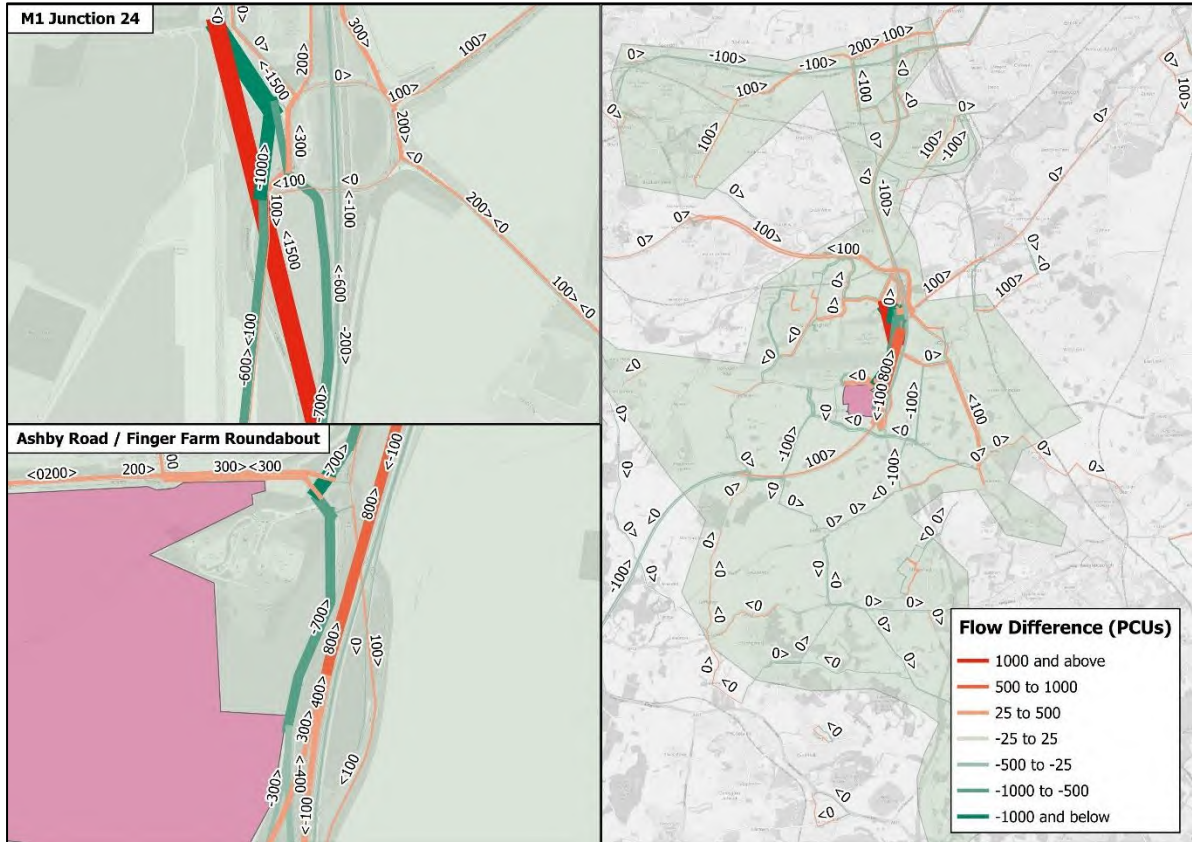
PM Peak hour



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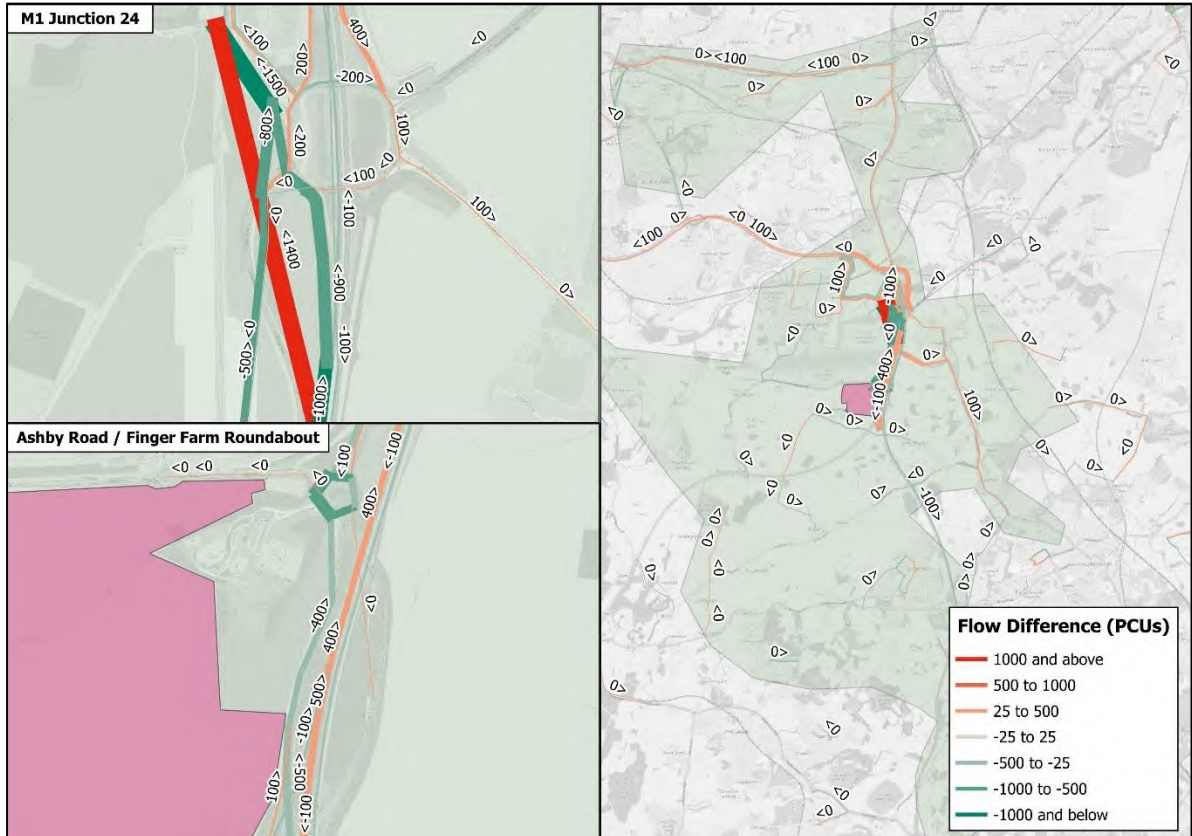
Figure A.2: Forecast Flow Change for 2038 'With Development (2a)' minus 'With Development (1a)'

AM Peak hour



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PM Peak hour



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Forecast Delay Change

- A.1.8 As a result of forecast flow changes in the 'With development (2a)' scenario, there are also changes to the forecast delays on the highway network. These changes in delay can be generated from two sources: link delay based on the speed-flow curve applied to the link; and the junction delay due to capacity constraints for individual turning movements. The analysis in this section combines the link and junction delays (taking a flow-weighted average of junction delays) to assess the changes in forecast delays with the proposed development traffic.
- A.1.9 Figure A.3 and Figure A.4 show the forecast delay changes (in seconds) in 2028 and 2038 between the 'With Development (2a)' and 'With Development (1a)' scenarios for the AM Peak and PM Peak hours.

New M1 northbound to A50 westbound interchange link

- A.1.10 With the new interchange link road included, delays are expected to occur on the A50 where vehicles join the A50 from the proposed link road. No delays exist in the 'Without Development (1a)' scenario as this junction does not exist in this scenario. However, delays are forecast to reduce at the J24 and Finger Farm Roundabout as this mitigation measure has attracted traffic off these junctions.

M1 southbound link approaching Junction 24

- A.1.11 A decrease in delay is forecast on the circulatory lanes of M1 J24 for all forecast scenarios in both the AM Peak and PM Peak hours. In addition, there are decreases in delays on the M1 southbound to the north of J24. These reductions in delay are provided by the additional M1 southbound capacity (i.e. extra lane) and the optimisation of the signals at M1 J24 (see Section 2.3).

EMGP1 access improvements

- A.1.12 The Wilders Way / A453 / A6 Kegworth Bypass junction is forecast to have a reduction in delays in all scenarios. This has been provided by the inclusions of the new interchange link road and the EMGP1 access improvements. As noted in Section 2.3, the benefits of the EMGP1 access improvements have been 'unlocked' by the Wilders Way / A453 signal optimisation.

A453 Finger Farm Roundabout westbound exit widening

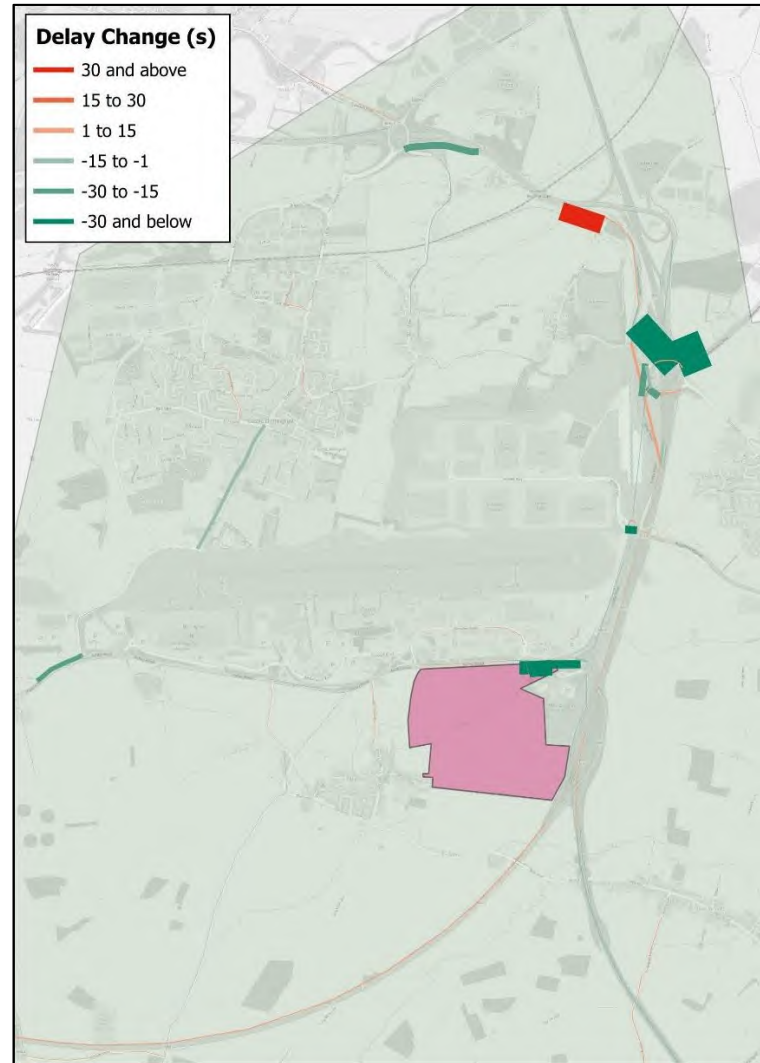
- A.1.13 Delays have generally reduced in the 'With Development (2a)' scenario with the proposed mitigation measures included that reduce traffic off the A453 and provide additional capacity at Finger Farm Roundabout.

EMGP2 access roundabout and toucan crossing

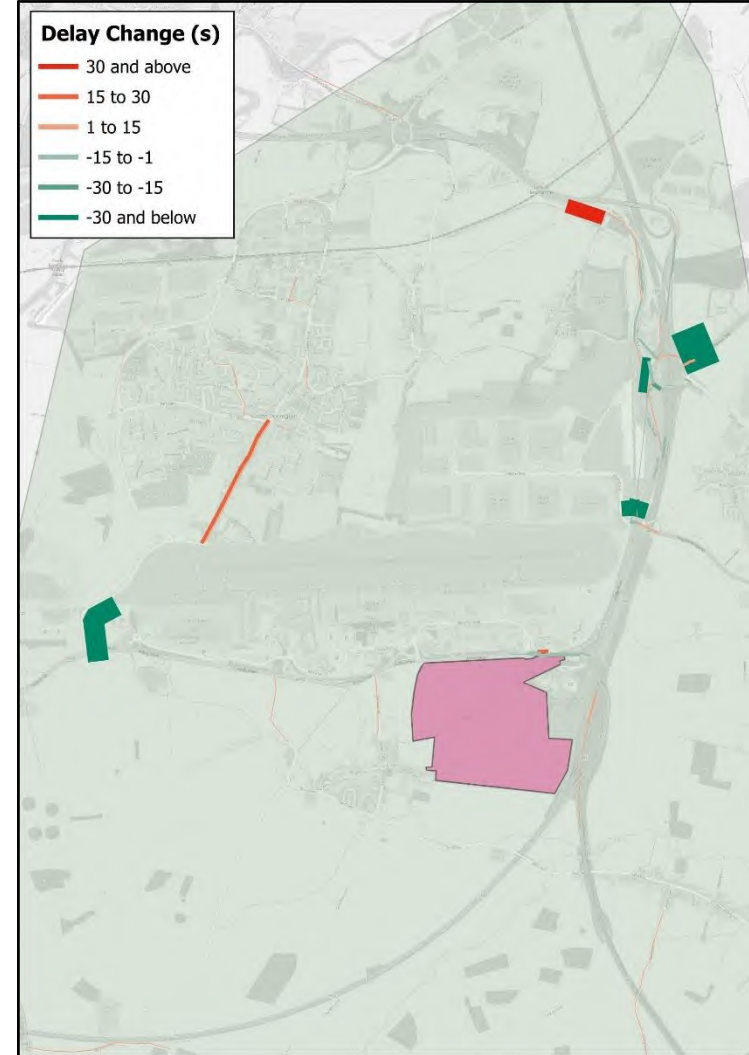
- A.1.14 There are reductions in delay forecast in all 'With Development (2a)' scenarios except in 2028 PM Peak hour. These reductions in delay are caused by the proposed mitigation measures, in particular the additional capacity (extended flares) on either side of the proposed site access roundabout.

Figure A.3: Forecast Delay Change for 2028 'With Development (2a)' minus 'With Development (1a)'

AM Peak hour



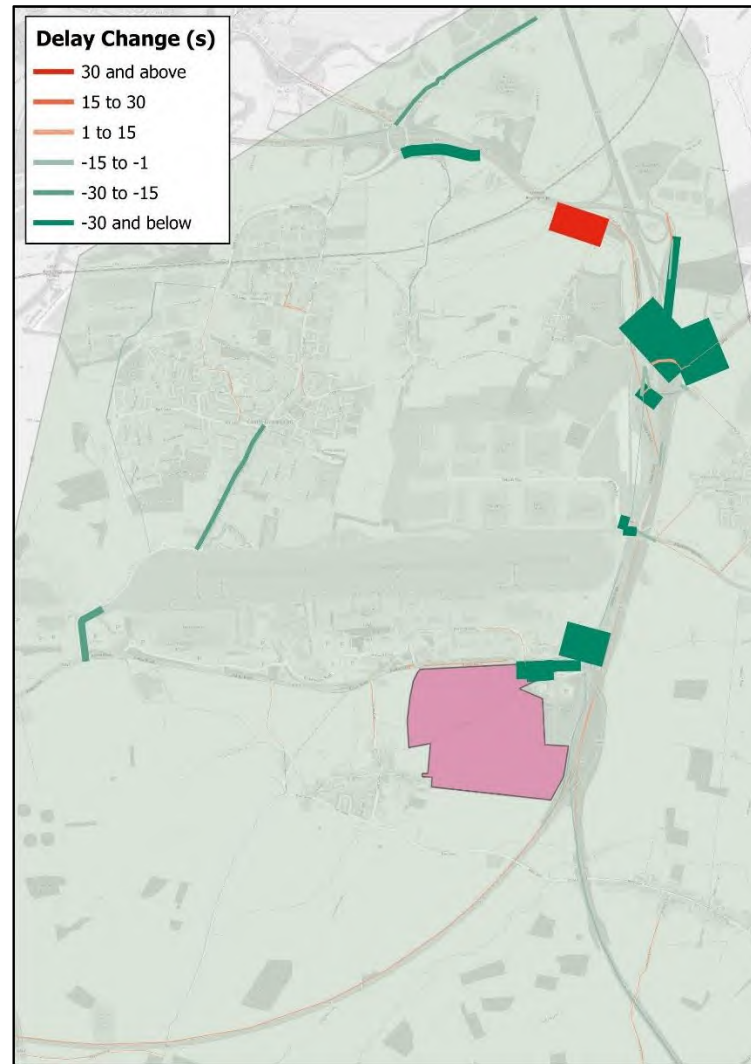
PM Peak hour



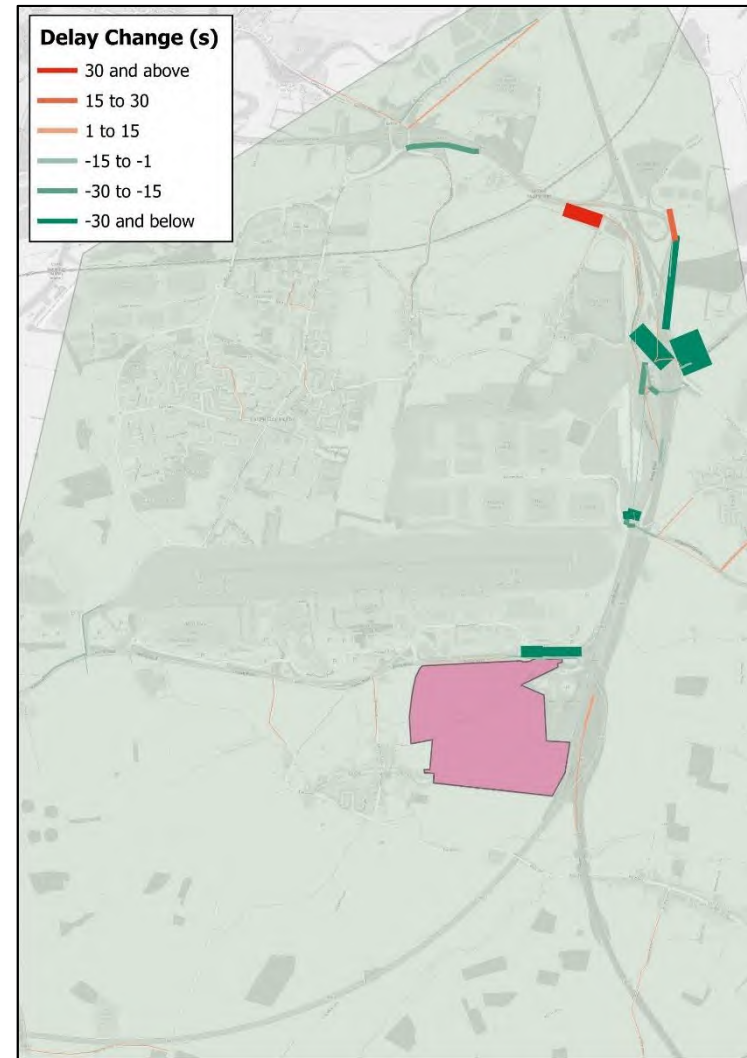
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Figure A.4: Forecast Delay Change for 2038 'With Development (2a)' minus 'With Development (1a)'

AM Peak hour



PM Peak hour



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Forecast Node Volume-Capacity Ratios

- A.1.15 As a part of the forecast modelling, node / junction capacities are estimated for individual turning movements based on a number of factors including priority of the turn (for example, give-way or merge), the level of green-time at signalised junctions, and the amount of opposing traffic at the junction. Using these calculated capacities and the forecast traffic volumes, node volume-capacity ratios are estimated to identify locations where the forecast flows are approaching or exceeding the forecast capacity.
- A.1.16 To summarise the forecast-capacity ratios for the individual turning movements at a node, there are two approaches. These are to calculate the flow-weighted average volume-capacity of the node, or to calculate the maximum volume-capacity ratio for all turns within a node. The average volume-capacity ratio provides an overview of how the individual node is performing but may not highlight locations where a limited number of movements at a node are approaching or exceeding capacity. To highlight these locations, the maximum volume-capacity ratio at each node has been used. Node volume-capacity ratios exceeding 85% indicate that the highway network is under stress, and there is likely to be a reduction in speed and increase in delay.
- A.1.17 Figure A.5 and Figure A.6 show the forecast maximum node volume-capacity ratios for 2028 and 2038, 'With Development (2a)' and 'With Development (1a)' scenarios. For ease of comparison, the symbology has been designed to show the data for 'With Development (2a)' and 'With Development (1a)' scenarios on the same plot.
- A.1.18 The reader should note that these two figures show a subset of all nodes within the EMFM to reduce the number of data points within the plots. Nodes which do not fall within the Aol, as defined in Figure 3.11, are not shown. Nodes with maximum volume-capacity ratios below 85% in all forecast scenarios are not shown, except for the node which is located at the proposed site access on the A453.
- A.1.19 The forecast maximum node volume-capacity ratios for 2028 and 2038 are similar in both the 'With Development (2a)' and 'With Development (1a)' scenarios. However, the forecast maximum node volume-capacity ratio plots show that the EMGP1 access roundabout junction, EMGP2 access junction, M1 Junction 24, and Finger Farm Roundabout are the most affected by the proposed mitigation measures and have seen mostly improvements in the node volume-capacity ratios in the 'With Development (2a)' scenarios.

New M1 northbound to A50 westbound interchange link

- A.1.20 With the inclusion of the proposed mitigation measures included in the 'With Development (2a)' scenarios the node volume-capacity decrease slightly overall, particularly on the western side of the junction. These improvements are a result of traffic diverting off the M1 J24 to use the new link road.

EMGP1 access improvements

- A.1.21 The node volume-capacity ratios at Wilders Way / A453 / A6 Kegworth Bypass junction are forecast to generally decrease in both forecast years in the 'With Development (2a)' scenarios. This improvement is caused by traffic diverting off the A453 and onto the new link road and the EMGP1 access improvements and associated signal optimisation.

A453 Finger Farm Roundabout westbound exit widening

- A.1.22 The node volume-capacity ratios for Finger Farm Roundabout are forecast to have increases and decreases in Stage 2a with the proposed mitigation measures included, reflecting the increase in flow on the A453 in the AM Peak hours in 2028 and 2038 and the reduction in flow on the roundabout itself.

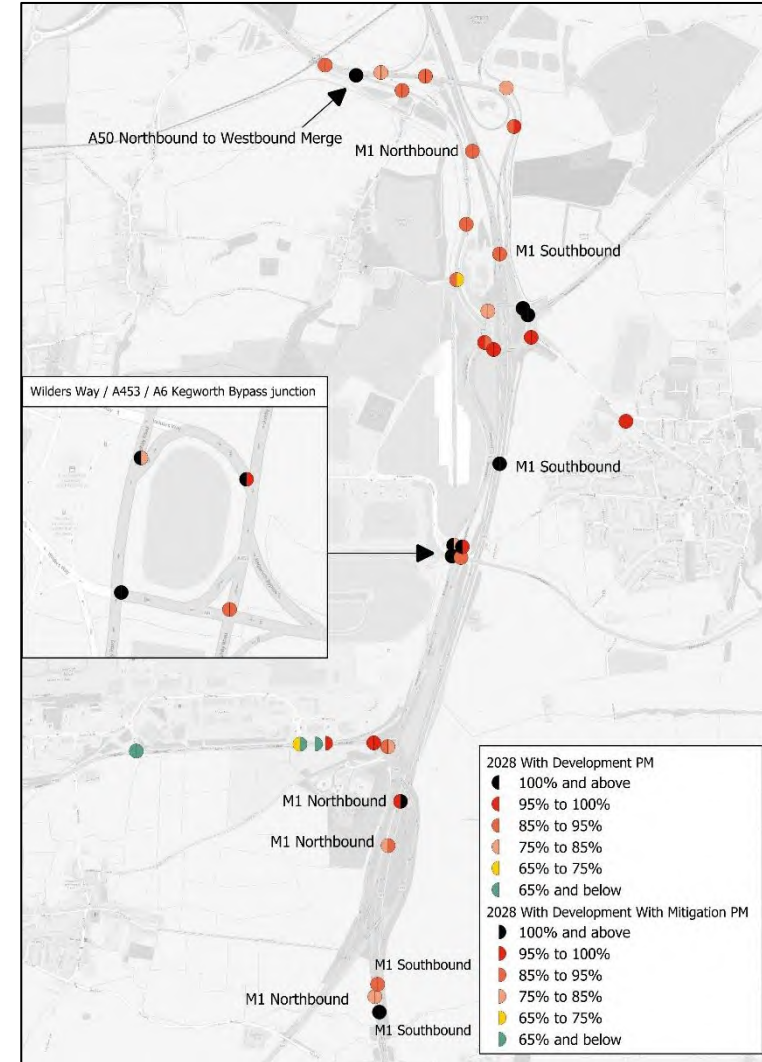
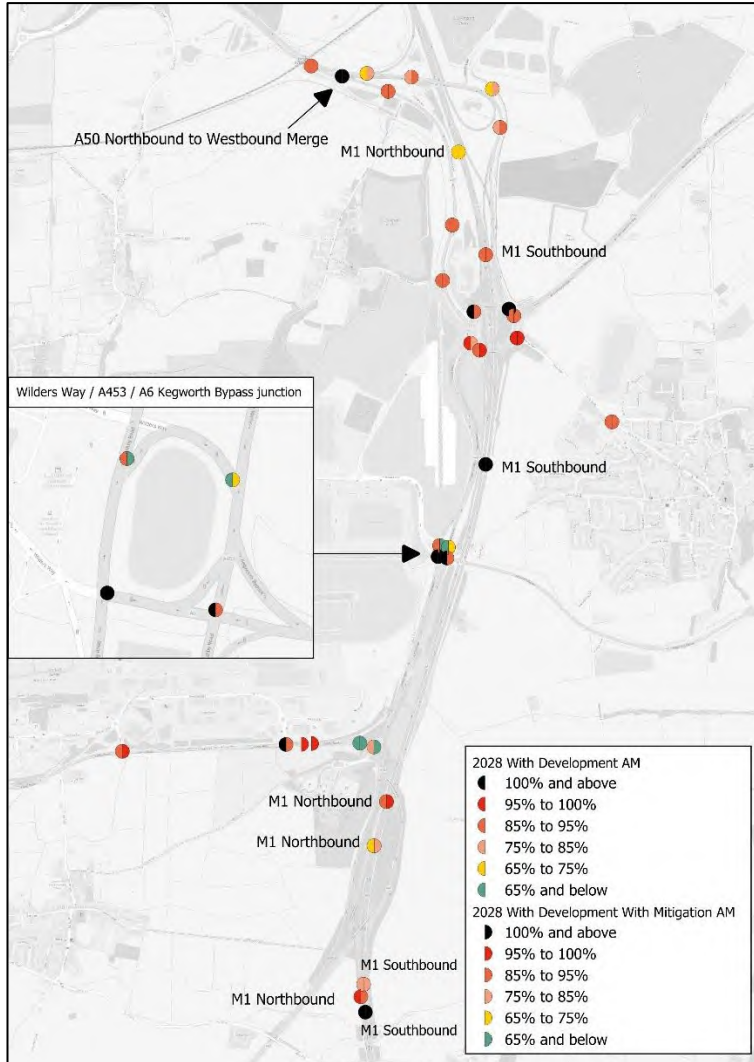
EMGP2 access roundabout and toucan crossing

- A.1.23 The node volume-capacity ratios at EMGP2 access roundabout are forecast to reduce in all scenarios. The proposed toucan (represented by the semi-circle closest to Finger Farm Roundabout) is forecast to be between 95% and 100% volume-capacity ratios in all Stage 2a scenarios.

Figure A.5: Forecast Node Volume-Capacity Ratio for 2028 ‘With Development (1a)’ and 2028 ‘With Development (2a)’ Scenarios

AM Peak hour

PM Peak hour

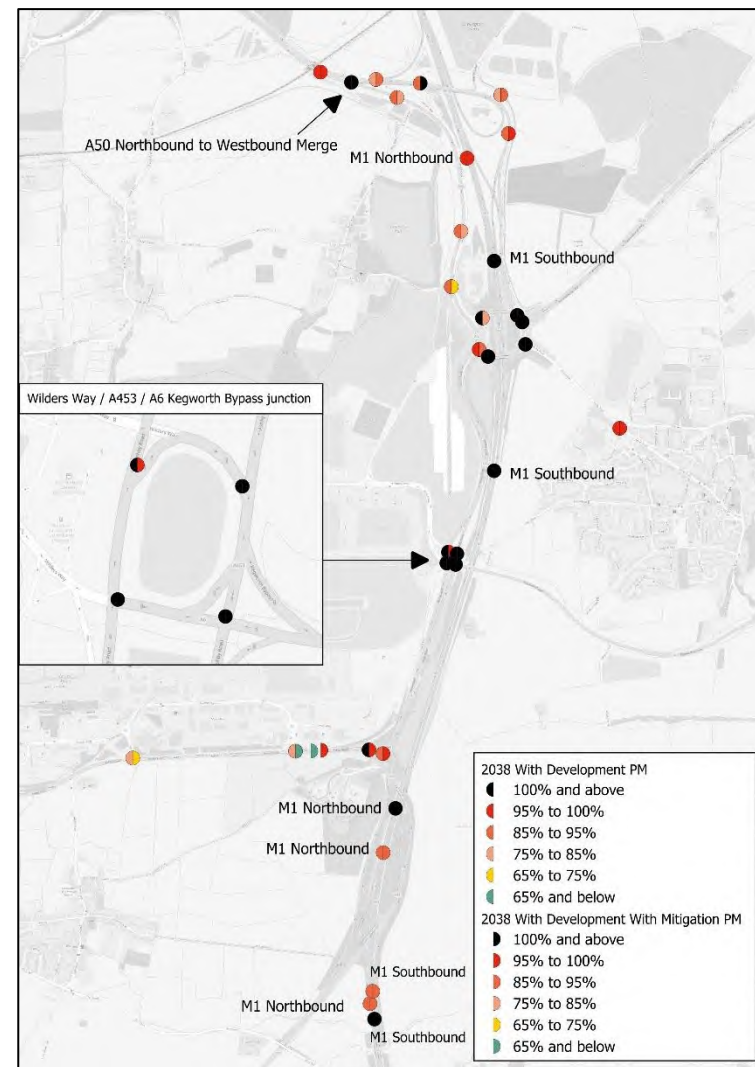
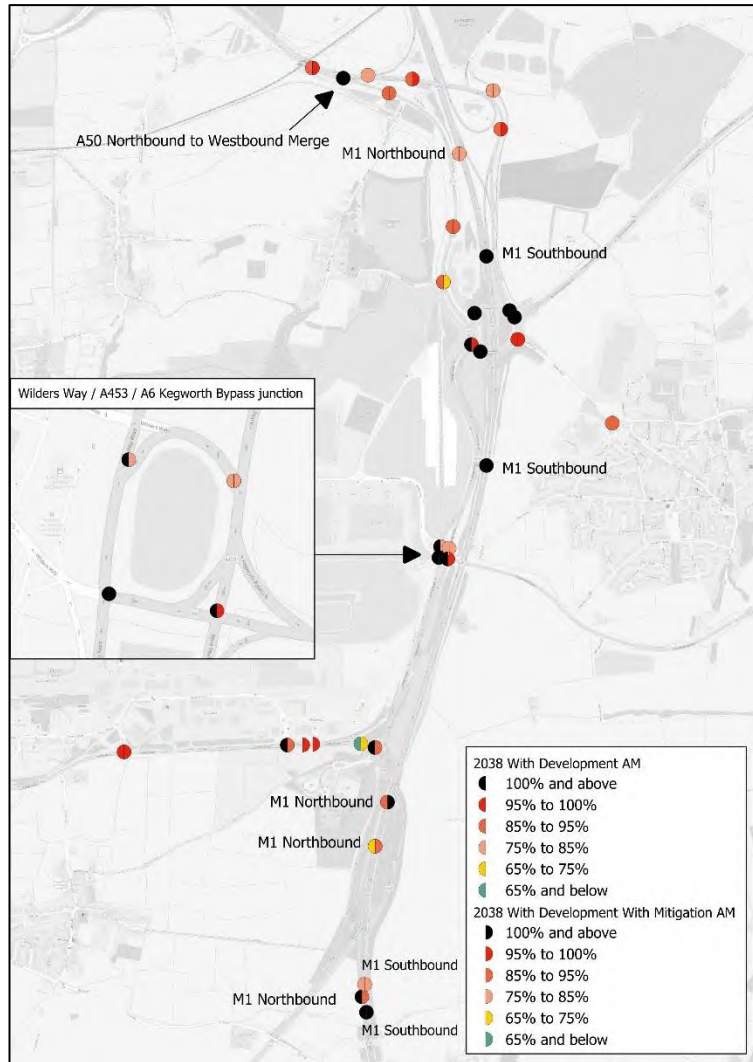


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Figure A.6: Forecast Node Volume-Capacity Ratio for 2038 'With Development (1a)' and 2038 'With Development (2a)' Scenarios

AM Peak hour

PM Peak hour



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Appendix B Comparison of '2a NH3' (A50 merge sensitivity) and Stage 1a (no mitigation)

Introduction

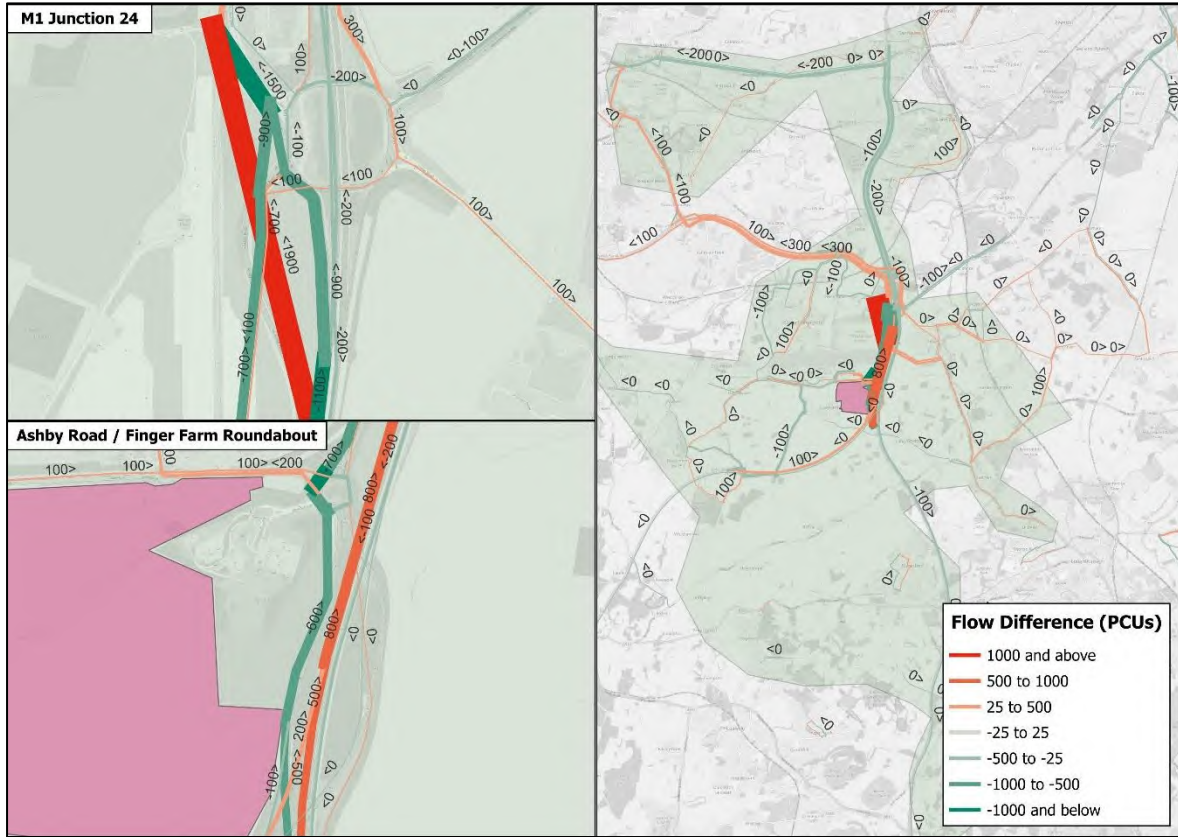
- B.1.1 Appendix B provides plots comparing the '2a NH3' scenario with the Stage 1a scenario that does not include the proposed mitigation measures ('With Development (1a)').

Forecast Flow Change

- B.1.2 Figure B.1 and Figure B.2 show the forecast flow changes in 2028 and 2038 between the '2a NH3' and 'With Development (1a)' scenarios for the AM Peak and PM Peak hours. Red bandwidth represents an increase in traffic flow in the '2a NH3' and green bandwidth represents a decrease.

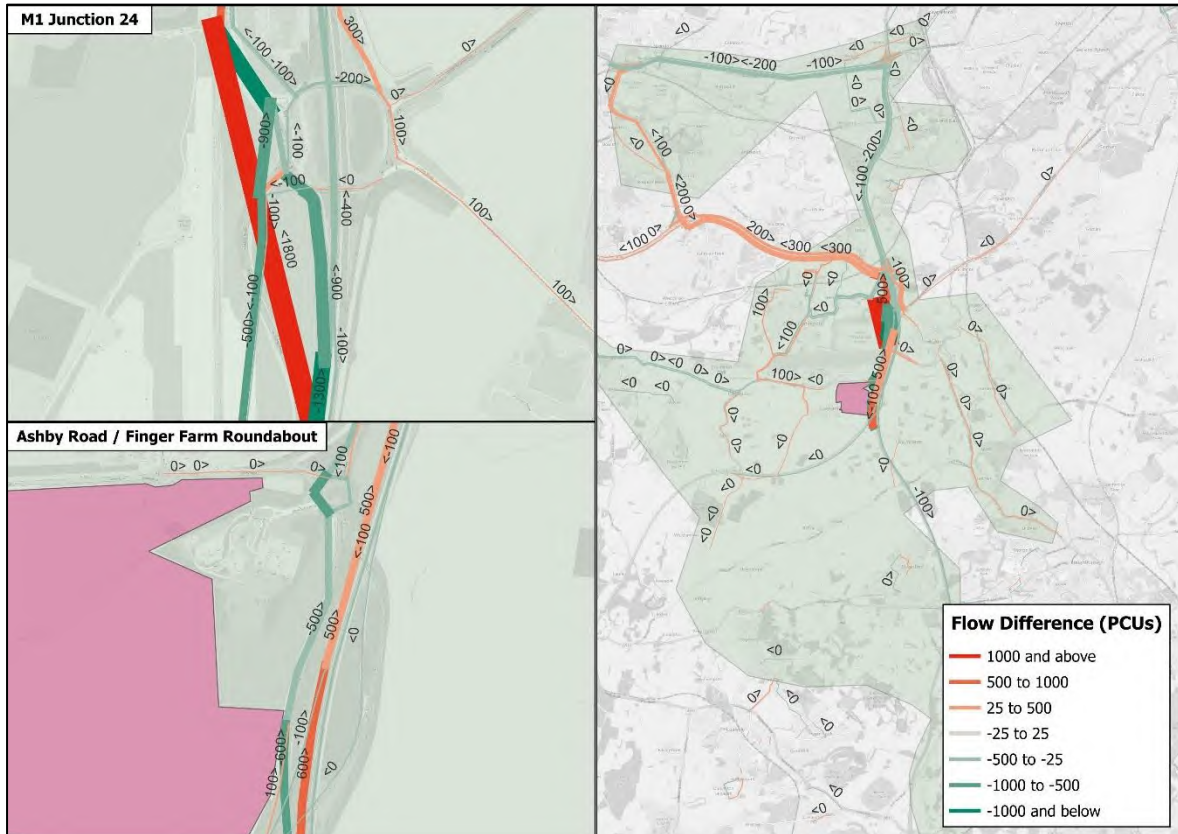
Figure B.1: Forecast Flow Change for 2028 '2a NH3' minus 'With Development (1a)'

AM Peak hour



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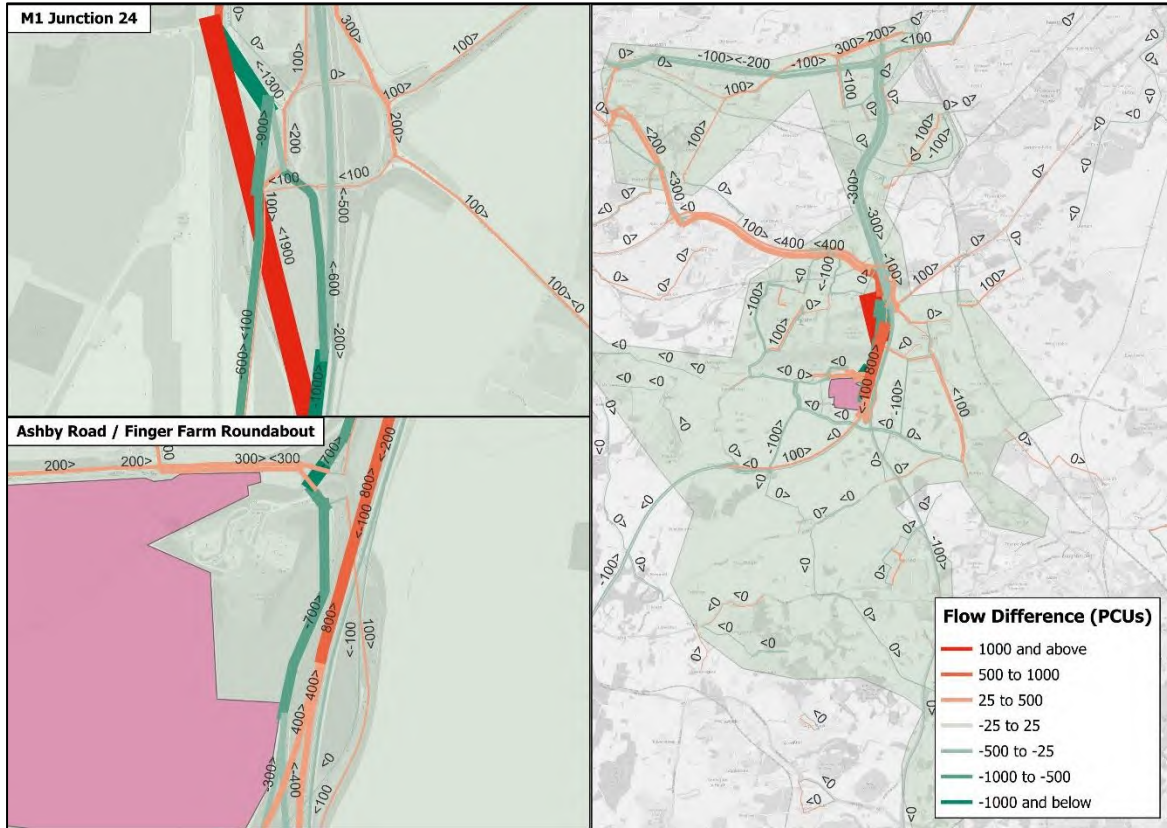
PM Peak hour



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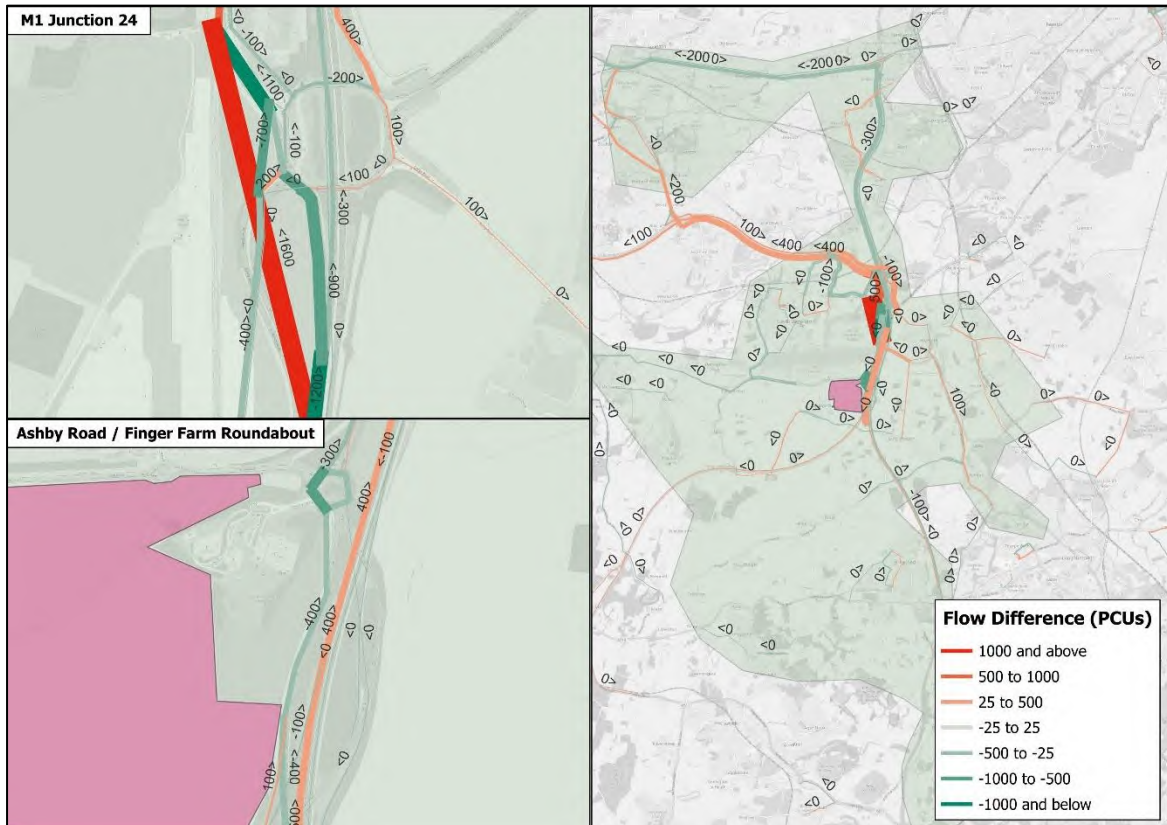
Figure B.2: Forecast Flow Change for 2038 '2a NH3' minus 'With Development (1a)'

AM Peak hour



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PM Peak hour



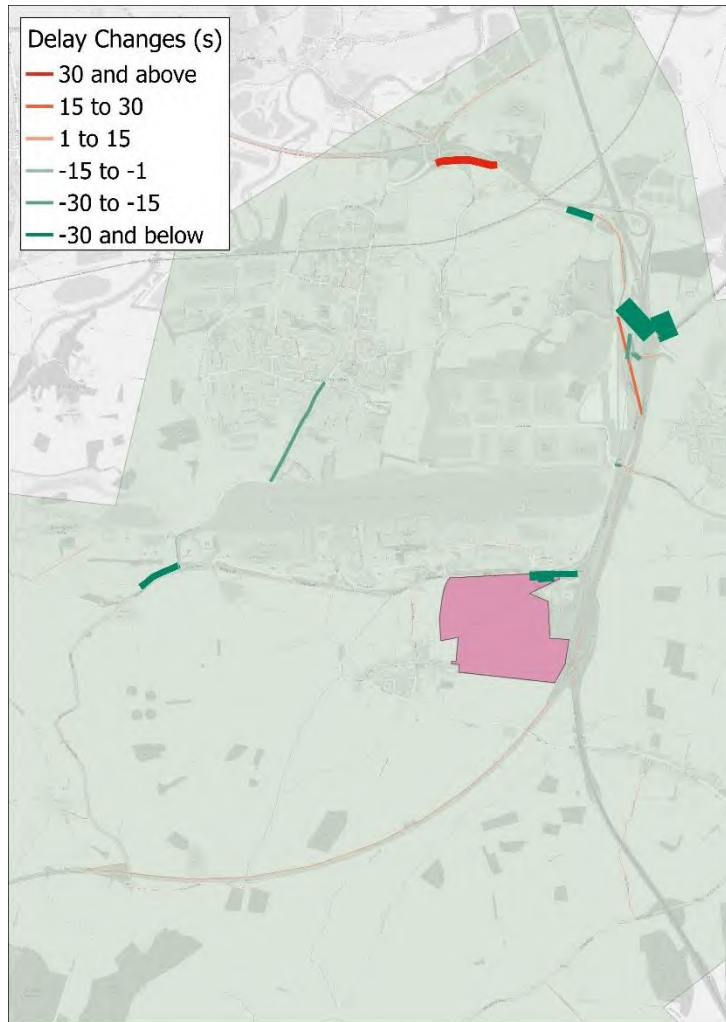
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Forecast Delay Change

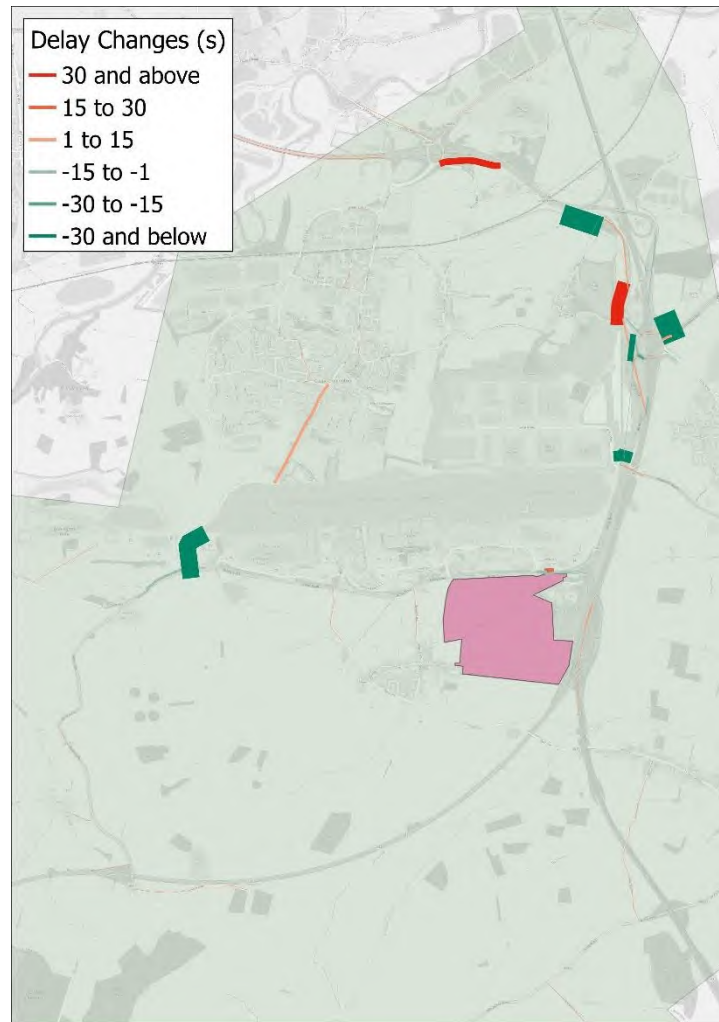
- B.1.3 Figure B.3 and Figure B.4 show the forecast delay changes (in seconds) in 2028 and 2038 between the '2a NH3' and 'With Development (1a)' scenarios for the AM Peak and PM Peak hours.

Figure B.3: Forecast Delay Change for 2028 '2a NH3' minus 'With Development (1a)'

AM Peak hour



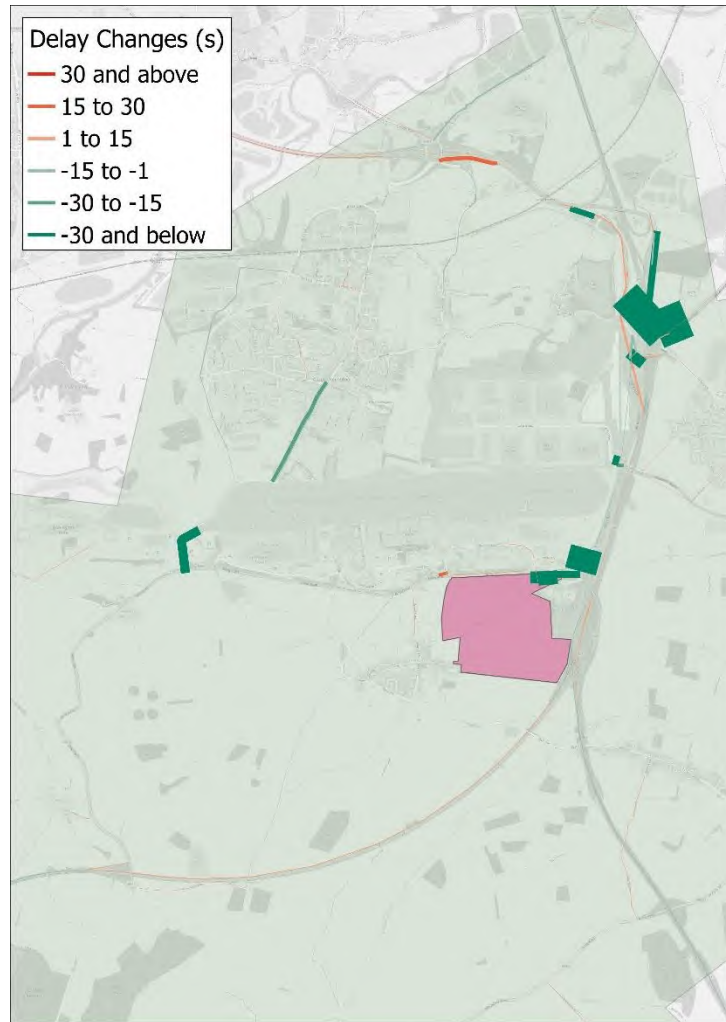
PM Peak hour



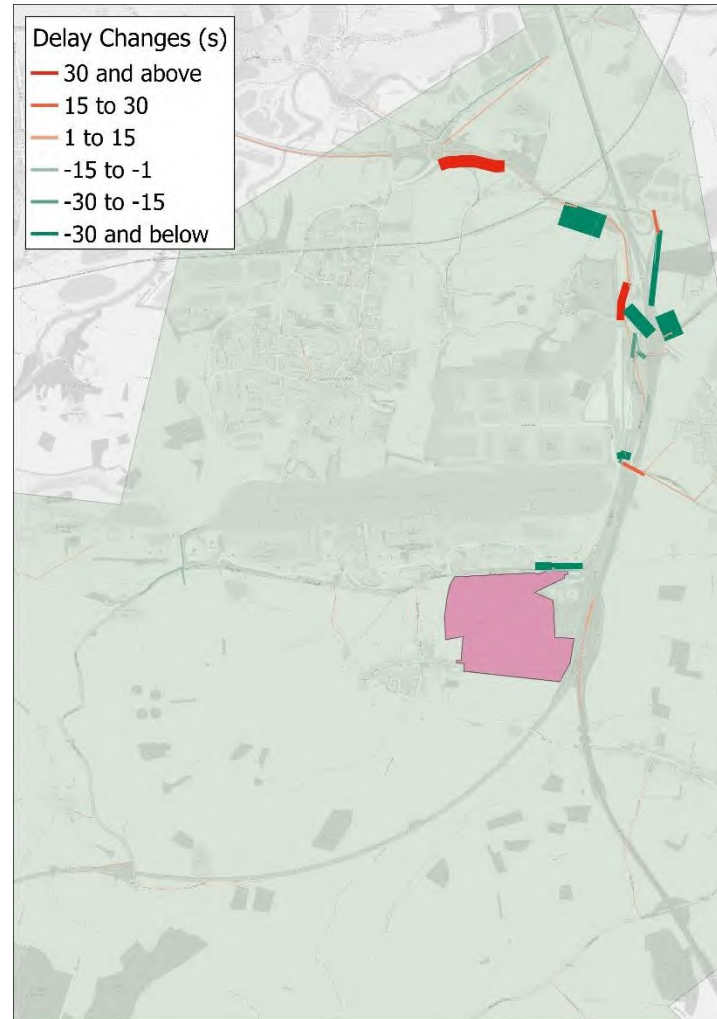
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Figure B.4: Forecast Delay Change for 2038 '2a NH3' minus 'With Development (1a)'

AM Peak hour



PM Peak hour



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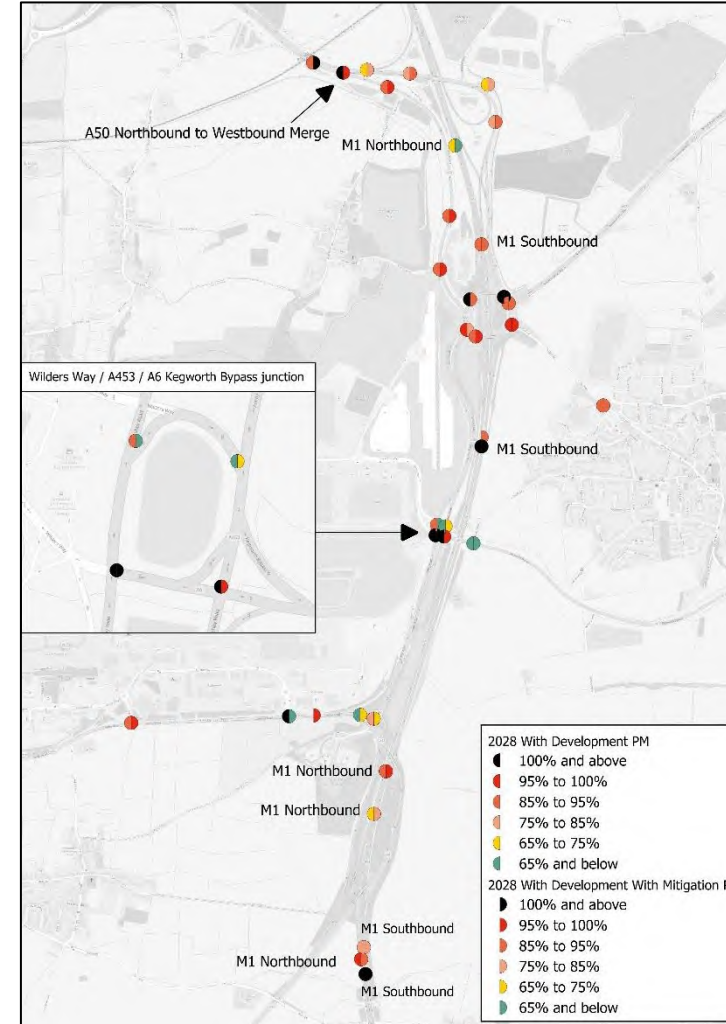
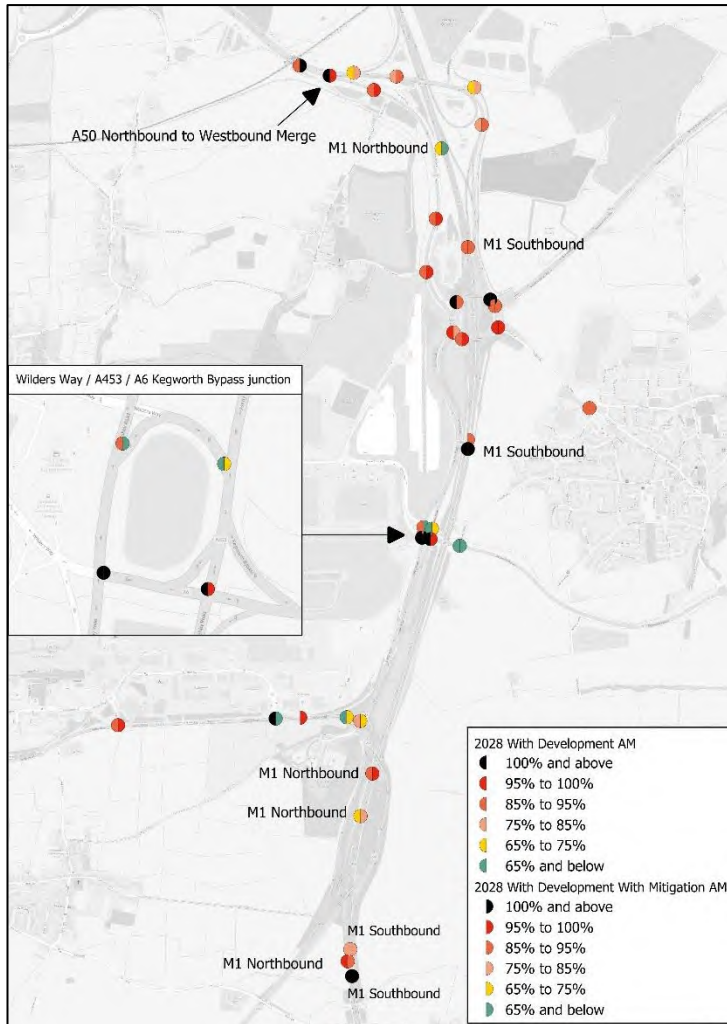
Forecast Node Volume-Capacity Ratios

- B.1.4 Figure B.5 and Figure B.6 show the forecast maximum node volume-capacity ratios for 2028 and 2038, and the '2a NH3' and 'With Development (1a)' scenarios. For ease of comparison, the symbology has been designed to show the data for the '2a NH3' and 'With Development (1a)' scenarios on the same plot.
-

Figure B.5: Forecast Node Volume-Capacity Ratio for 2028 'With Development (1a)' and 2028 '2a NH3' Scenarios

AM Peak hour

PM Peak hour

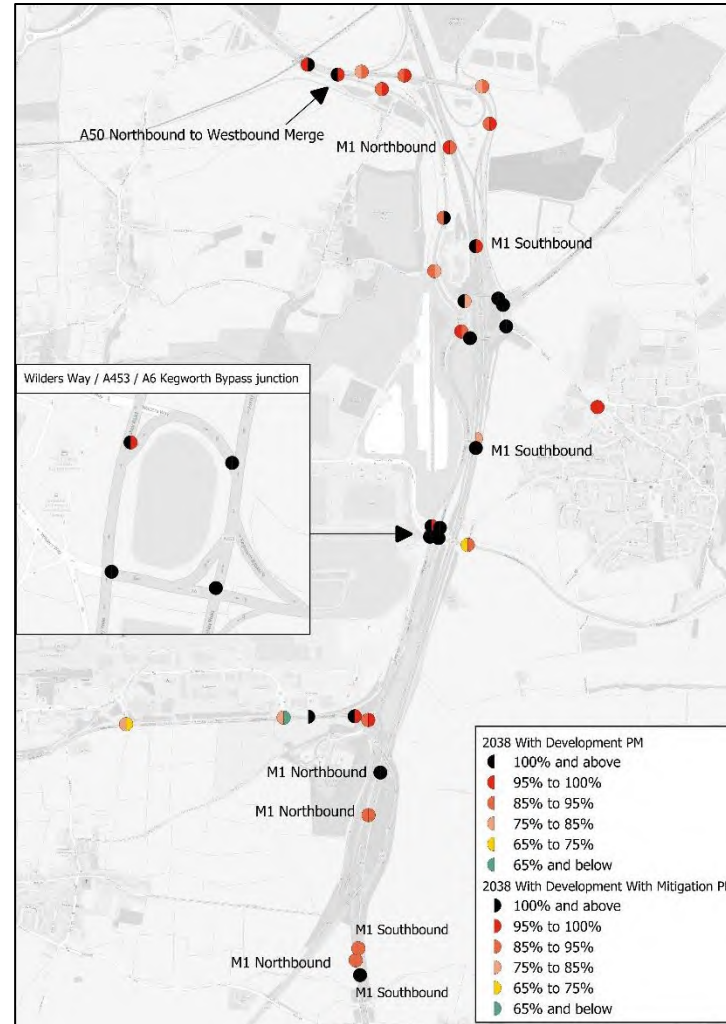
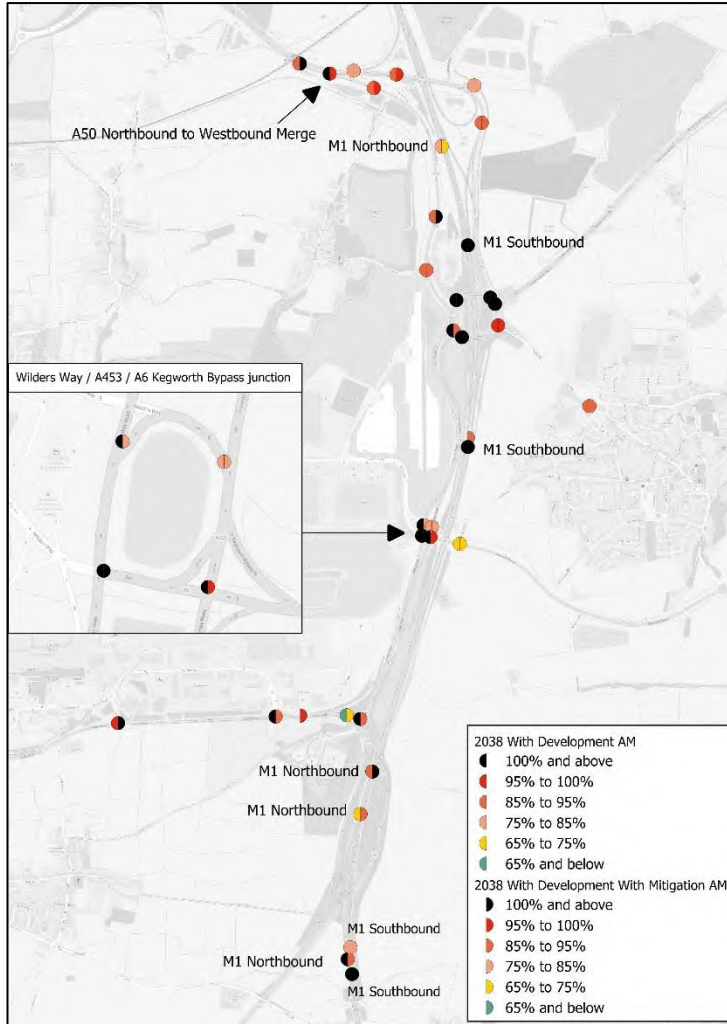


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Figure B.6: Forecast Node Volume-Capacity Ratio for 2038 'With Development (1a)' and 2038 '2a NH3' Scenarios

AM Peak hour

PM Peak hour



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Appendix C EMFM Indicative Network Statistics

- C.1.1 Table C.1 and Table C.2 presents the model network statistic within the Aol (see Figure 3.11). It should be noted that these statistics are high-level and should be considered as indicative only.
- C.1.2 The statistics include vehicle kilometre travelled (km), network speed (mph) and junction delay (hours) between 2038 'Without Development (1a)', 2038 'With Development (1a)' and 2038 'With Development (2a)' scenarios for both AM Peak and PM Peak hour by motorway and non-motorway roads.
- C.1.3 As expected, the forecast vehicle kilometres increase in the 'With Development (1a)' scenario compared with the 'Without Development (1a)' scenario for both motorway and non-motorway links. Vehicle kilometres increase further in the 'With development (2a)' scenario on motorway links as the mitigation measures provide additional network capacity on motorways, while vehicle kilometres are forecast to decrease on non-motorway links indicating that the mitigation measures are attracting traffic on to motorway links and off non-motorway links.
- C.1.4 The forecast speeds in the 'With Development (1a)' scenario are slower than speeds forecast in the 'Without Development (1a)' for both motorway and non-motorway links. Overall speeds are forecast to reduce by -1.7% on motorway links and -1.2% for non-motorway links. Speeds are forecast to reduce by -0.5% and -0.4% on motorway and non-motorway links respectively in the 'With Development (2a)' scenario compared with the 'Without Development (1a)' scenario, indicating lower delay in this with development scenario.
- C.1.5 Junction delays on motorway links are forecast to increase in both with development scenarios compared with the 'Without Development (1a)' scenario, with the 'With Development (2a)' scenario forecast to have the lowest increase (+3.3%) on motorway links. Junction delays on non-motorway links follow a similar pattern with forecast difference in junction delays in the 'With Development (2a)' forecast to have slightly higher delay (2.2%) than the 'Without Development (1a)' scenario.

Table C.1 Indicative Network Statistics within the Aol for Motorway Links

Scenario	Model Year/ Peak	Veh/km (demand ⁷)	Speed (mph)	Junction Delay (Hours)
'Without Development (1a)'	2038 AM	299,175	40.1	1,670
'With Development (1a)'		302,665	39.3	1,781
'With Development (2a)'		306,610	40.0	1,722
'Without Development (1a)'	2038 PM	308,352	43.1	1,386
'With Development (1a)'		312,102	42.5	1,469
'With Development (2a)'		313,111	42.9	1,435
'Without Development (1a)'	2038 AM + PM	607,527	41.6	3,056
'With Development (1a)'		614,767	40.9	3,250
'With Development (2a)'		619,721	41.4	3,157
Percentage difference compared with 'Without Development (1a)'				
'With Development (1a)'	2038	1.2%	-1.7%	6.3%
'With Development (2a)'	AM + PM	2.0%	-0.5%	3.3%

⁷ 'Demand flow' is the initial flow, taking into account capacity constraint, delay, etc., considered to pass through a selected link. Whereas 'actual flow' is what reaches the selected, link within the modelled hour, and is reduced whenever the path passes through an over-capacity link or turn. 'Queued flow' is essentially the difference between the demand and the actual flow.

Table C.2 Indicative Network Statistics within the AoI for Non-Motorway Links

Scenario	Model Year/ Peak	Veh/km (demand ⁷)	Speed (mph)	Junction Delay (Hours)
'Without Development (1a)'	2038 AM	509,055	26.6	5,167
'With Development (1a)'		517,258	26.1	5,441
'With Development (2a)'		514,276	26.6	5,205
'Without Development (1a)'	2038 PM	539,729	25.5	5,711
'With Development (1a)'		548,366	25.3	5,911
'With Development (2a)'		547,102	25.3	5,910
'Without Development (1a)'	2038 AM + PM	1,048,784	26.0	10,878
'With Development (1a)'		1,065,624	25.7	11,352
'With Development (2a)'		1,061,378	25.9	11,115
Percentage difference compared with 'Without Development (1a)'				
'With Development (1a)'	2038 AM + PM	1.6%	-1.2%	4.4%
'With Development (2a)'		1.2%	-0.4%	2.2%

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Delivering a better world

Project PRTM Applications - EMGP2
Document Response to capacity changes requested by NH ("NH3")
Version v1.0
Date 17th Sept 2025

Tab
1.0 Summary New M1 NB 2a NH3
2.1 Summary M1 Mainline 2a NH3
3.1 M1J24 2a NH3
3.2 Finger Farm Rb 2a NH3
3.3 A453 Kegworth By 2a NH3
3.4 A50 Mainline 2a NH3

Hi Paul.

Thanks for this. That's really helpful.

I have looped in LCC colleagues following our discussion at the TWG yesterday.

We can understand the rationale for this potential testing.

Where you are undertaking this exercise, NH would require:-

- A concise Addendum to the Forecasting Note [v4.], updating critical figures etc.
- Revised spreadsheets quantifying volume, delays, VCs, and comparisons.
- An updated 2028 / 2038 AM/ PM 2a Difference Plot.BMP

This would be for:-

- 2028 AM & PM
- 2038 AM & PM

We believe the PM runs are necessary as part of this assessment due to the higher levels of modelled delays at the A50.

Can you also let us know what your intention is for the VISSIM workstream. Presumably, this would be included in the VISSIM assessment and essentially supersede the 2a flows submitted yesterday. If you could confirm.

I appreciate you will also be taking into consideration the EMFM 2 point following Harry's helpful email yesterday and the discussion at the TWG, so if you could keep us in the loop regarding your intentions, I'd be most grateful.

Coding, traffic volumes and delay for the M1 northbound alterations merge to A50 WB (Stage 2a NH3)

Forecast traffic flow (PCU) and Delay

M1 NB alterations merge to A50 WB

Scenario	Year	Peak	Flows (PCU)		Delay (sec)	
			A50 WB	From M1 EB	A50 WB	From M1 EB
Stage 2a NH3	2028	AM	3886	687	13	1
		PM	4000	450	28	1
	2038	AM	4000	678	28	1
		PM	4000	817	28	1

A50 WB merge from 3 lanes to 2 lanes

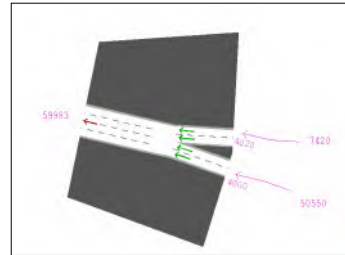
Scenario	Year	Peak	Flows (PCU)		Delay (sec)	
			M1 NB	M1 NB	M1 NB	M1 NB
Stage 2a NH3	2028	AM	3886		4	
		PM	4024		84	
	2038	AM	4035		20	
		PM	3981		55	

New M1 NB alterations merge to A50 WB

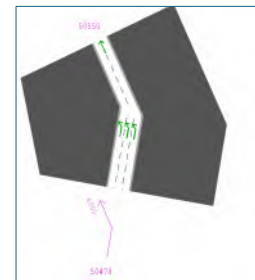
Scenario	Year	Peak	Flows (PCU)		Delay (sec)	
			M1 NB alterations Merge to A50	A50 main line	M1 NB alterations Merge to A50	A50 main line
Stage 2a NH3	2028	AM	1904	1982	16	1
		PM	1792	2232	8	2
	2038	AM	1863	2172	12	2
		PM	1605	2376	5	2

Coding of the model and the capacity (saturation flows)

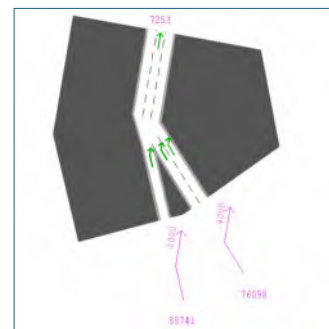
M1 NB merge to A50 WB
EMFM Network coding



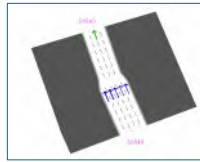
A50 WB merge from 3 lanes to 2 lanes
EMFM Network coding



New M1 NB alterations merge to A50 WB
EMFM Network coding



Comparison of the Forecast Traffic Volumes, Approach VC, Change in Delay and VC for the M1 Mainline
 For 2028 and 2038 'Without Development (1a)' and 'With Development (2a NH3)'



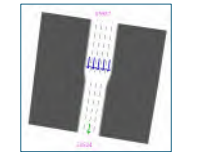
Location 1 - M1 Northbound between J24 and J24a

Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change	
Scenario	Year	Peak				
Stage 2a NH3	2028	AM	4237	0	0.64	-0.02
		PM	5605	0	0.85	-0.04
2038		AM	4733	0	0.72	-0.04
		PM	5992	0	0.91	-0.03



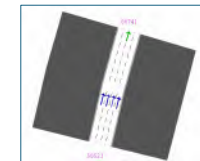
Location 2 - M1 Southbound between J24 and J24a

Summary of traffic flow (PCU), VC and delay change		Approach 1 - M1 Southbound mainline				Approach 2 - From A50 EB				
Scenario	Year	Peak	Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change	Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
Stage 2a NH3	2028	AM	4698	0	0.69	-0.01	1533	0	0.89	0.00
		PM	3844	0	0.56	-0.01	1521	-4	0.88	-0.04
2038		AM	4547	0	0.69	-0.04	1805	-12	1.04	-0.01
		PM	4139	0	0.63	0.00	1722	-27	1.00	-0.02



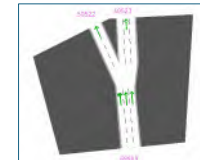
Location 3 - M1 Southbound between J23a and J24

Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change	
Scenario	Year	Peak				
Stage 2a NH3	2028	AM	6847	-3	1.04	-0.02
		PM	6780	-3	1.03	-0.02
2038		AM	7403	-6	1.13	-0.04
		PM	7235	-1	1.10	0.00



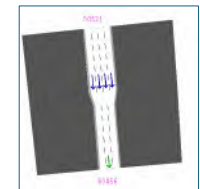
Location 4 - M1 Northbound at J23a

Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change	
Scenario	Year	Peak				
Stage 2a NH3	2028	AM	6521	1	0.99	0.13
		PM	6890	9	1.05	0.09
2038		AM	6841	8	1.04	0.13
		PM	7203	14	1.10	0.08



Location 5 - M1 Northbound between J23 and J23a

Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change	
Scenario	Year	Peak				
Stage 2a NH3	2028	AM	5777	1	0.88	0.03
		PM	5632	3	0.86	0.02
2038		AM	6074	-1	0.92	0.02
		PM	5996	4	0.91	0.02



Location 6 - M1 Southbound between J23 and J23a

Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change	
Scenario	Year	Peak				
Stage 2a NH3	2028	AM	5156	-1	1.05	-0.01
		PM	5582	5	1.13	0.03
2038		AM	5402	-4	1.10	-0.02
		PM	5832	3	1.18	0.02

Comparison of the Forecast Traffic Volumes, Approach VC, Change in Delay and VC for M1 J24
 For 2028 and 2038 'Without Development (1a)' and 'With Development (2a NH3)'



Location 1 - M1 J24 Approaching Arm A (M1 SB)

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	2196	-84	1.07	-0.03
		PM	2347	-93	1.03	-0.02
	2038	AM	2285	-124	1.14	-0.04
		PM	2387	-82	1.07	-0.01

Location 2 - M1 J24 Approaching Arm B (A453 Remembrance Way)

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	1535	0	0.59	0.00
		PM	2676	16	1.03	0.01
	2038	AM	2668	24	1.02	0.01
		PM	2719	22	1.09	0.00

Location 3 - M1 J24 Approaching Arm C (Derby Road)

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	915	8	0.98	0.01
		PM	913	-4	0.98	-0.01
	2038	AM	897	0	0.96	0.00
		PM	971	16	1.04	0.01

Location 4 - M1 J24 Approaching Arm D (M1 Northbound)

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	1158	-4	0.43	-0.34
		PM	768	-3	0.29	-0.33
	2038	AM	1221	-2	0.48	-0.22
		PM	874	-3	0.33	-0.32

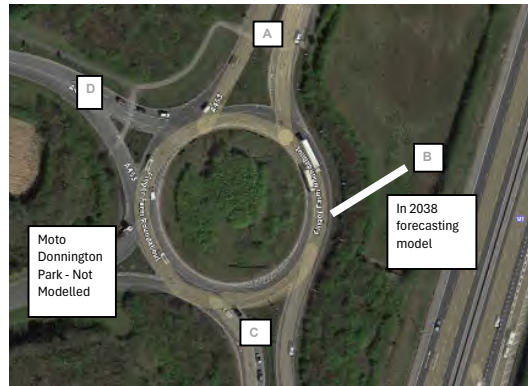
Location 5 - M1 J24 Approaching Arm E (A453 Northbound)

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	1825	-3	0.45	-0.16
		PM	2371	-3	0.59	-0.08
	2038	AM	2145	-2	0.53	-0.15
		PM	2610	-3	0.65	-0.08

Location 6 - M1 J24 Approaching Arm G (Hilton Hotel Lane)

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	434	-89	0.93	-0.09
		PM	207	-5	0.45	-0.19
	2038	AM	507	-124	1.09	-0.07
		PM	352	-46	0.76	-0.21

Comparison of the Forecast Traffic Volumes, Approach VC, Change in Delay and VC for Finger Farm Roundabout
For 2028 and 2038 'Without Development (1a)' and 'With Development (2a NH3)'



Location 1 - Finger Farm Roundabout Approaching Arm A (A453 Southbound)

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	874	0	0.15	0.04
		PM	1055	0	0.19	0.05
	2038	AM	1052	0	0.19	0.04
		PM	1110	0	0.23	0.01

Location 2 - Finger Farm Roundabout Approaching Arm B (New development site)

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	-	-	-	-
		PM	-	-	-	-
	2038	AM	27	0	0.03	0.00
		PM	59	0	0.07	0.00

Location 3 - Finger Farm Roundabout Approaching Arm C (From A42 and M1 Northbound)

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	2163	-2	0.54	-0.13
		PM	1322	-1	0.33	-0.11
	2038	AM	2440	-3	0.61	-0.17
		PM	1556	-1	0.39	-0.08

Location 4 - Finger Farm Roundabout Approaching Arm D (A453 Eastbound)

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	1144	-7	0.24	-0.23
		PM	1695	-4	0.33	0.04
	2038	AM	1187	-74	0.37	-0.64
		PM	1730	2	0.38	-0.15

Comparison of the Forecast Traffic Volumes, Approach VC, Change in Delay and VC for Kegworth Bypass Junction
For 2028 and 2038 'Without Development (1a)' and 'With Development (2a NH3)'



Location 1 - Kegworth Bypass Junction Approaching Arm A (A453 Southbound)

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	951	0	0.25	0.05
		PM	803	2	0.23	0.03
	2038	AM	891	0	0.23	0.04
		PM	873	3	0.25	0.03

Location 2 - Kegworth Bypass Junction Approaching Arm B (Kegworth Bypass)

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	1098	5	0.92	-0.09
		PM	1074	8	0.88	0.02
	2038	AM	1226	7	0.97	-0.04
		PM	1219	26	1.05	0.02

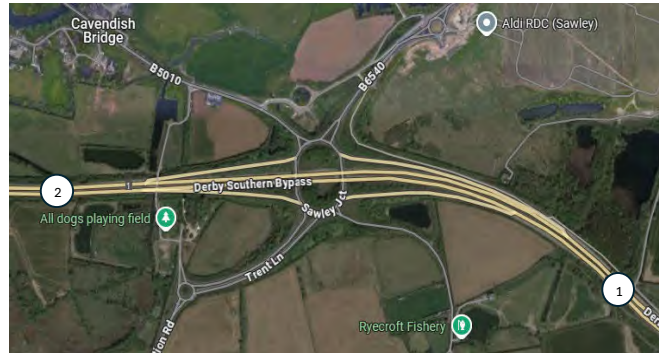
Location 3 - Kegworth Bypass Junction Approaching Arm C (A453 Northbound)

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	1738	0	0.36	-0.12
		PM	1726	0	0.36	-0.04
	2038	AM	2121	-1	0.44	-0.13
		PM	1993	0	0.41	-0.03

Location 4 - Kegworth Bypass Junction Approaching Arm D (Wilders Way)

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	360	0	0.27	0.02
		PM	1014	-39	0.58	-0.23
	2038	AM	358	0	0.27	0.01
		PM	1012	-7	0.71	-0.10

Comparison of the Forecast Traffic Volumes, Approach VC, Change in Delay and VC for A50 Mainline
For 2028 and 2038 'Without Development (1a)' and 'With Development (2a NH3)'



Location 1 - A50 Mainline Eastbound

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	3578	0	0.79	0.04
		PM	4029	0	0.89	0.04
	2038	AM	3979	0	0.88	0.05
		PM	4221	0	0.93	0.05

Location 1 - A50 Mainline Westbound

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	4573	1	0.76	0.06
		PM	4450	1	0.74	0.07
	2038	AM	4678	1	0.78	0.06
		PM	4817	2	0.80	0.07

Location 2 - A50 Mainline Eastbound

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	3982	2	0.66	0.02
		PM	3803	2	0.63	0.03
	2038	AM	4083	2	0.68	0.02
		PM	3757	1	0.62	0.01

Location 2 - A50 Mainline Westbound

Scenario	Summary of traffic flow (PCU), VC and delay change		Flows (PCU)	Change in Delay (sec)	V/C approach	V/C Change
	Year	Peak				
Stage 2a NH3	2028	AM	4078	4	0.68	0.05
		PM	4372	5	0.73	0.06
	2038	AM	4310	5	0.71	0.06
		PM	4751	6	0.79	0.07

APPENDIX 5: Traffic flows to be used in the engineering evaluation and design work

This email originated from outside of our organisation. Please exercise caution with content, links and attachments.

Hi Paul,

Thanks for your helpful and detailed email.

We have reflected on the details and methodology you outlined below. In short, you propose “A ‘minimum’ and ‘maximum’ set of traffic flows for consideration in the highway design work, as follows”:-

- i) ‘minimum’ = the average of the constrained and unconstrained 2019 PRTM scenarios set out above; i.e. 1511 vehicles travelling along the link road in the AM, and 1513 in the PM.
- ii) ‘maximum’ = the average of the constrained and unconstrained VISSIM model outputs based on Alain’s furnishing methodology; i.e. 1752 vehicles travelling along the link road in the AM, and 1766 in the PM (based on the furnished flows).

We believe taking an average approach between constrained and unconstrained model runs is appropriate. However, the PRTM and VISSIM should not be used separately to generate minimum (PRTM) and maximum (VISSIM) flows, especially given the connection between them with PRTM providing input flow changes and VISSIM providing base-defined forecast flows.

Flows should come from only one of the models and should be calculated from constrained and unconstrained versions of that single model. We believe that the VISSIM demand flows should be used because they assume a more refined and also more robust base with this being carried over to the forecast flows. We also believe that NH’s preferred furnishing method (i.e. Alain’s) should be used.

We therefore request you use: -

- i) ‘Average VISSIM Demand Flows’ = the average of the constrained and unconstrained VISSIM demand flows using NH’s preferred furnishing method; i.e. 1,752 vehicles travelling along the link road in the AM, and 1,766 in the PM.

We would ask the methodology is applied to the *Downstream mainline* and *Diverging flow* for the M1 NB New Proposed Link Road to A50 and M1 NB Diverge and the *Upstream mainline* and *Merge flow* for the Merge Link Road/A50 Exit at J24 and A50 WB/M1SB Merge.

We do query the difference identified in the PM peak in part 3 of your analysis. This shortfall appears to stem more from an upstream bottleneck (associated with a delay) rather than a simple delay and will need to be investigated as part of the on-going analysis.

You’ll be aware that the review of the VISSIM submission received on 24th October is on-going so worth bearing that in mind as you advance your design workstream.

Thanks

Multistory (Colmore Square), 7th Floor, 38 Colmore Circus, Birmingham, B4 6BN | UK

Jacobs Challenging today.
Reinventing tomorrow.

Please note I am on annual leave on:-

12/11/25
20/11/25
27/11/25

Please Note: As of January 2026 I will be working a reduced week. This will reflect the school day hours.

I refer to your conversation with Simon on Thursday PM, post ours earlier that day.

I had a limited opportunity to catch up with Simon before he signed off for A/L, but gather a discussion was held as to what traffic flows he should consider from the 2019 PRTM sensitivity test modelling work to inform his engineering design review, the associated VISSIM modelling related information of which was issued by Charlie on Friday below (together with an update as to how we plan to respond formally to your most recent Technical Note - TN).

This email therefore sets out the following:

- i) a review of the traffic flows forecast to be travelling from the A42/M1 NB to the A50 via the new link via based on various methods considered to date (extracted directly from PRTM/ the various furnessing spreadsheets where applicable)
- ii) the proposed minimum traffic flows to be considered by Simon as a result in his assessment (extracted from the 2019 PRTM Cordoned Matrices)
- iii) the proposed maximum traffic flows to be considered by Simon (extracted from the Stage 2A VISSIM Models)

1. Traffic flow review

The table below sets out the demand numbers for traffic that are travelling from the A42/M1 NB to the A50 via the new link based on the two most recent furnessing methodologies used where applicable (Alain's approach, and ours which we used prior to then), extracted from both the 2019 PRTM and associated VISSIM modelling work:

Furnessing Methodology	Vehicles using the Proposed link Road (PRTM)		Vehicles using the Proposed link Road (VISSIM)	
	AM	PM	AM	PM
2038 Stage 2A Constrained Numbers (Initial Furnessing Method)	1325	1389	1343	1466
2038 Stage 2A Constrained Numbers (Alain Furnessing Method)			1566	1641
2038 Stage 2A Un-Constrained Numbers (Initial Furnessing Method)	1696	1638	1715	1716
2038 Stage 2A Un-			1938	1891

Constrained Numbers (Alain Furnessing Method)				
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As a result of the above the only scenario whereby 1800 vehicles are exceeded on the link road is when Alain's methodology is adopted in the unconstrained scenario, to inform the VISSIM assessment work. These flows are highlighted red above, versus all other methods whereby less than 1800 vehicles would be travelling along the link road, hence them being highlighted green.

Based on the above, I gather Simon suggested, post an internal discussion with us prior, that we take an average of the flows from the two 2019 PRTM scenarios, which would equate to 1511 vehicles travelling along the link road in the AM, and 1514 in the PM. The average approach builds on what our TN concludes, and as set out in my Teams message on 16/10/25, that the reality will be that the flows/operation of the merge and surroundings (including the link road and any downstream links) will be somewhere in between the core DCO run (i.e. the constrained modelling) and the sensitivity test run (i.e. the unconstrained modelling, which we took it upon ourselves to undertake, to provide a greater understanding to help respond to your TN).

I gather you appeared minded to accept this approach to inform Simon's design flows, but Alain remain intrigued in the numbers from the subsequent VISSIM modelling work to help inform an opinion. The table above should therefore help provide wider context to the methods used, and add weight to what Charlie set out below, that the VISSIM modelling work (which has been based on the red highlighted numbers) forms a worst-case stress test of the operation of the link road in the unconstrained A50 westbound merge scenario.

In hindsight, moving forward, we should perhaps seek to put a cap on the furnished numbers so that they do not exceed link capacity (1800 vehicles in this instance) so that there is less of theoretical disconnect between the VISSIM model, which does not take this into consideration, and the reality of what will transpire, albeit at least it helps provide said worst-case stress test from a VISSIM modelling perspective. However, we are firmly of the opinion that this should not then extend to the highway design work, because it would provide an unrealistic set of numbers to underpin such work.

We therefore proposed a 'minimum' and 'maximum' set of traffic flows for consideration in the highway design work, as follows:

- i) 'minimum' = the average of the constrained and unconstrained 2019 PRTM scenarios set out above; i.e. 1511 vehicles travelling along the link road in the AM, and 1513 in the PM.
- ii) 'maximum' = the average of the constrained and unconstrained VISSIM model outputs based on Alain's furnessing methodology; i.e. 1752 vehicles travelling along the link road in the AM, and 1766 in the PM (based on the furnished flows)

These proposed flows sets are set out in greater detail below.

2. Proposed minimum traffic flows to be considered

The average vehicle flows for the constrained and unconstrained 2019 PRTM scenarios are set out in the following tables:

M1 NB New Proposed Link Road to A50				
Flow Set	Downstream mainline		Diverging flow	
	AM	PM	AM	PM
2038 2A unconstrained	4,311	5,111	1,696	1,638
2038 2A constrained	4,659	5,261	1,325	1,389
Average	4,485	5,186	1,511	1,513

M1 NB Diverge to J24				
Flow Set	Downstream mainline		Diverging flow	
	AM	PM	AM	PM
2038 2A unconstrained	3,190	4,266	1,122	845
2038 2A constrained	3,471	4,398	1,187	863
Average	3,331	4,332	1,155	854

Merge Link Road/A50 Exit at J24				
Flow Set	Upstream mainline		Merge flow	
	AM	PM	AM	PM
2038 2A unconstrained	1,726	1,890	1,696	1,638
2038 2A constrained	1,542	1,574	1,325	1,389
Average	1,634	1,732	1,511	1,513

A50 WB/M1SB Merge				
Flow Set	Upstream mainline		Merge flow	
	AM	PM	AM	PM
2038 2A unconstrained	603	754	3,422	3,528
2038 2A constrained	721	842	2,868	2,963
Average	662	798	3,145	3,245

3. Proposed maximum traffic flows to be considered

The average vehicle flows for the constrained and unconstrained VISSIM modelling outputs are set out in the following tables.

It should be noted that the numbers included within the tables below (from the VISSIM model itself) are lower than what's included for in the coloured table above (from Alain's furnishing methodology). This is due to the slight delay in the PM model at J23a where due to the high mainline flow, the A42 merge has a slight delay for vehicles merging on the M1 NB, albeit it should be noted that this still provides significant betterment when compared to the existing future situation, hence the difference in numbers should not cause any concern.

M1 NB New Proposed Link Road to A50				
Flow Set	Downstream mainline		Diverging flow	
	AM	PM	AM	PM
2038 2A unconstrained	4,806	6,149	1,946	1,580
2038 2A constrained	5,384	6,298	1,574	1,353
Average	5,095	6,224	1,760	1,467

M1 NB Diverge to J24				
Flow Set	Downstream mainline		Diverging flow	
	AM	PM	AM	PM
2038 2A unconstrained	3,726	5,276	1,080	873
2038 2A constrained	3,999	5,426	1,385	872
Average	3,863	5,351	1,233	873

Merge Link Road/A50 Exit at J24				
Flow Set	Upstream mainline		Merge flow	
	AM	PM	AM	PM
2038 2A unconstrained	1,593	1,383	1,946	1,580
2038 2A constrained	1,413	1,070	1,574	1,353
Average	1,503	1,227	1,760	1,467

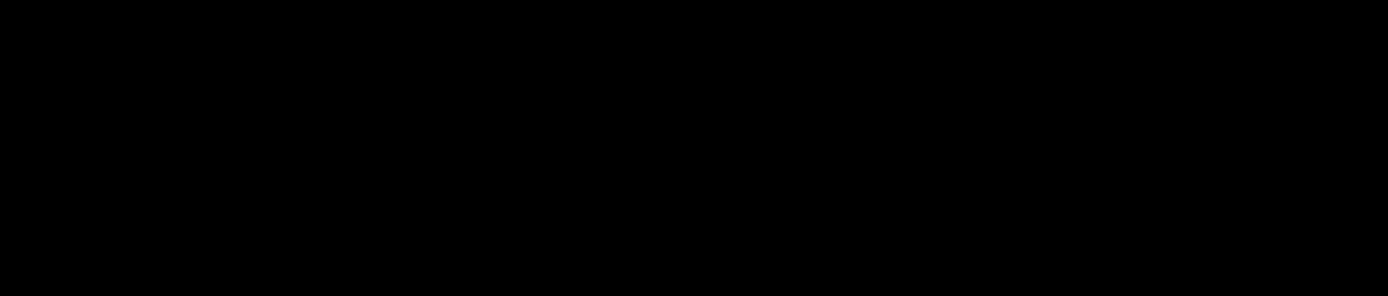
A50 WB/M1SB Merge				
Flow Set	Upstream mainline		Merge flow	
	AM	PM	AM	PM
2038 2A unconstrained	603	754	3,539	2,963
2038 2A constrained	721	842	2,987	2,423
Average	662	798	3,263	2,693

We trust the above is of use and provides suitable elaboration and supporting justification as to why we propose to adopt the minimum and maximum traffic flows set out above in Simon's highway design considerations, versus the worst-case traffic flows used to stress test the mitigation proposals from a VISSIM perspective. However, should you have any queries, please ask. Ideally, we would like a response before the end of the week, to inform Simon's work from the w/c 3/11/25 when he returns from a mixture of A/L and meetings, if that is possible. Thanks in advance

Kind regards

Paul Wilson BA(Hons) MCIHT MSoRSA CMILT MInstILM
Director | Head of Transport & Accessibility Planning | BWB Consulting Limited

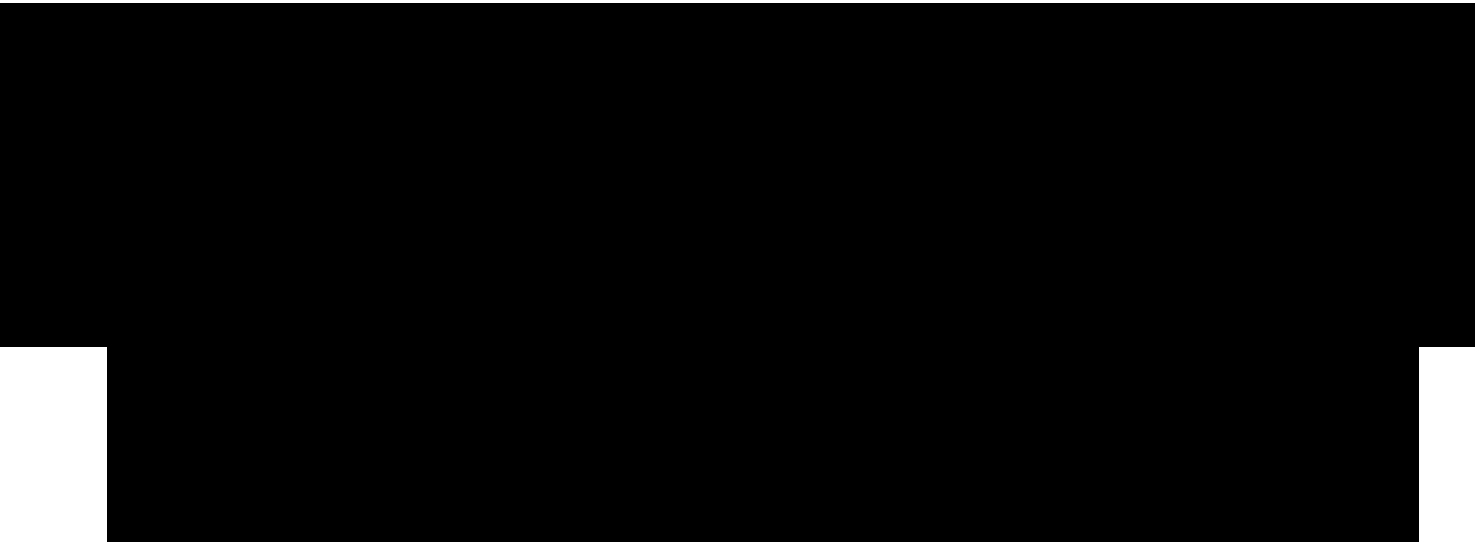
5th Floor, Waterfront House, Station Street, Nottingham, NG2 3DQ
M: [REDACTED] | W: bwbconsulting.com



I have just checked and there is a copy of the VISSIM flow input spreadsheet in the link below but for ease, I have also attached it above. Let me know if there are any issues.

Kind regards,

[REDACTED] & Accessibility - Planning | BWB Consulting Limited



[REDACTED]
Multistory (Colmore Square), 7th Floor, 38 Colmore Circus, Birmingham, B4 6BN | UK



Please note I am on annual leave on:-
12/11/25
20/11/25
27/11/25

[REDACTED]

Further to the below, and Vibi's email last Friday, please find below a link to the VISSIM model and output spreadsheets for the 2019 PRTM unconstrained sensitivity test:

[251024_Stage_2A_Sensi_VISSIM_Model](#)

We note you (George) and Alain discussed with Simon how this then translates into the traffic flow information he adopts for his engineering review yesterday PM; we shall refer back on this next week. Our formal Technical Note (TN) response to your (updated) TN dated 15/10/25 will follow the w/c 3/11/25, when Simon and Vibi return from A/L next week, building on the information above, which forms a worst-case stress test of the operation of the link road in the unconstrained A50 westbound merge scenario.

In summary, the outputs, and reporting in the formal TN, shows that the betterment in terms of operation of the highway network included within the VISSIM model study area when compared to the core DCO Stage 1a assessment remains intact, therefore providing (hopeful) comfort from a modelling perspective with regards to this test. That is especially when the Stage 1a VISIM modelling work has not been updated to account for the unconstrained merge in the future baseline scenario (ie this would also see an increase in the number of vehicles entering the network also) , therefore providing a worst-case comparison, We will of course respond to the associated 9 substantive issues in the formal TN response.

We trust the above is of use; however, should you have any queries in the meantime, whilst we finalise the supporting TN ,please ask. Thanks.

Kind regards,

[REDACTED]
Senior Engineer | Transport & Accessibility - Planning | BWB Consulting Limited

[REDACTED]

[REDACTED]



Hi all,

Building on the actual model and associated spreadsheets issued by Vibi on 17/10/25 to NH, please find below links to copies of our revised VISSIM LMVR and Forecasting Reports.

Link to transmittal documents -  [VISSIM revised LMVR and Forecasting Report-2025-10-23](#)

Link to folder for comments -  [VISSIM revised LMVR and Forecasting Report-2025-10-23](#)

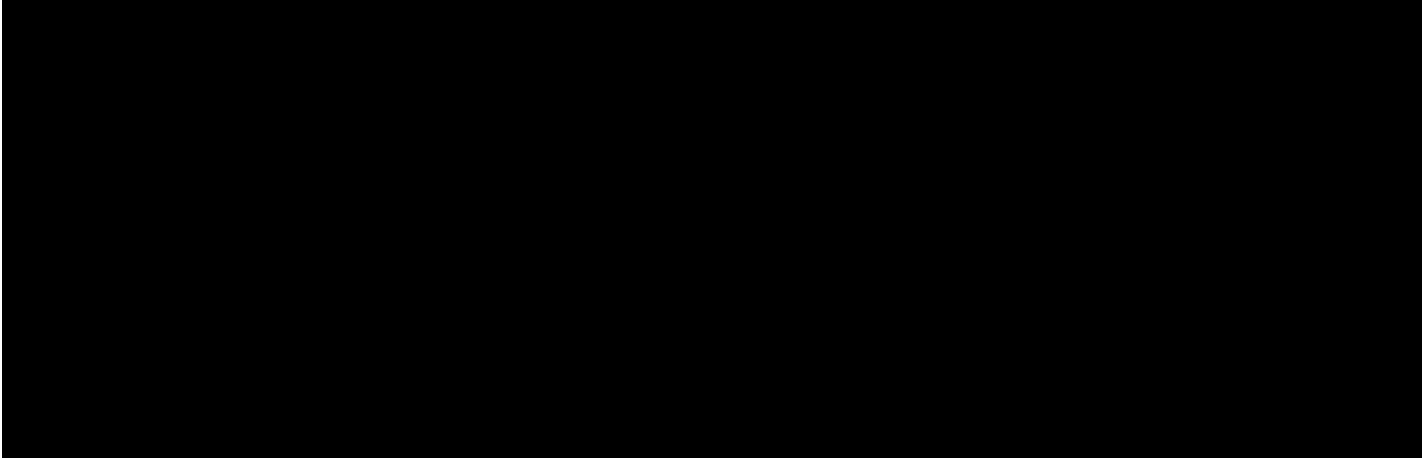
The VISSIM model has been updated to respond to comments from National Highways on the coding of the Stage 2A scenario. These caused some of the results to change, which in turn required updates to the Forecasting Report and LMVR for consistency, although the base model continues to validate well.

These documents therefore replace those within Appendices 46 and 50 of the Transport Assessment that was issued on 17/10 and reflect the core PRTM 2019 modelling, which hopefully a positive line can now be drawn under. The latter also includes the reporting information discussed with LCC earlier in the month.

In the meantime, we continue to work through the PRTM 2019 (unconstrained) and PRTM 2023 sensitivity tests, which will be presented within separate Technical Notes.

Kind regards

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