East Midlands Gateway
Phase 2 (EMG2)

Document DCO 6.6A/MCO 6.6A (Part 10)

ENVIRONMENTAL STATEMENT

Technical Appendices

Appendix 6A

Transport Assessment

~~October 2025~~April 2026

06

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

APPENDIX 6.6A TRANSPORT ASSESSMENT (PART 10) (DOCUMENT DCO 6.6A/MCO 6.6A)

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EMFM 2019

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

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Quality Information

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Section 1 – Overview

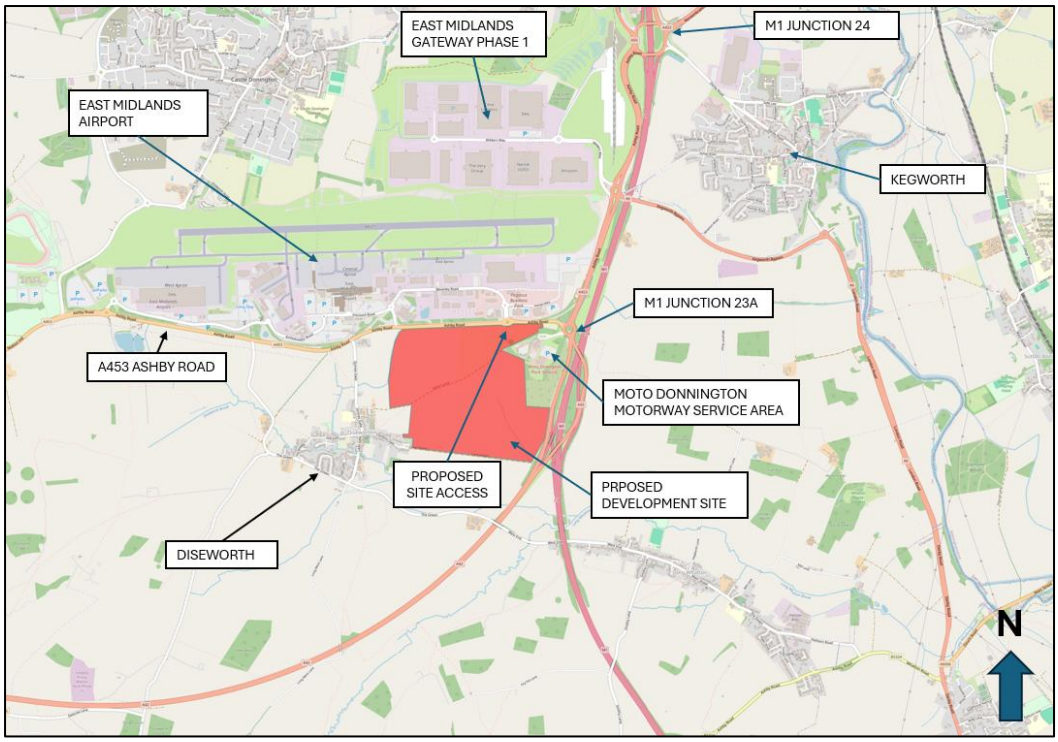
1.1 Introduction

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



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1.1.4 The proposed EMGP2 development will access the highway network via a single point of access:

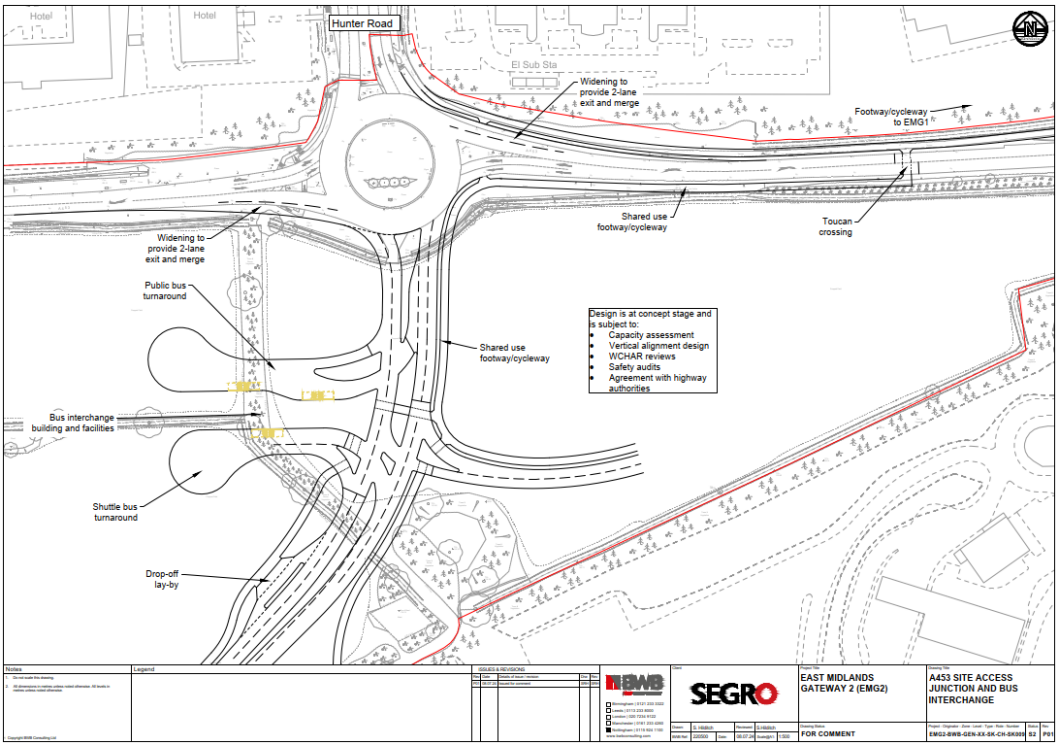
- a fourth arm off the existing A453 / Hunter Road roundabout, as indicatively shown in Figure 1.2.

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 Junction[2]



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 Freeport 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 Freeport and Local Plan sites).

2028/2038 'With Development (1a)'. With EMGP2 development (with all Freeport 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 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).

1.1.8 This report follows the East Midlands Gateway Phase 2 Base Year Model Review Addendum report[3], 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 1b[5] and Stage 2b forecasts are reported as separate addendums to the Forecasting Report[4].

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 – 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: Presents indicative network statistics within the AoI 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

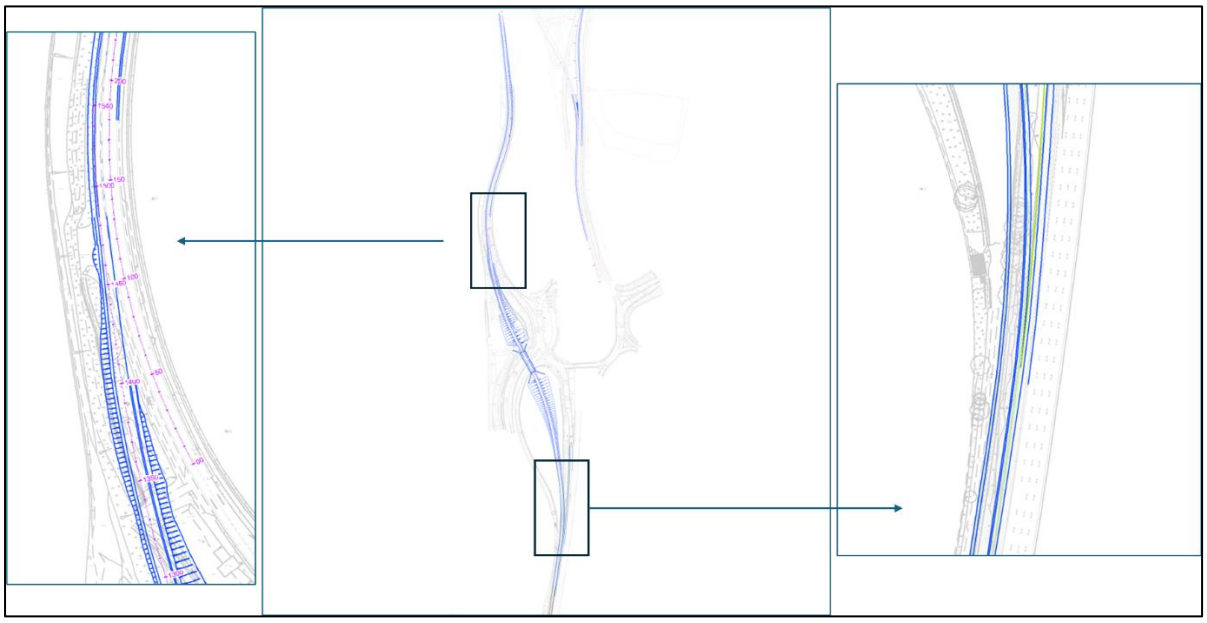


Figure 2.2: M1 Northbound to A50 Westbound Interchange Link Road Diverge Layout

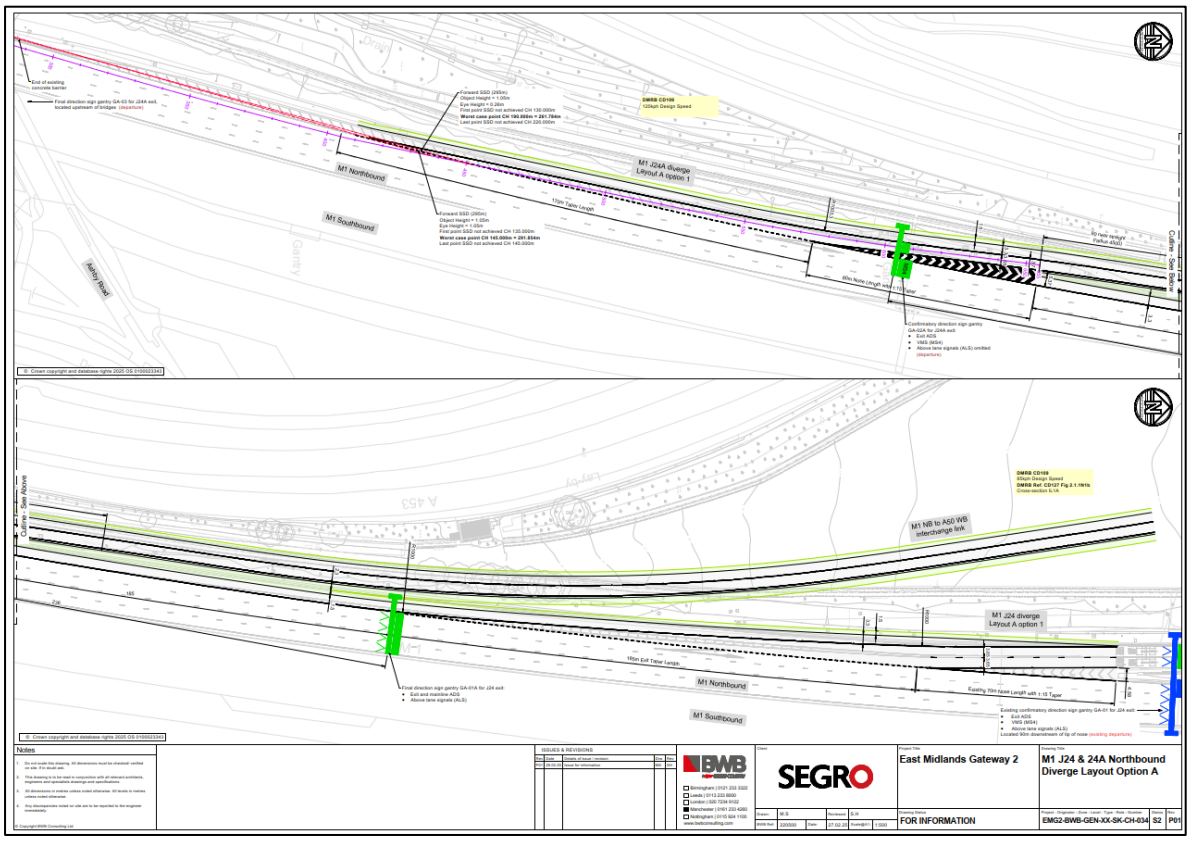


Figure 2.3: M1 Southbound Widening on Approach to J24

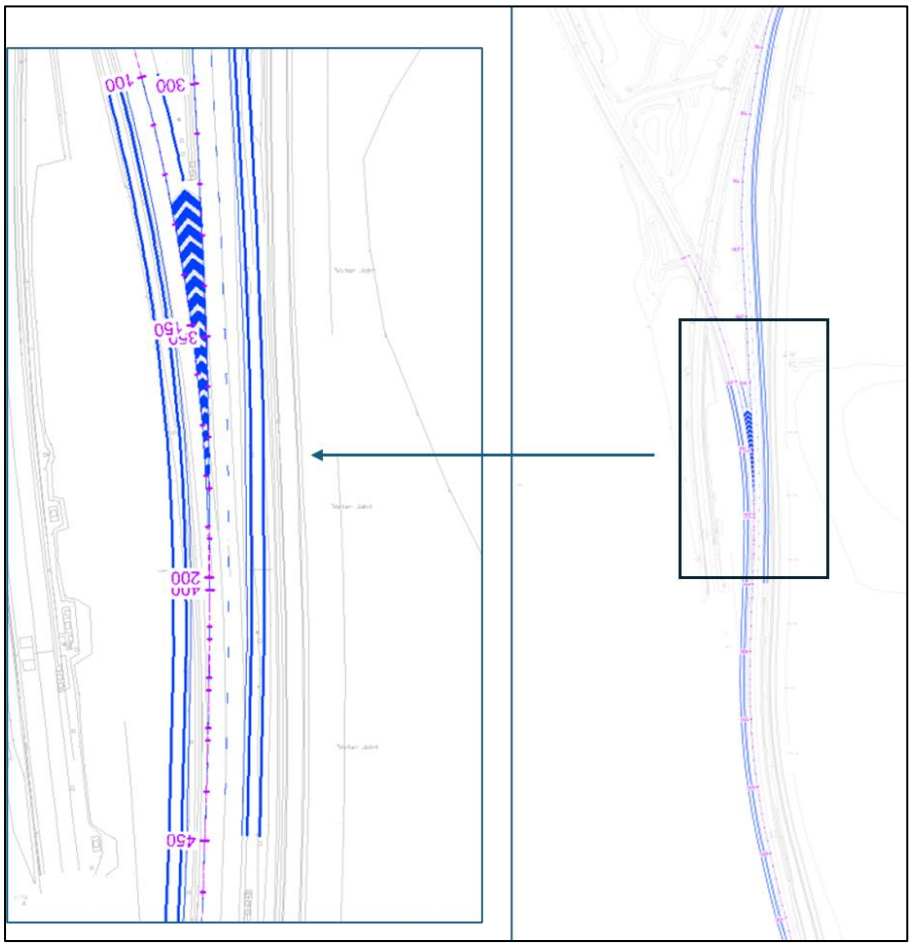


Figure 2.4: EMGP1 Access Improvements

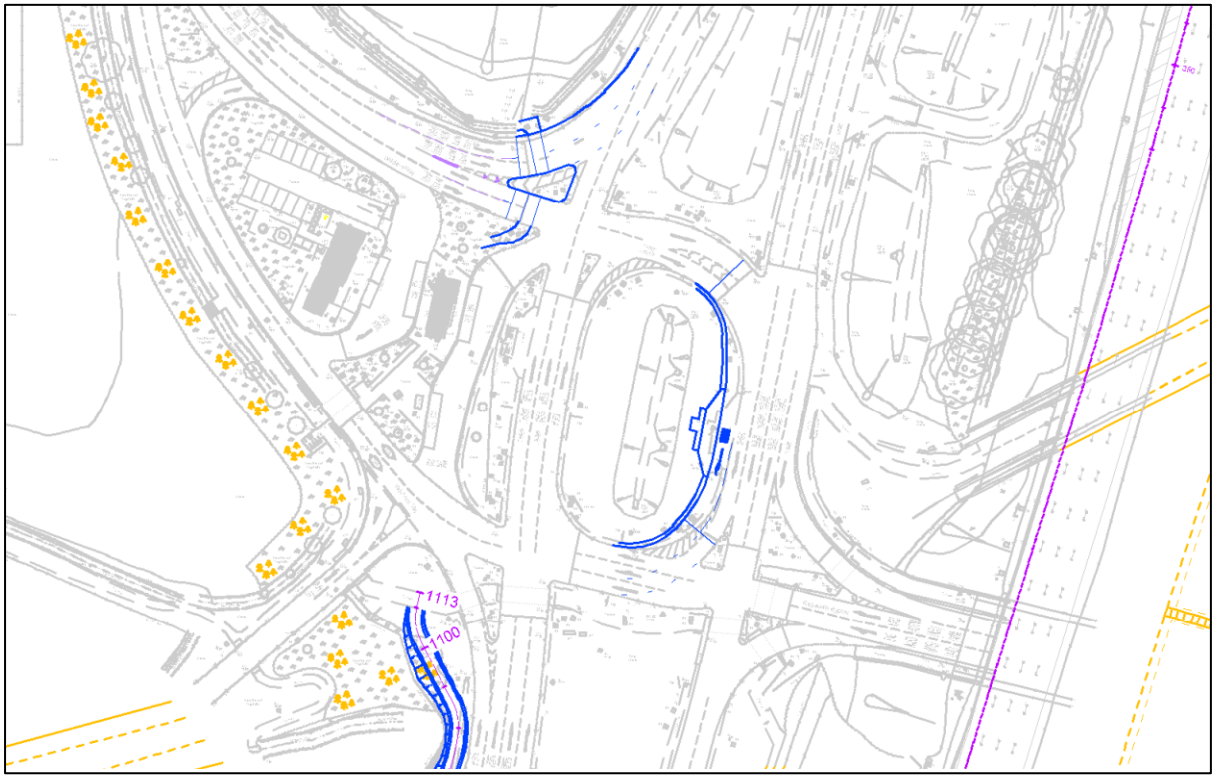


Figure 2.5: A453 Finger Farm Westbound Exit Widening

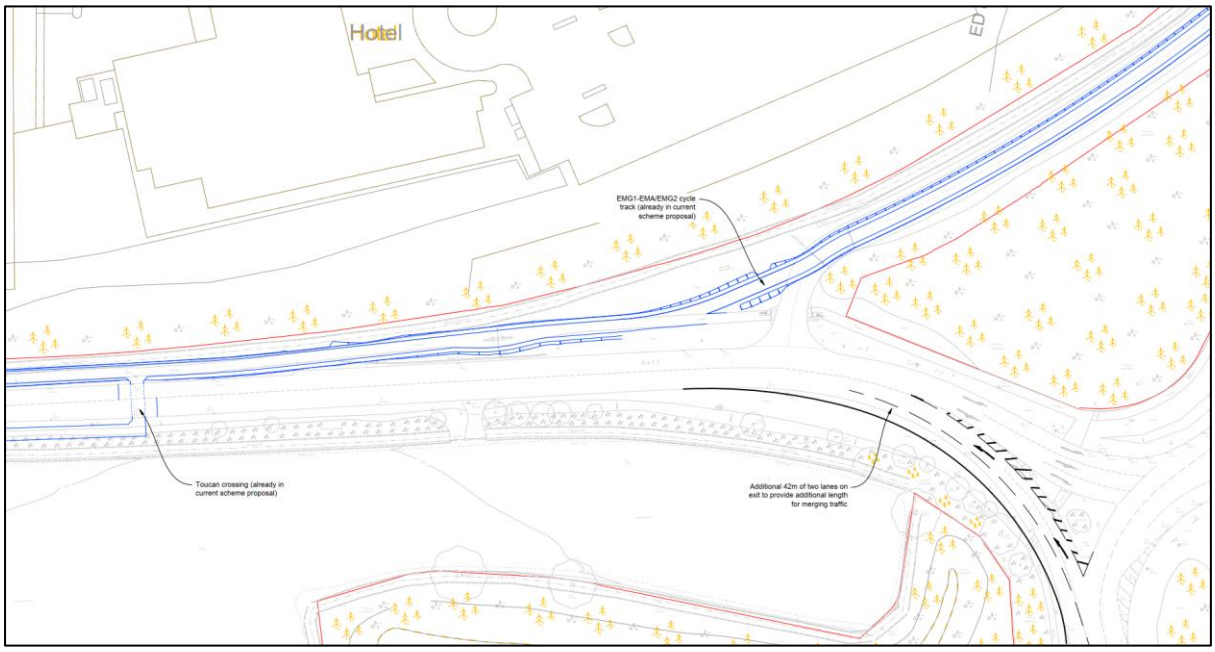
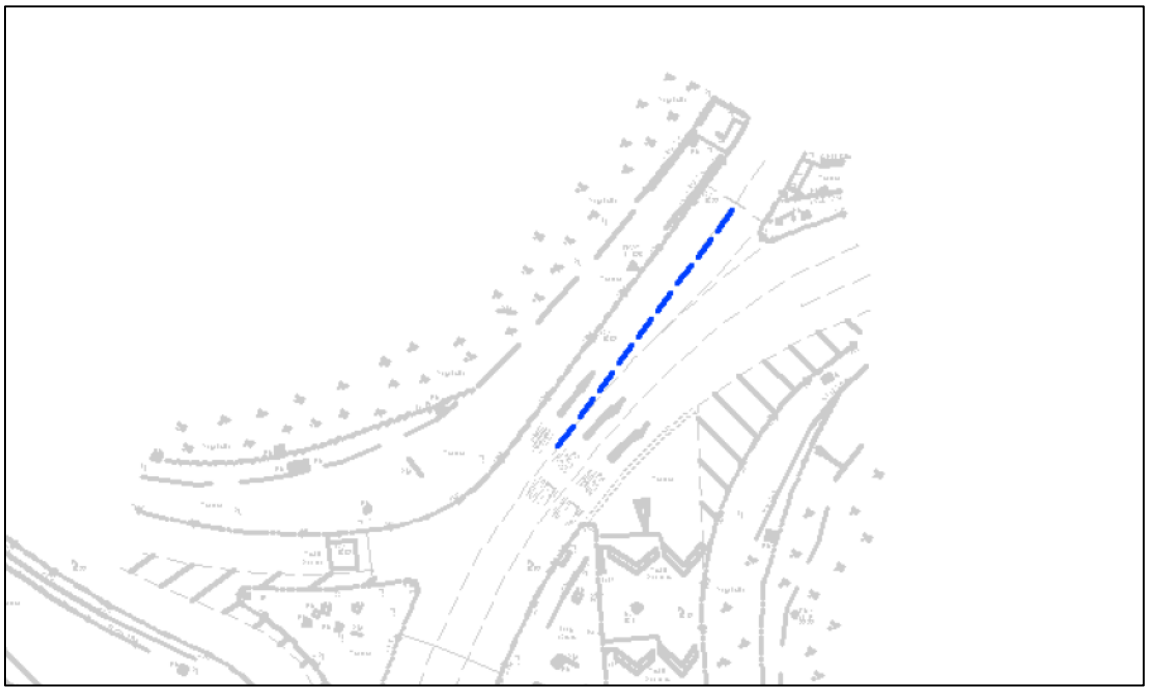


Figure 2.6: A453 EMGP2 Access Junction and Toucan Crossing

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:

- routeing 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 Report[4]. 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.

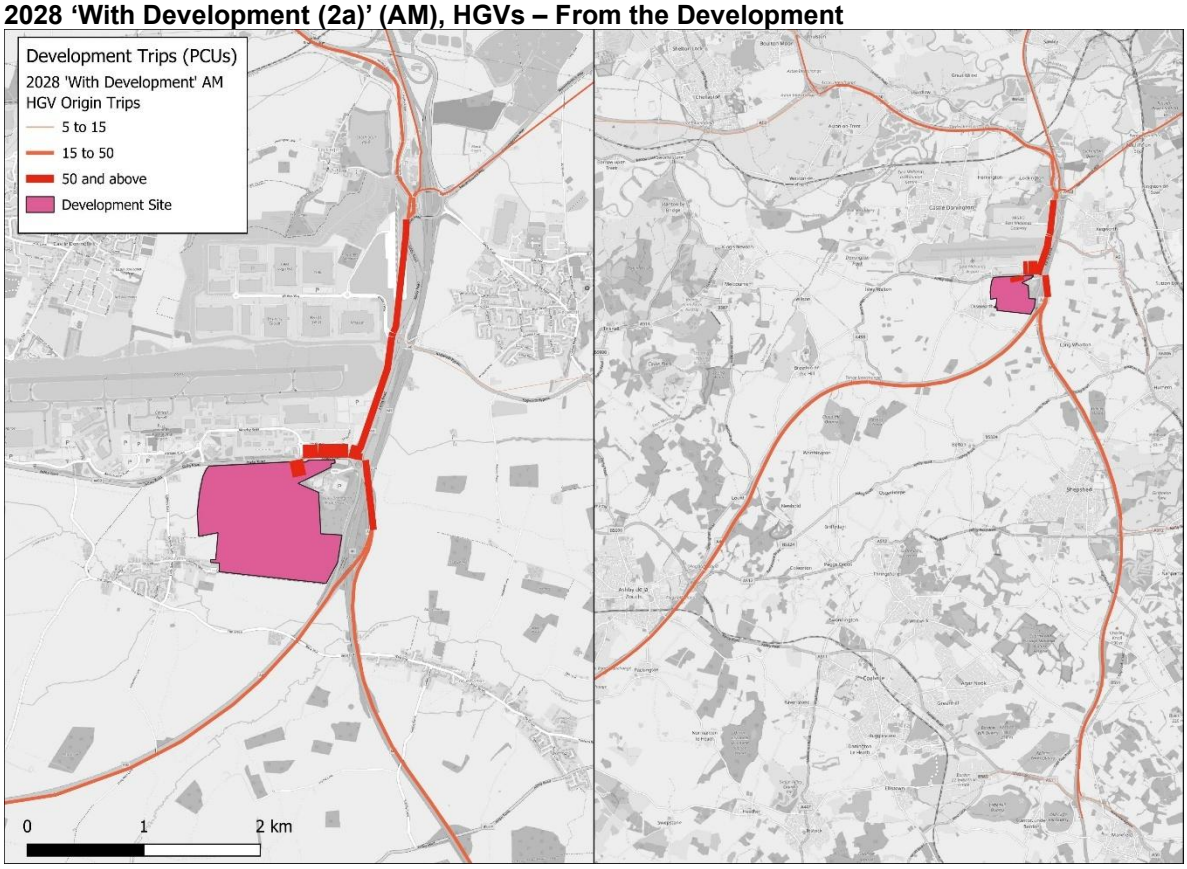
3.2.7 With the M1 northbound to A50 westbound interchange link road included in Stage 2a the development traffic (lights and heavy vehicles combined) on the A50 is forecast to have fewer than 100 vehicles in both directions in either the 2028 or 2038 scenarios for Stage 2a, which are very similar to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

3.2.8 It should be noted that the local networks through Diseworth, Castle Donington 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

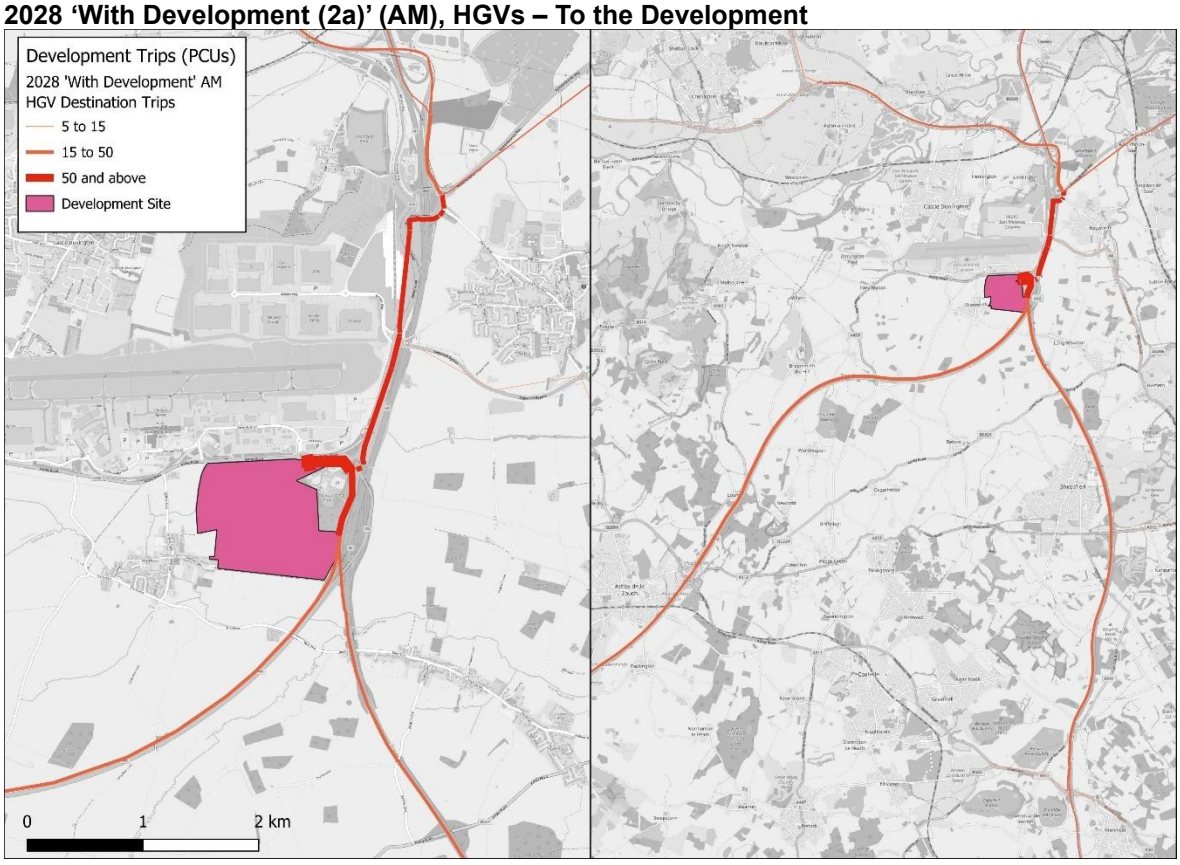

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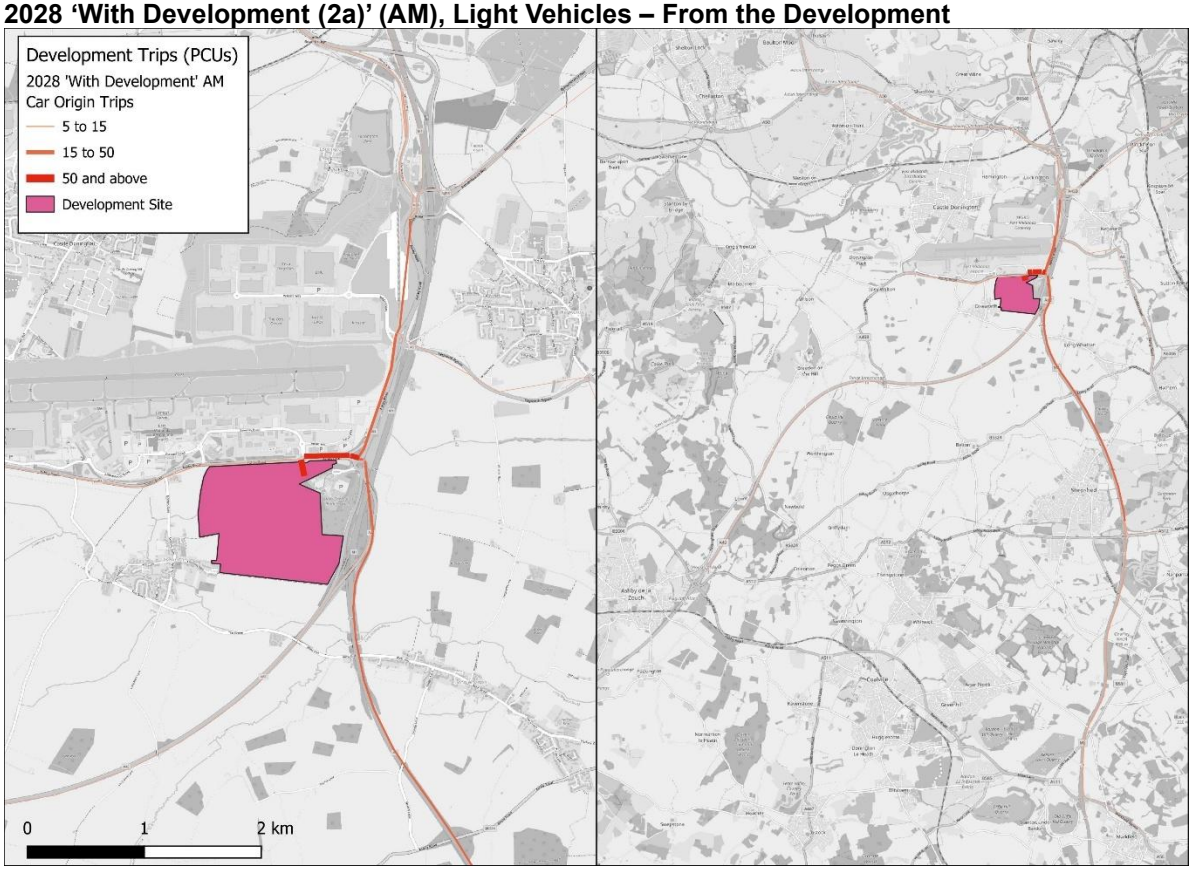
Figure 3.2: Light Vehicle Trip Distribution to and from the Proposed Development for 2028 (AM)

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



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

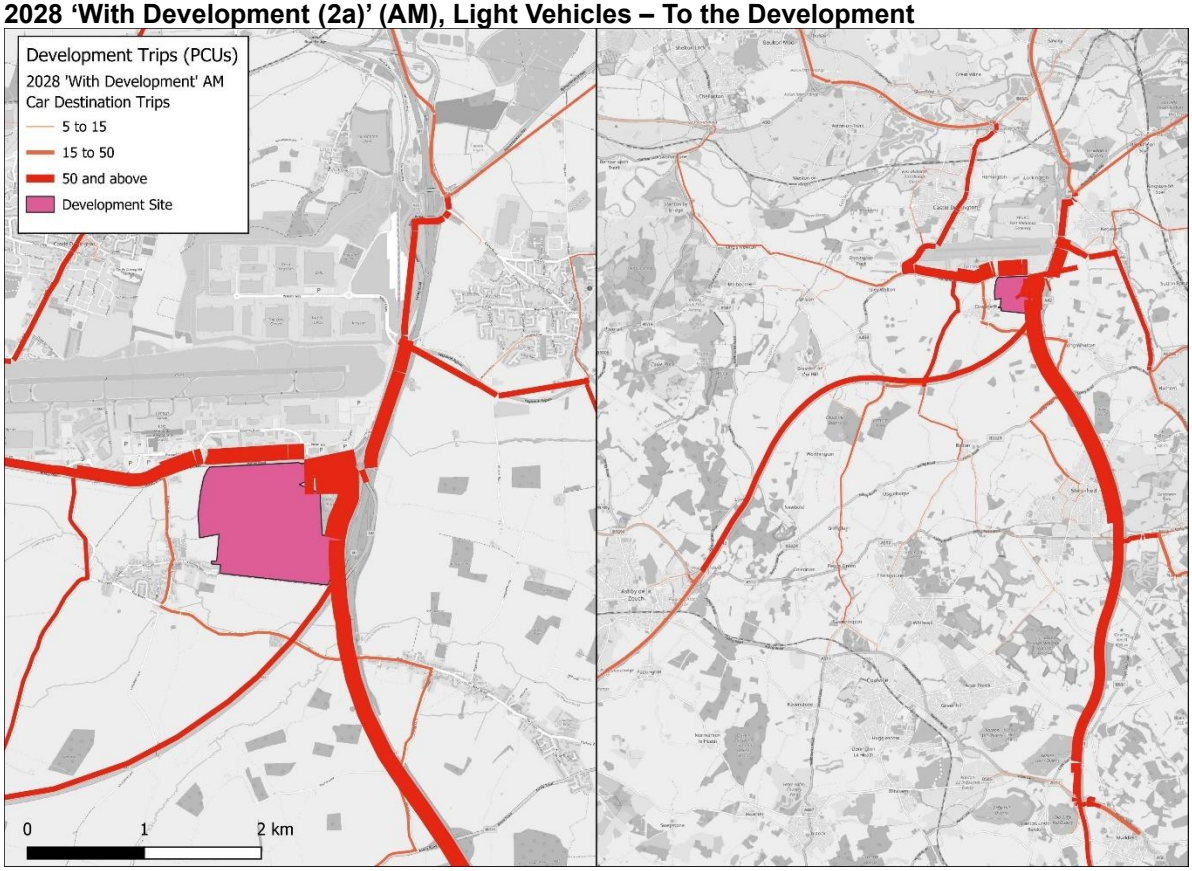

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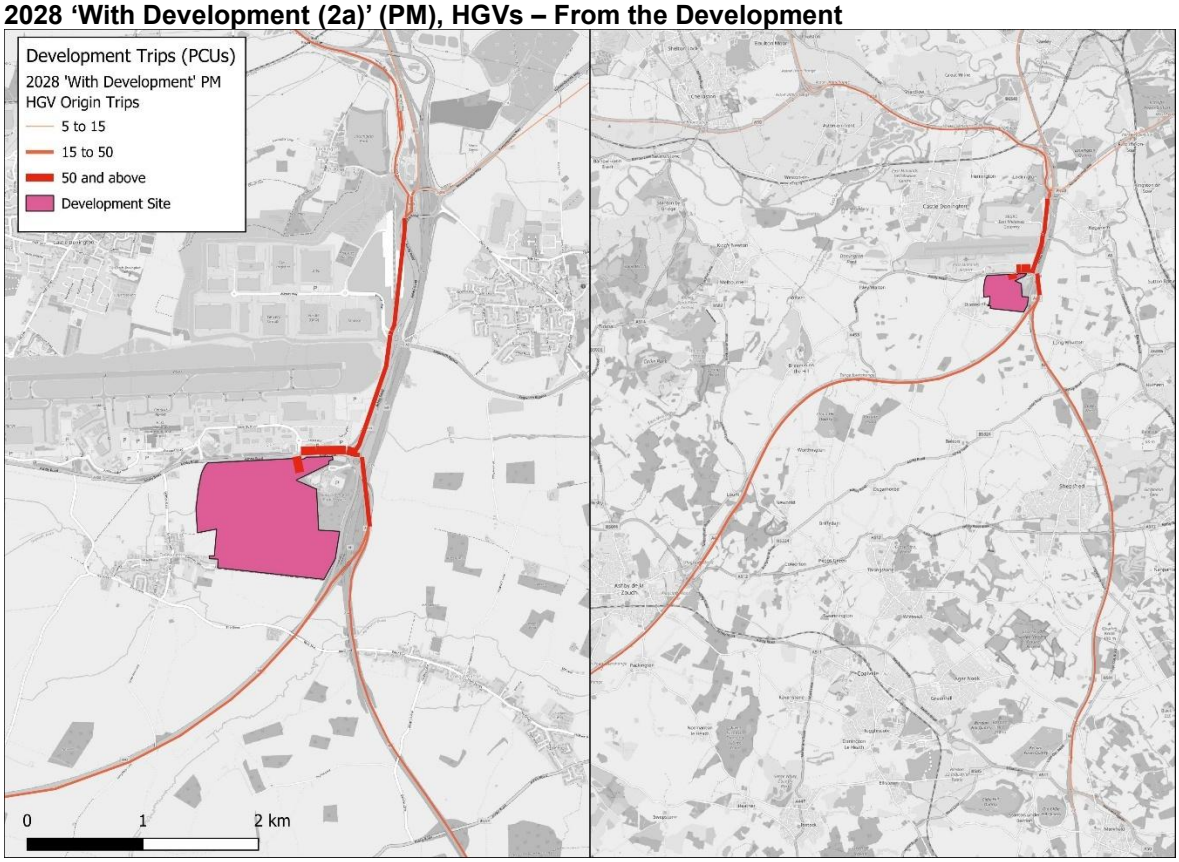
Figure 3.3: HGV Trip Distribution to and from the Proposed Development for 2028 (PM)

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



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

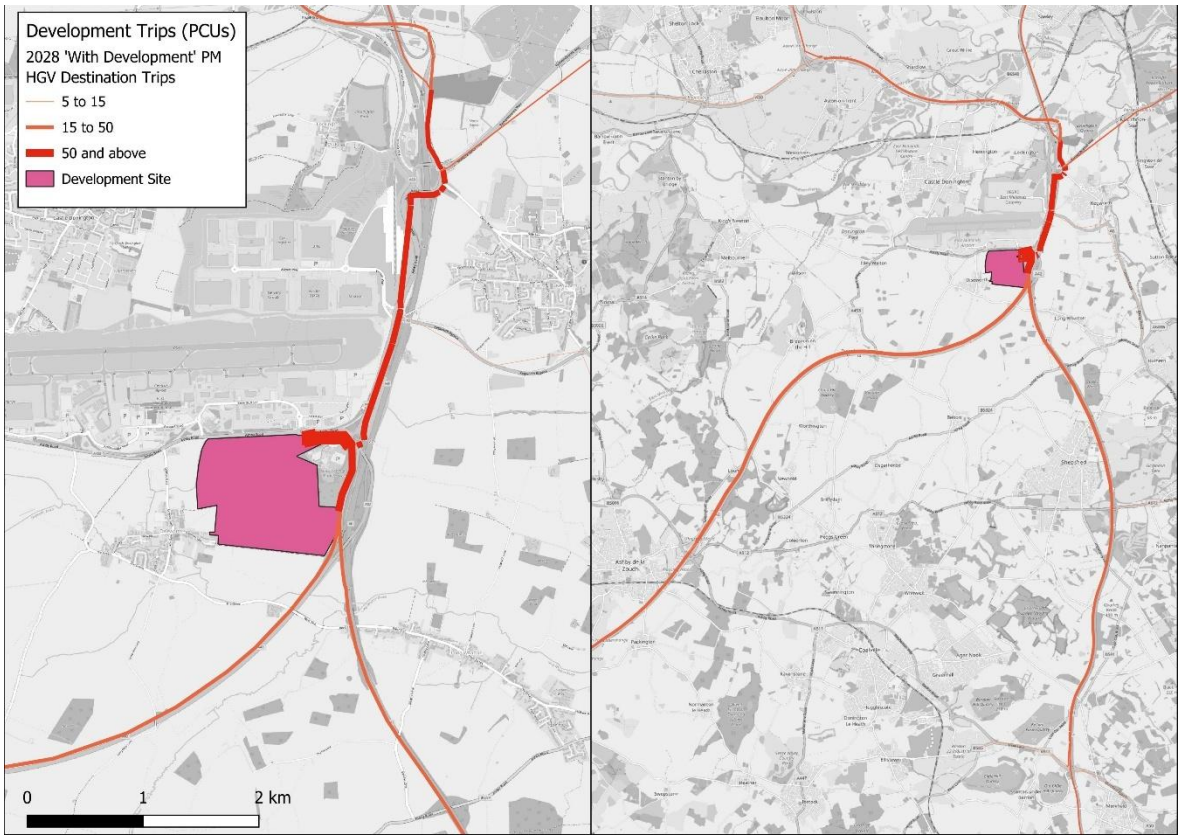

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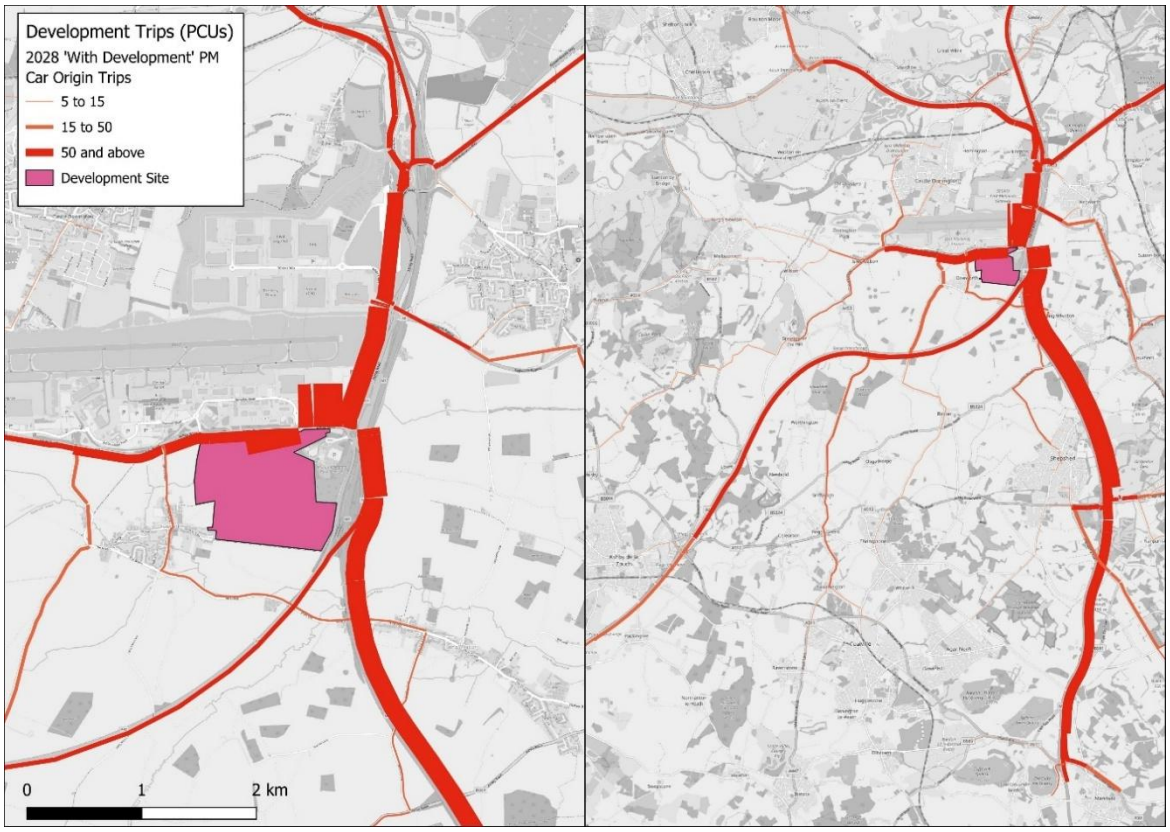
Figure 3.4: Light Vehicle Trip Distribution to and from the Proposed Development for 2028 (PM)

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



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

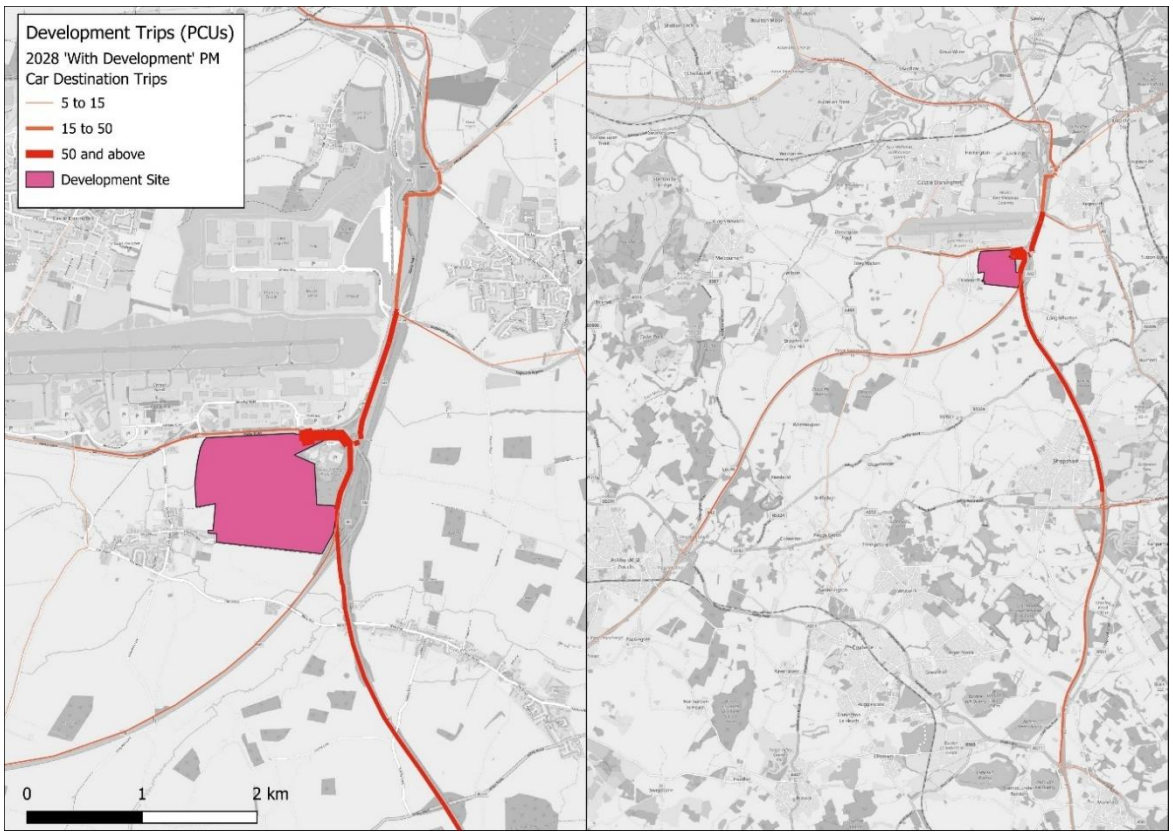

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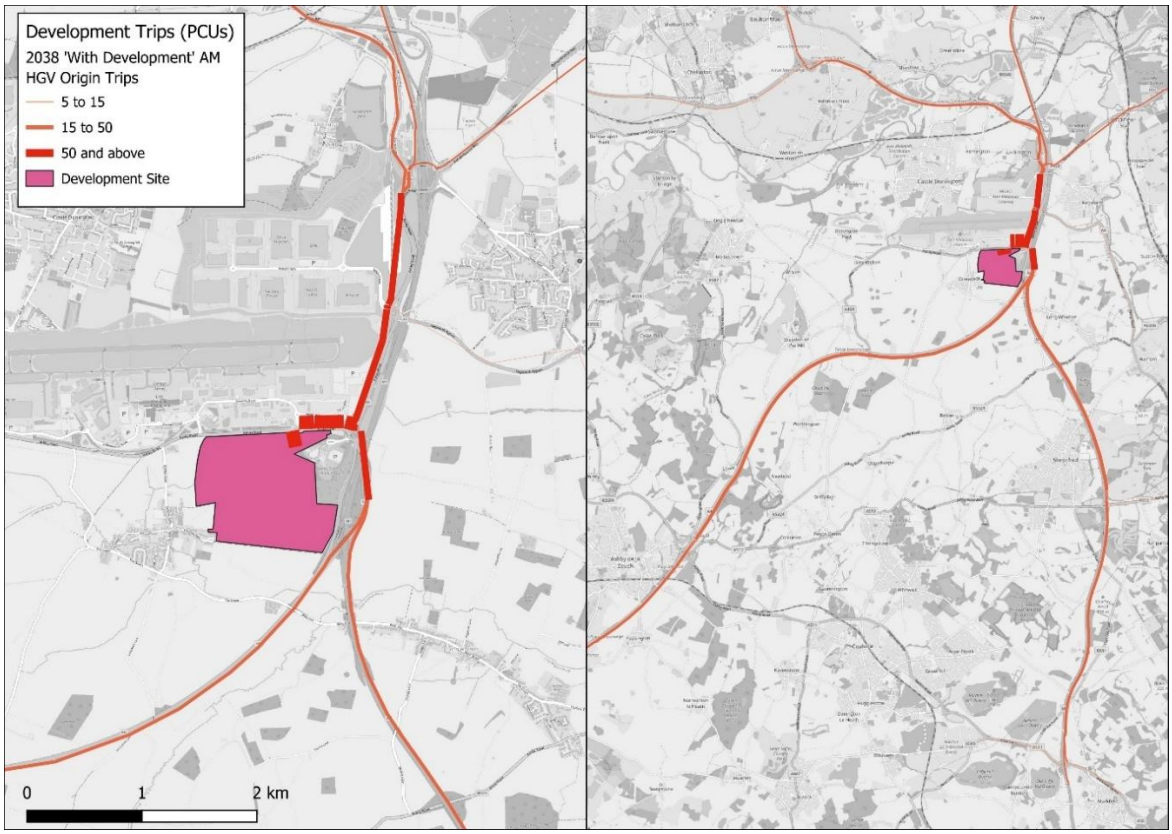
Figure 3.5: HGV Trip Distribution to and from the Proposed Development for 2038 (AM)

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



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

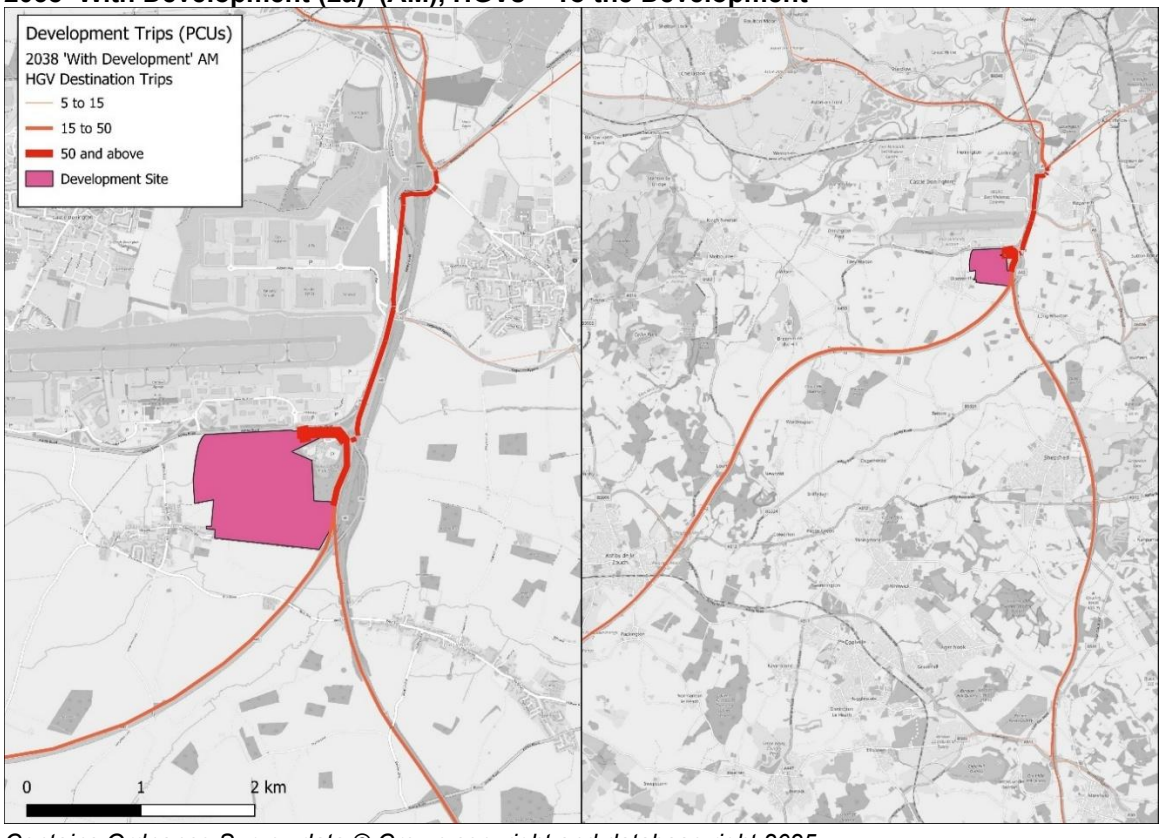

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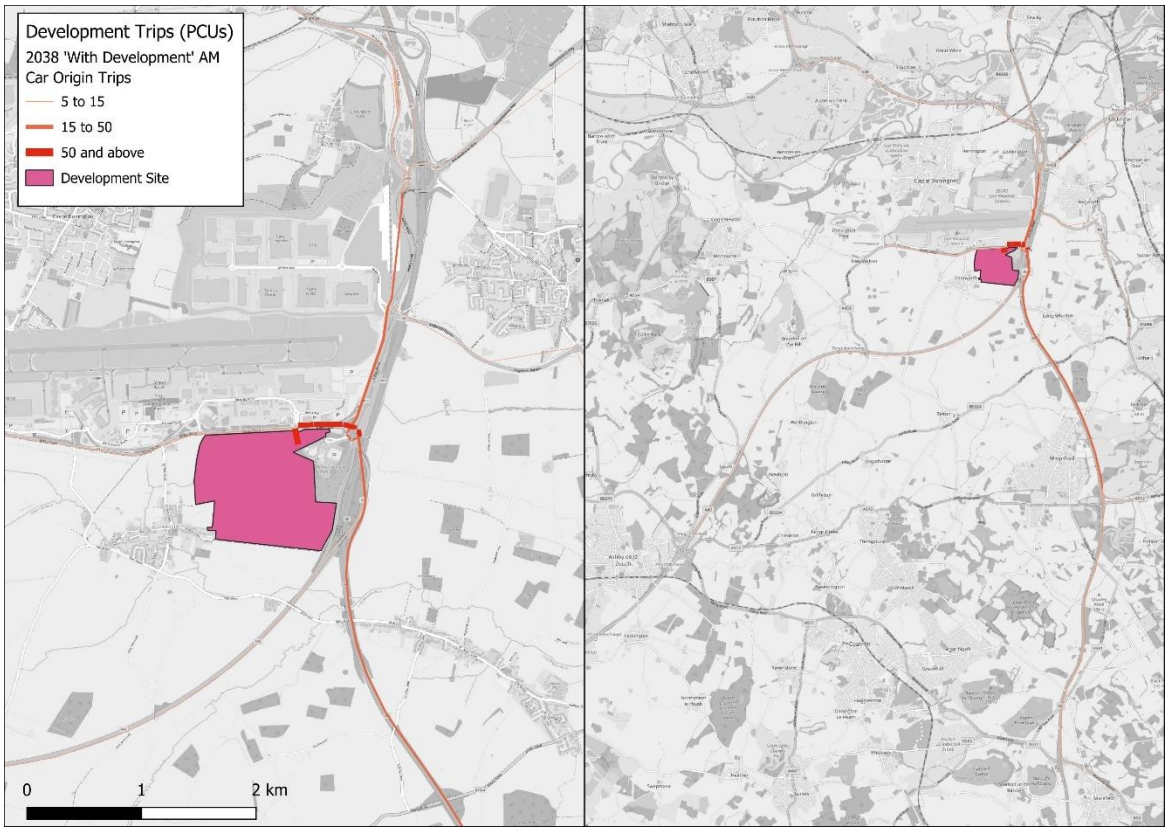
Figure 3.6: Light Vehicle Trip Distribution to and from the Proposed Development for 2038 (AM)

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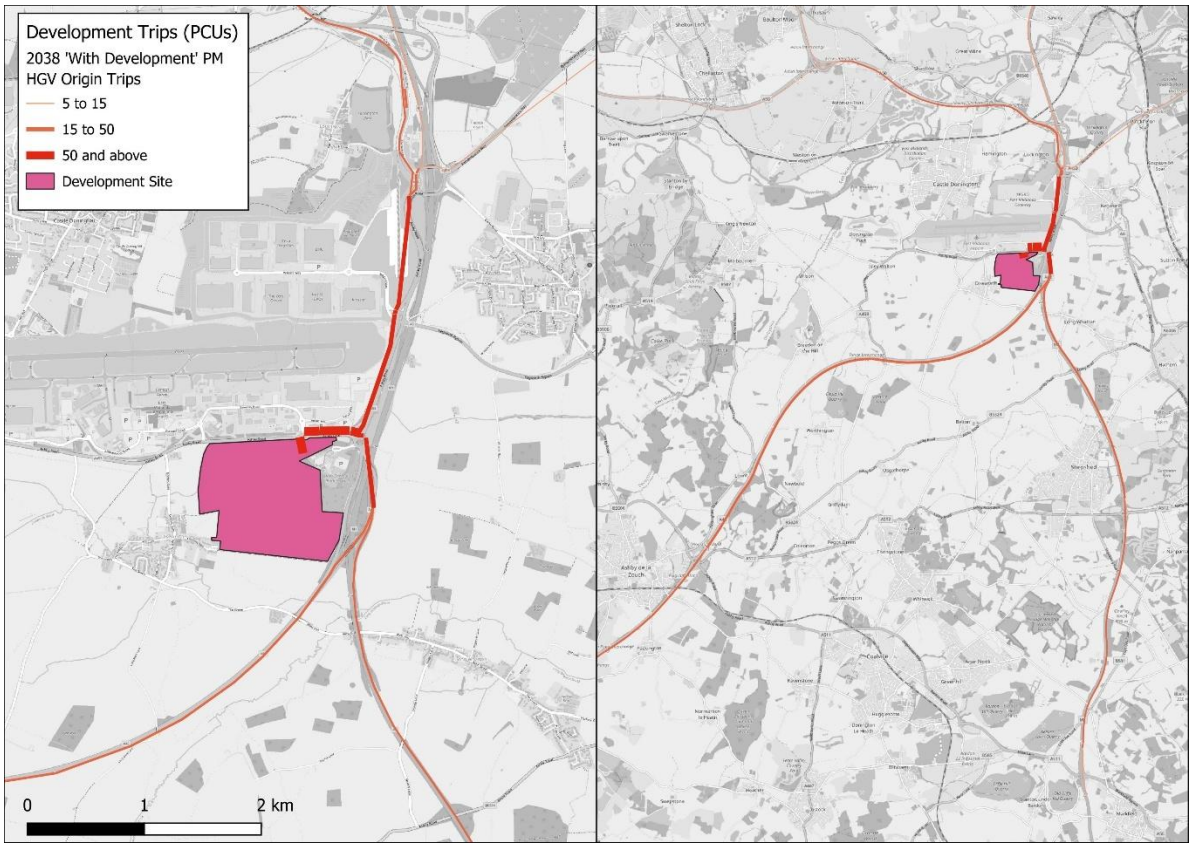
Figure 3.7: HGV Trip Distribution to and from the Proposed Development for 2038 (PM)

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



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

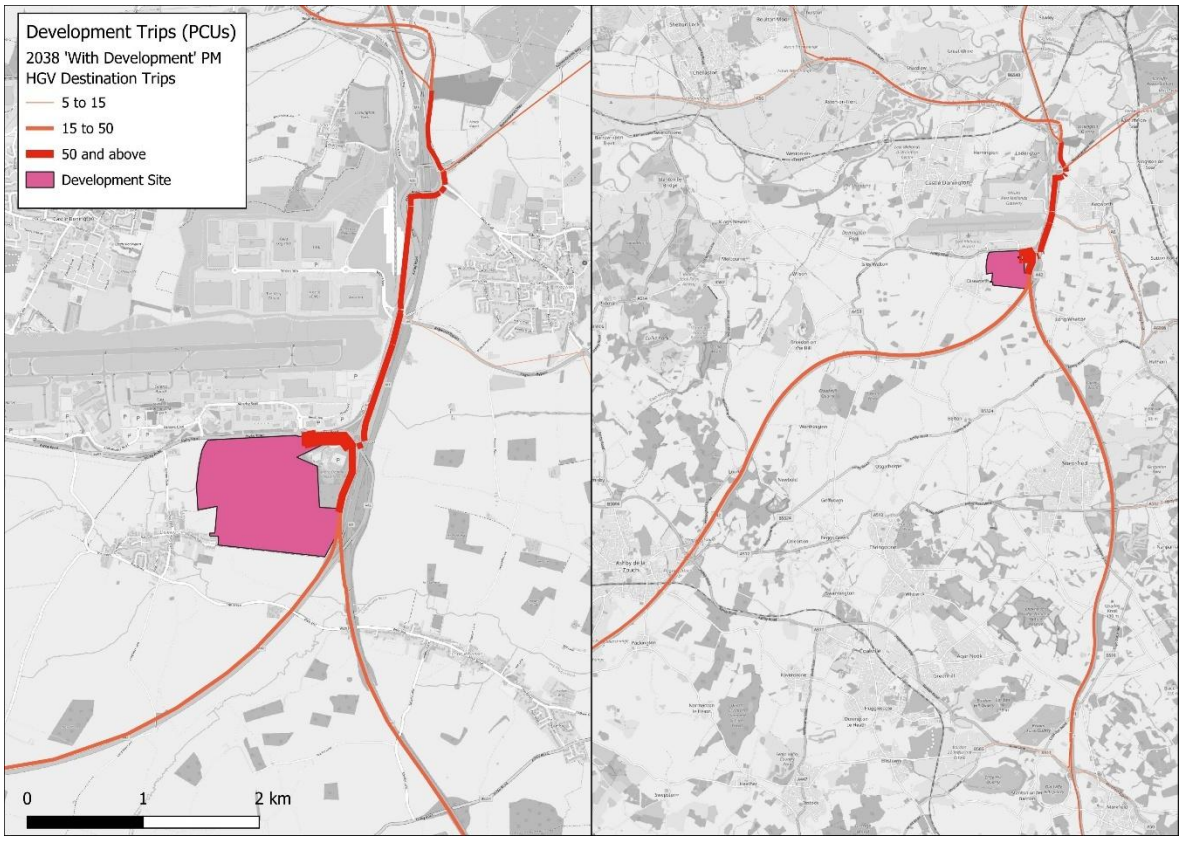

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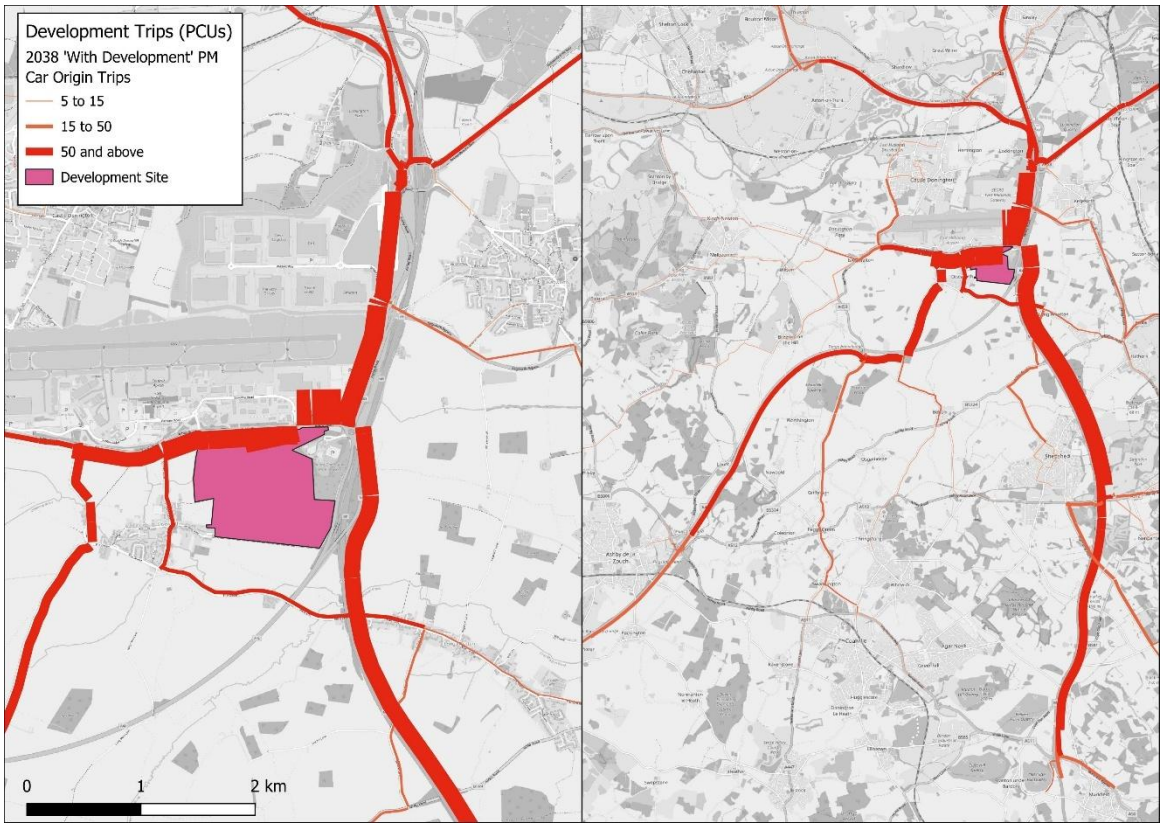
Figure 3.8: Light Vehicle Trip Distribution to and from the Proposed Development for 2038 (PM)

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



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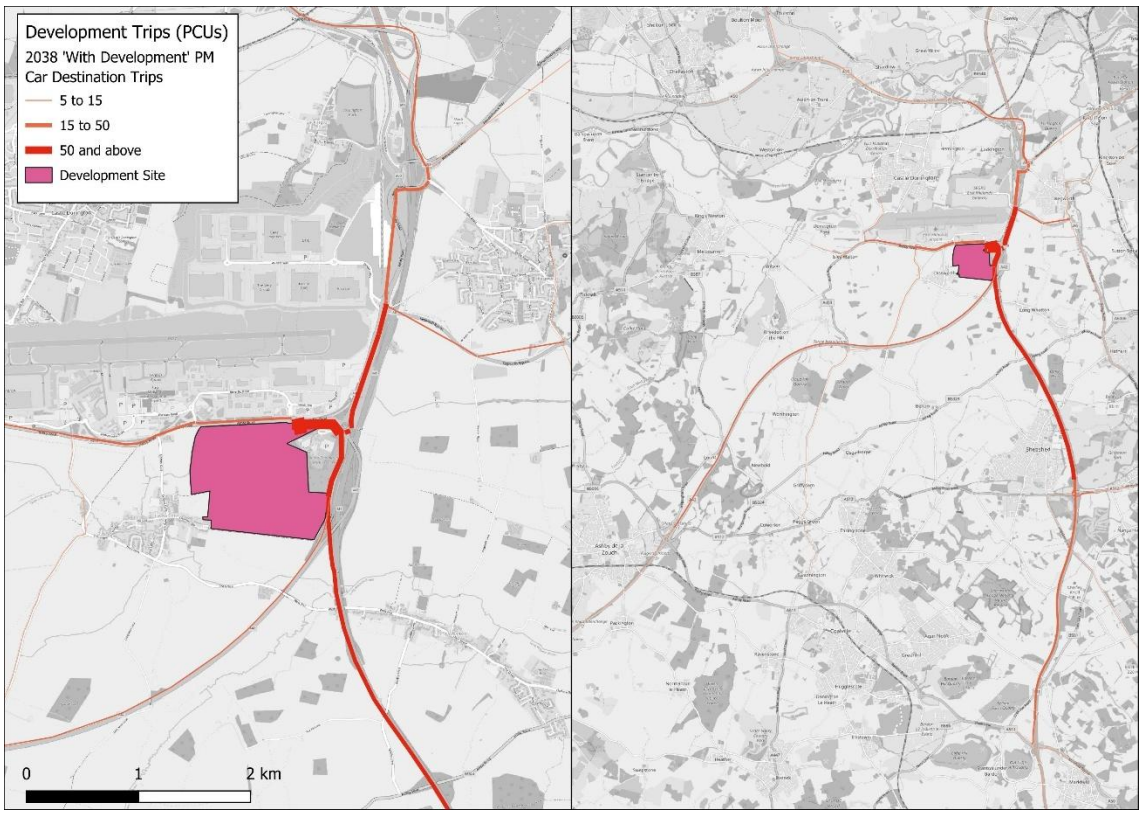
2038 'With Development (2a)' (PM), Light Vehicles – To the Development



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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

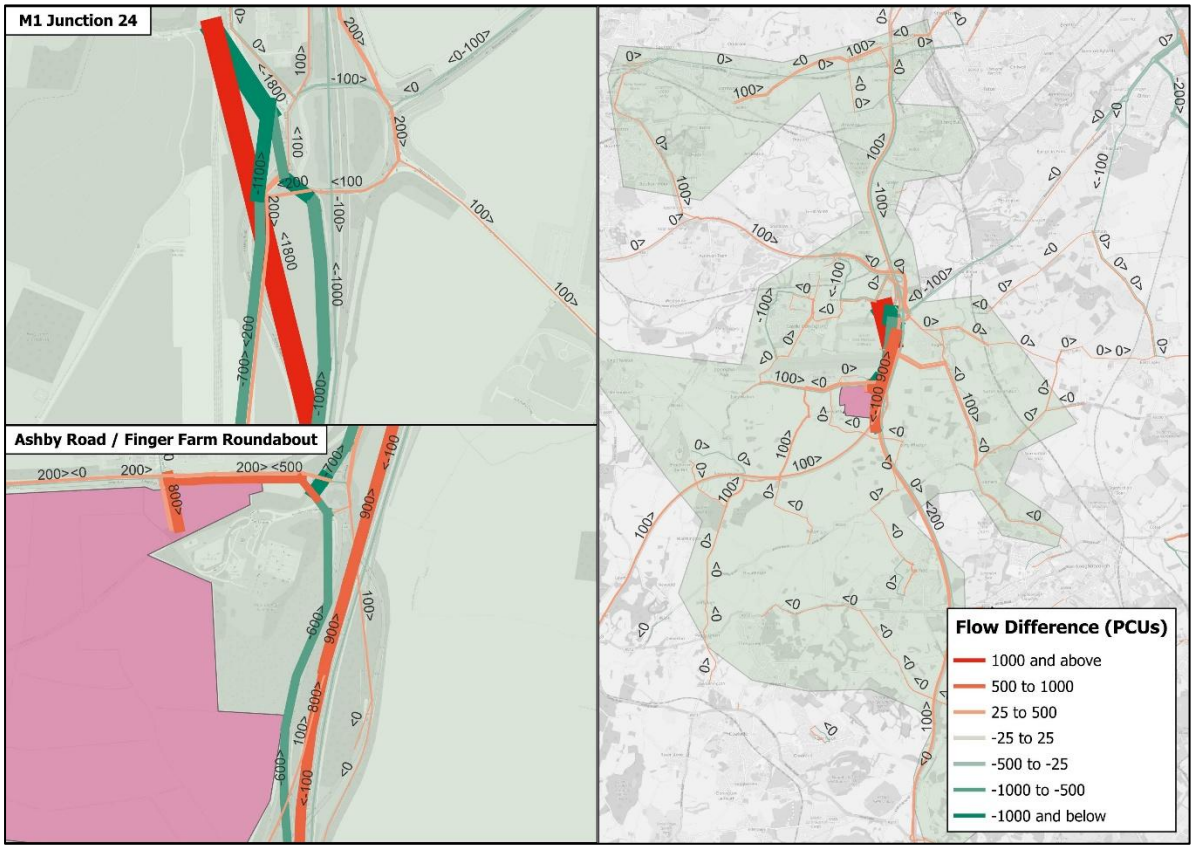
3.3.6 A reduction in northbound traffic on the A453 is forecast at Finger Farm Roundabout primarily as a result of the new link road. There is also an increase (~100 PCUs) on the A453 from the north with the largest increase, as expected, on the A453 to / from the proposed development site.

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 'Without Development (1a)' minus 'With Development (2a)'

AM Peak hour



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PM Peak hour

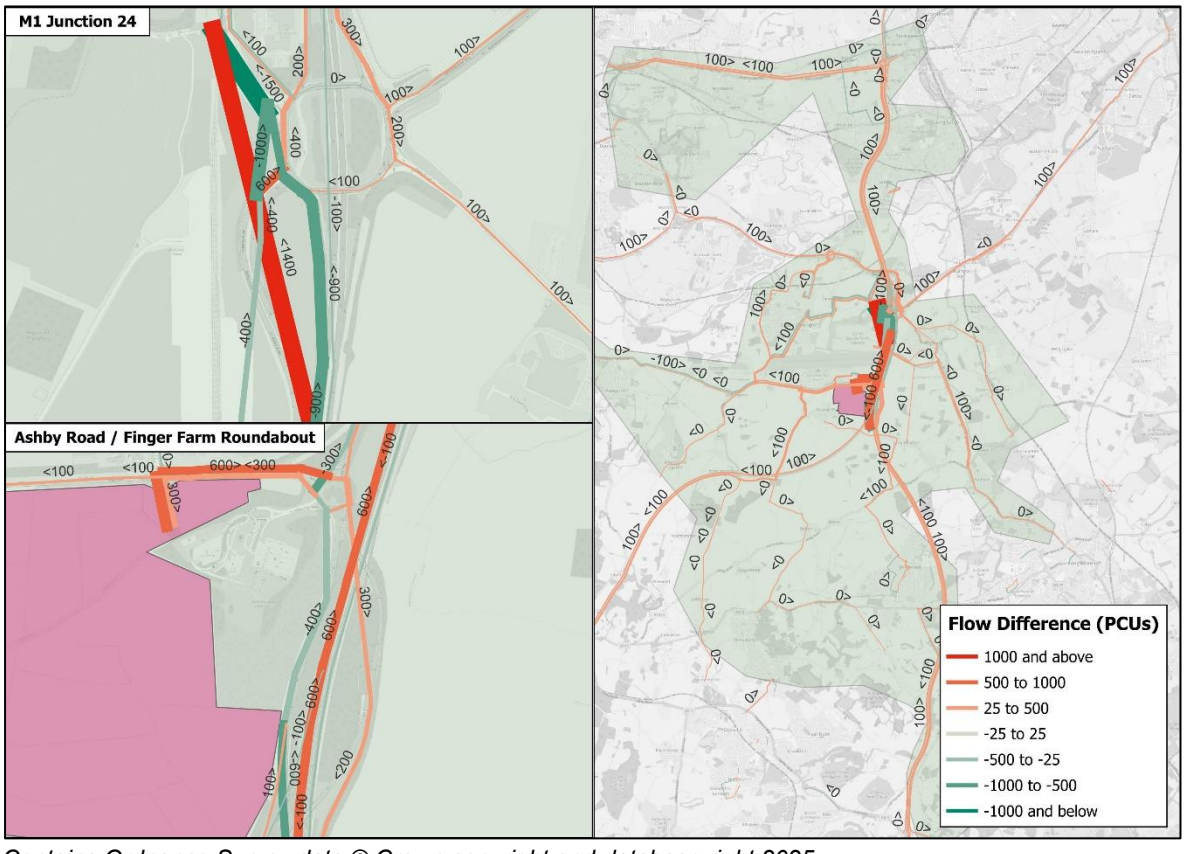

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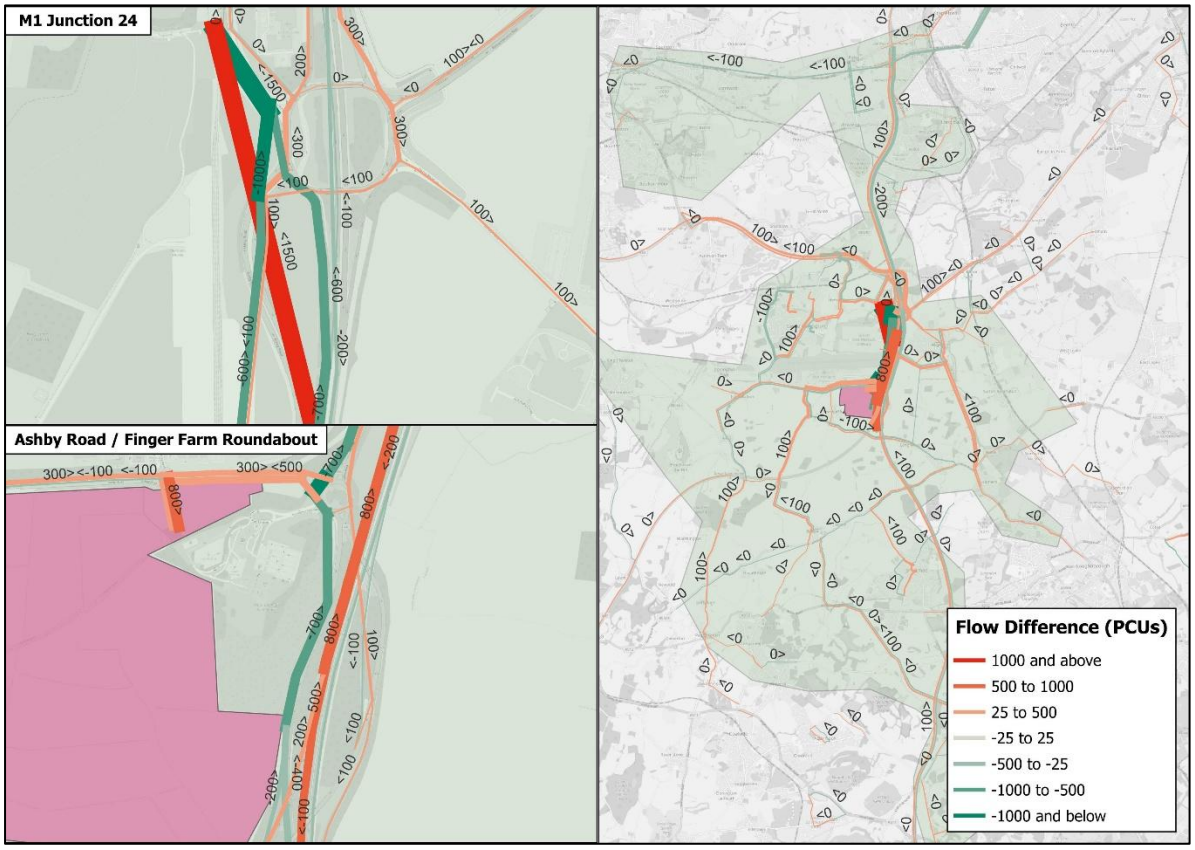
Figure 3.10: Forecast Flow Change for 2038 'Without Development (1a)' minus 'With Development (2a)'

AM Peak hour



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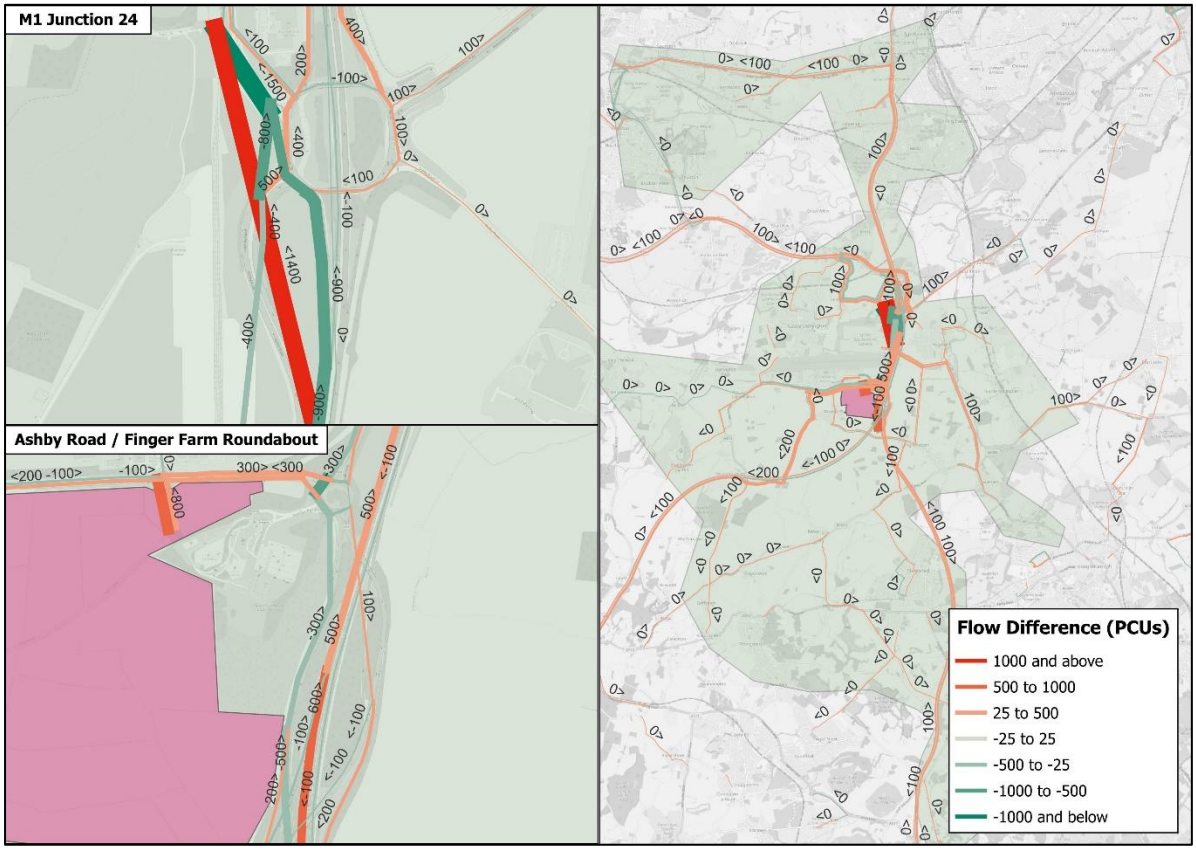
PM Peak hour



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3.4 Area of Influence

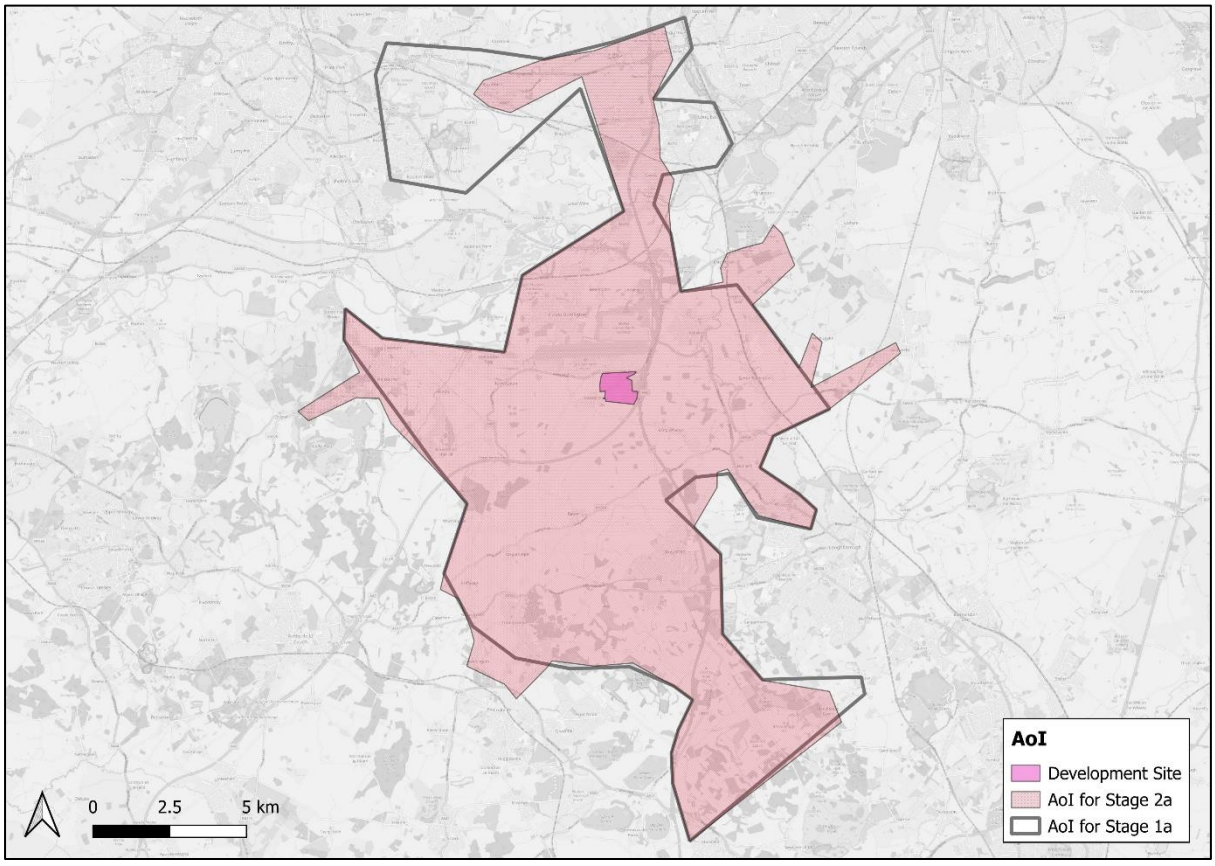
3.4.1 Using the forecast flow changes between the 'With Development (2a)' and 'Without Development (1a)' scenarios, an indication of the AoI in Stage 2a has been defined and is shown in Figure 3.11.

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 ±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 Borrowash; 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 to 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

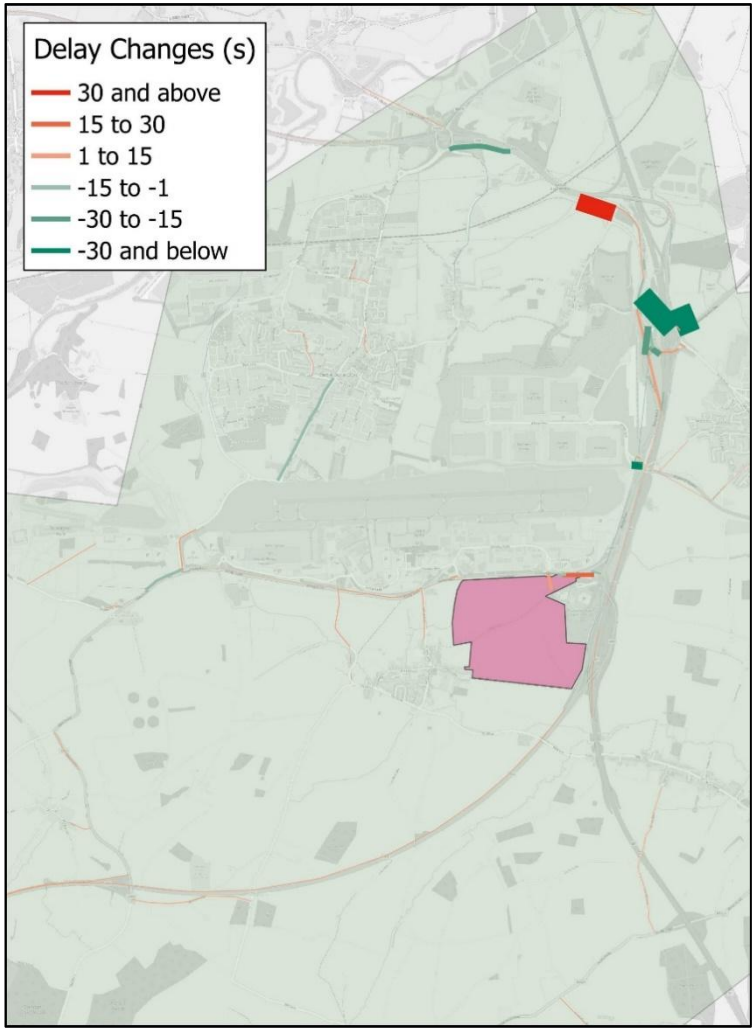
3.5.6 Delays remain largely unchanged across all scenarios when compared with the 'Without Development (1a)' scenarios, except for a reduction in delays on the A453 eastbound approach during the 2038 AM Peak hour.

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 routeing 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 to 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

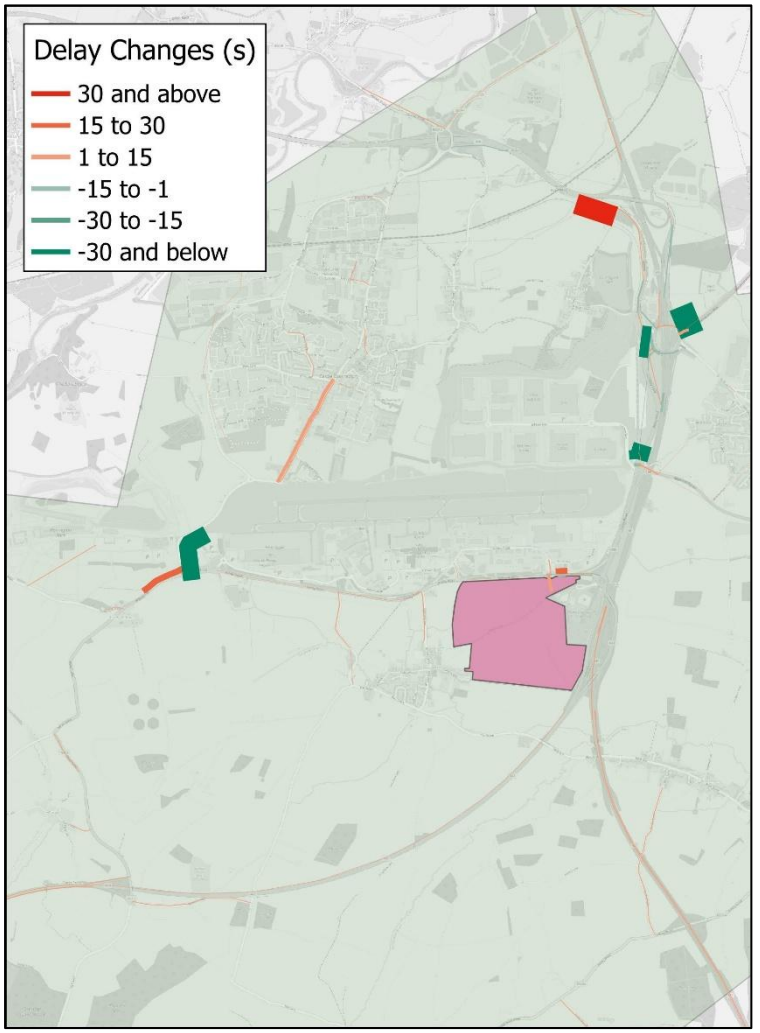


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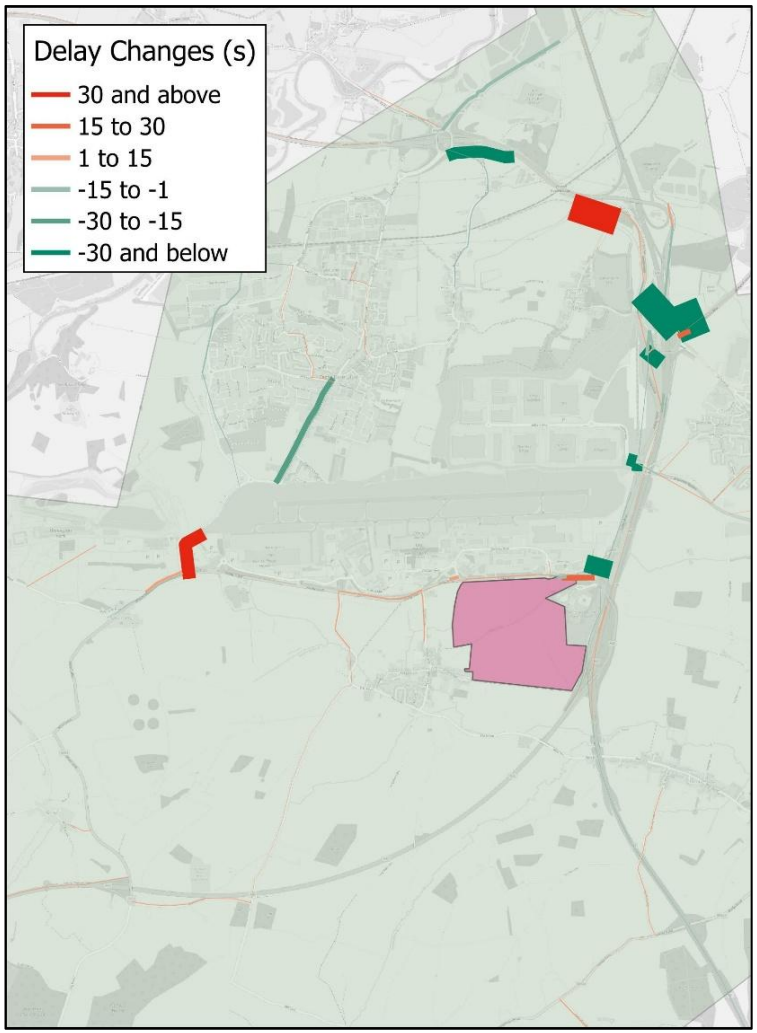
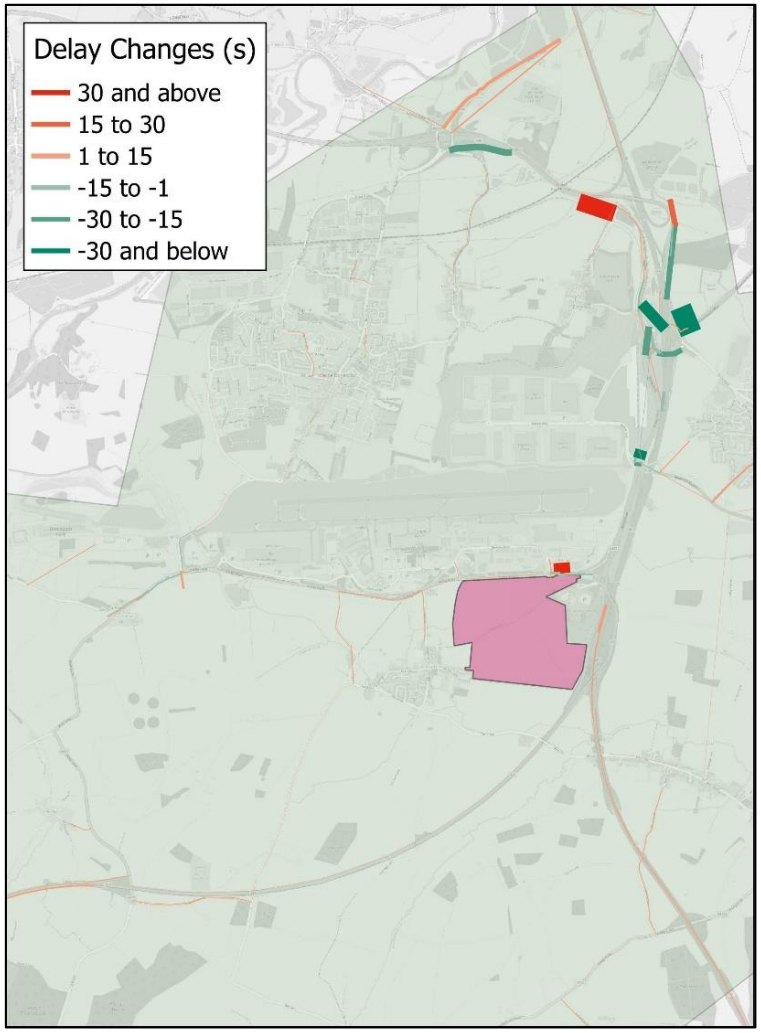
Figure 3.13: Forecast Delay Change for 2038 'With Development (2a)' minus 'Without Development (1a)'

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 routeing 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 3.1and 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

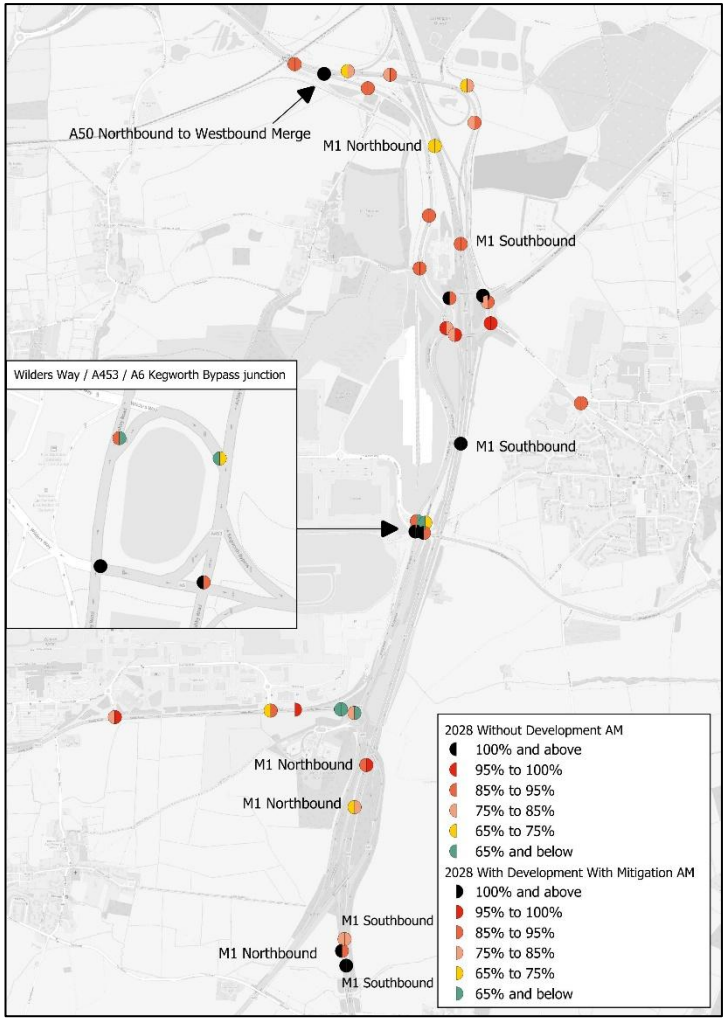
3.6.10 The node volume-capacity ratios for Finger Farm Roundabout are forecast to decrease in the AM Peak hour in both forecast years as a result of the proposed mitigation measures. The PM Peak is forecast to have nodes with higher node volume-capacity ratios in the 'With Development (2a)' and as shown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

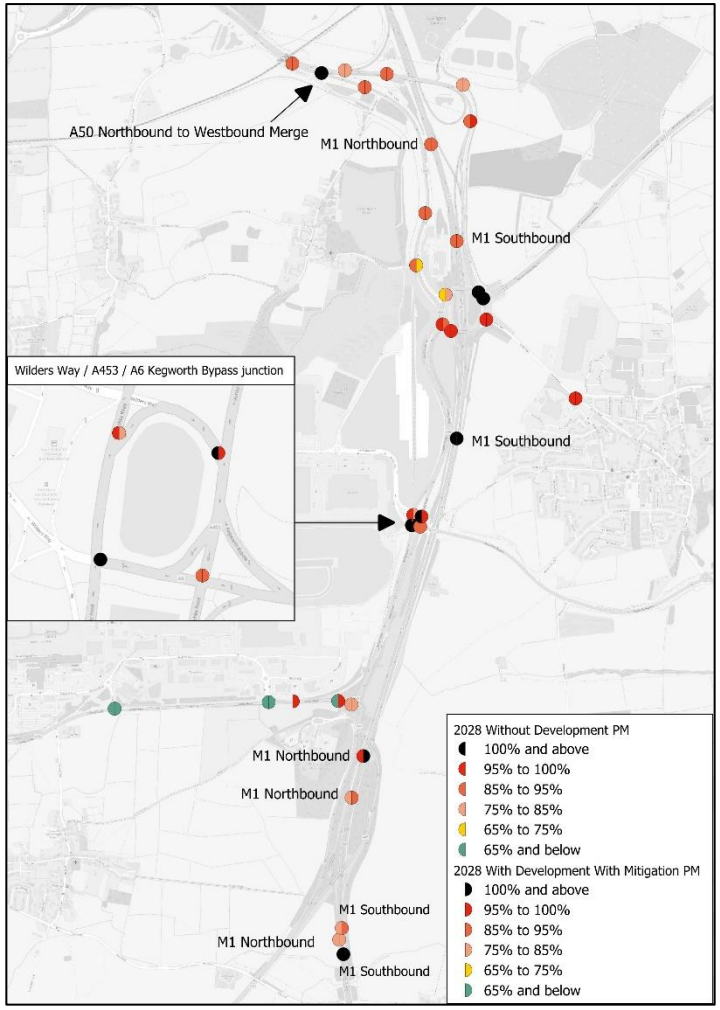


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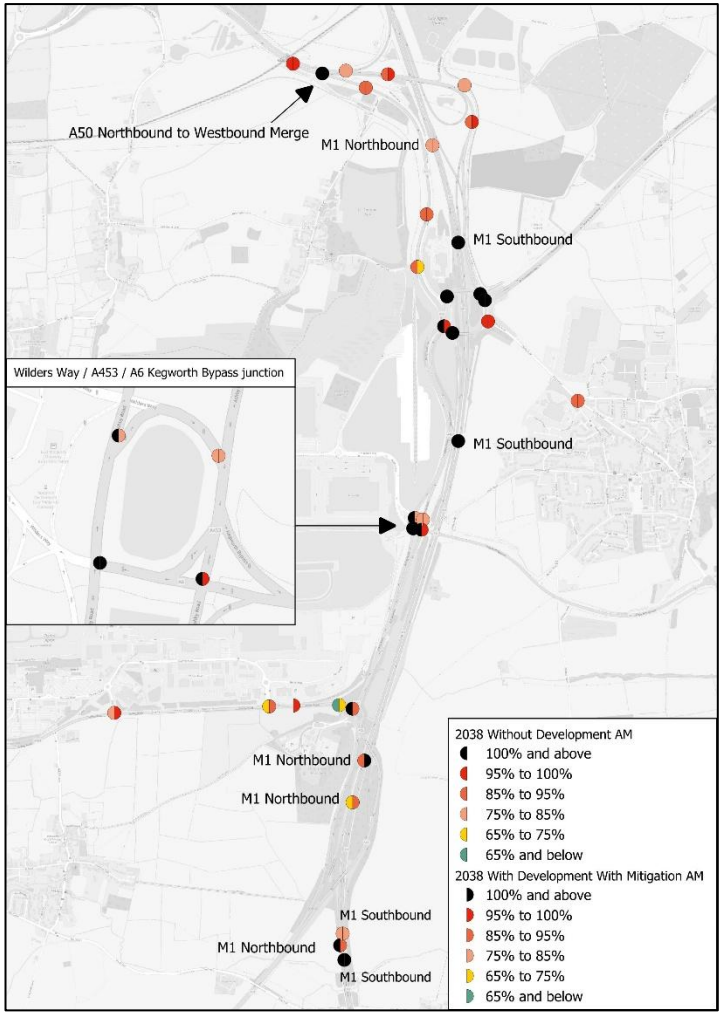
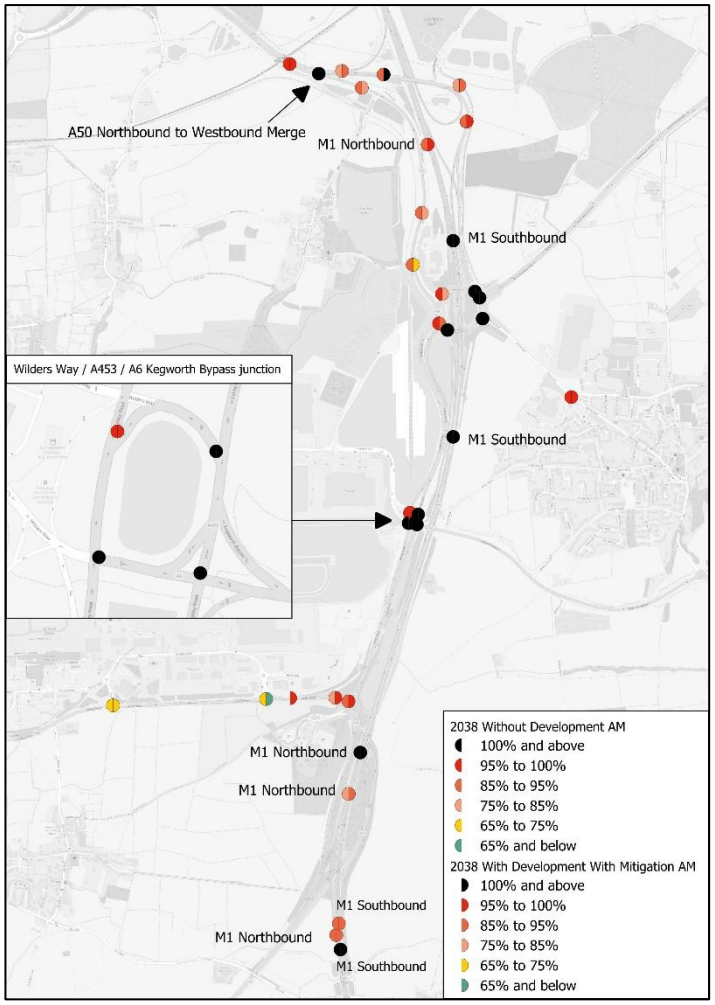
Figure 3.15: Forecast Node Volume-Capacity Ratio for 2038 'Without Development (1a)' and 2038 'With Development (2a)'

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:

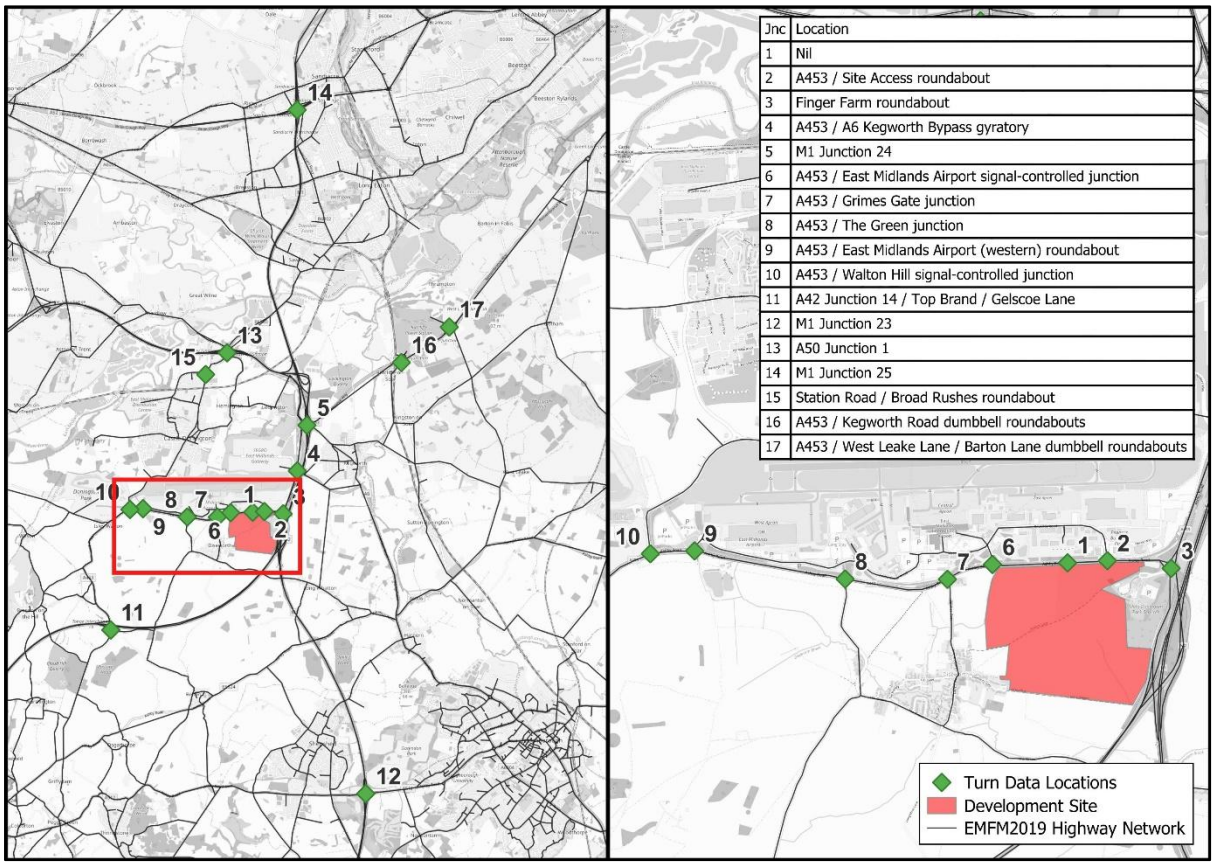
- A453 /Site access Roundabout (Junction 2);
- Finger Farm Roundabout (Junction 3);
- A453 / A6 Kegworth Bypass gyratory (Junction 4);
- M1 Junction 24 (Junction 5);
- A453 / East Midlands Airport signal-controlled junction (Junction 6);
- A453 / Grimes Gate junction (Junction 7);
- A453 / The Green 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 format[6] 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 – Summary of the Mitigation Assessment

4.1 Summary of Assessment

4.1.1 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.

4.1.2 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.

4.1.3 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 AoIs for Stage 1a and Stage 2a shows that they are broadly similar but with Stage 2a AoI 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.

4.1.4 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.

4.1.5 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

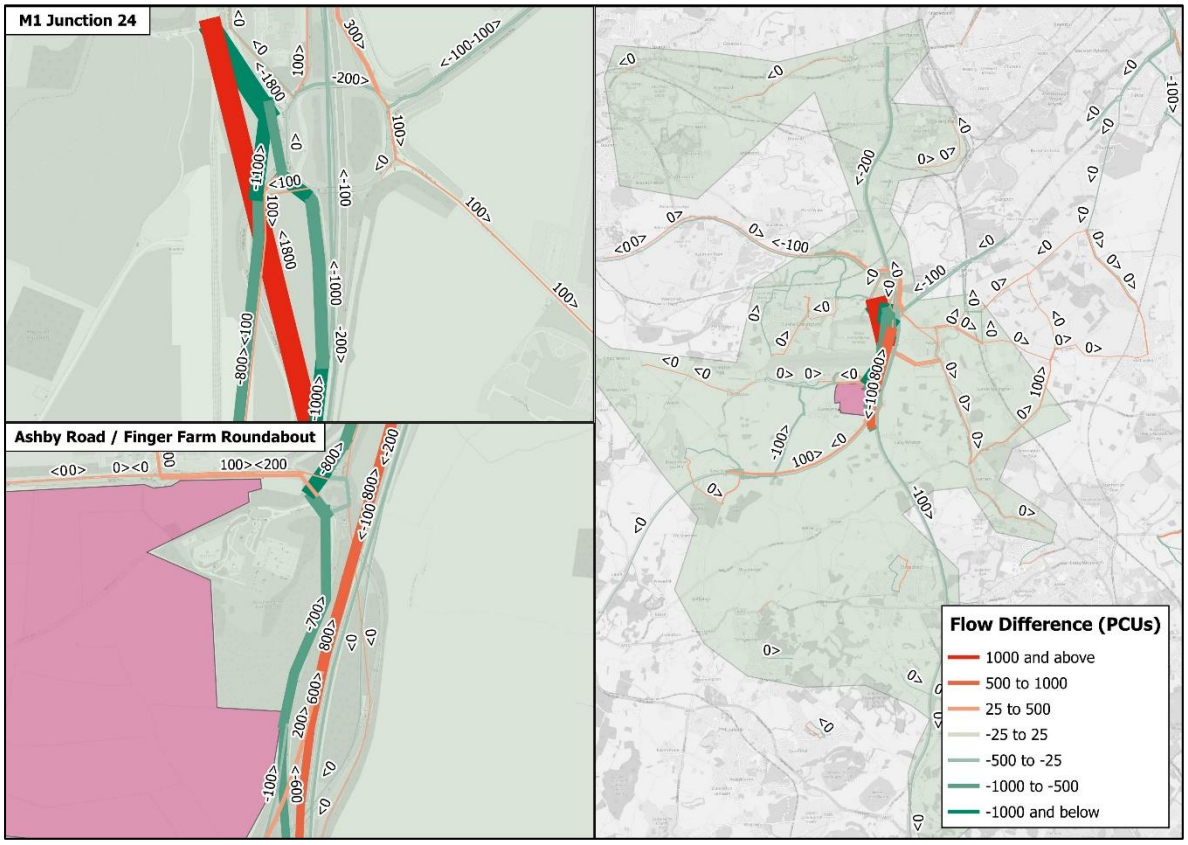
A.1.6 A reduction in northbound traffic on the A453 is forecast at Finger Farm Roundabout primarily as a result of the new link road that is forecast to divert traffic off the A453 northbound.

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

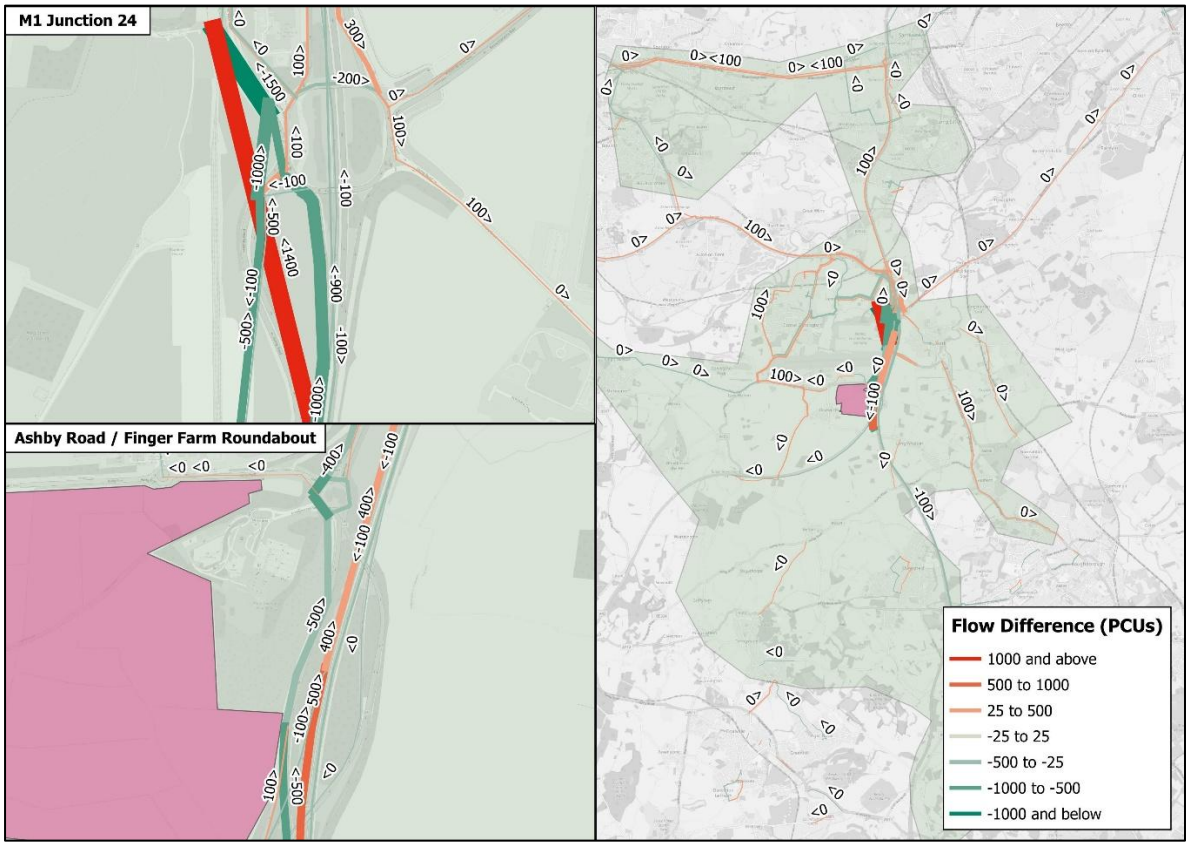

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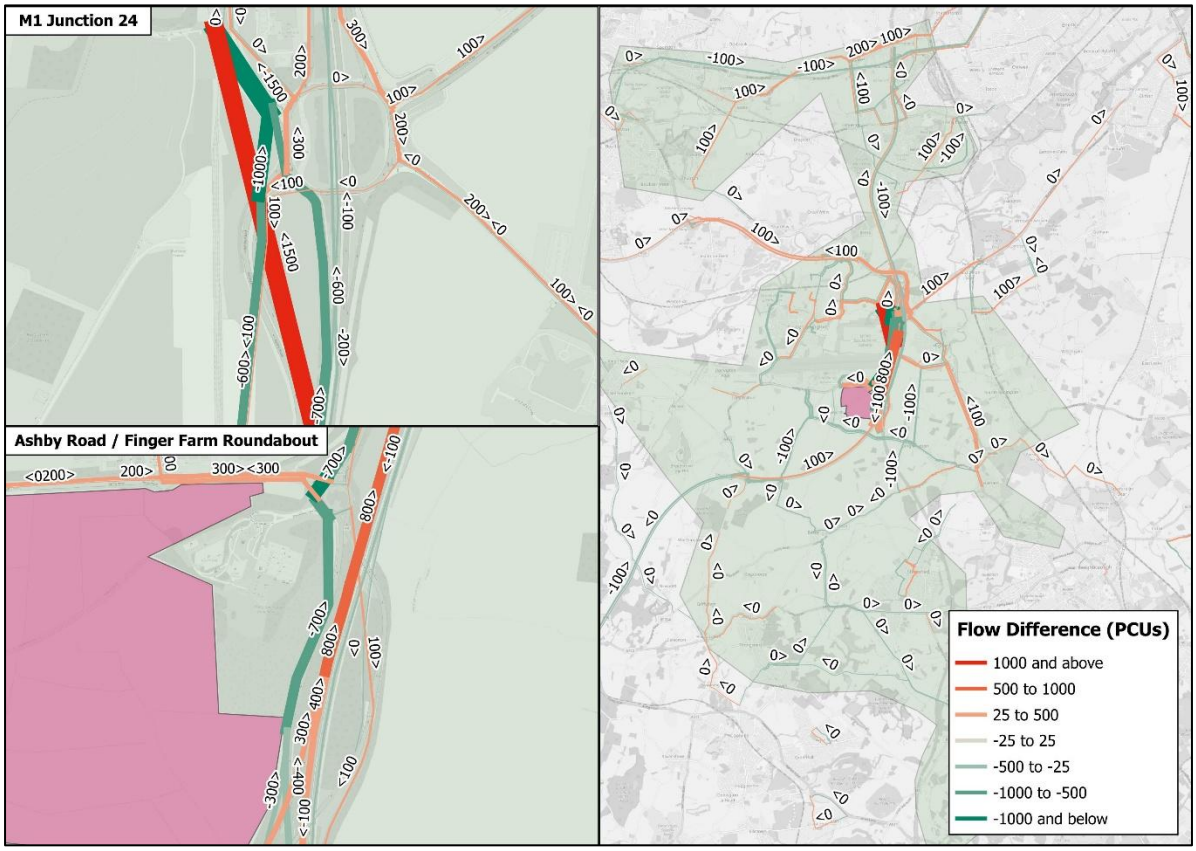
Figure A.2: Forecast Flow Change for 2038 'With Development (2a)' minus 'With Development (1a)'

AM Peak hour



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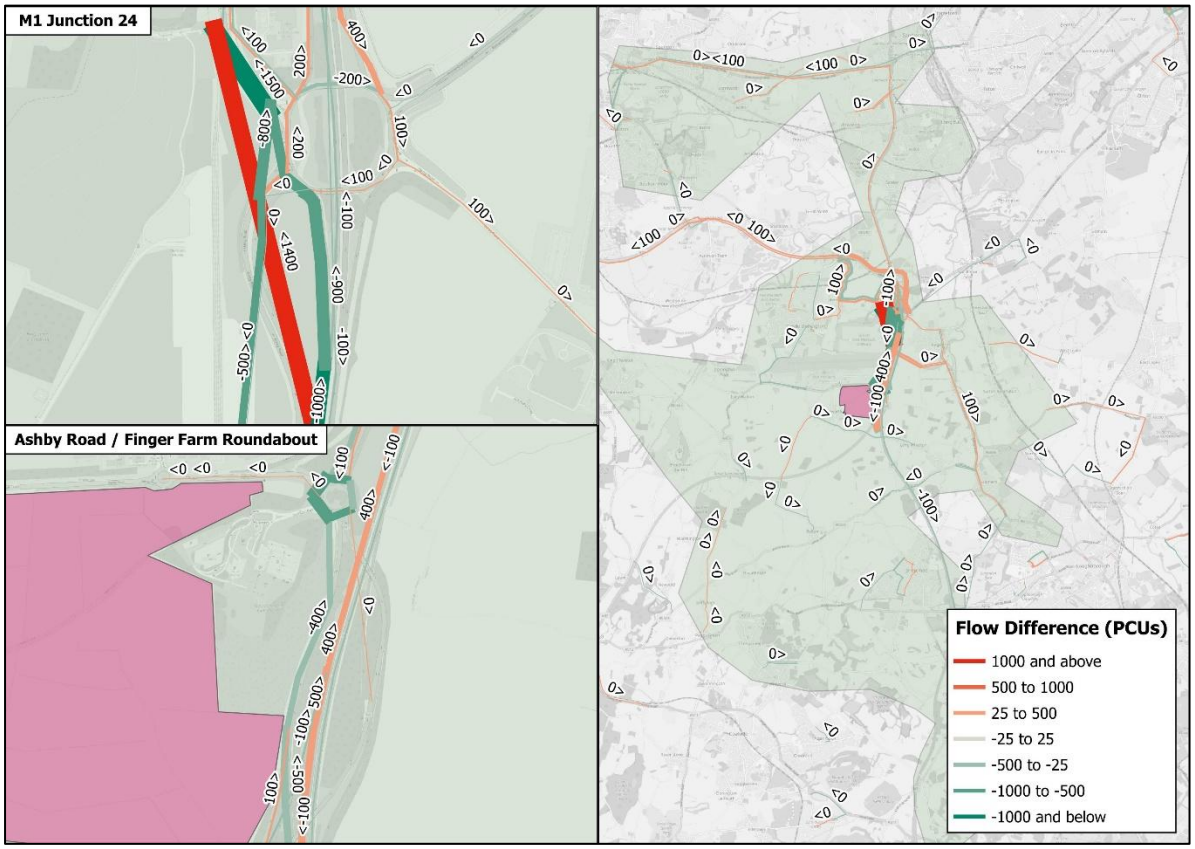
PM Peak hour



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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

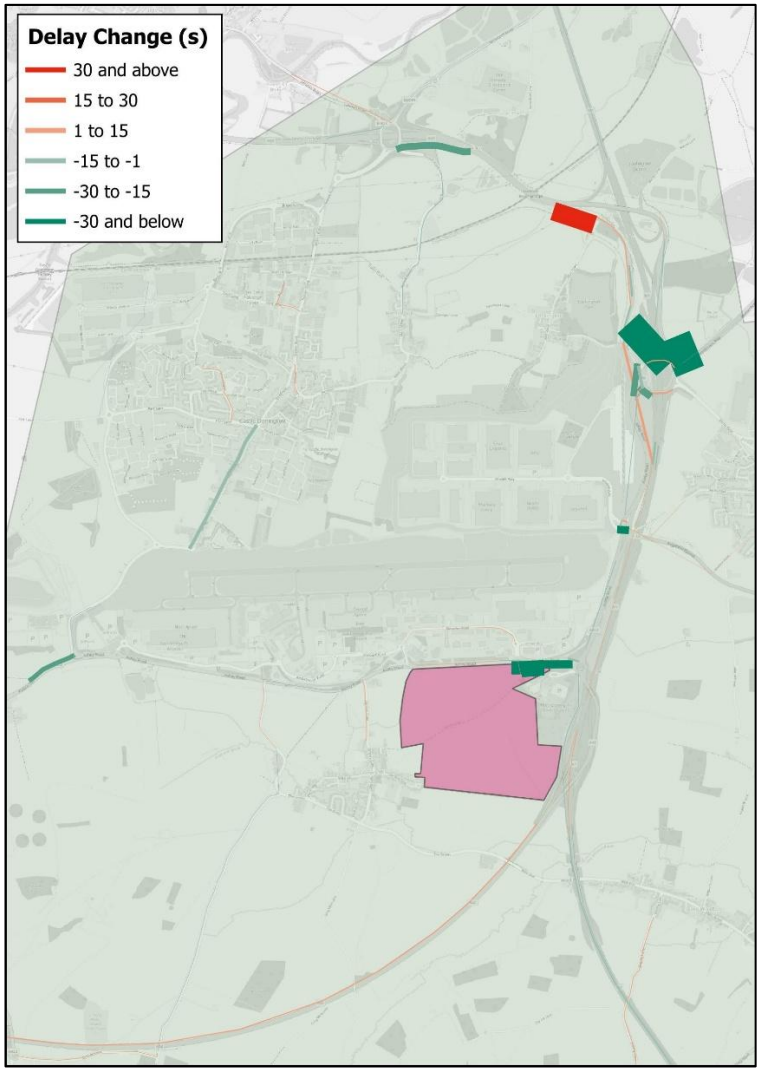
A.1.13 Delays have generally reduced in the 'With Development (2a) scenario with the proposed mitigation measures included that reduce traffic off the A453 and provide additional capacity at Finger Farm Roundabout.

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

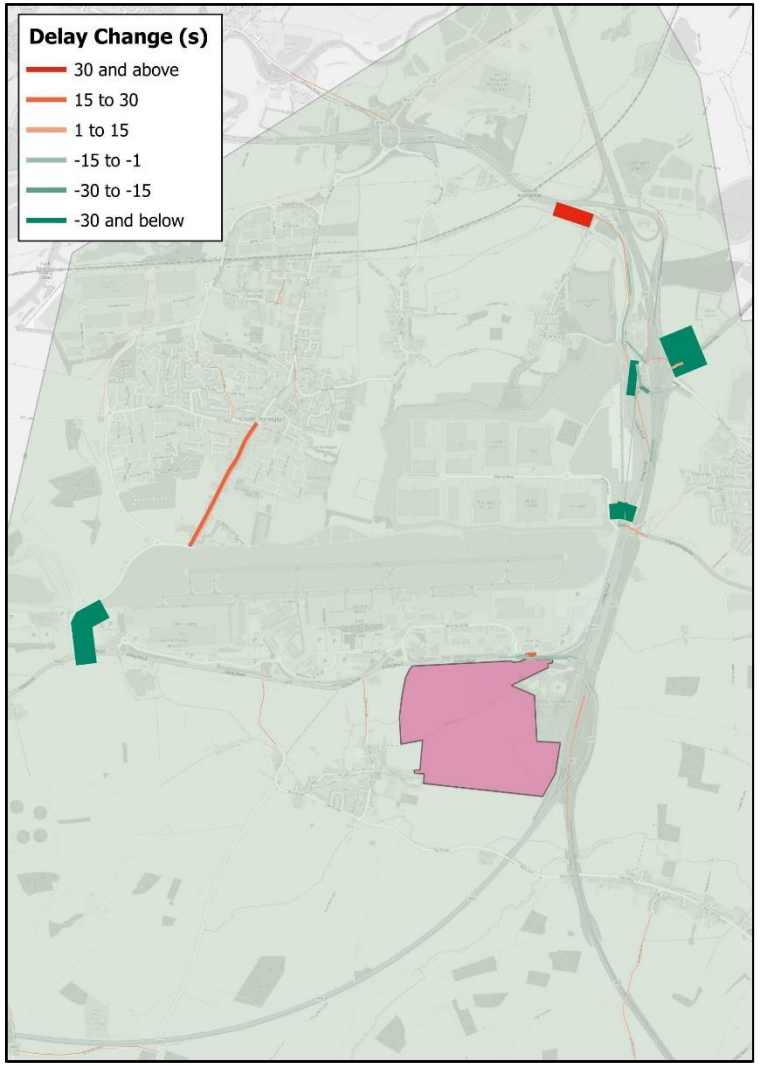


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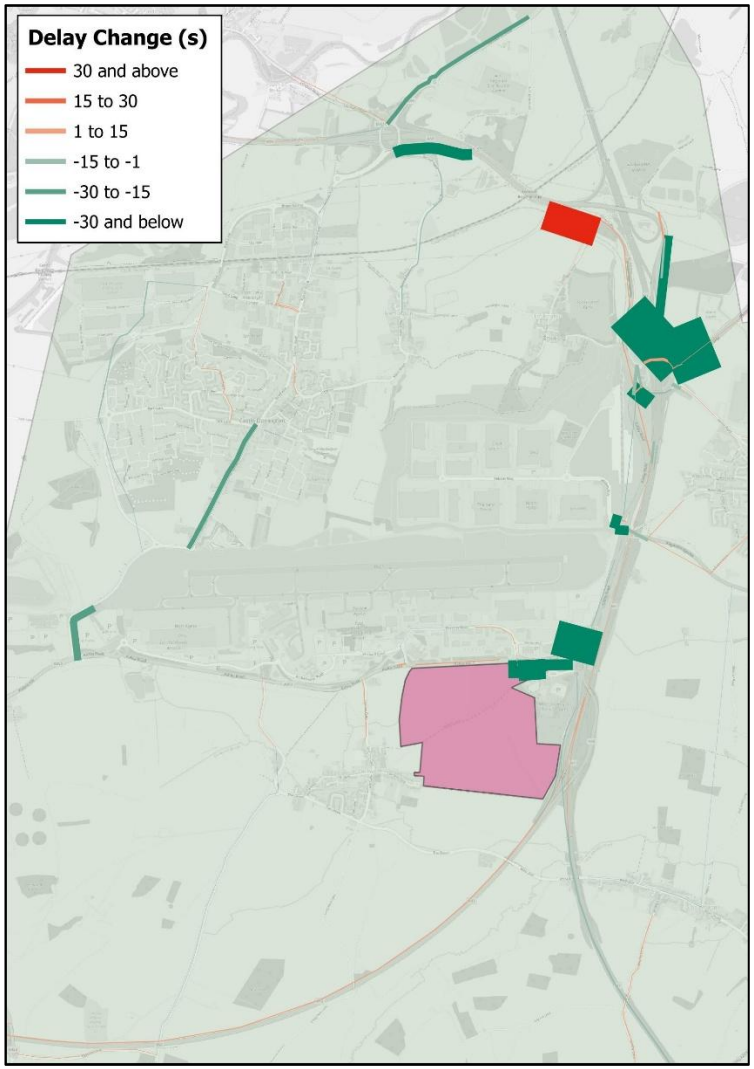
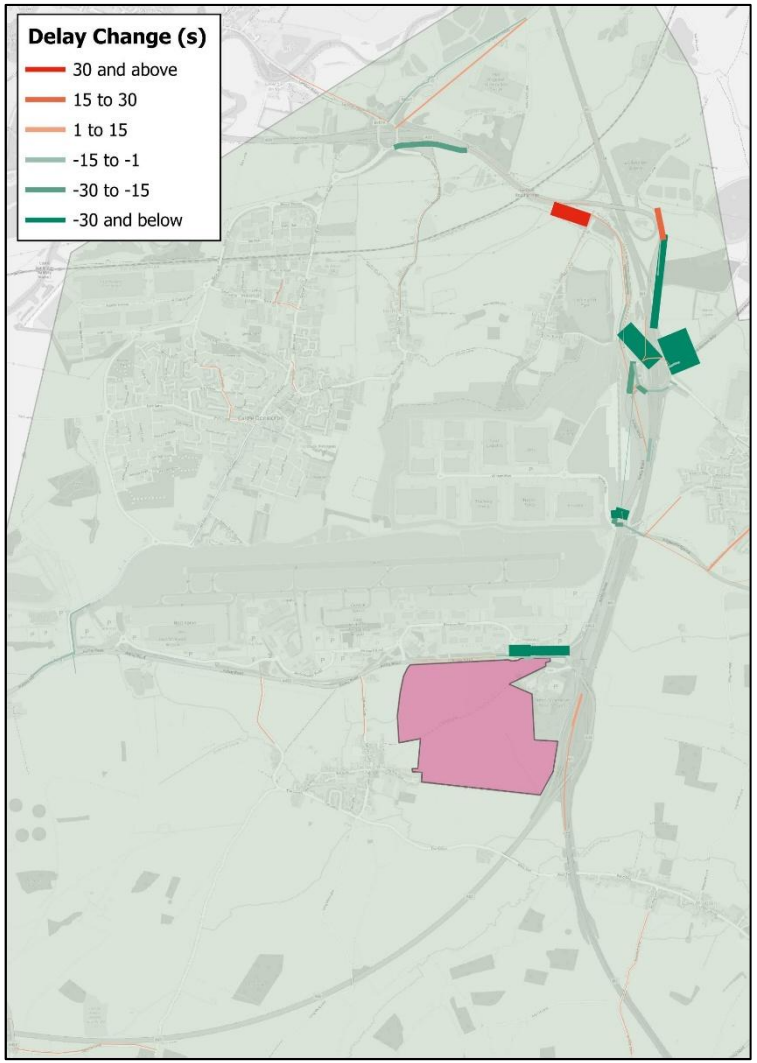
Figure A.4: Forecast Delay Change for 2038 'With Development (2a)' minus 'With Development (1a)'

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 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.

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

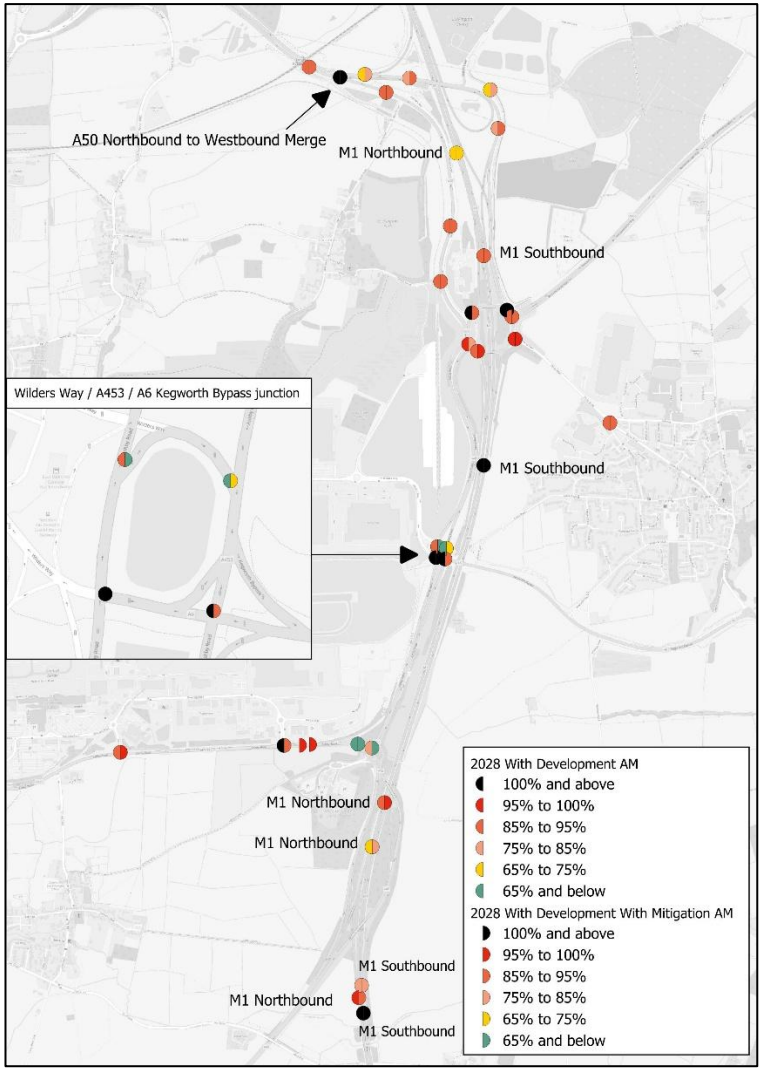
A.1.22 The node volume-capacity ratios for Finger Farm Roundabout are forecast to have increases and decreases in Stage 2a with the proposed mitigation measures included, reflecting the increase in flow on the A453 in the AM Peak hours in 2028 and 2038 and the reduction in flow on the roundabout itself.

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

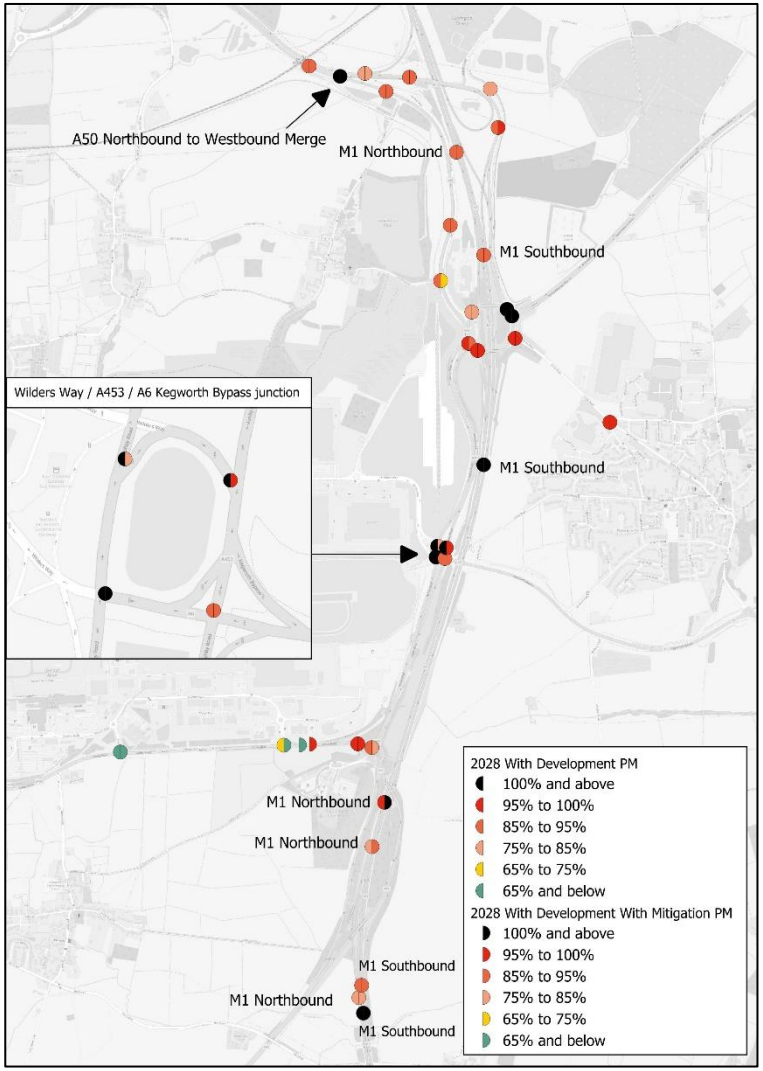


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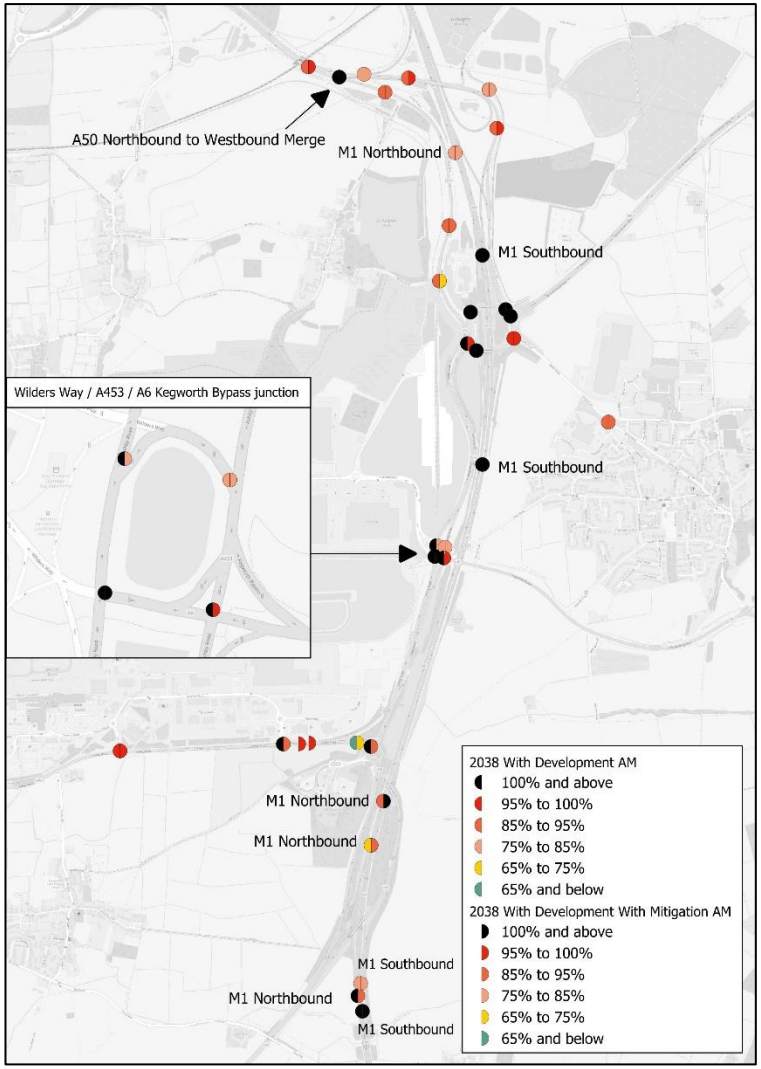
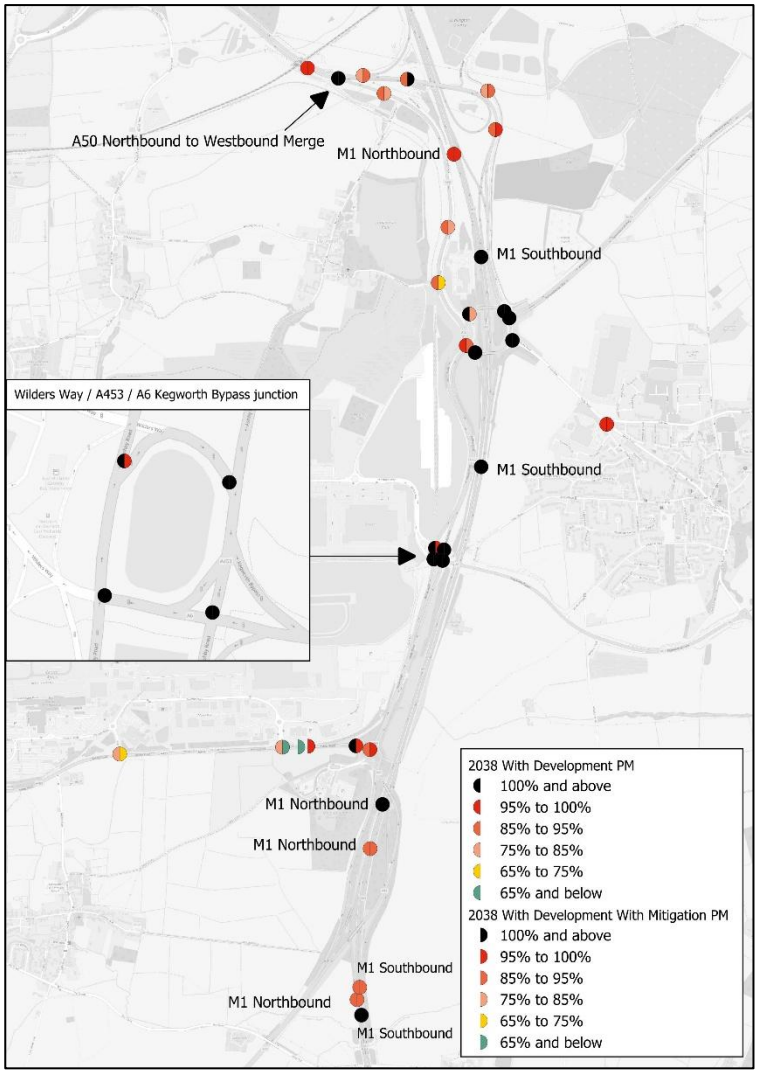
Figure A.6: Forecast Node Volume-Capacity Ratio for 2038 'With Development (1a)' and 2038 'With Development (2a)' Scenarios

AM Peak hour



PM Peak hour



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Appendix B EMFM Indicative Network Statistics

B.1.1 Table B.1 and Table B.2 presents the model network statistic within the AoI (see Figure 3.11). It should be noted that these statistics are high-level and should be considered as indicative only.

B.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.

B.1.3 As expected, the forecast vehicle kilometres increase in the 'With Development (1a)' scenario compared to 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.

B.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 to the 'Without Development (1a)' scenario, indicating lower delay in this with development scenario.

B.1.5 Junction delays on motorway links are forecast to increase in both with development scenarios compared to 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 B.1 Indicative Network Statistic within the AoI 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 to 'Without Development (1a)'				
'With Development (1a)'	2038 AM + PM	1.2%	-1.7%	6.3%
'With Development (2a)'		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 B.2 Indicative Network Statistic 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 to '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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EMFM

East Midlands Gateway Phase 2

Mitigation Measures and Optimisation Summary

5 June 2025

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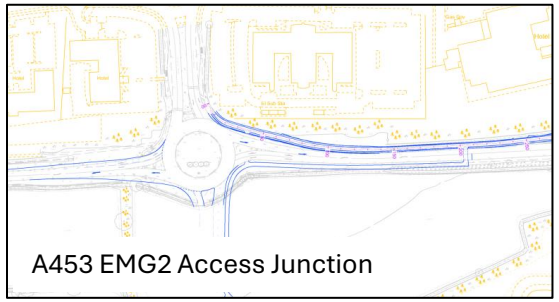
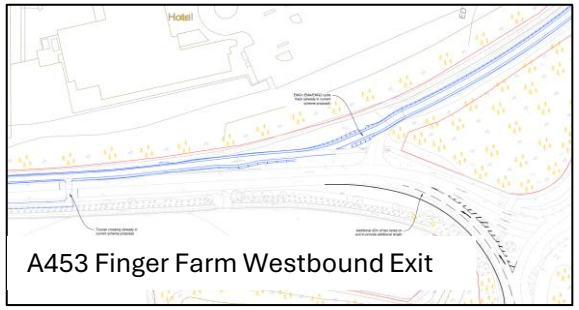
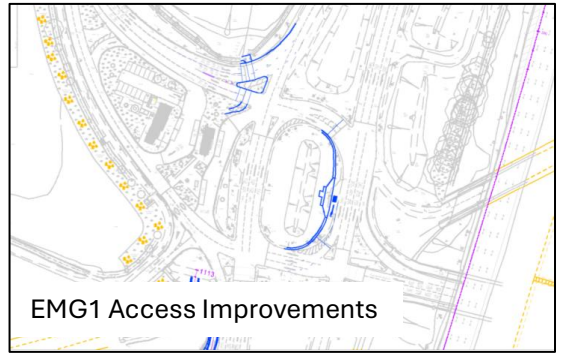
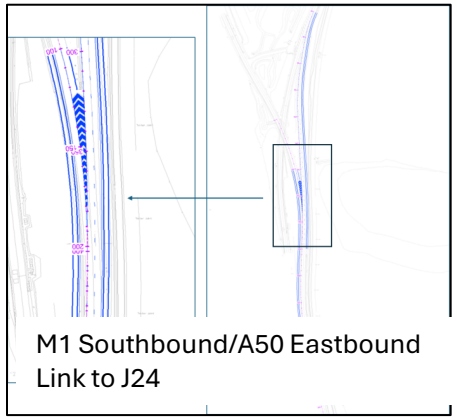
Summary of Mitigation Measures

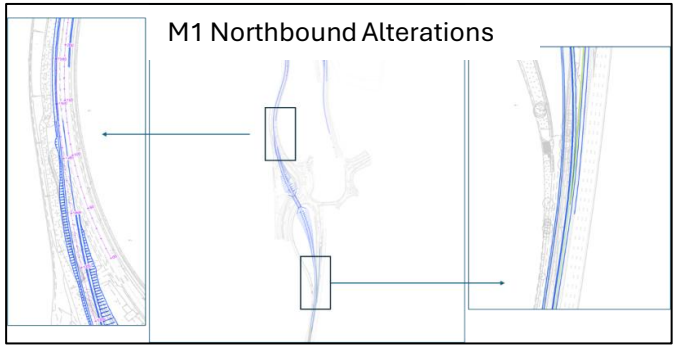
- **A453 EMG2 Access Junction**
  - Additional flare length at the EMGP2 access roundabout
  - Tucson crossing signal phase
- **A453 Finger Farm Westbound Exit**
  - Additional two-lane widening on exit
- **EMG1 Access Improvements**
  - No change in Wilders Way signal timings
  - **Optimised signal timings to improve flow from the gyratory to EMGP1**
- **M1 Northbound Alterations**
  - Single lane operates as a free-flowing interchange link
  - Mandatory 50 mph speed limit
- **M1 Northbound to A50 Westbound Link**
  - Lane diverges from existing four-lane carriageway
  - Slip road to J24 becomes two lanes
  - **Optimised signal timings for M1 southbound approach**
- **M1 Southbound/A50 Eastbound Link to J24**
  - Existing link widened to three lanes
- **M1 J24 Minor Works**
  - Middle lane converted to shared use at A453 NB to M1 NB


A453 EMG2 Access Junction


A453 Finger Farm Westbound Exit


EMG1 Access Improvements


M1 Southbound/A50 Eastbound Link to J24



Reasons for Optimising Signals affected by Mitigation

1. EMFM signal timings are based on observed data in the Base Year model (2019), as is standard approach.

2. Some signals should be optimised to ‘unlock’ or release the benefits following the implementation of the proposed mitigation measures – keeping traffic on to the SRN. This needs performed carefully without unrealistically changing the traffic patterns / routing (especially on a congested network).

3. To ‘balance’ the delay / volume over capacity at congested junctions.

4. Feedback from VISSIM modelling (min / max green times, etc).

Summary of EMFM Mitigation Measures and Optimisation Iterations

1. **2a/2b mitigation measures with no-optimisation (Iteration 1)**

2. **2a/2b full/over optimisation (iteration 2)**
   - Optimised signal time based with the objective of maintaining the volume-to-capacity ratio below one.

3. **2a/2b optimisation (iteration 3)**
   - 1 additional second of green time from the gyratory towards EMGP1.
   - 2 additional seconds at J24 from the M1 southbound on to the gyratory.
   - Additional flare length at the EMGP2 access roundabout and improve the saturation flow on all 4 arms

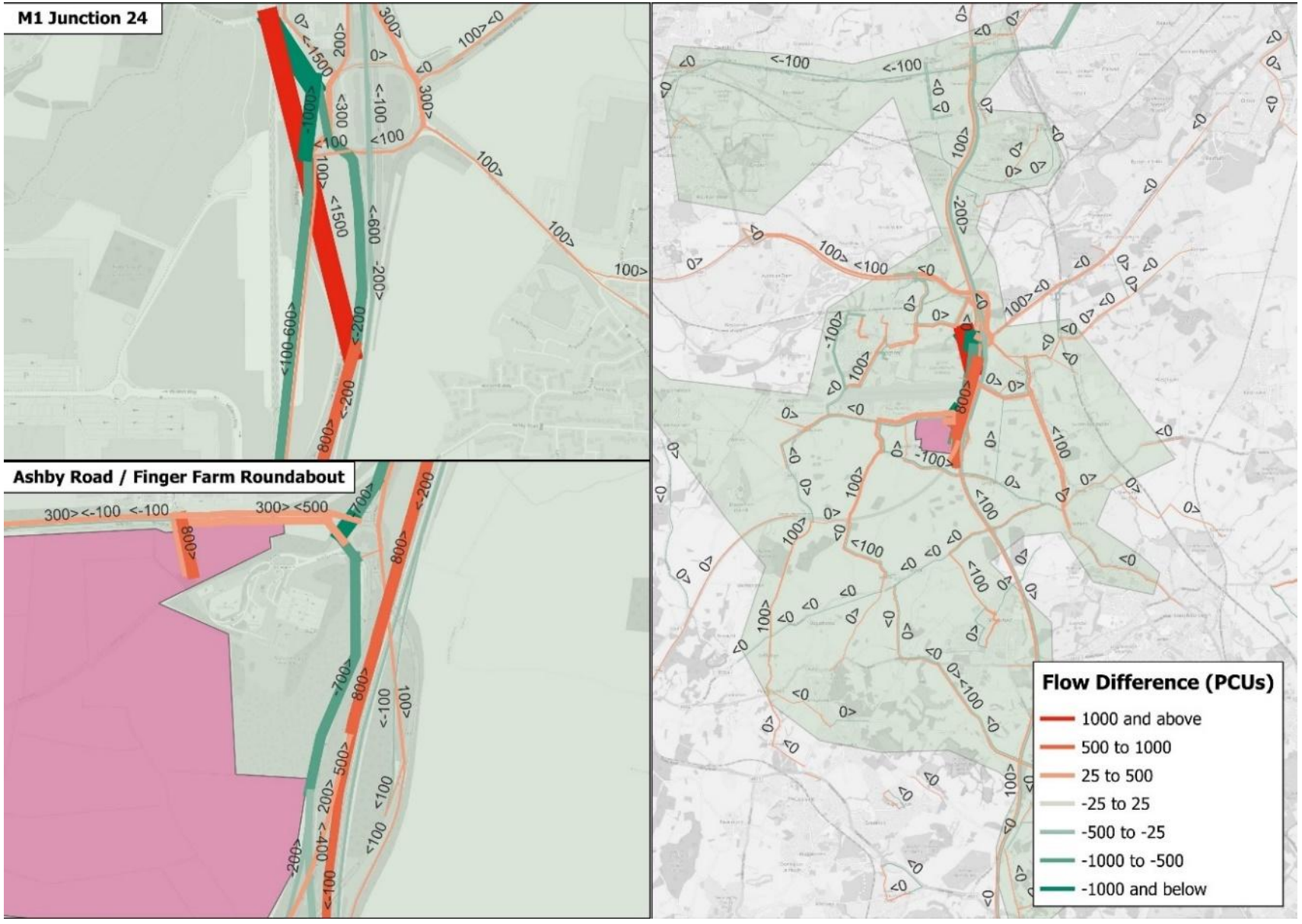
4. **2a/2b optimisation (iteration 4) A453 Sensitivity Test**
   - 3 additional second at J24 from the M1 southbound on to the gyratory.
   - Increased the link capacity on the A453 east of the EMGP2 access (dualled), in both directions

5. **2a/2b optimisation (iteration 5)**
   - 3 additional second at J24 from the M1 southbound on to the gyratory

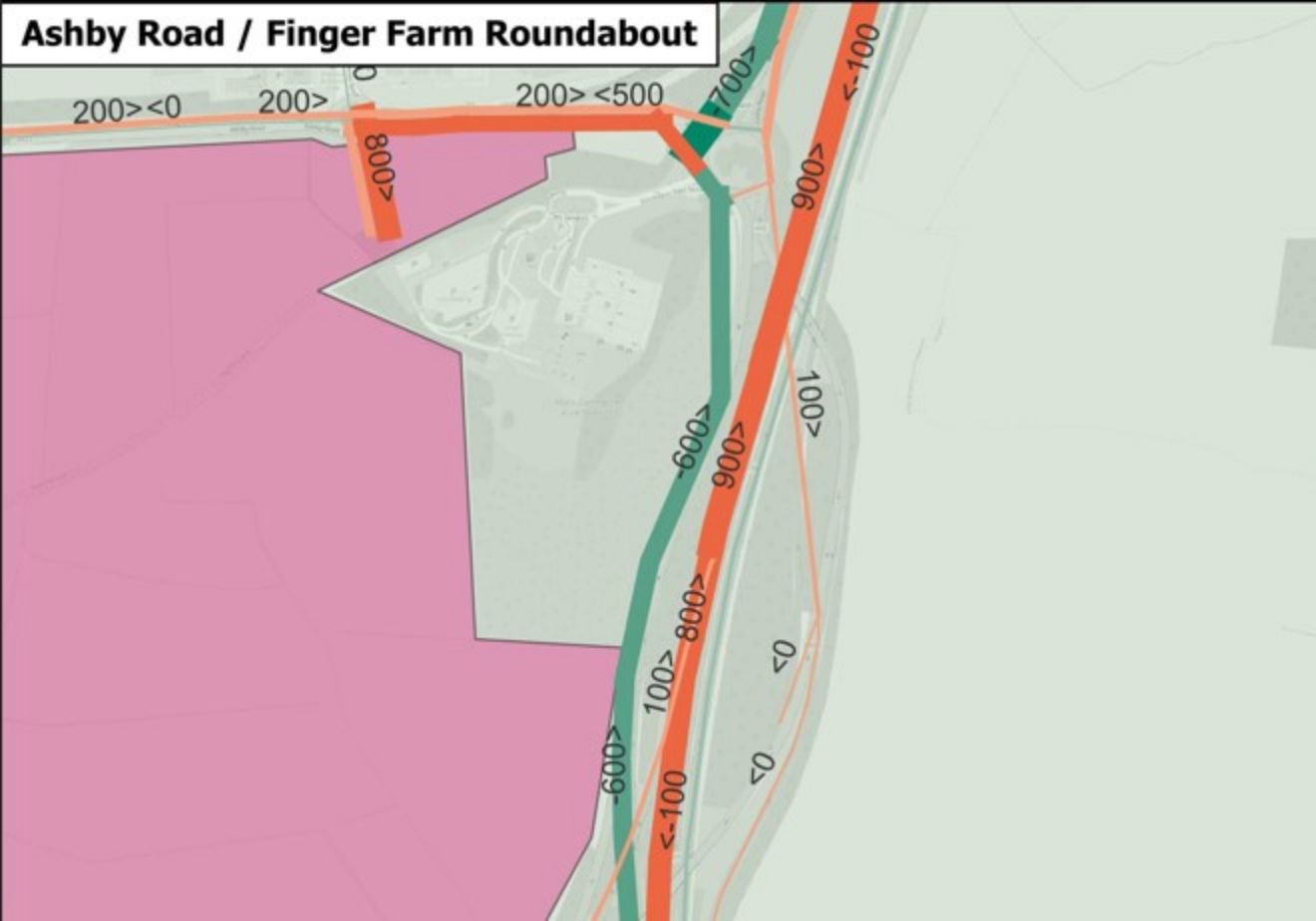
6. **2a optimisation (iteration 6) Hilton Hotel Lane Sensitivity Test**
   - Based on VISSIM model, Improved the signal time on Hilton Hotel Lane approach at M1 Junction 24

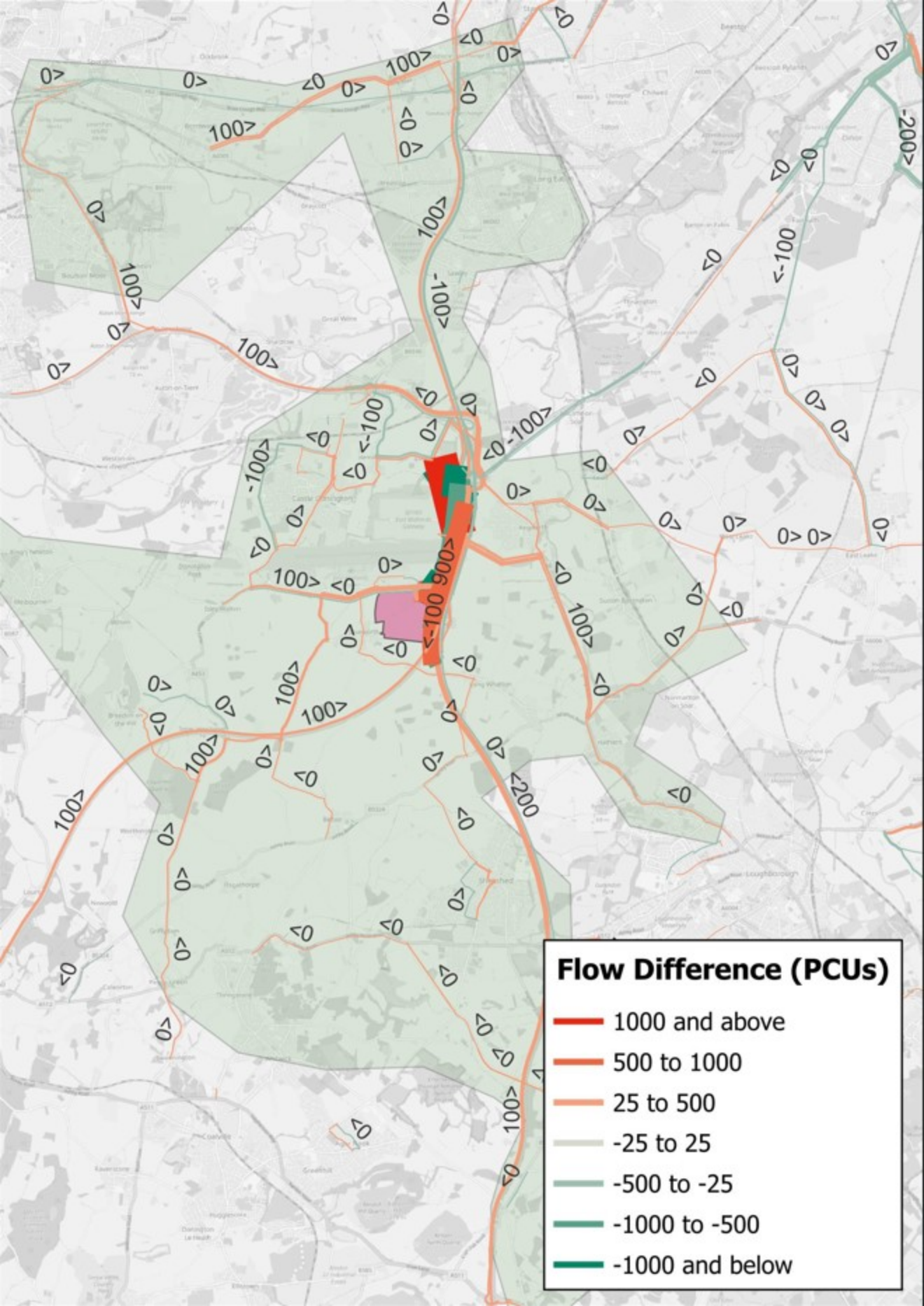
Forecast Flow Change for 2038 'Without Development (1a)' minus 'With Development with Mitigation (2a) – Iteration 5'

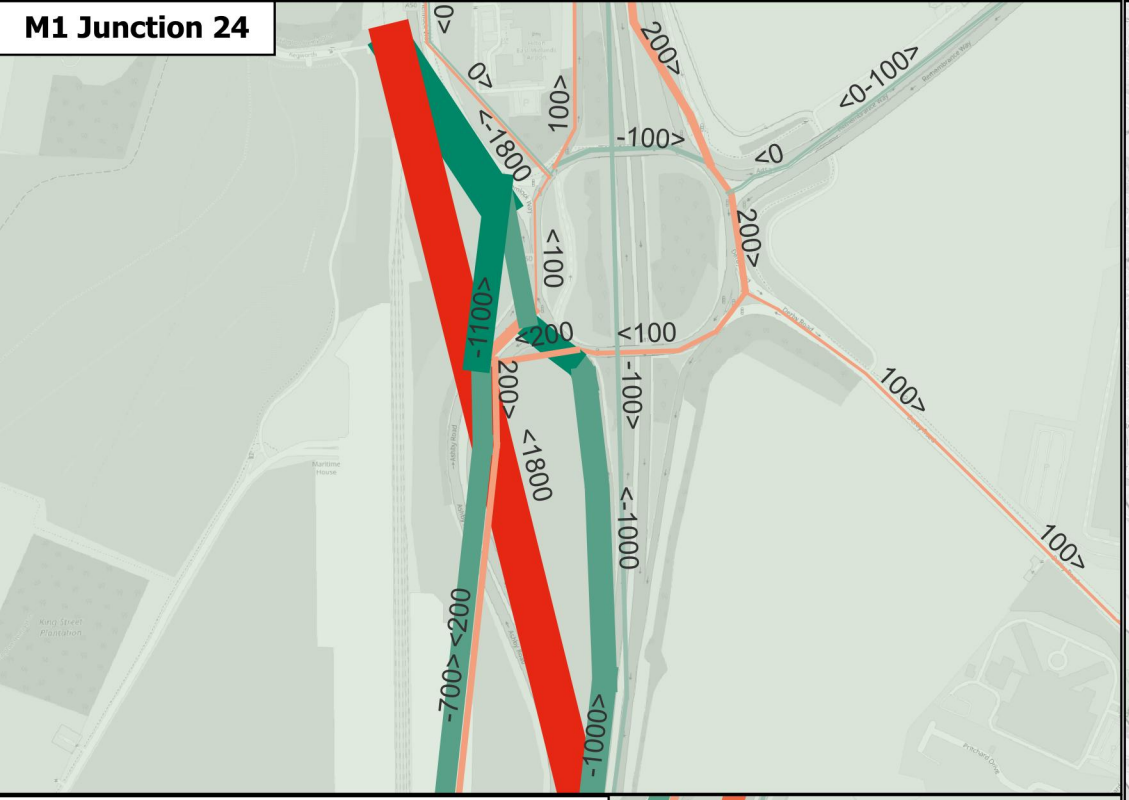
AM Peak hour

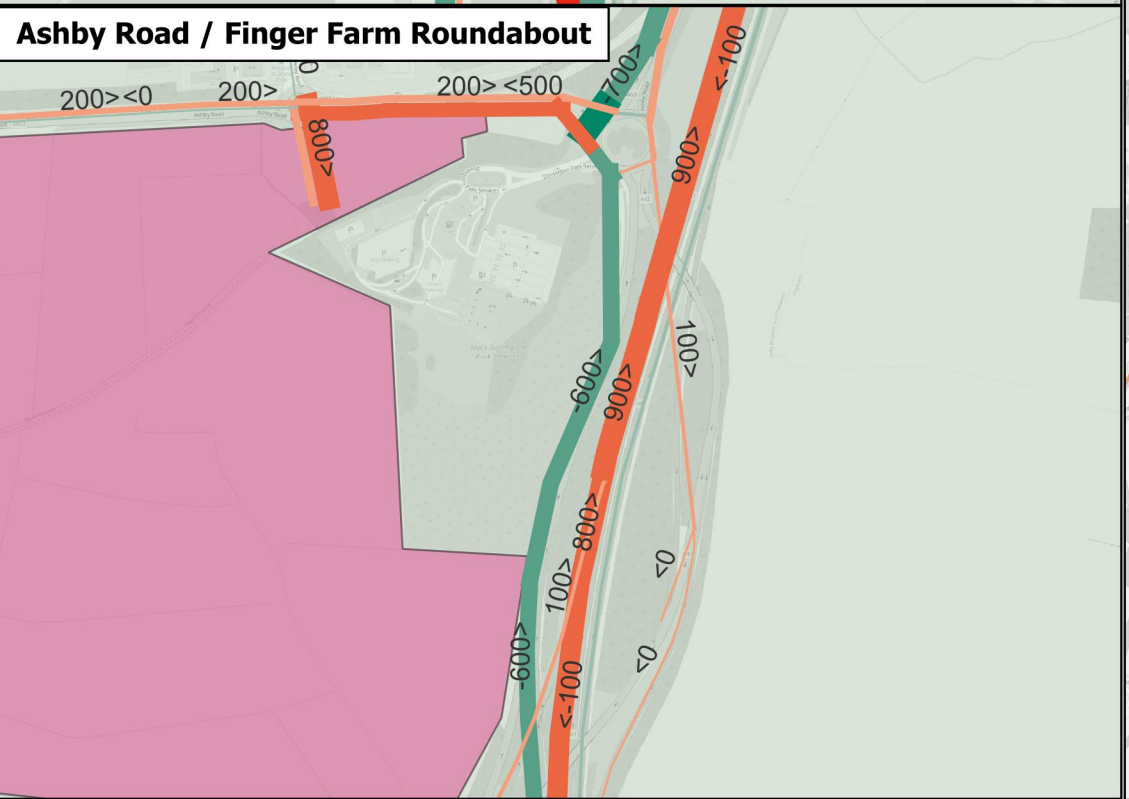


M1 Junction 24
<0
0>
<-1800
100>
200>
-100>
<0-100>
<0
200>
<100
<-1100
<200
<100
200>
<1800
-100>
100>
<-1000
100>
200>
<200
-1000>


Ashby Road / Finger Farm Roundabout
200><0
200>
200> <500
>700
<-100
900>
<008
-600>
900>
100>
100>
800>
<0
<0
-600>
<-100


Flow Difference (PCUs)
1000 and above
500 to 1000
25 to 500
-25 to 25
-500 to -25
-1000 to -500
-1000 and below


M1 Junction 24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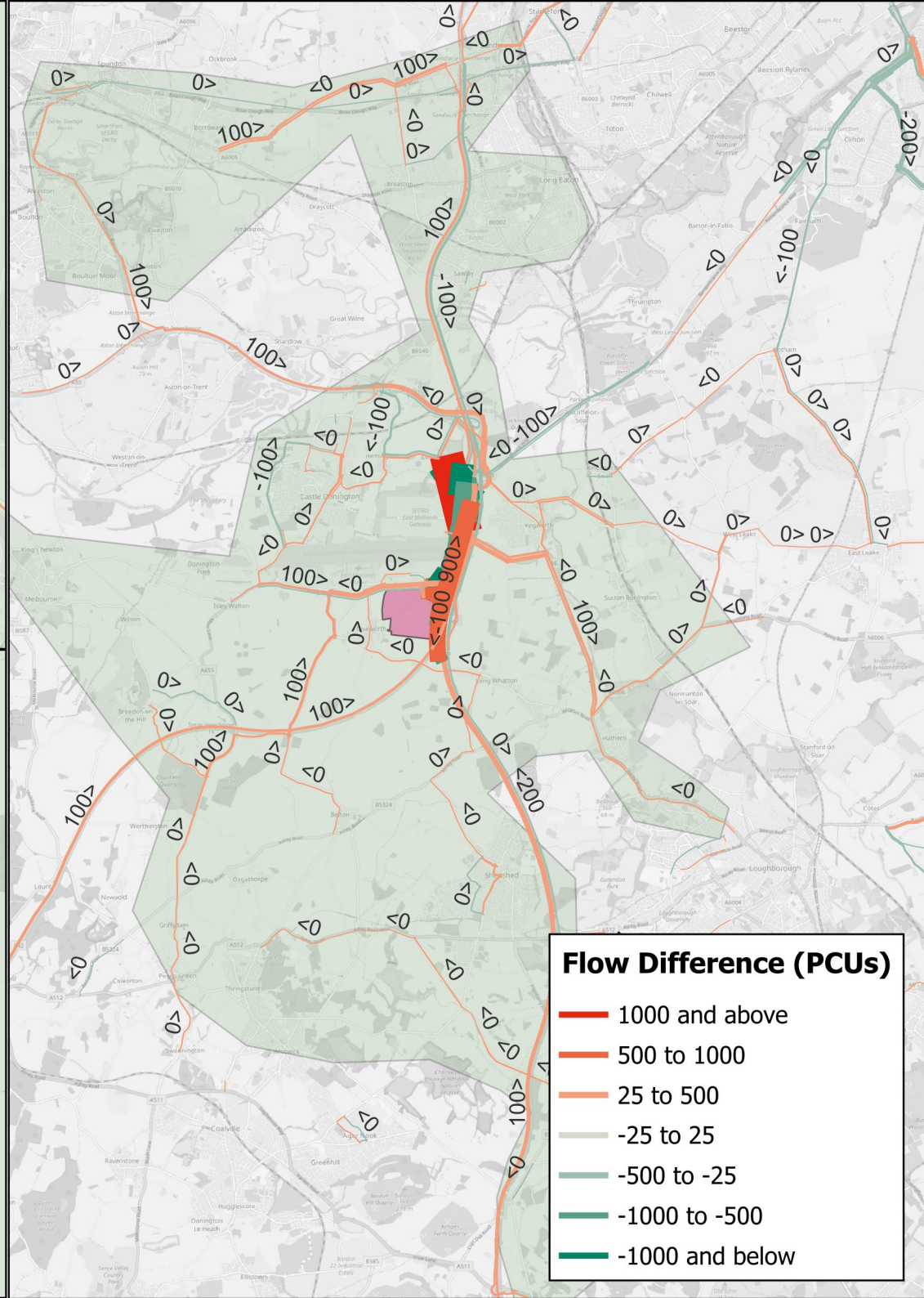
Flow Difference (PCUs)
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500 to 1000
25 to 500
-25 to 25
-500 to -25
-1000 to -500
-1000 and below

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300>
0>
100>
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200>
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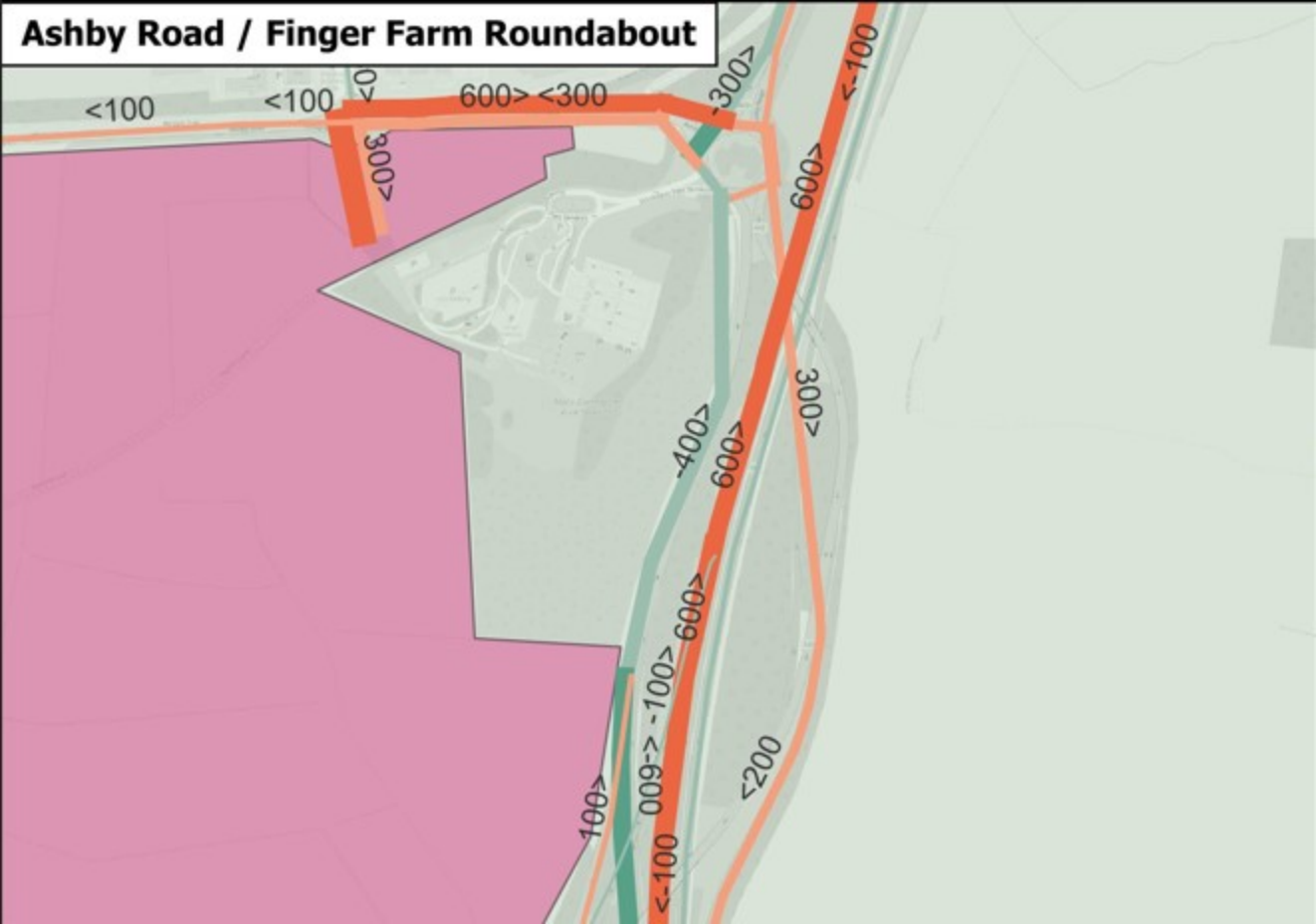
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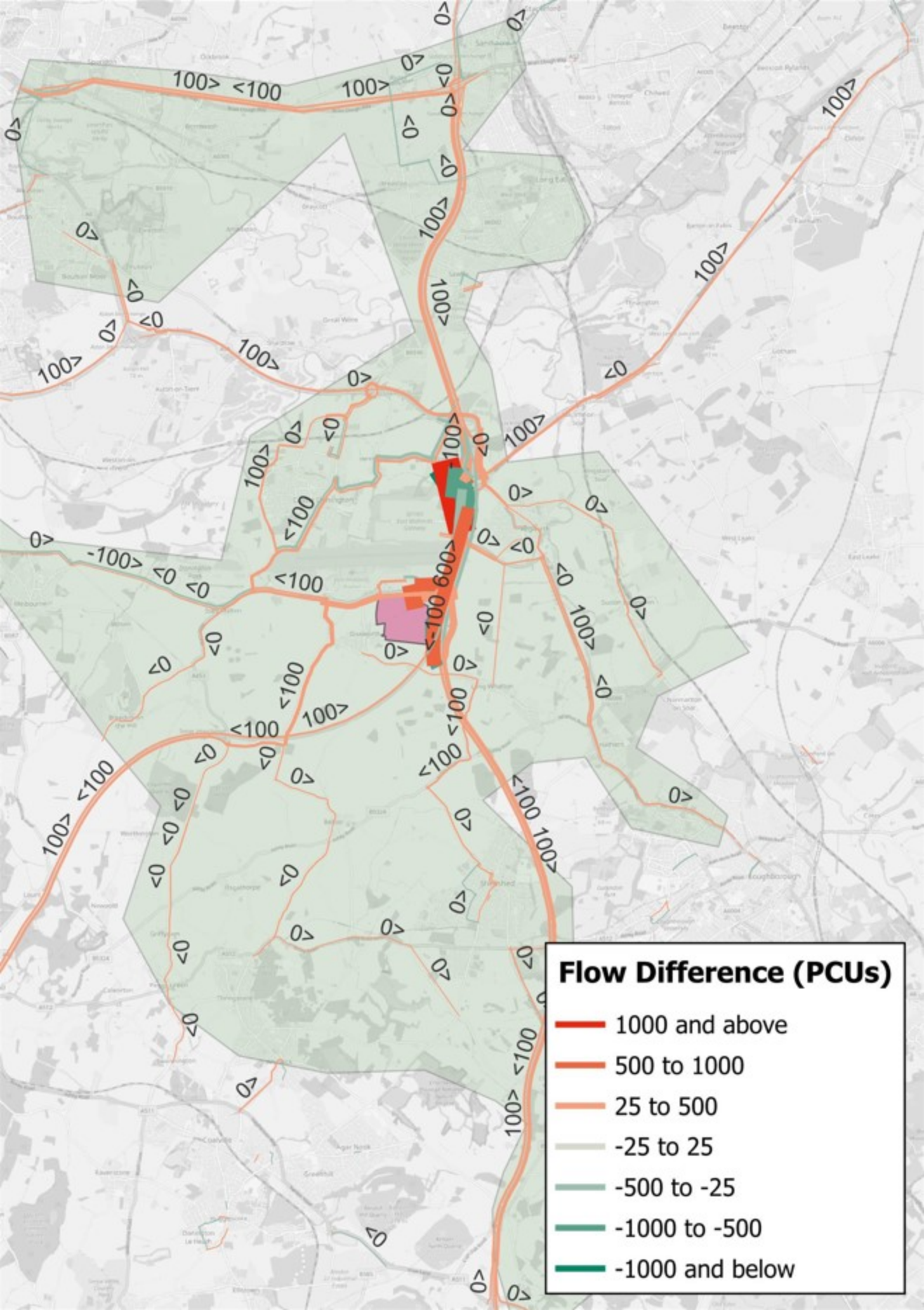
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25 to 500
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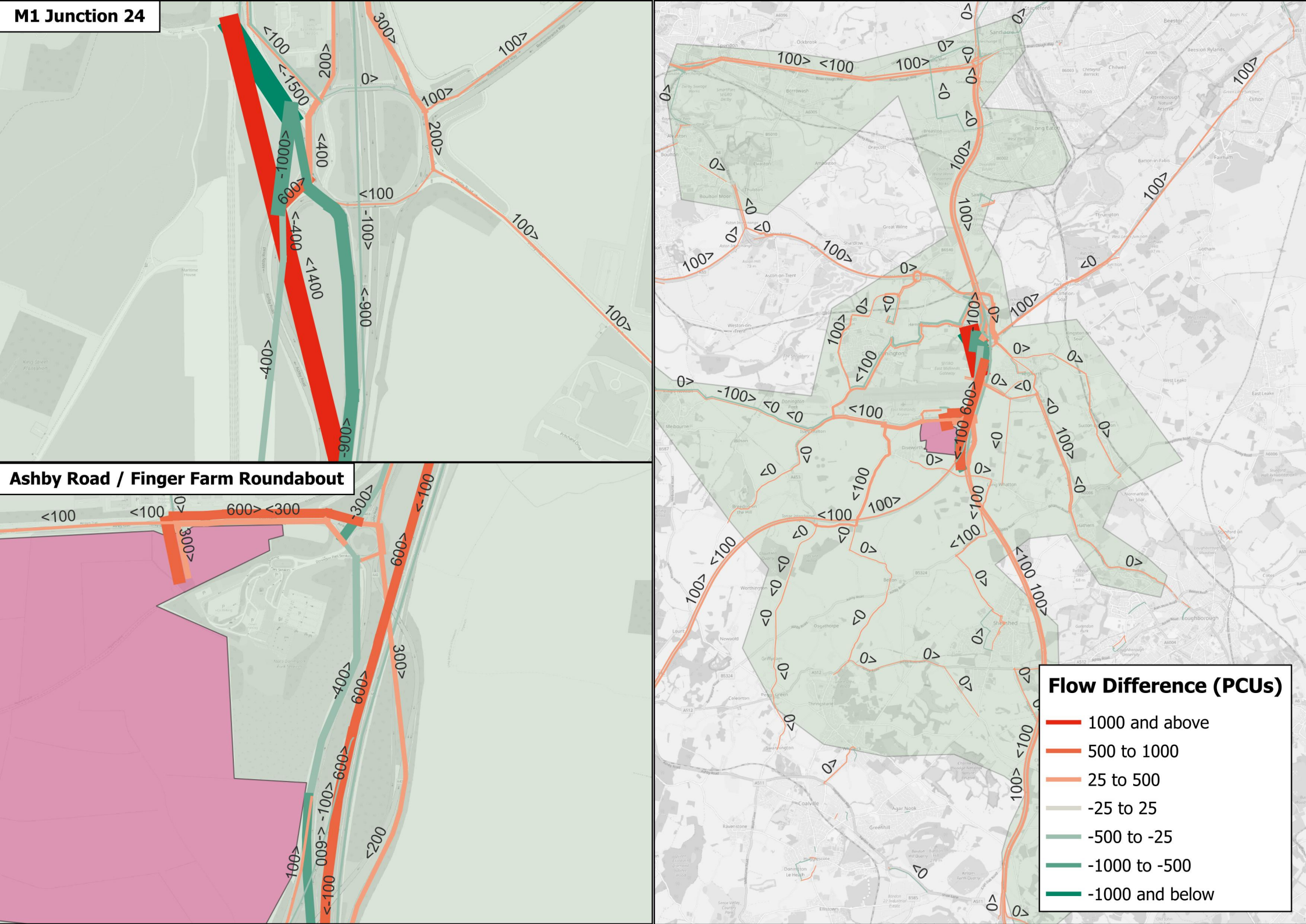
-1000 and below


M1 Junction 24
Ashby Road / Finger Farm Roundabout
Flow Difference (PCUs)
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500 to 1000
25 to 500
-25 to 25
-500 to -25
-1000 to -500
-1000 and below

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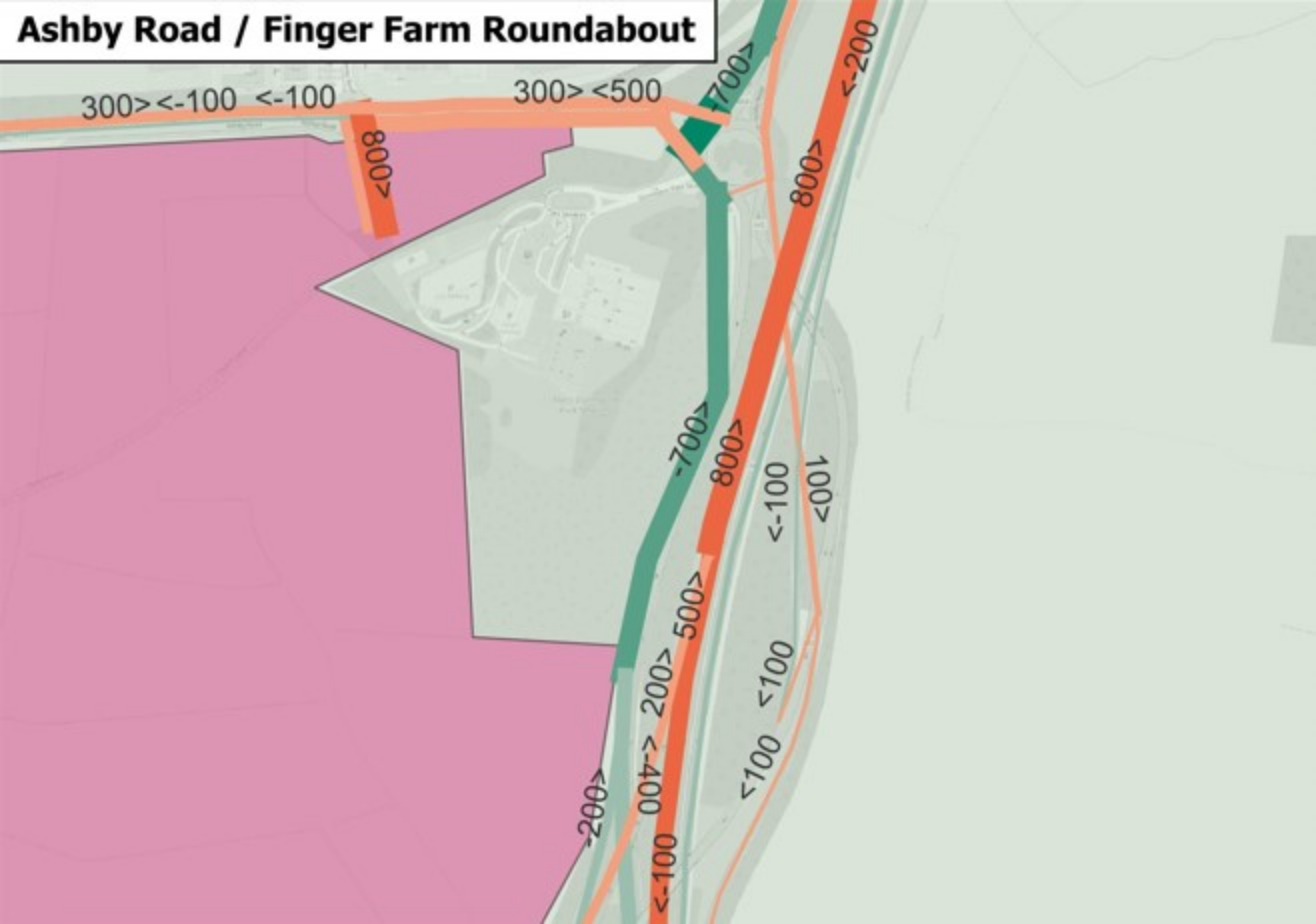
Ashby Road / Finger Farm Roundabout
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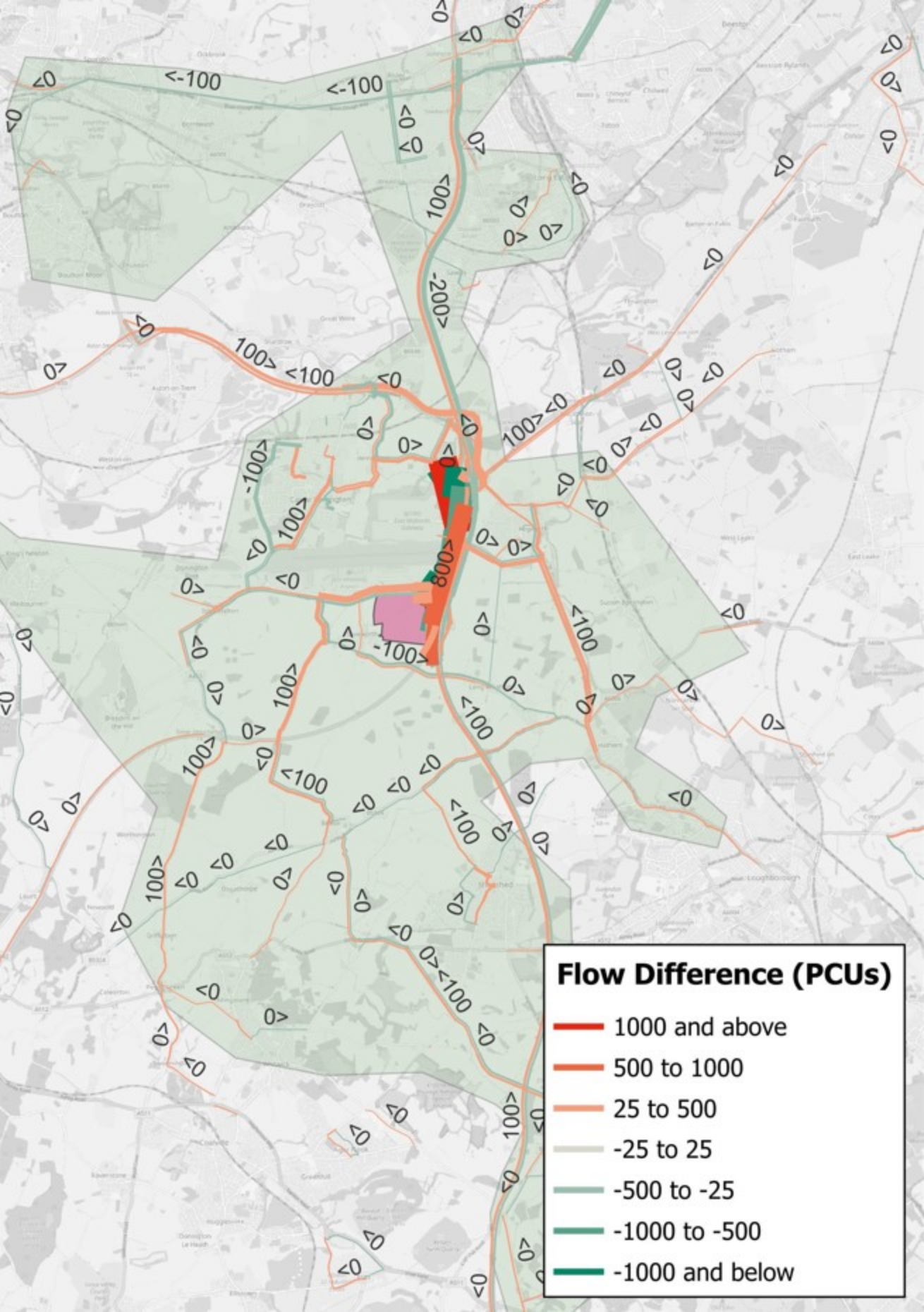
Flow Difference (PCUs)
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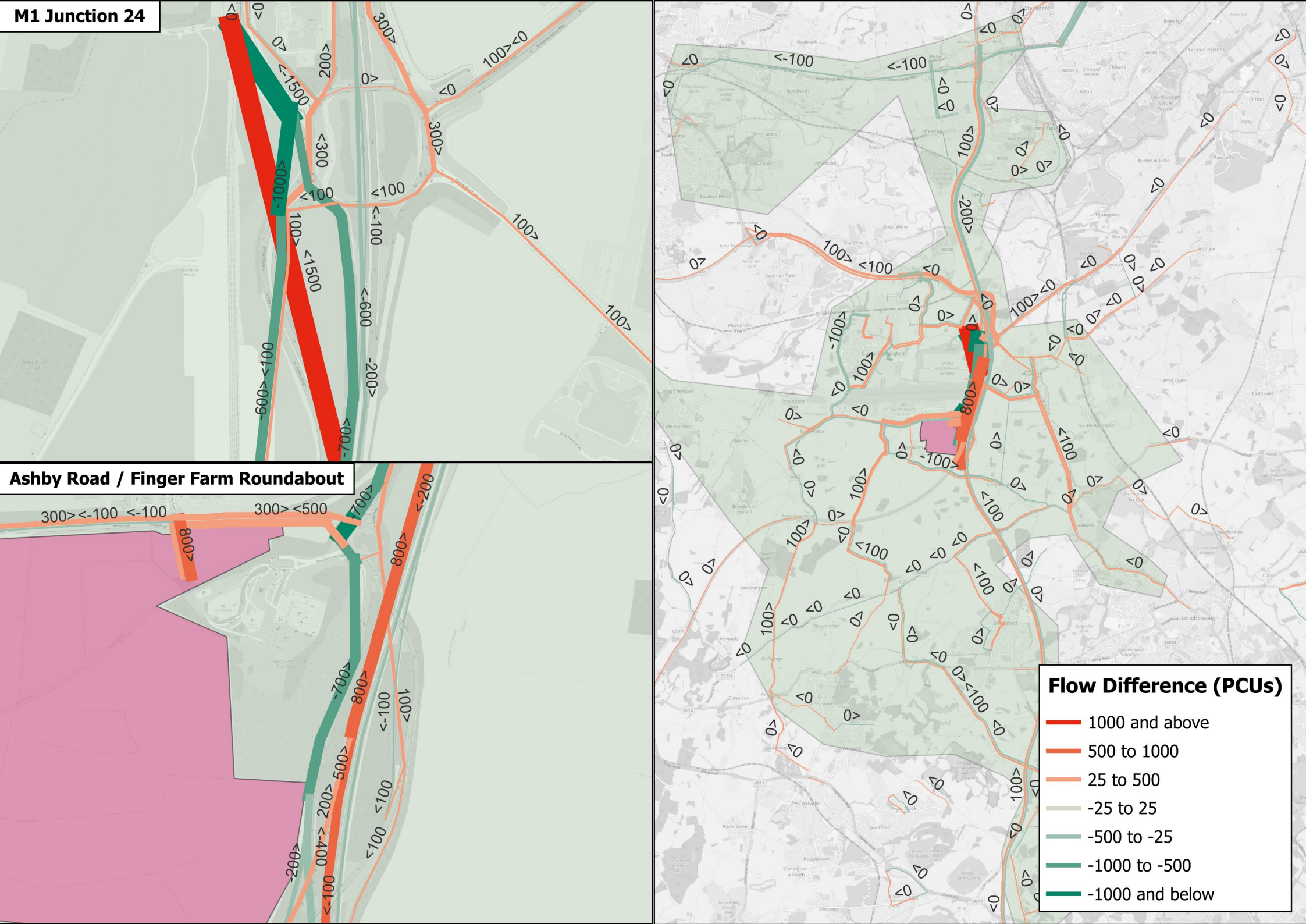
500 to 1000
25 to 500
-25 to 25
-500 to -25
-1000 to -500
-1000 and below


M1 Junction 24
Ashby Road / Finger Farm Roundabout
Flow Difference (PCUs)
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500 to 1000
25 to 500
-25 to 25
-500 to -25
-1000 to -500
-1000 and below

M1 Junction 24
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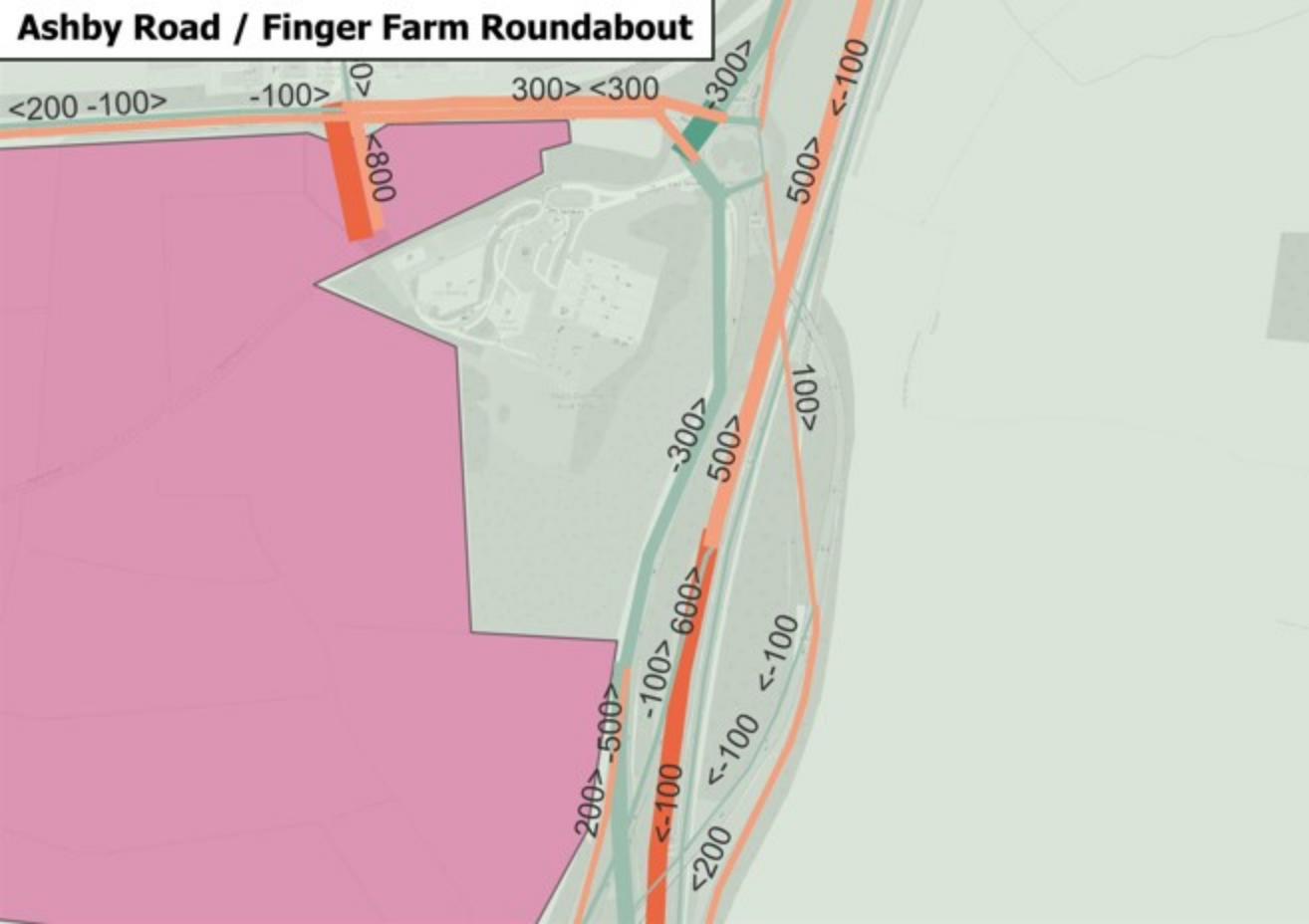
Ashby Road / Finger Farm Roundabout
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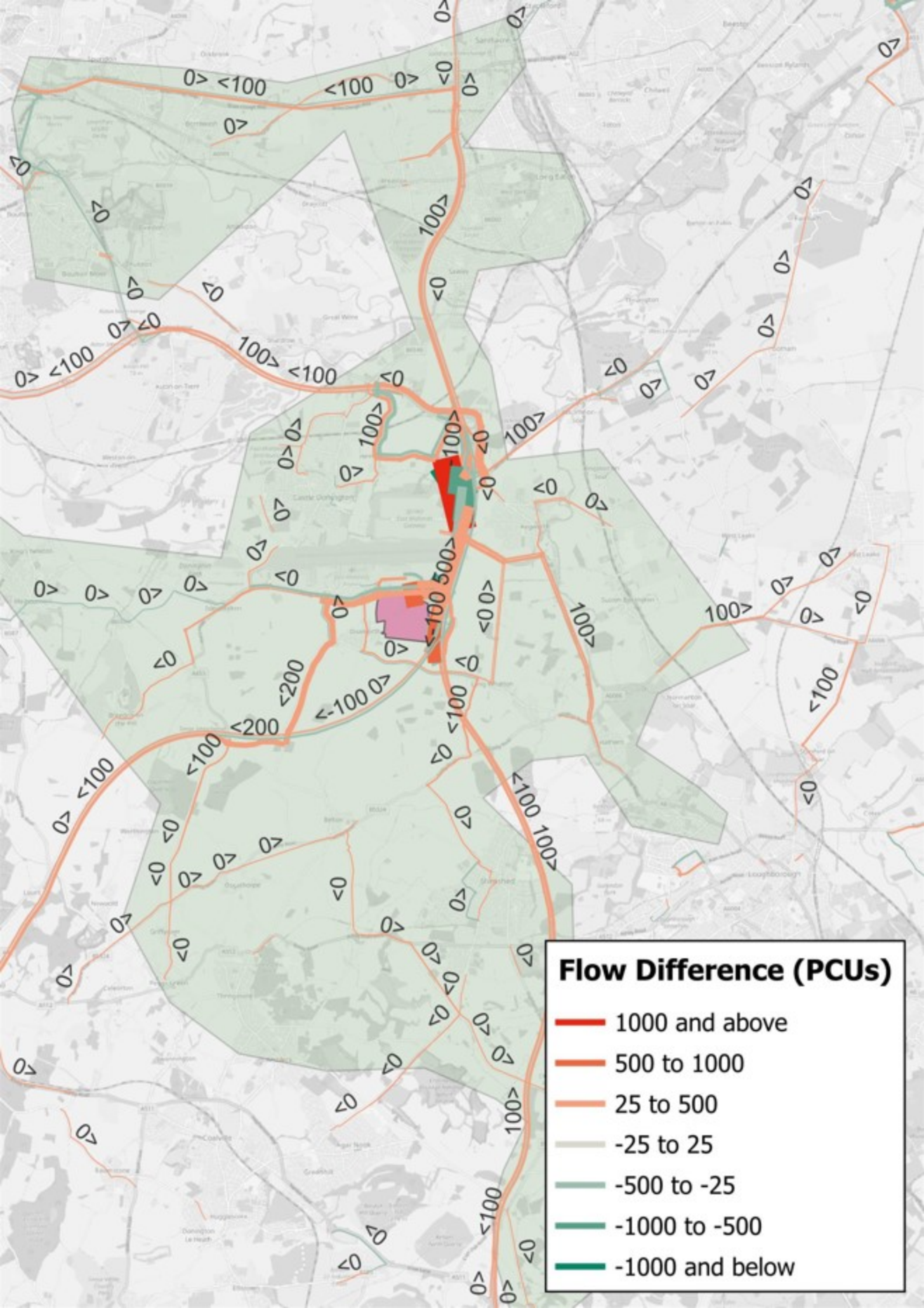
<-100
<-100
<200


Flow Difference (PCUs)
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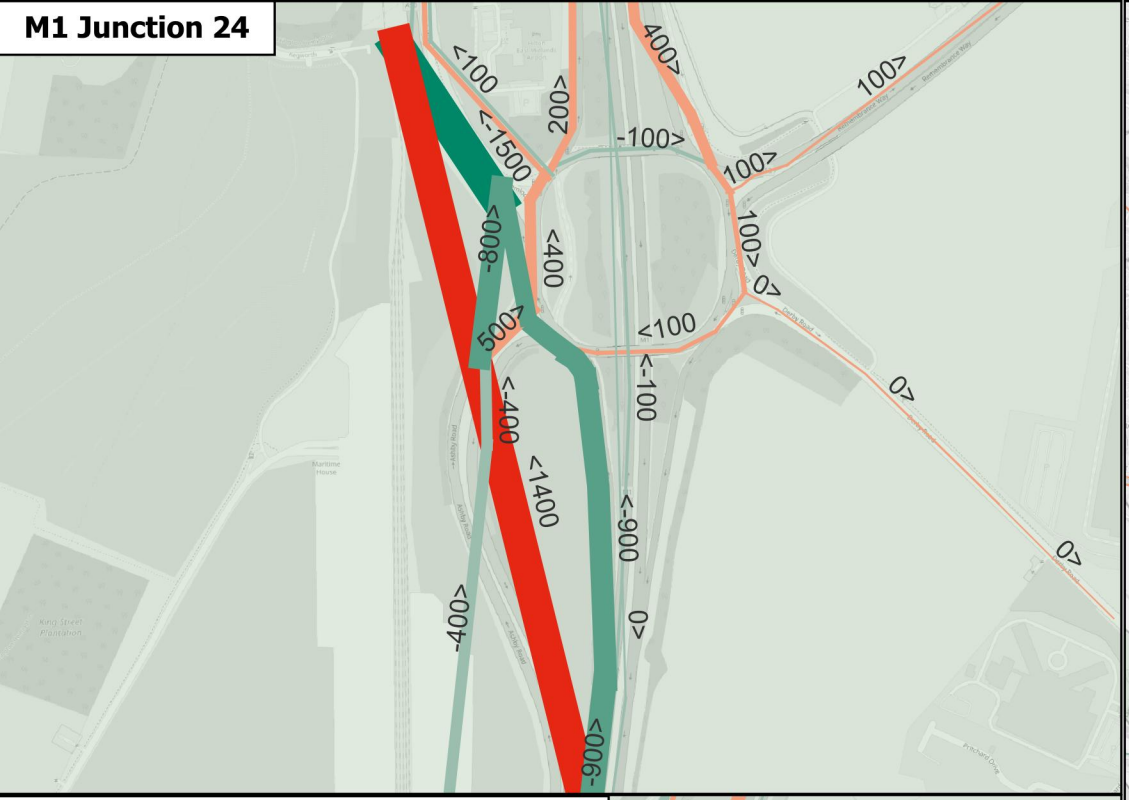
500 to 1000
25 to 500
-25 to 25
-500 to -25
-1000 to -500
-1000 and below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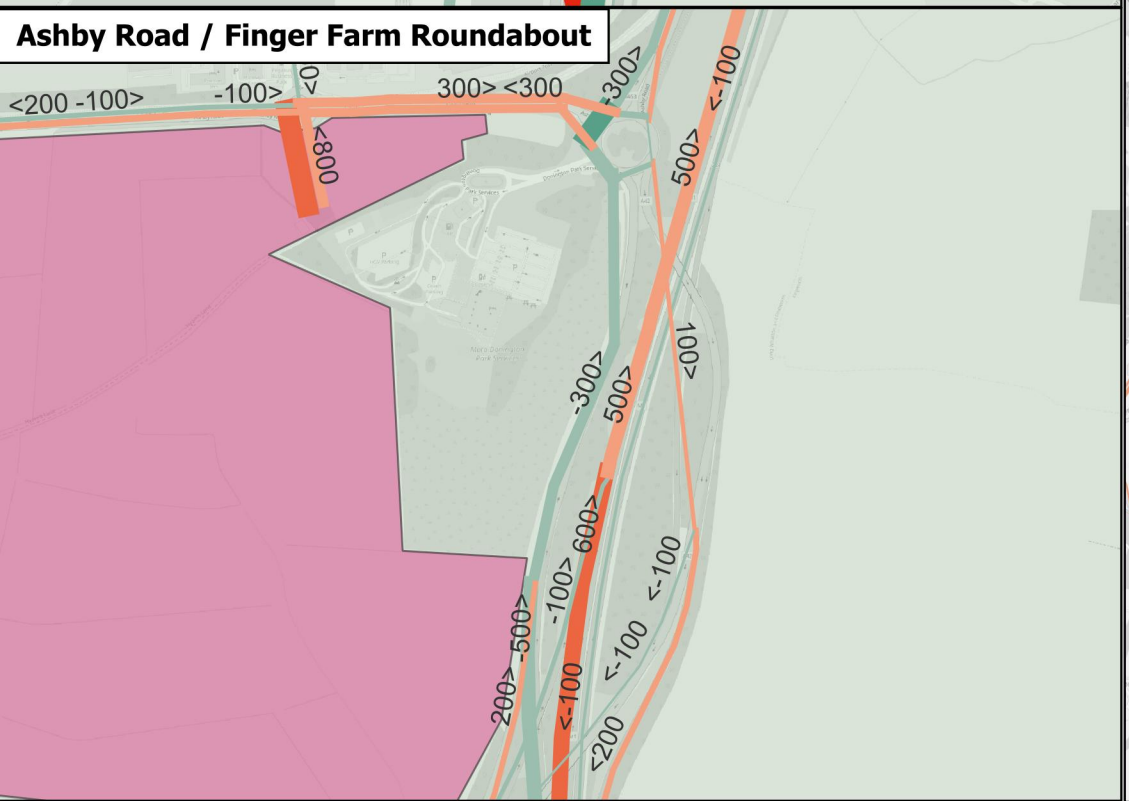
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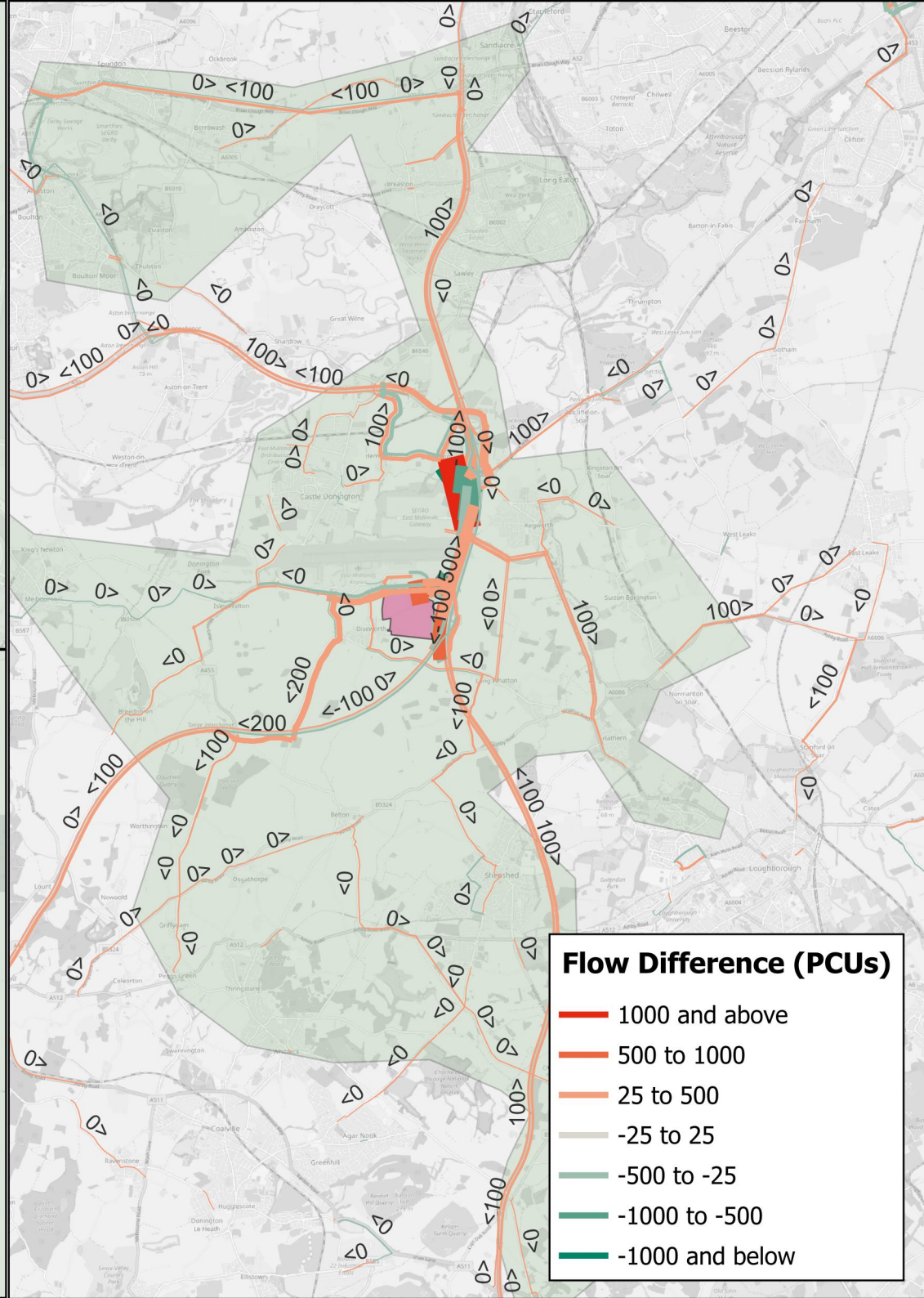
Flow Difference (PCUs)
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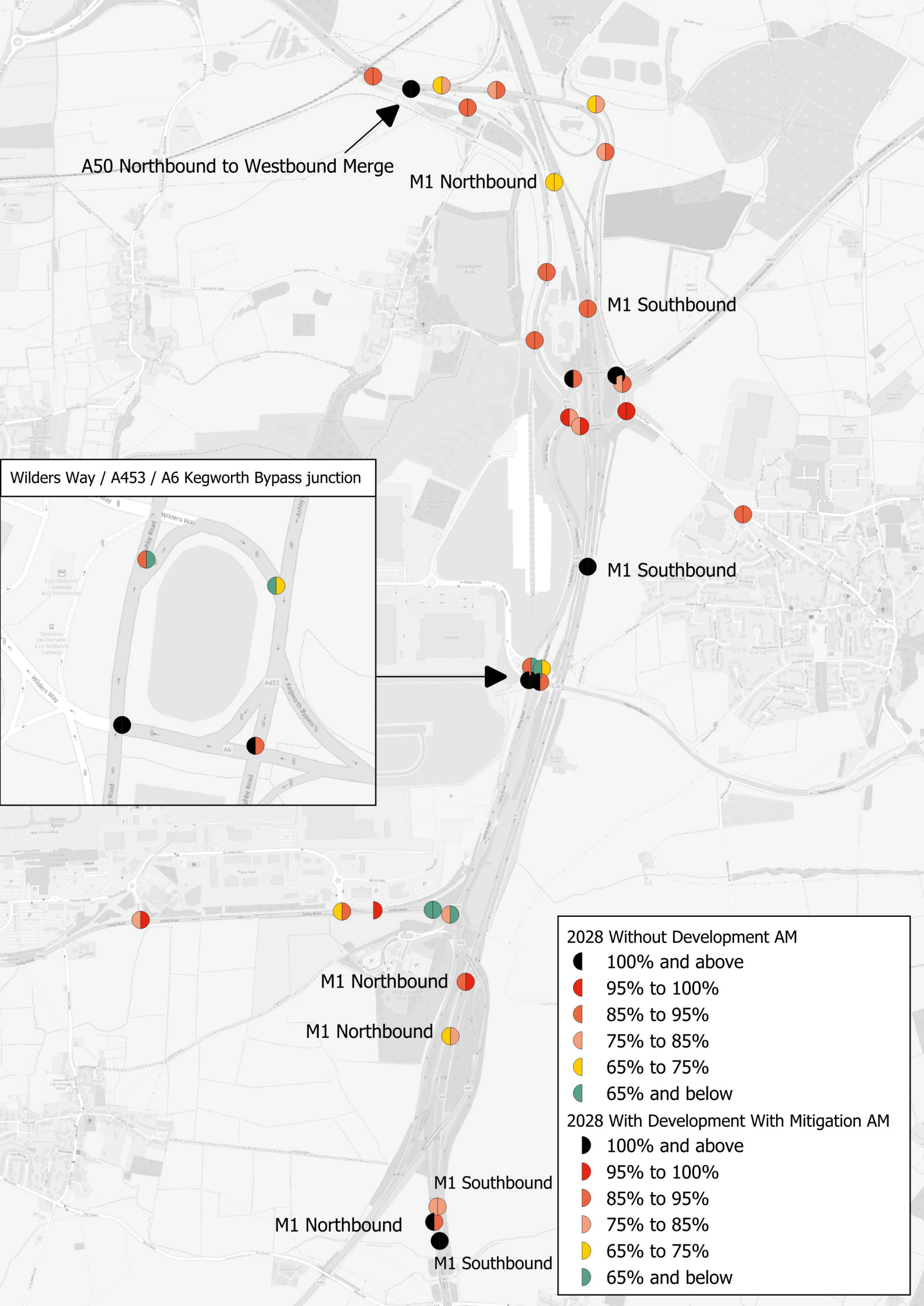
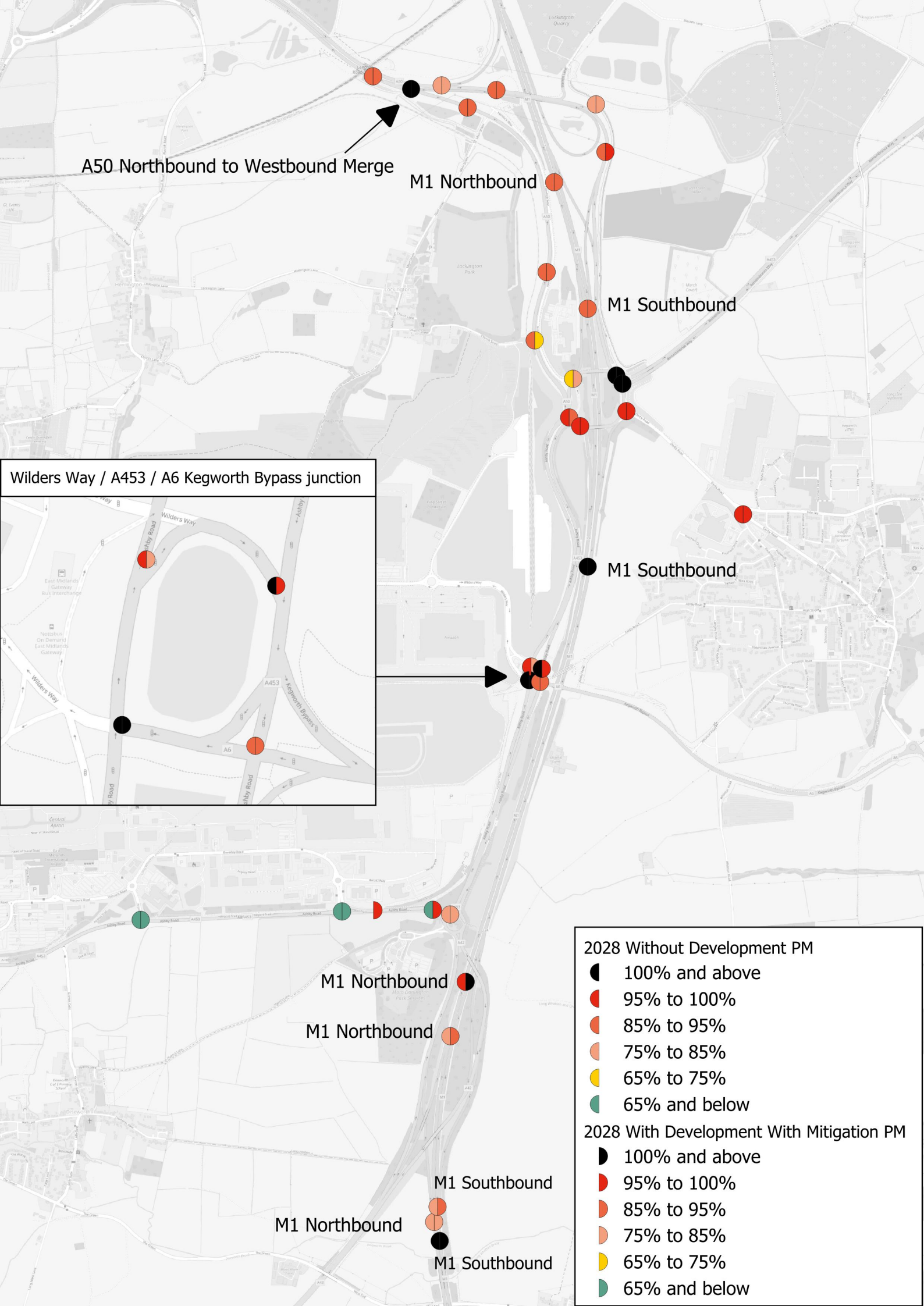
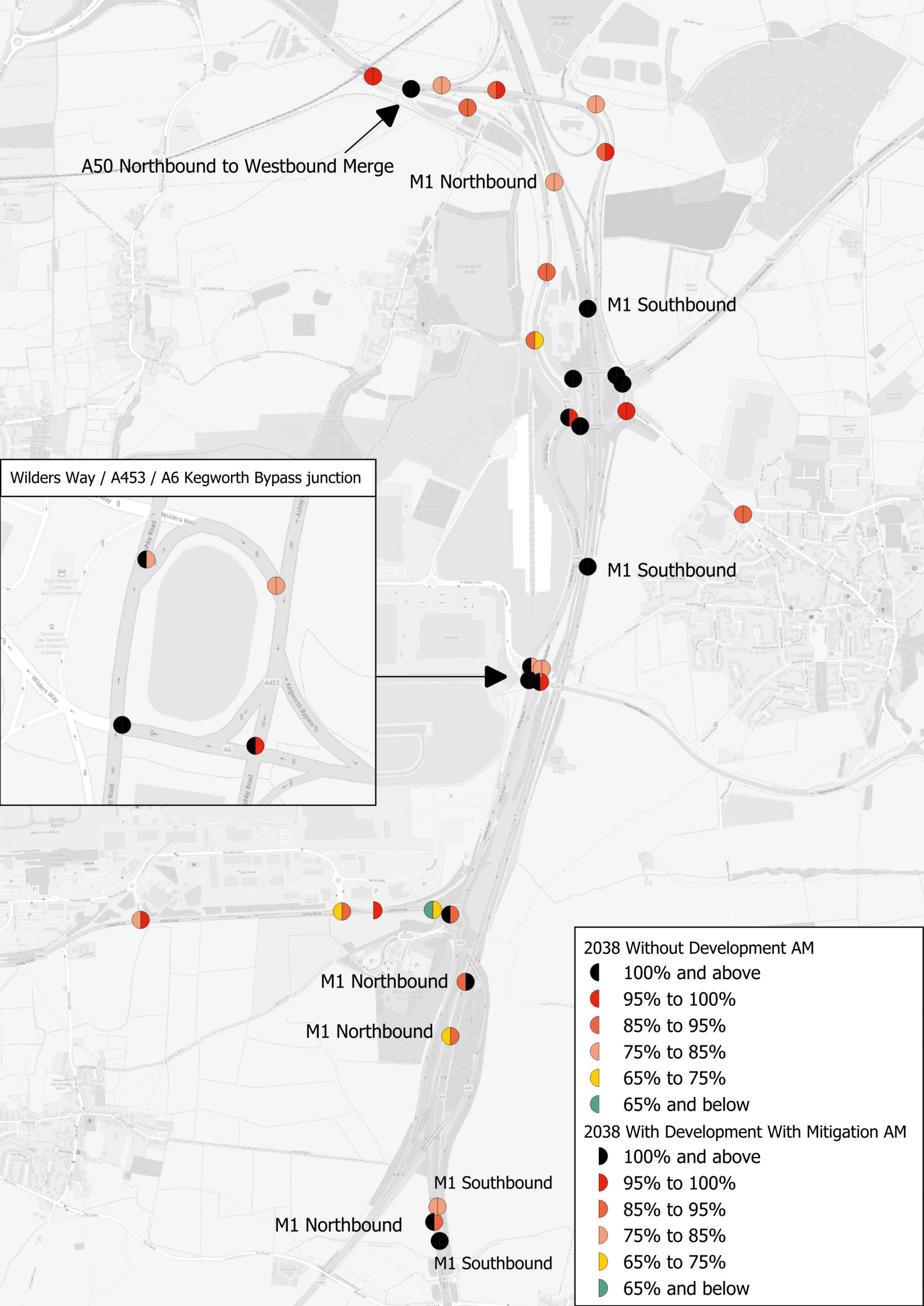
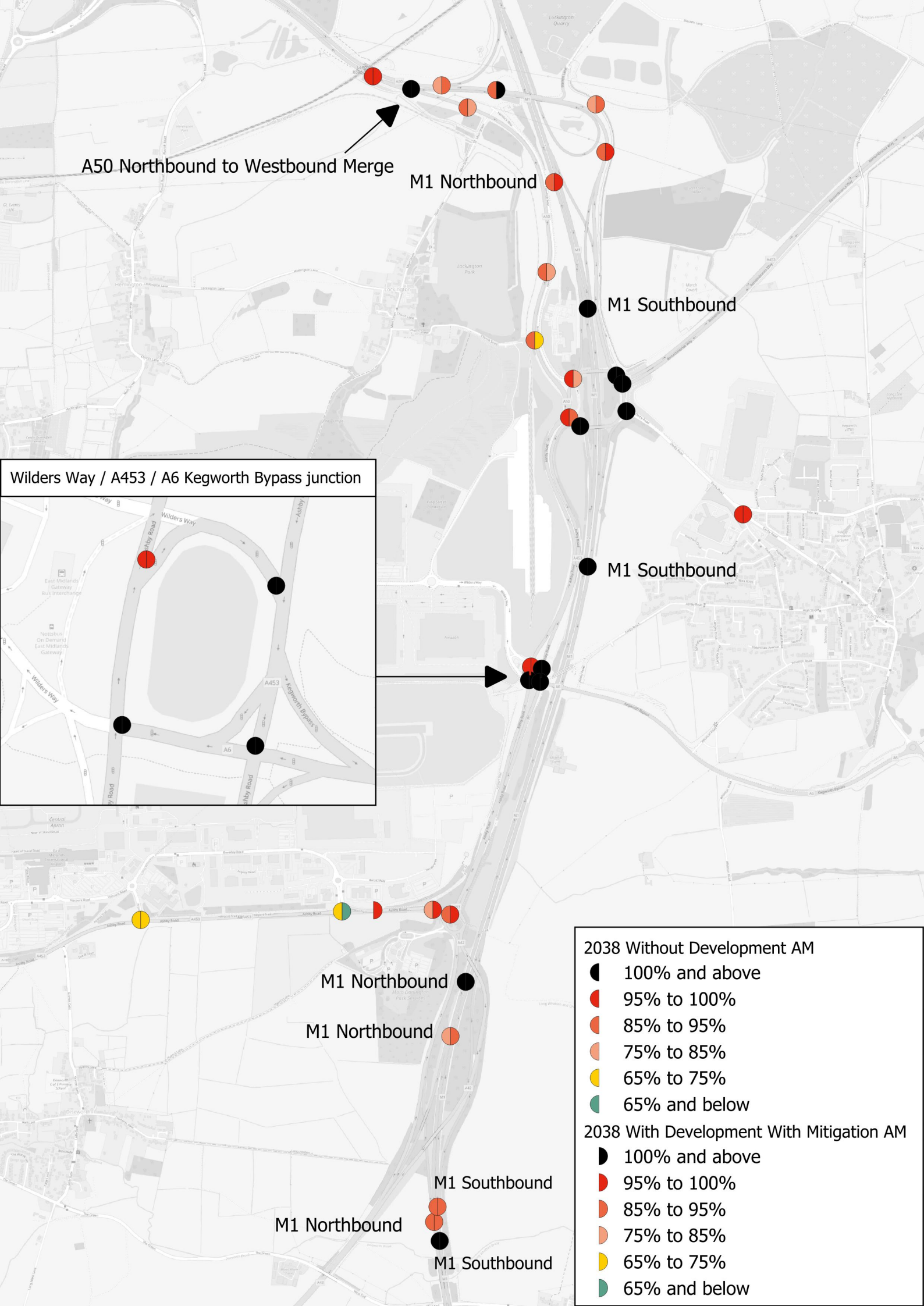
500 to 1000
25 to 500
-25 to 25
-500 to -25
-1000 to -500
-1000 and below


A50 Northbound to Westbound Merge
M1 Northbound
M1 Southbound
Wilders Way / A453 / A6 Kegworth Bypass junction
M1 Southbound
M1 Northbound
M1 Northbound
M1 Southbound
M1 Northbound
M1 Southbound
2028 Without Development AM
100% and above
95% to 100%
85% to 95%
75% to 85%
65% to 75%
65% and below
2028 With Development With Mitigation AM
100% and above
95% to 100%
85% to 95%
75% to 85%
65% to 75%
65% and below


A50 Northbound to Westbound Merge
M1 Northbound
M1 Southbound
Wilders Way / A453 / A6 Kegworth Bypass junction
M1 Southbound
M1 Northbound
M1 Northbound
M1 Southbound
M1 Northbound
M1 Southbound
2028 Without Development PM
100% and above
95% to 100%
85% to 95%
75% to 85%
65% to 75%
65% and below
2028 With Development With Mitigation PM
100% and above
95% to 100%
85% to 95%
75% to 85%
65% to 75%
65% and below


A50 Northbound to Westbound Merge
M1 Northbound
M1 Southbound
Wilders Way / A453 / A6 Kegworth Bypass junction
M1 Southbound
M1 Northbound
M1 Northbound
M1 Southbound
M1 Northbound
M1 Southbound
2038 Without Development AM
100% and above
95% to 100%
85% to 95%
75% to 85%
65% to 75%
65% and below
2038 With Development With Mitigation AM
100% and above
95% to 100%
85% to 95%
75% to 85%
65% to 75%
65% and below


A50 Northbound to Westbound Merge
M1 Northbound
M1 Southbound
Wilders Way / A453 / A6 Kegworth Bypass junction
M1 Southbound
M1 Northbound
M1 Northbound
M1 Southbound
M1 Northbound
M1 Southbound
2038 Without Development AM
100% and above
95% to 100%
85% to 95%
75% to 85%
65% to 75%
65% and below
2038 With Development With Mitigation AM
100% and above
95% to 100%
85% to 95%
75% to 85%
65% to 75%
65% and below

APPENDIX 71: Updated Study Area Spreadsheet using Stage 2A Modelling Outputs

No.	Junction	2038 VoC (%)						Traffic Flows (Total Vehicles)									
		AM			PM			AM					PM				
		Without Dev	With Dev	With Dev With Miti	Without Dev	With Dev	With Dev With Miti	1. Without Dev	2. With Dev	2-1 Difference	3. With Dev w/ Miti	3-1 Difference	Without Dev	With Dev	2-1 Difference	3. With Dev w/ Miti	3-1 Difference
1	A453 Site Access Roundabout, Leics	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	A453 / Hunter Road Roundabout, Leics	73.77%	101.36%	86.30%	65.77%	84.83%	63.90%	2356	2793	436	2767	411	1952	2907	955	2847	895
3	Finger Farm Roundabout, Leics	101.36%	104.95%	88.96%	86.91%	85.77%	95.10%	4487	4601	115	4277	-210	4104	4335	231	4072	-32
4	A453 / EMGP1 Signal Junction, Leics	103.07%	103.04%	102.28%	103.88%	104.64%	106.95%	4470	4526	56	4027	-442	4688	4794	106	4524	-164
5	M1 J24, Leics (SRN)	117.82%	119.79%	114.39%	108.65%	109.24%	108.47%	10765	10742	-23	10117	-648	11510	11599	89	10823	-687
6	A453 / East Midlands Airport Signal Junction, Leics	82.81%	95.96%	99.98%	68.72%	75.25%	74.30%	1816	1763	-53	1777	-39	1868	2057	189	2015	147
7	A453 / Grimes Gate, Leics	54.86%	68.40%	68.87%	41.77%	57.34%	58.88%	1460	1632	172	1617	157	1308	1472	164	1487	179
8	A453 / The Green, Leics	38.43%	55.43%	48.22%	32.60%	40.55%	41.51%	1879	2077	198	1981	102	1815	1979	164	1956	141
9	A453 / East Midlands Airport Roundabout, Leics	82.81%	95.96%	99.98%	68.72%	75.25%	74.30%	2043	1983	-60	2013	-30	2159	2397	238	2358	199
10	A453 / Walton Hill, Leics	106.27%	109.76%	109.03%	59.62%	100.17%	99.25%	3146	3144	-2	3119	-27	3337	3438	100	3369	31
11	A42 J14 Eastbound off slip, Leics (SRN)	28.32%	27.22%	24.87%	34.28%	36.66%	34.84%	1173	1332	158	1137	-36	1182	1228	45	1199	17
12	A42 J14 Roundabout with Top Brand / Gelscoe Lane, Leics (SRN)	37.15%	47.35%	35.58%	17.47%	40.39%	39.63%	1136	1324	187	1149	13	1182	1363	181	1370	189
13	M1 J23, Leics (SRN)	102.28%	102.35%	101.95%	98.94%	100.17%	99.68%	5677	5735	58	5713	36	6023	6091	68	6006	-17
14	A50 Junction 1, Leics (SRN)	101.62%	101.35%	97.06%	99.45%	98.69%	100.37%	4958	5048	90	4759	-199	4958	4990	32	4961	3
15	A50 Junction 2, Derbys (SRN)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
16	M1 J25, Notts (SRN)	120.54%	108.81%	108.85%	213.21%	214.02%	113.13%	6930	6985	54	6965	35	7459	7489	30	7513	55
17	Beacon Road / Shepshed Road Priority Crossroads, Woodhouse Eaves. Leics	97.27%	96.52%	96.06%	92.67%	93.29%	93.93%	2666	2691	25	2700	34	3038	3098	60	3100	62
18	A6 Derby Road / Whatton Road / Zouch Road Signal Junction, Hathern, Leics	107.50%	109.07%	103.36%	108.28%	108.87%	108.39%	2569	2597	28	2706	137	2927	3003	76	3031	104
19	Station Road / Broad Rushes Roundabout, Castle Donington, Leics	87.33%	88.90%	85.36%	81.86%	83.43%	82.67%	2506	2590	85	2466	-40	2293	2350	57	2314	21
20	High Street / Park Lane / Delven Lane Signal Junction, Castle Donington, Leics	96.84%	96.73%	93.72%	98.01%	98.18%	98.99%	1063	1116	53	1149	86	939	955	16	950	11
21	A453 / Kegworth Road Slip Roads, Ratcliffe on Soar, Notts	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
22	A453 / Barton Lane / West Leake Lane Slip Roads, Ratcliffe on Soar, Notts	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
23	B591 / Whitewick Road Signal Junction, Copt Oak, Leics	100.6%	100.6%	100.5%	104.7%	105.0%	105.0%	2060	2080	20	2086	26	1683	1715	32	1705	22
24	A6/London Road, Kegworth	42.34%	44.21%	50.32%	44.06%	66.38%	72.15%	1559	1605	46	1708	148	1847	1904	57	1989	142
25	The Green/Lady Gate, Diseworth	15.30%	17.65%	15.69%	17.55%	17.94%	16.59%	600	726	126	578	-22	634	717	83	652	18
26	Tamworth Road/Fields Farm Road roundabout, Long Eaton	81.81%	82.64%	82.40%	84.70%	102.23%	102.32%	2251	2245	-6	2266	15	2404	2393	-11	2378	-27
27	Nottingham Road/Draycott Road, Borrowash	62.17%	51.85%	63.20%	87.56%	91.57%	93.56%	1667	1631	-35	1667	1	1497	1502	4	1540	43

Junction	AM			PM			Assessment Required?	Comments
	Stage 1A V/C WoD	Stage 2A V/C	Difference	Stage 1A V/C WoD	Stage 2A V/C	Difference		
Nottingham Road/Willowcroft Road, Spondon, Derby	429%	424%	-5.00%	397%	392%	-5.00%	No	Betterment in v/c ratios of 5% in AM and PM peaks
Derby Road/Nottingham Road Gyratory, Derby (city centre)	93.70%	94.20%	0.50%	108.30%	108.50%	0.20%	No	Negligible change of 0.5% in the AM and 0.2% in the PM
High Street/Park Lane, Castle Donington	96.80%	93.70%	-3.10%	96.80%	93.70%	-3.10%	No	Betterment in v/c ratios of 3.1% in AM and PM
A6 Derby Road/Whatton Road, Loughborough	107.50%	103.30%	-4.20%	<90%			No	Betterent in v/c ratios of 4.2% in AM, with junction operating within capacity in PM
Derby Road/Bishop Meadow Road, Loughborough	<90%			93.20%	95.10%	1.90%	No	Negligible change of 1.9% in PM, with junction operating within capacity in AM

APPENDIX 72: EMFM Stage 2B Modelling **Forecasting Report A**ddendum **(document reference EMFM 2019 East Midlands Gateway Phase 2: Forecasting Report Addendum Stage 2b**, v1.2**)**

EMFM 2019

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

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Principal Consultant		

Revision History

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v1.2	2025-07-10	Update to paragraph 3.3.4	Yes	Mark Dazeley	Regional Director

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Figure A.6: Forecast Node Volume-Capacity Ratio for 2038 ‘With Development (1b)’ and 2038 ‘With Development (2b)’ Scenarios 46

Section 1 – Overview

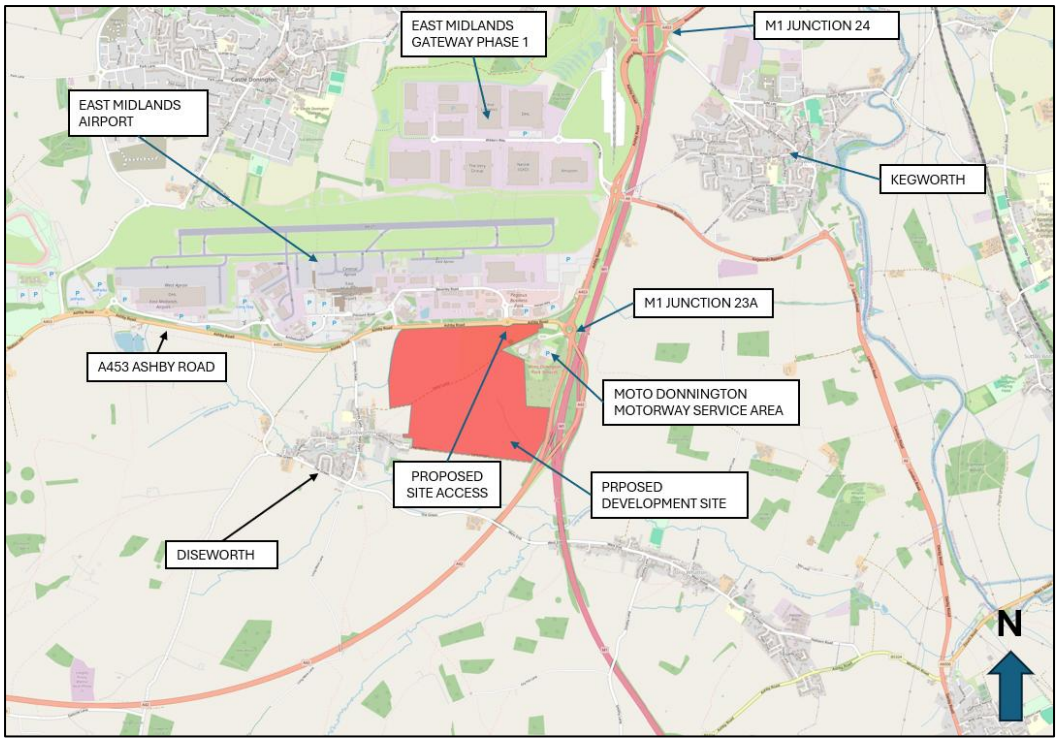
1.1 Introduction

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 400,000sqm floorspace (300,000sqm ground floorspace and 100,000sqm of B8 mezzanine floorspace) for 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:

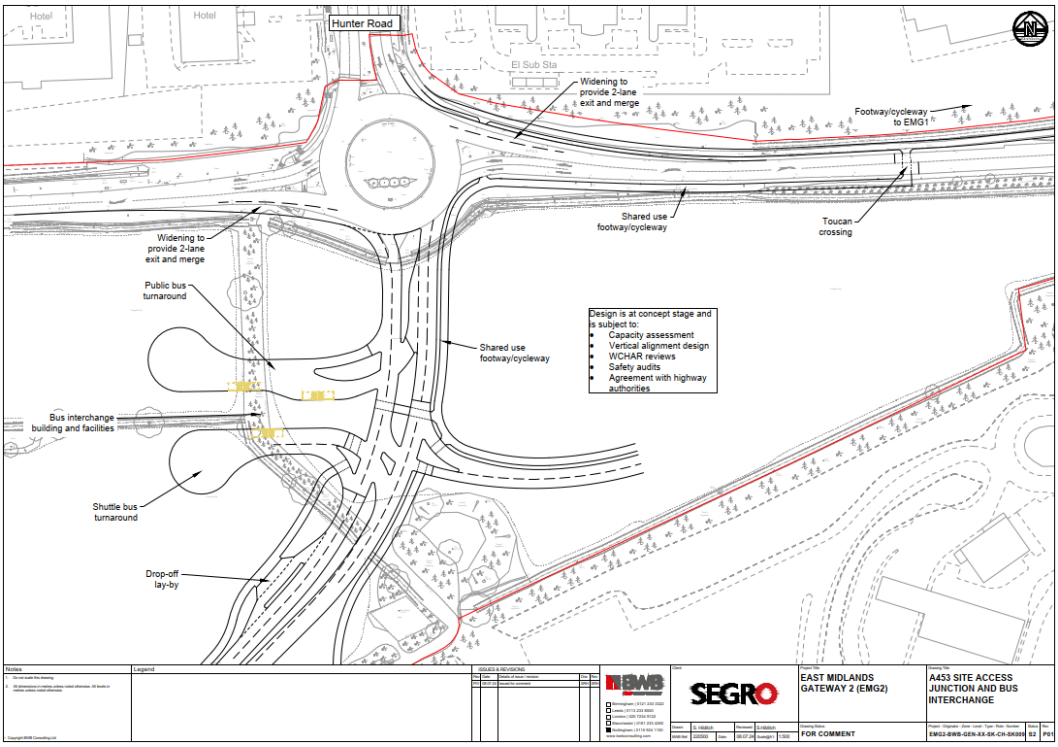
- a fourth arm off the existing A453 / Hunter Road roundabout, as indicatively shown in Figure 1.2.

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 Junction[2]



Shown indicatively for the purposes of the figure – further changes made are set out in Figure 2.6 later 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 Freeport 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 Freeport and Local Plan sites).

2028/2038 'With Development (1a)'. With EMGP2 development (with all Freeport 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 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).

1.1.8 This report follows the East Midlands Gateway Phase 2 Base Year Model Review Addendum report[3], 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 Report[4] and should be read in conjunction with the East Midlands Gateway Phase 2: Forecasting Report Addendum (Stage 1b)[5]. This addendum documents the forecast model results for Stage 2b of the EMFM strategic modelling assessment of the proposed development.

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 – 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 2b (with mitigation included) with Stage 1b (no mitigation).
- Appendix B: Presents indicative network statistics within the AoI for 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 2b modelling with mitigation included (Proforma 14)

2028/2038 'With Development (2b)'. With EMGP2 and with mitigation measures included (without Local Plan sites). Signal timings at junctions adjacent to mitigation measures have been optimised.

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

2.1.4 Section 2.2 provides the mitigation measures assumptions applied to the Stage 2b 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 2b 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 been included 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

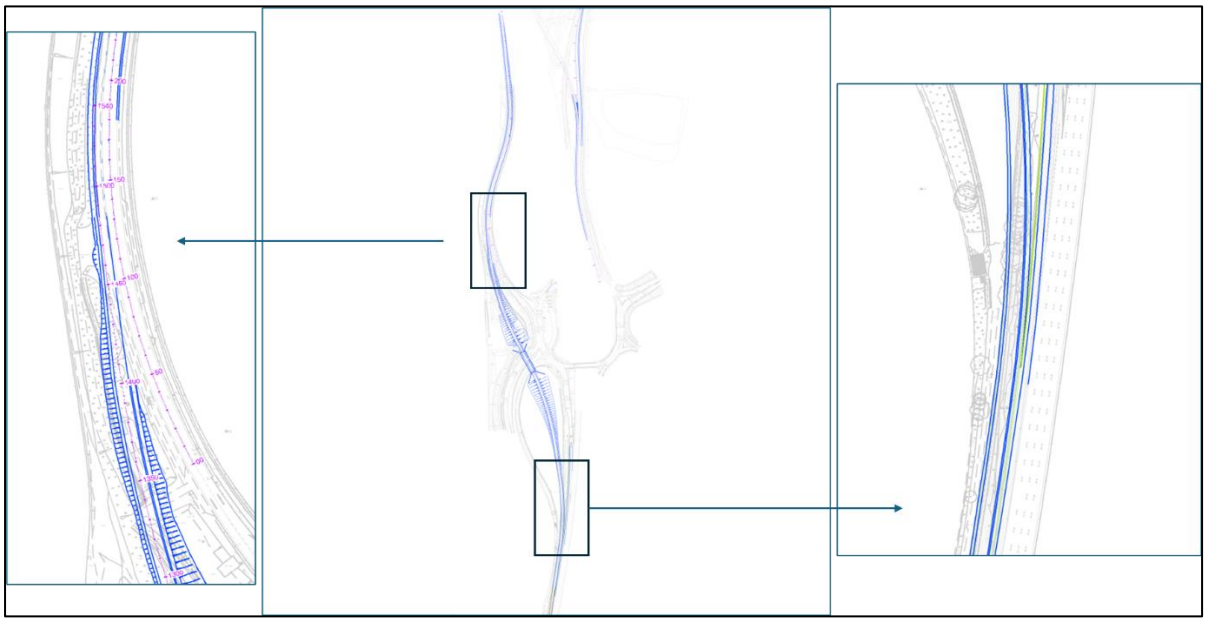


Figure 2.2: M1 Northbound to A50 Westbound Interchange Link Road Diverge Layout

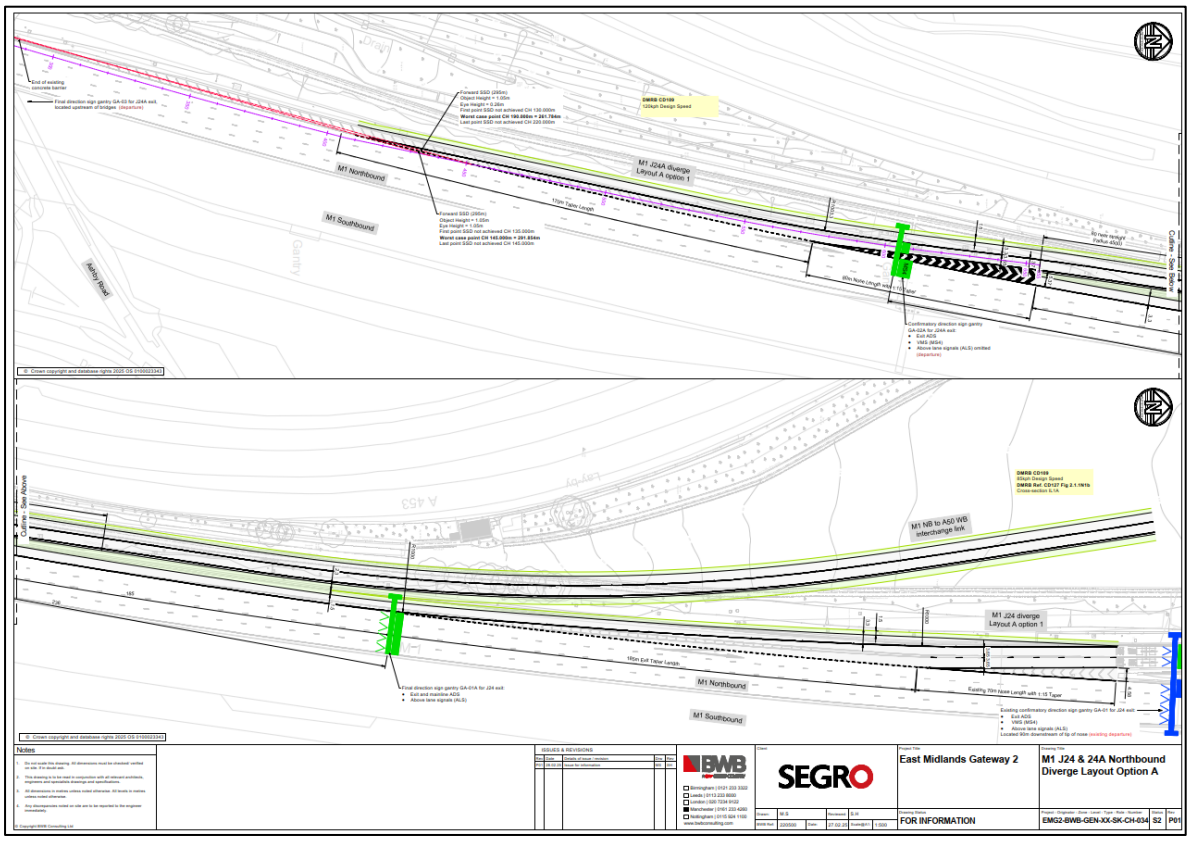


Figure 2.3: M1 Southbound Widening on Approach to J24

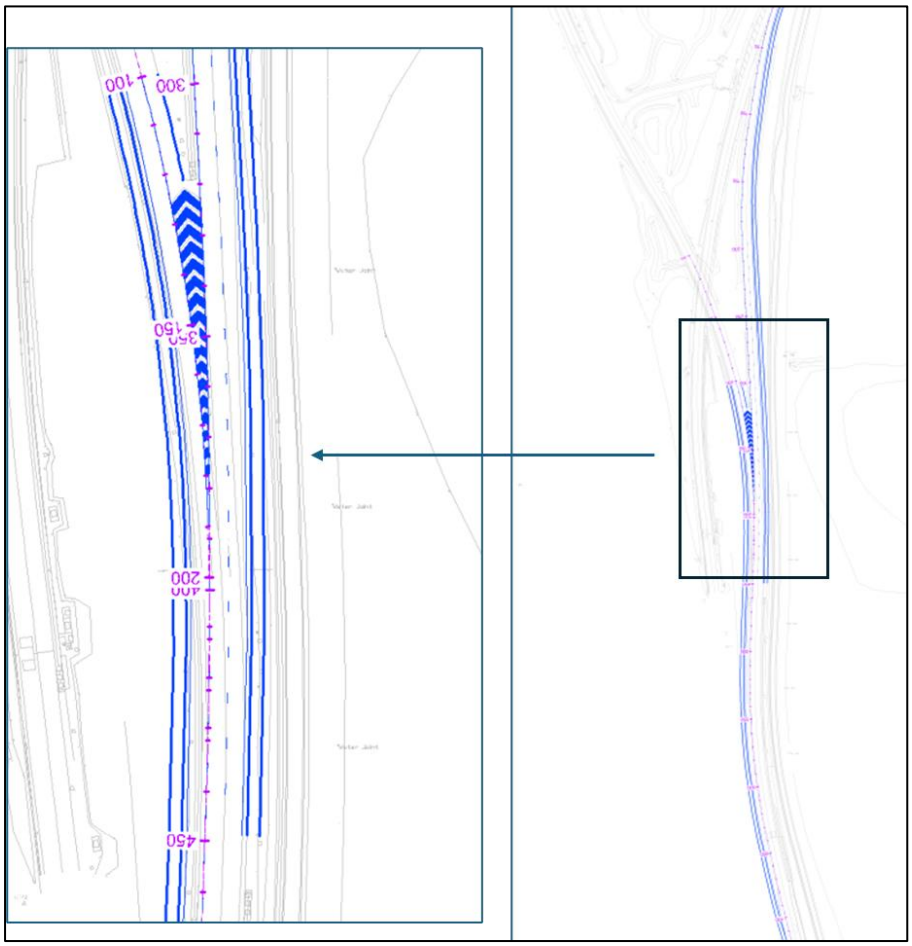


Figure 2.4: EMGP1 Access Improvements

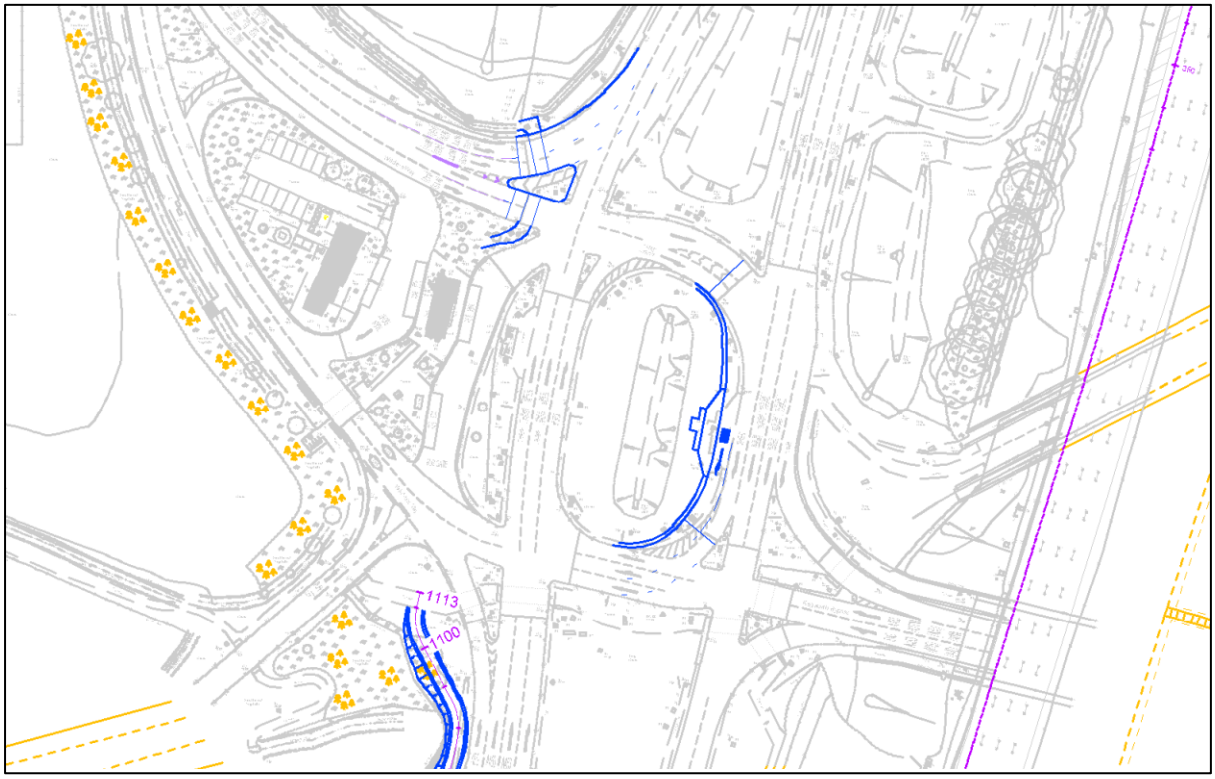


Figure 2.5: A453 Finger Farm Westbound Exit Widening

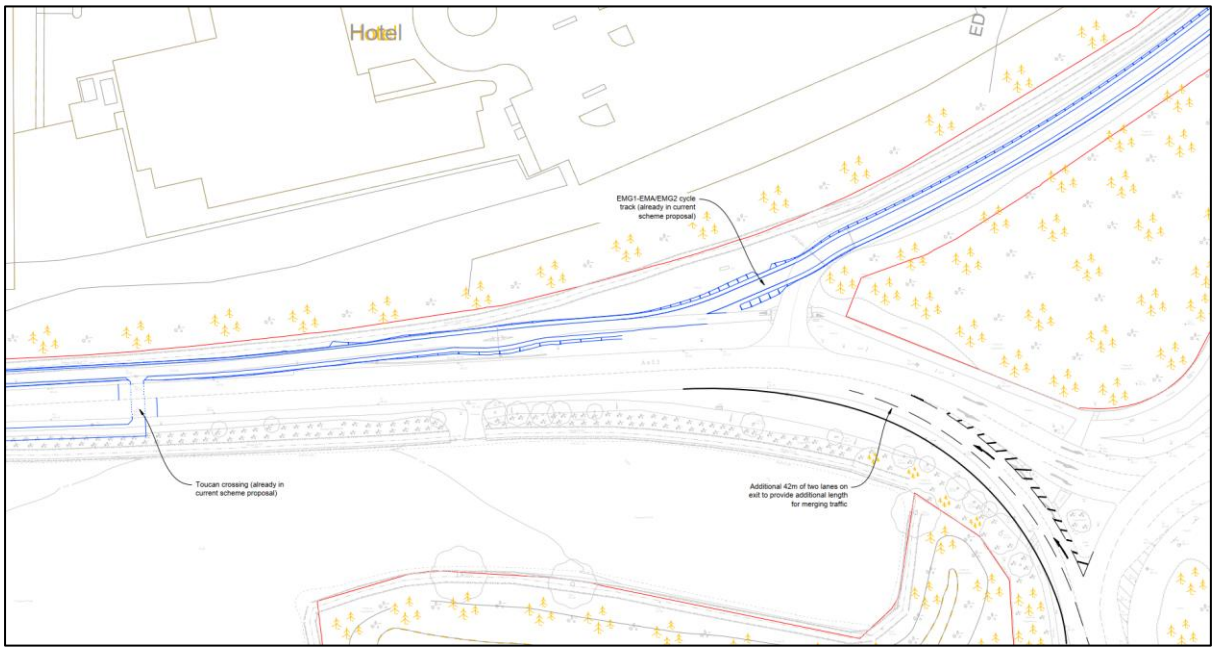
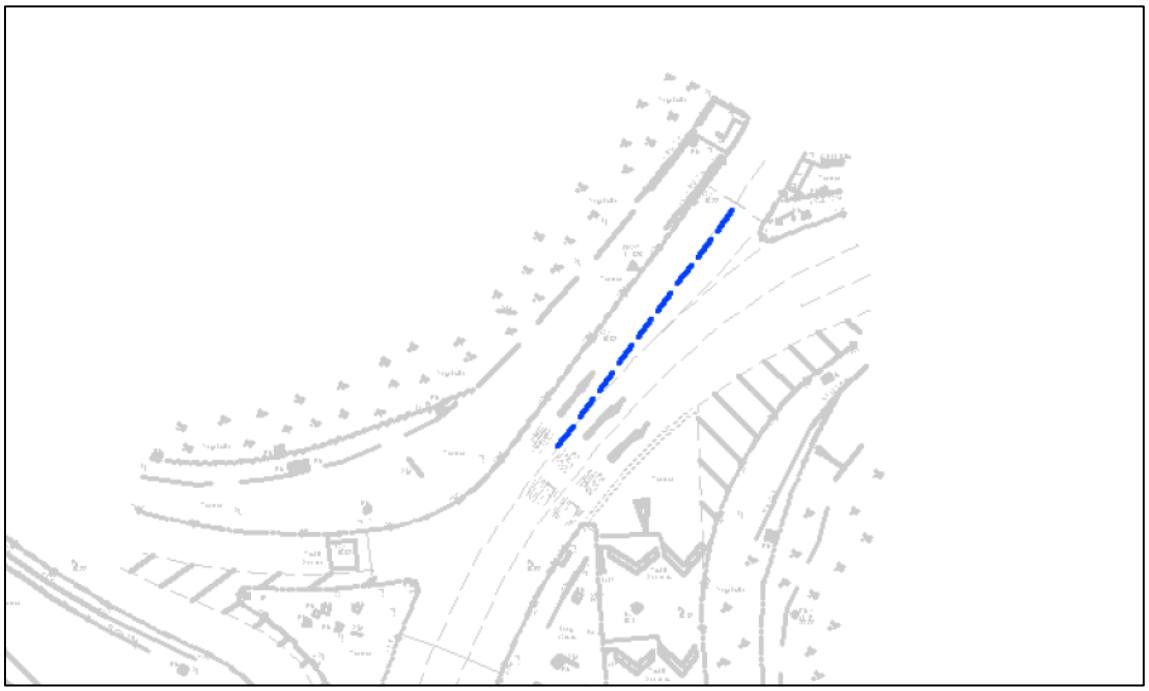


Figure 2.6: A453 EMGP2 Access Junction and Toucan Crossing

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 2b 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:

- 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 2b are based on observed signal time data from the EMFM Base Year model (2019), as is the standard approach); and
- information or feedback from the detailed Vissim modelling has been used (for example, the minimum / maximum green times (note that the Vissim model demand was based on outputs from the EMFM).

2.4.2 The optimisation of these two junctions were performed carefully and systematically such that traffic patterns were not unrealistically changed or distorted due to the additional capacity released 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 after 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 impacts from this sixth iteration were considered to be 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:

- routeing of the forecast development traffic in the 2028 and 2038 'With Development (2b)' scenarios (Section 3.2);
- forecast flow changes in 2028 and 2038 between the 'Without Development (1b)' and 'With Development (2b)' 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 (1b)' and 'With Development (2b)' scenarios (Section 3.5);
- forecast maximum node volume-capacity ratios in the 2028 and 2038 'With Development (2b)' 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 (2b)' and 'With Development (1b)' 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 1b and the development trip distribution from Stage 1b has been applied to the Stage 2b 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 (2b)' 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 2b (with mitigation) is very similar to Stage 1b (without mitigation) as reported in the Forecasting Report[4]. 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 for 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.

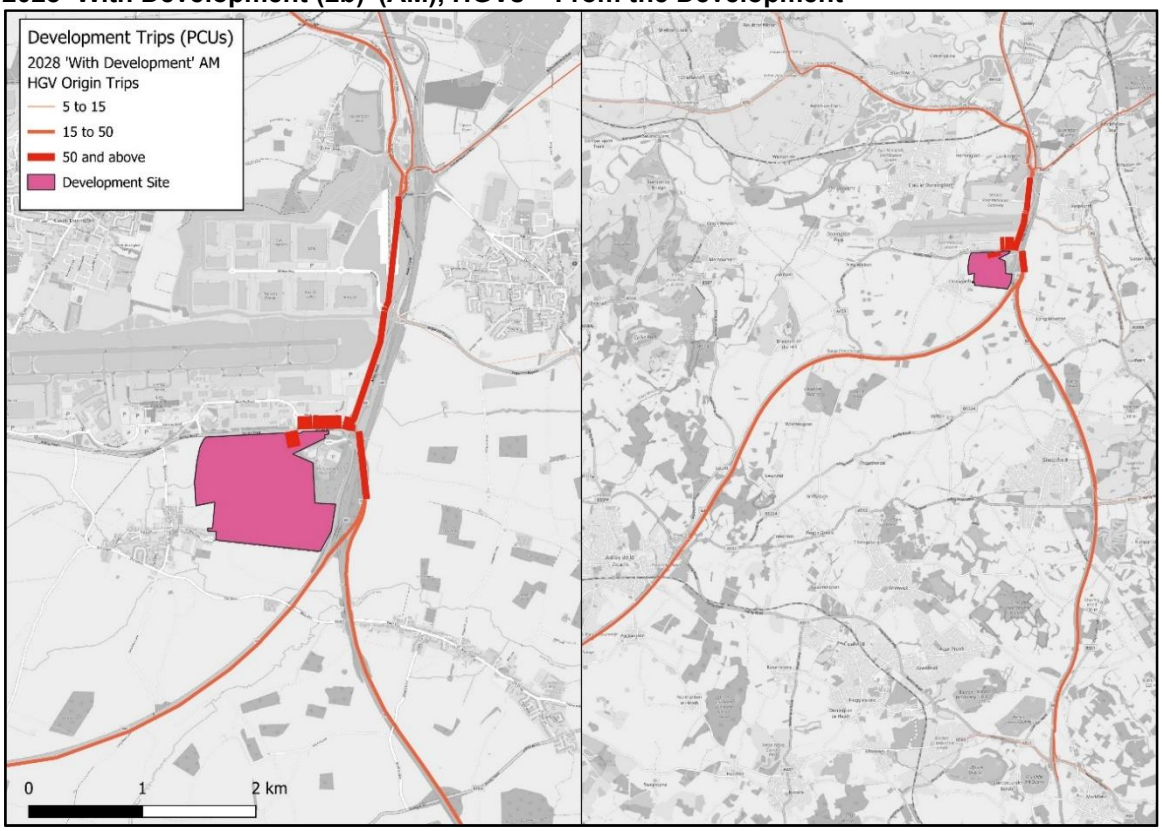
3.2.6 Light vehicle development trips from the development in the PM Peak hour in 2028 are forecast to route north via the M1, the A50, A453 Remembrance Way and south via the M1 and towards Diseworth to access the A42. This pattern is forecast in the reverse for the AM Peak hour development trips to 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 2b 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 2b, which are very similar to the equivalent Stage 1b forecasts.

3.2.8 It should be noted that the local networks through Diseworth, Castle Donington 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 (2b)' (AM), HGVs – From the Development



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

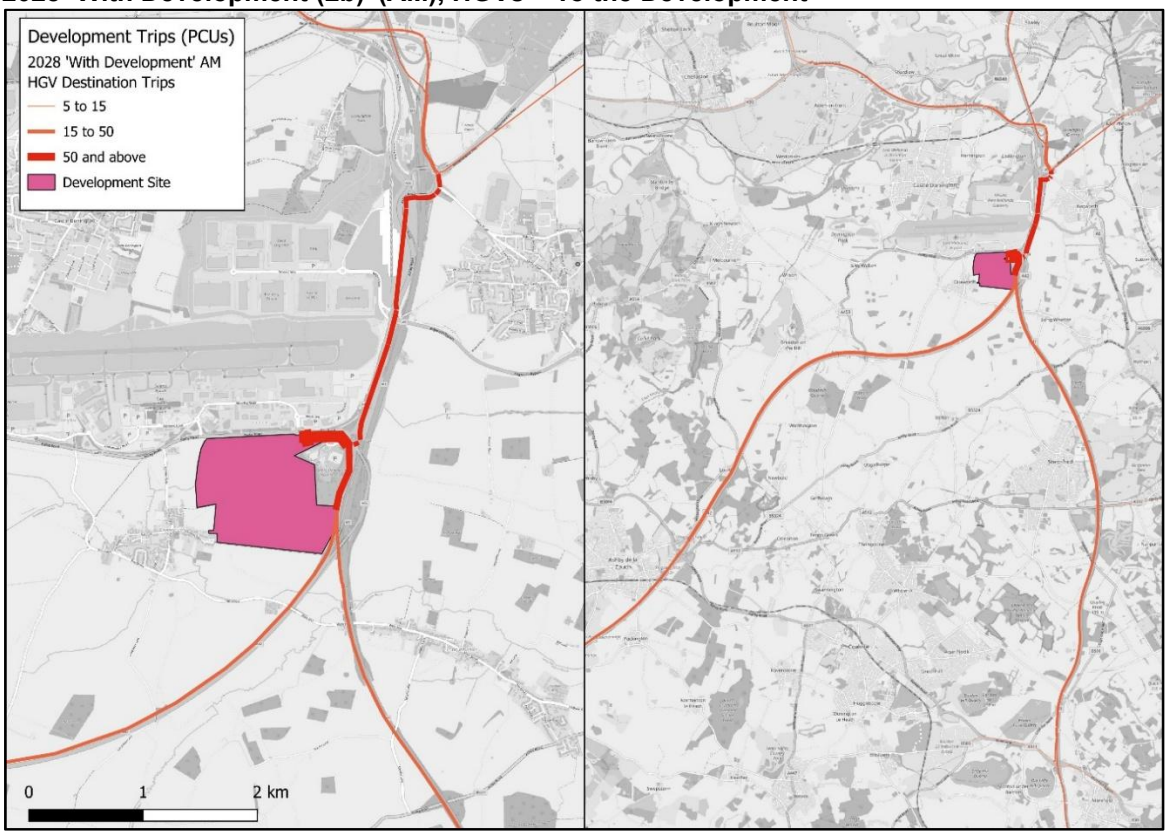

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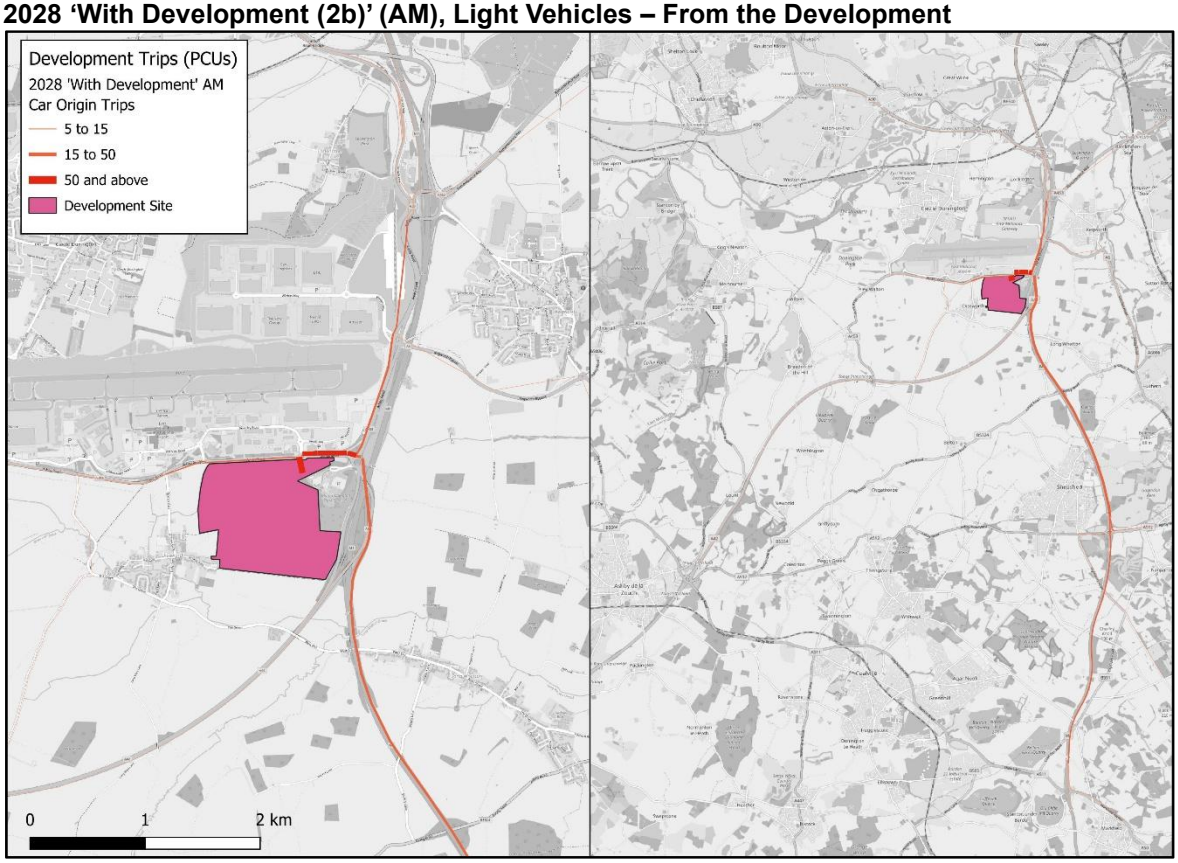
Figure 3.2: Light Vehicle Trip Distribution to and from the Proposed Development for 2028 (AM)

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



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

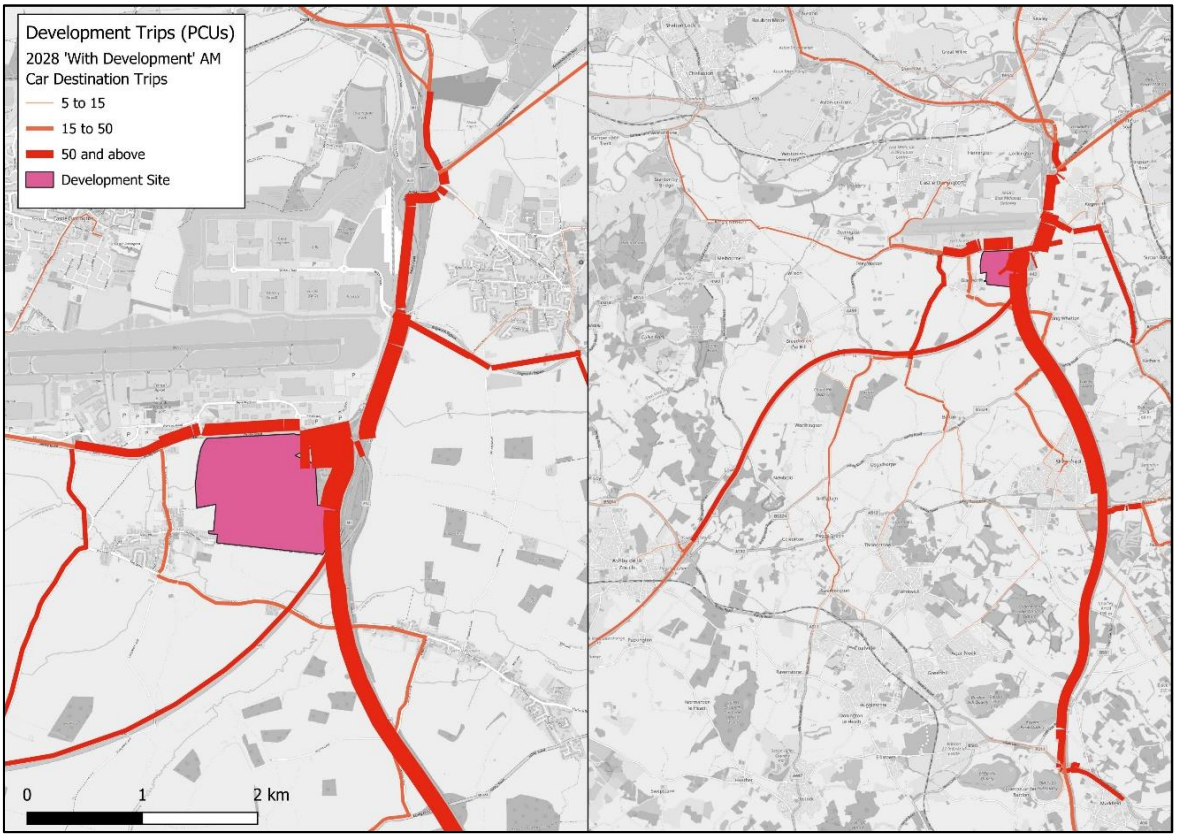

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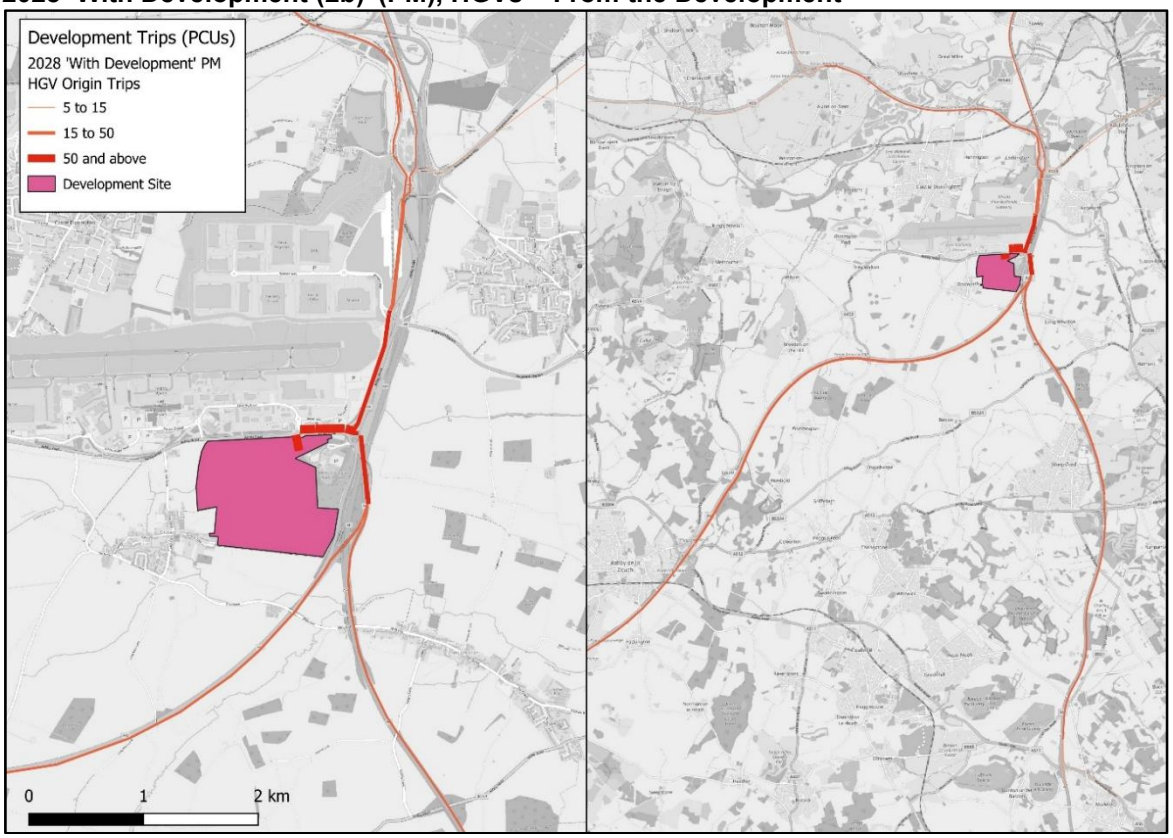
Figure 3.3: HGV Trip Distribution to and from the Proposed Development for 2028 (PM)

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



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

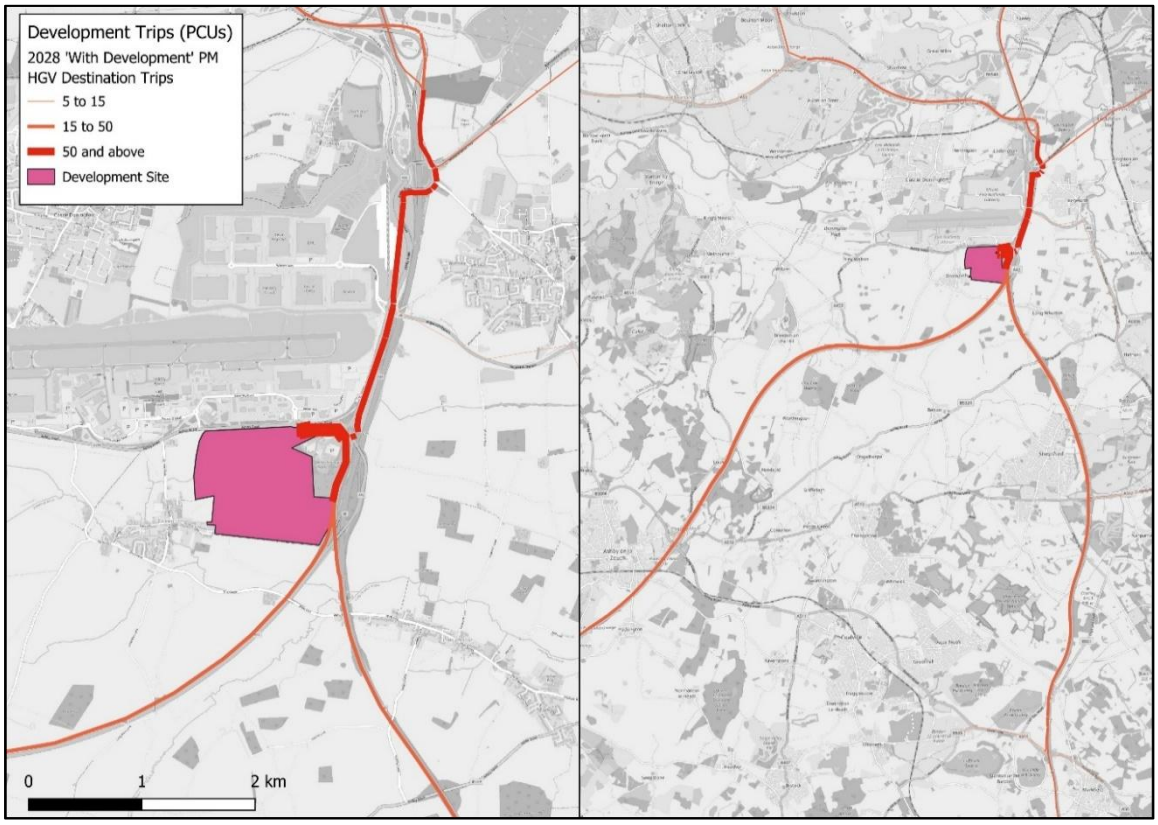

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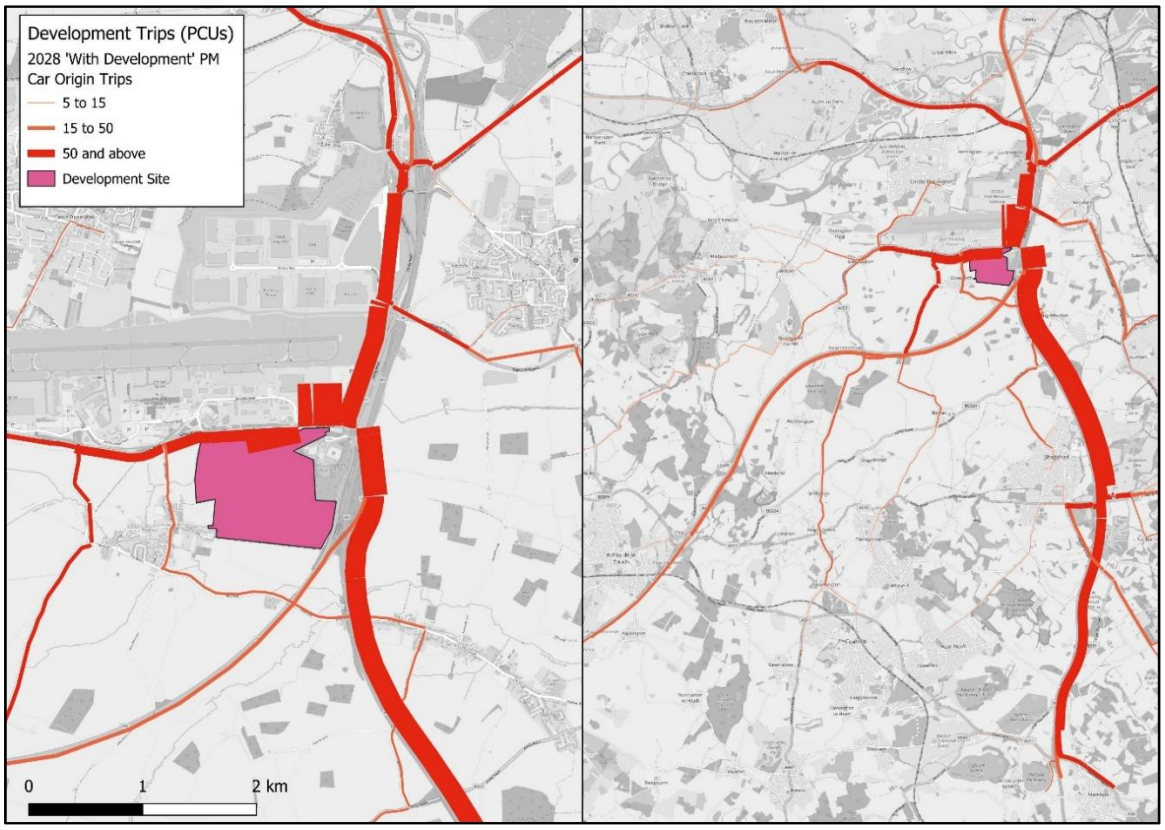
Figure 3.4: Light Vehicle Trip Distribution to and from the Proposed Development for 2028 (PM)

2028 'With Development (2b)' (PM), Light Vehicles – From the Development



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

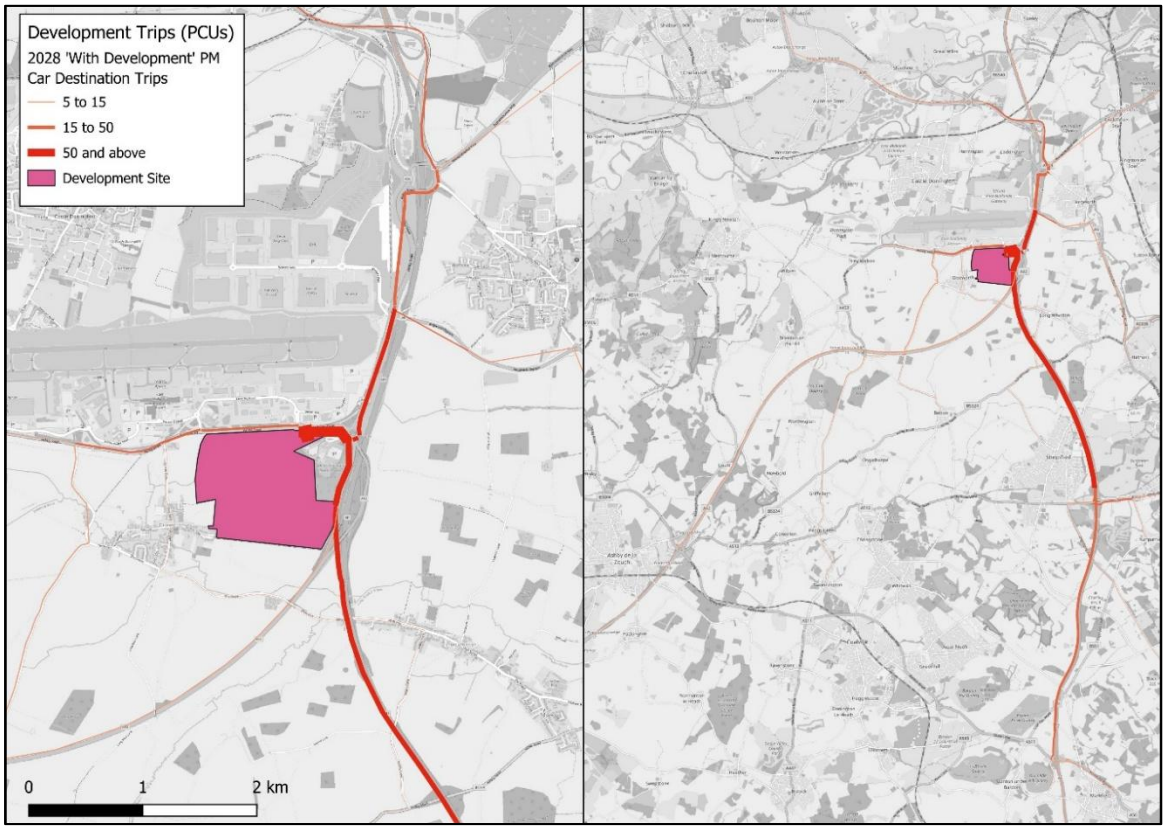

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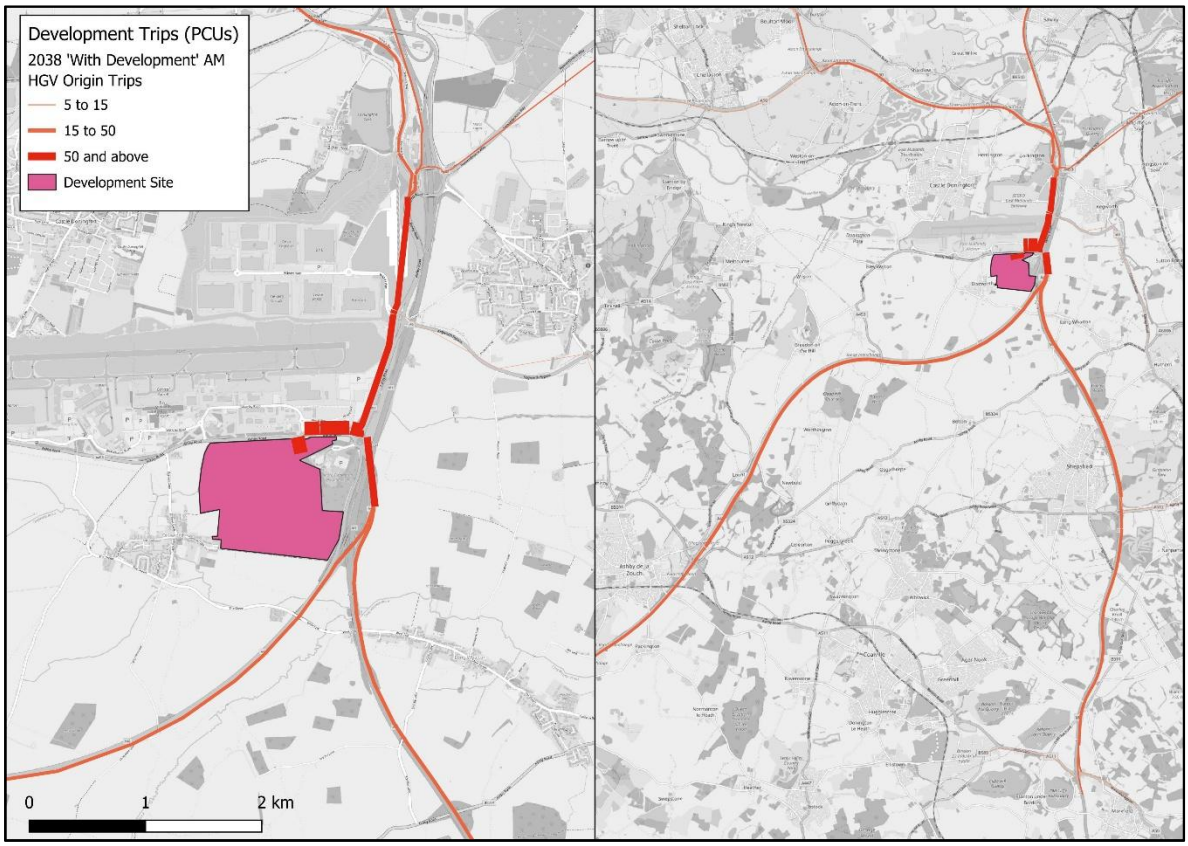
Figure 3.5: HGV Trip Distribution to and from the Proposed Development for 2038 (AM)

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



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

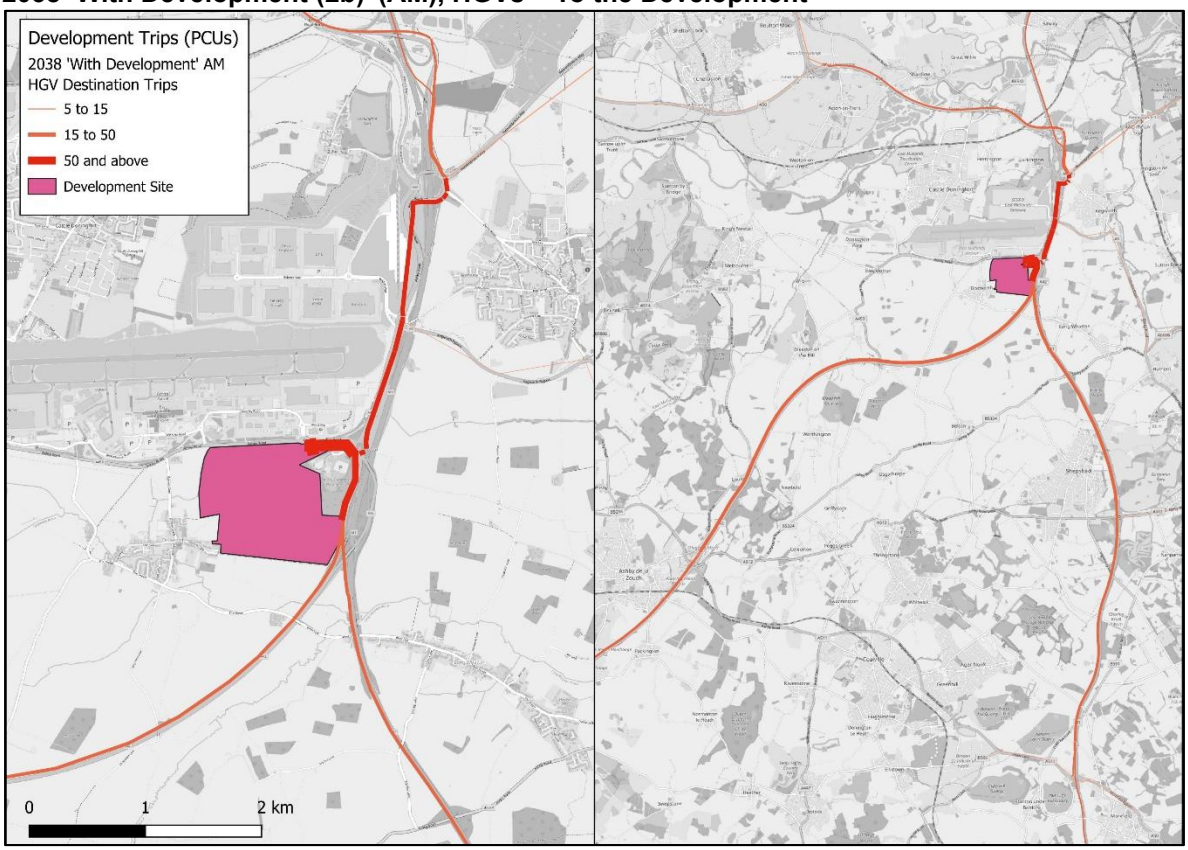

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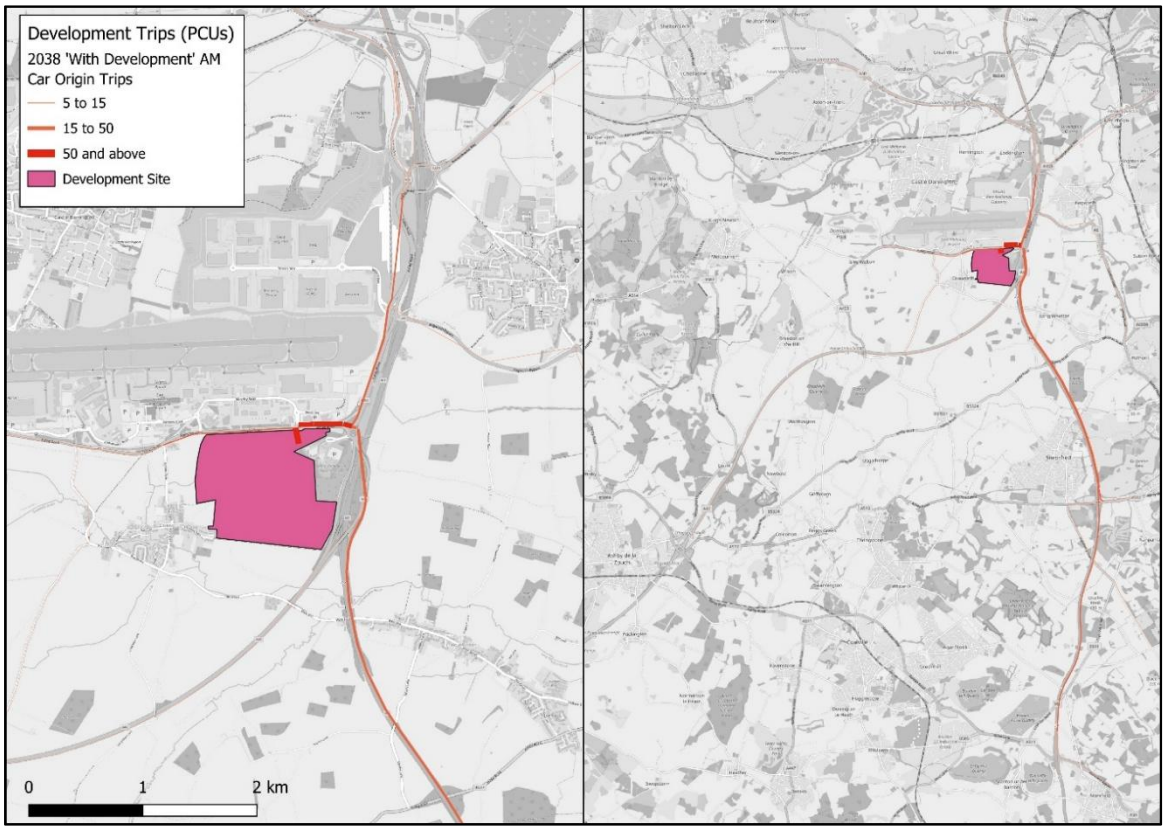
Figure 3.6: Light Vehicle Trip Distribution to and from the Proposed Development for 2038 (AM)

2038 'With Development (2b)' (AM), Light Vehicles – From the Development



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

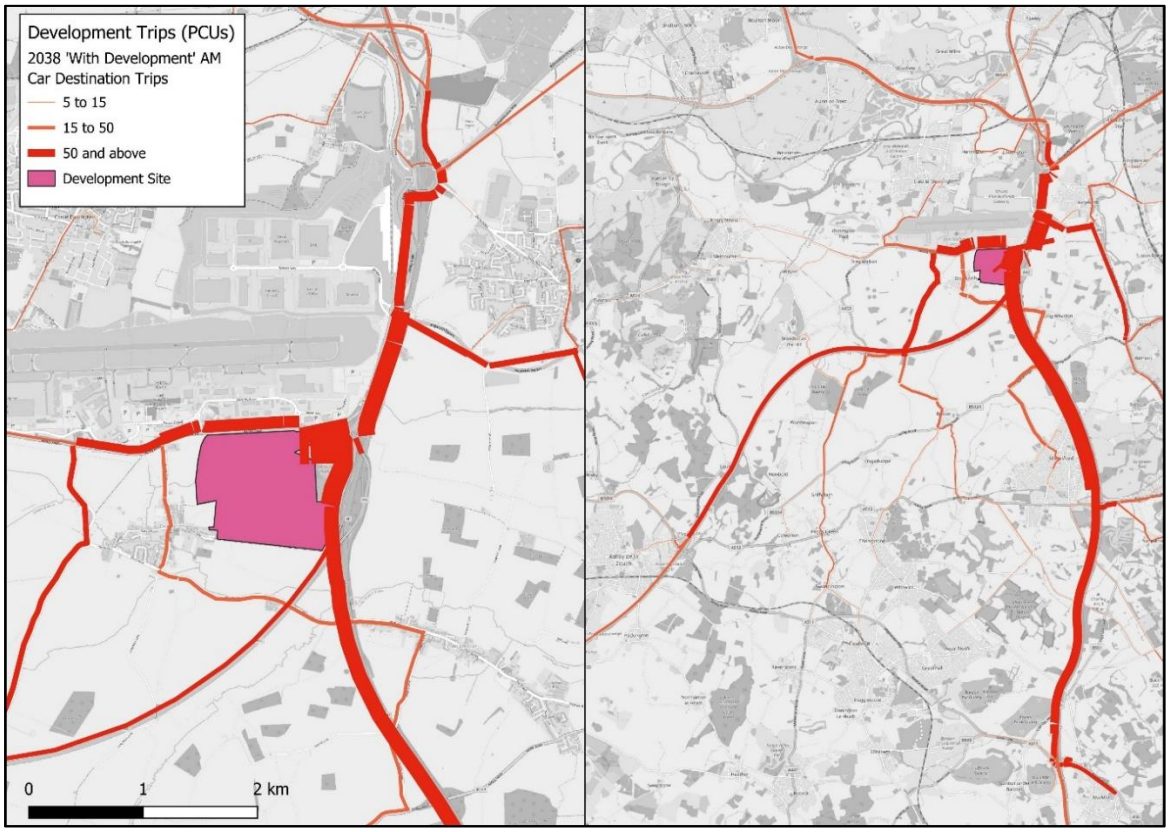

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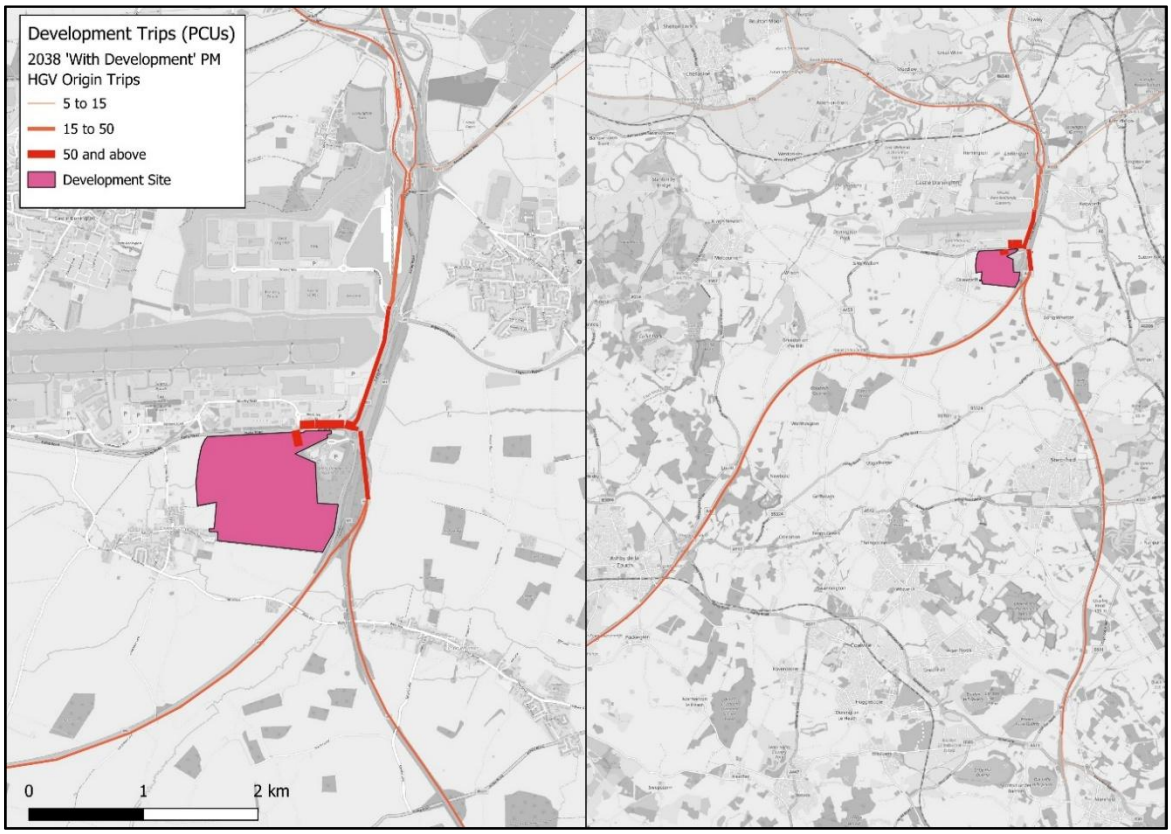
Figure 3.7: HGV Trip Distribution to and from the Proposed Development for 2038 (PM)

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



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

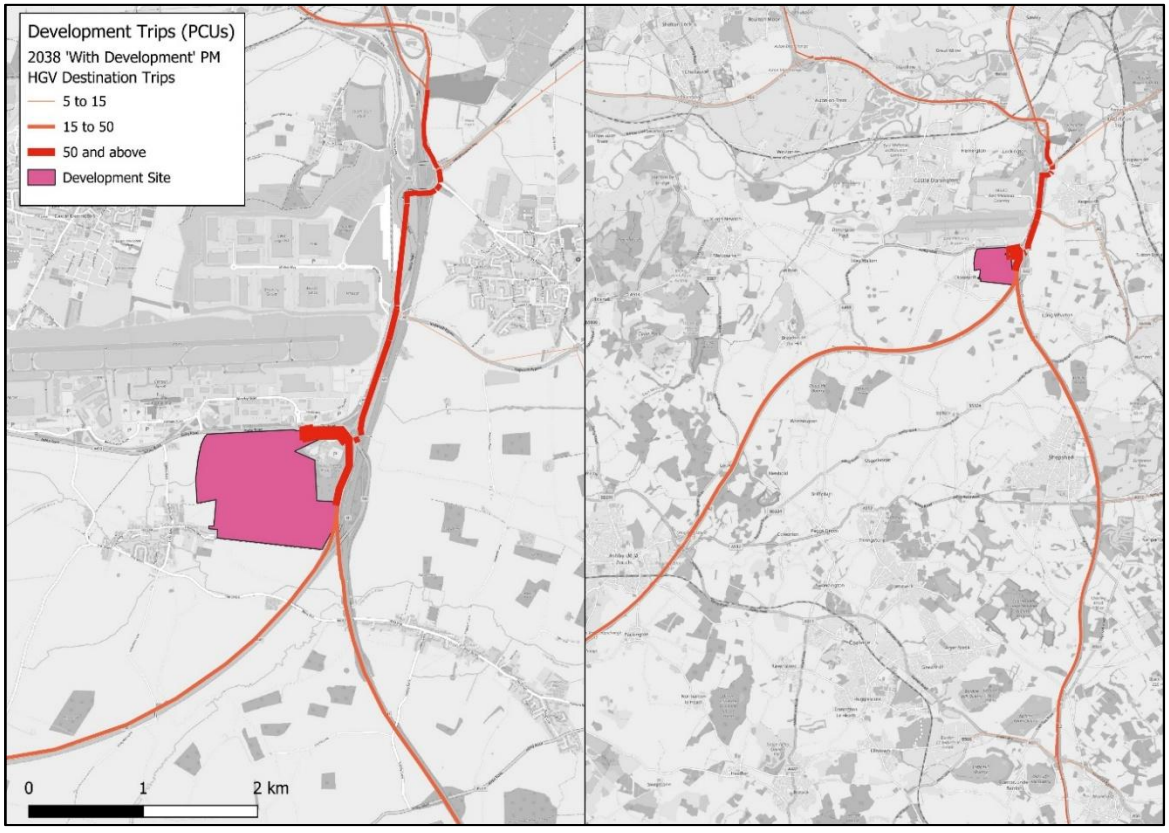

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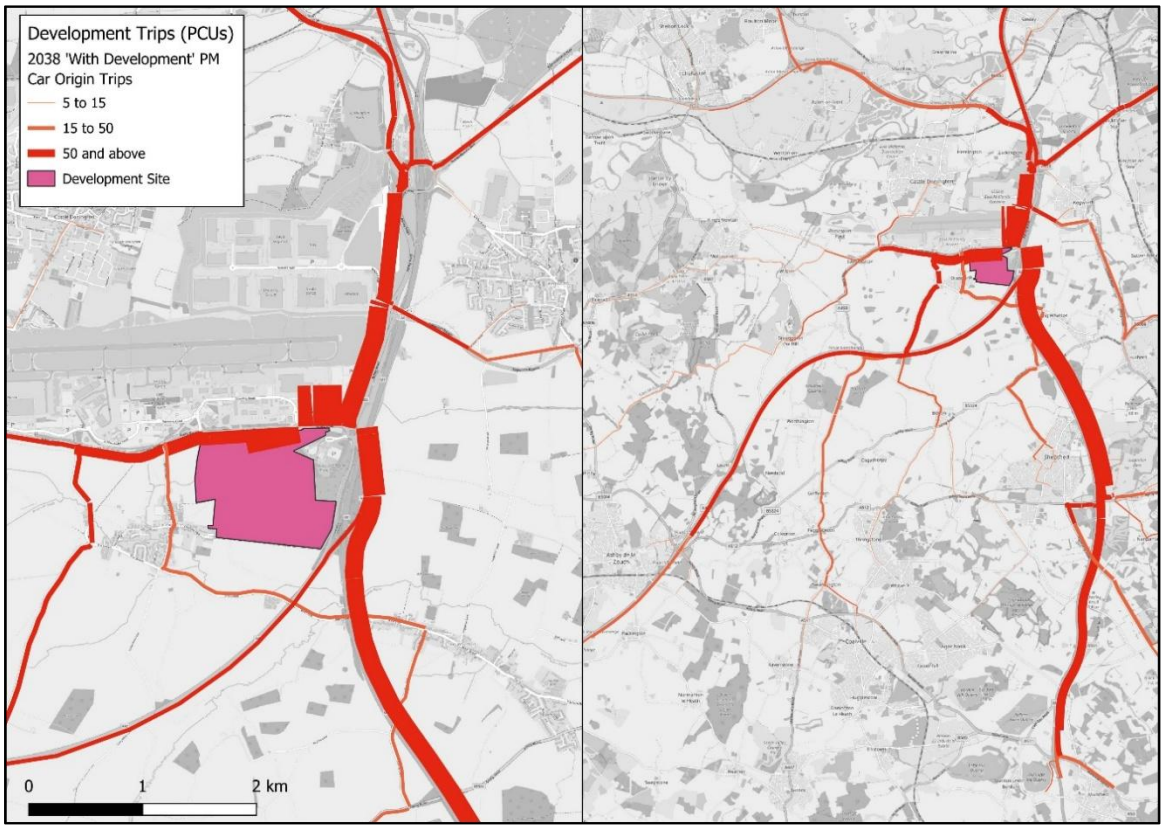
Figure 3.8: Light Vehicle Trip Distribution to and from the Proposed Development for 2038 (PM)

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



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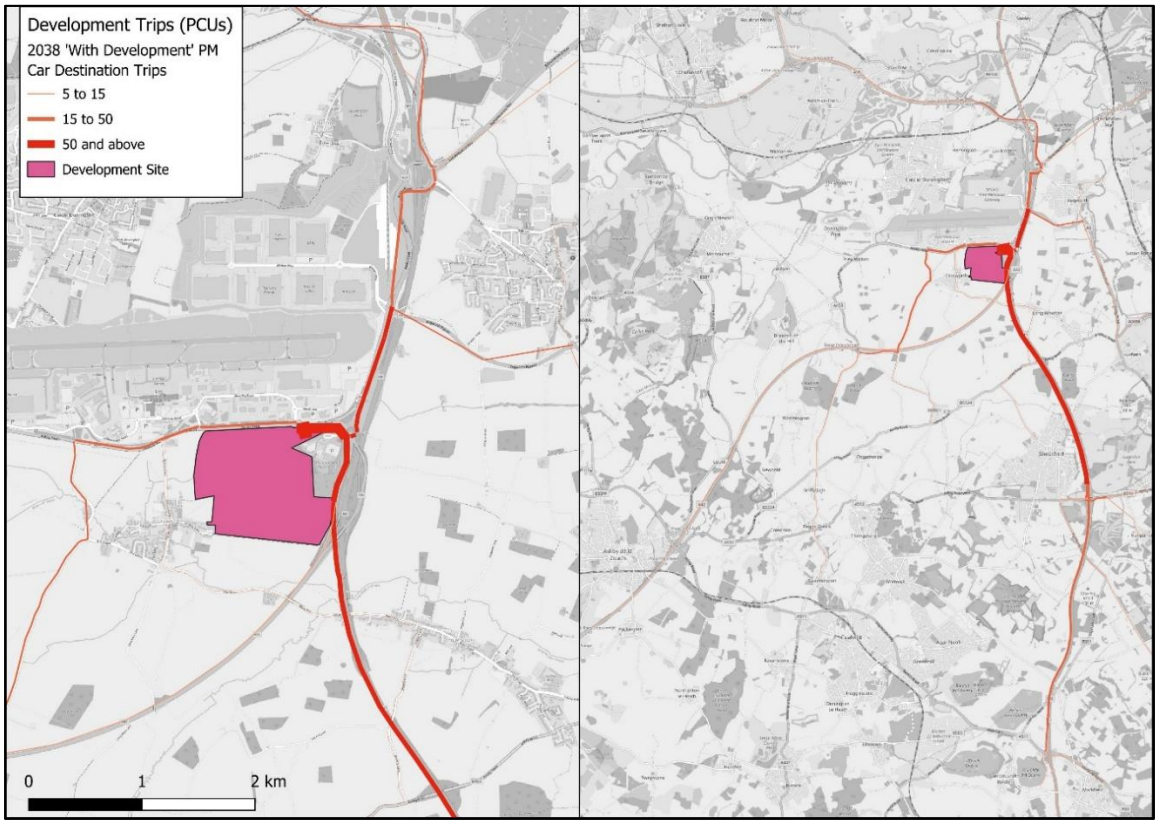
2038 'With Development (2b)' (PM), Light Vehicles – To the Development



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3.3 Forecast Flow Changes

3.3.1 Figure 3.9 and Figure 3.10 show the forecast flow changes in 2028 and 2038 between the 'With Development (2b)' and 'Without Development (1b)' scenarios for the AM Peak and PM Peak hours. Red bandwidth represents a proportional increase in traffic flow in the 'With Development (2b)' 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 300 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

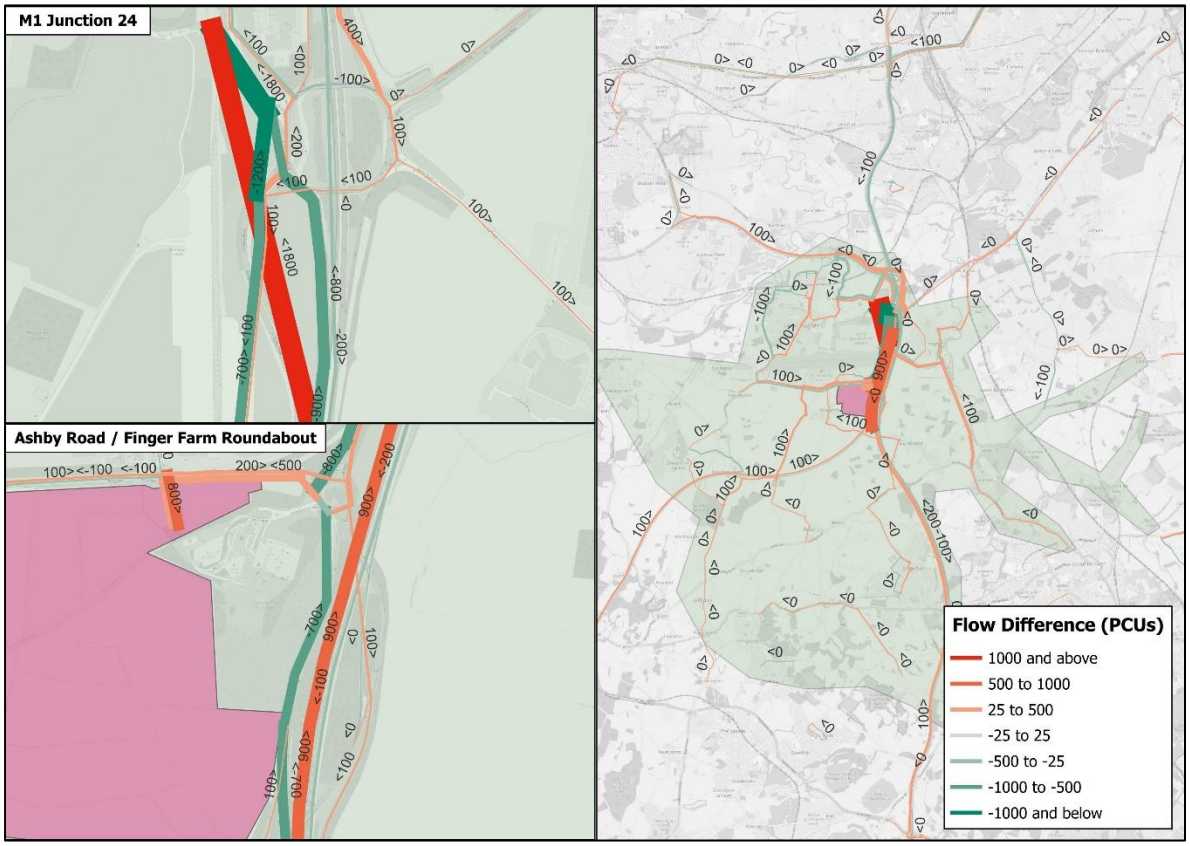
3.3.6 A reduction in northbound traffic on the A453 is forecast at Finger Farm Roundabout primarily attributable to the new link road. There is also an increase (~50 PCUs) on the A453 from the north with the largest increase, as expected, on the A453 to / from the proposed development site.

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. Most traffic is forecast to route to and from the east via Finger Farm Roundabout.

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

AM Peak hour



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PM Peak hour

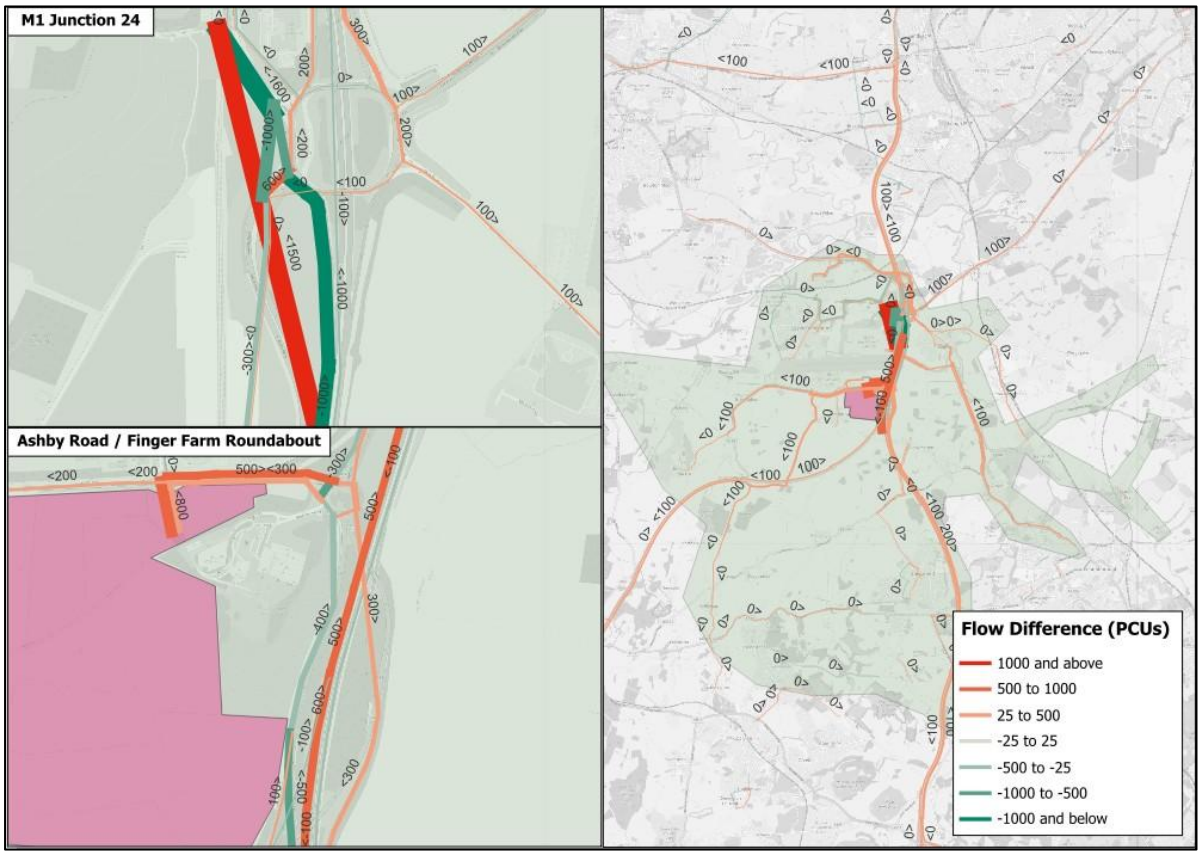

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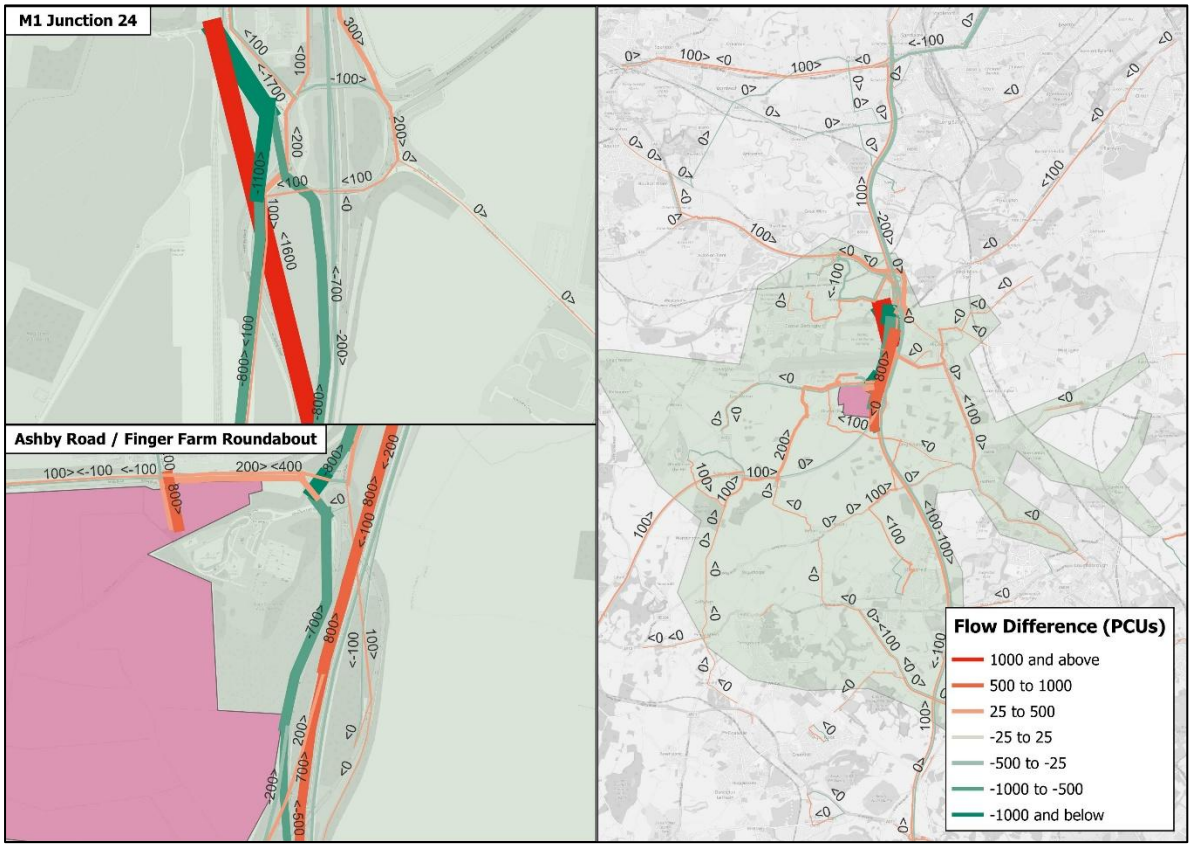
Figure 3.10: Forecast Flow Change for 2038 'Without Development (1b)' minus 'With Development (2b)'

AM Peak hour



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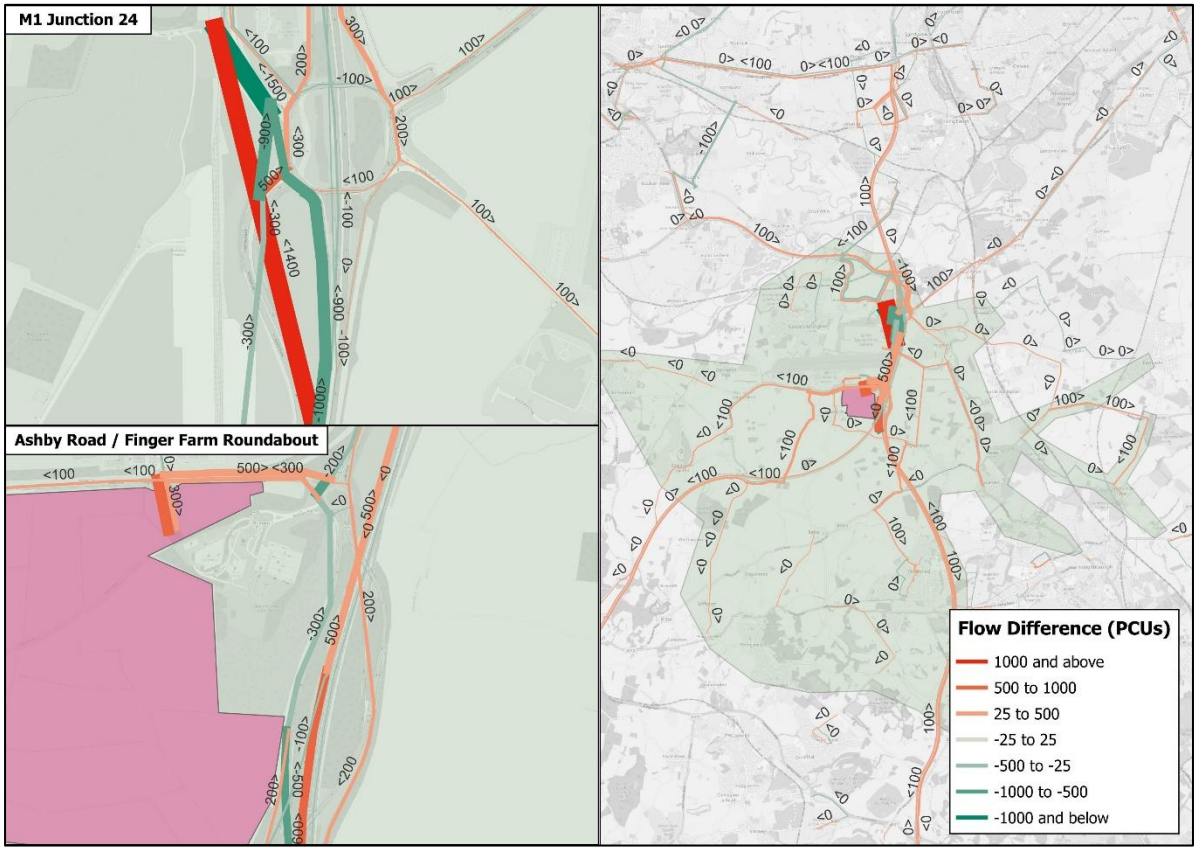
PM Peak hour



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3.4 Area of Influence

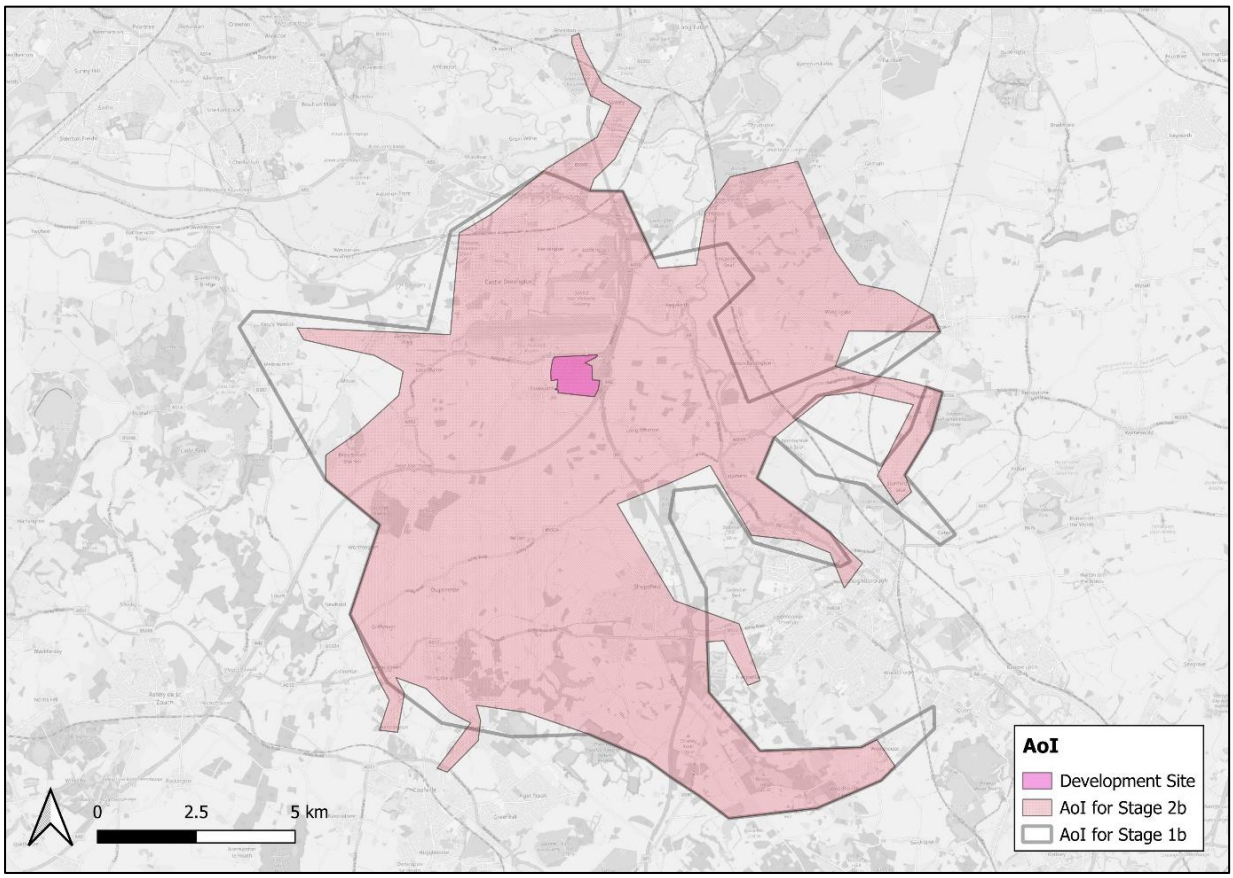
3.4.1 Using the forecast flow changes between the 'With Development (2b)' and 'Without Development (1b)' scenarios, an indication of the AoI in Stage 2b has been defined and is shown in Figure 3.11.

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 ±5% and ±30 PCUs between the 2028 and 2038 'With Development (2b)' and 'Without Development (1b)' 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 A42 Junction 14; 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 1b (without mitigation) and this shows that the AoIs are similar in both stages. To provide consistency with previous Stage 1b outputs, the AoI in Stage 1b has been retained for use for Stage 2b 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 (2b)' scenario, there are also changes to the forecast delays on the highway network when compared with the 'Without Development 1b' 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 (2b)’ and ‘Without Development (1b)’ scenarios for the AM Peak and PM Peak hours.

3.5.3 Figure 3.13 shows forecast difference in delay on the B6540 Tamworth Road in the PM Peak hour. The decrease in delay (green bandwidth) is forecast in the northbound and an increase in delay in the southbound direction (red bandwidth). The increase in delay is caused by a relatively small increase in flow (as shown in Figure 3.10) causing a large delay as the B6540 Tamworth Road was approaching capacity in the ‘Without Development (1b)’ scenario is forecast to exceed capacity in the ‘With Development (2b)’. Optimising the green time at this junction on Sawley Junction would be likely to mitigate this increase in delay.

New M1 northbound to A50 westbound interchange link

3.5.4 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 (1b)’ scenario as this proposed junction does not exist in the without development scenarios. It should also be noted that delays are forecast to generally reduce at the M1 J24 and Finger Farm Roundabout as this mitigation measure has attracted traffic from these junctions.

M1 southbound link approaching Junction 24

3.5.5 Delays on the M1 J24 are forecast to decrease overall 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

3.5.6 The Wilders Way / A453 / A6 Kegworth Bypass junction is forecast to have a reduction in delays in all scenarios, most notably the PM Peak. 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

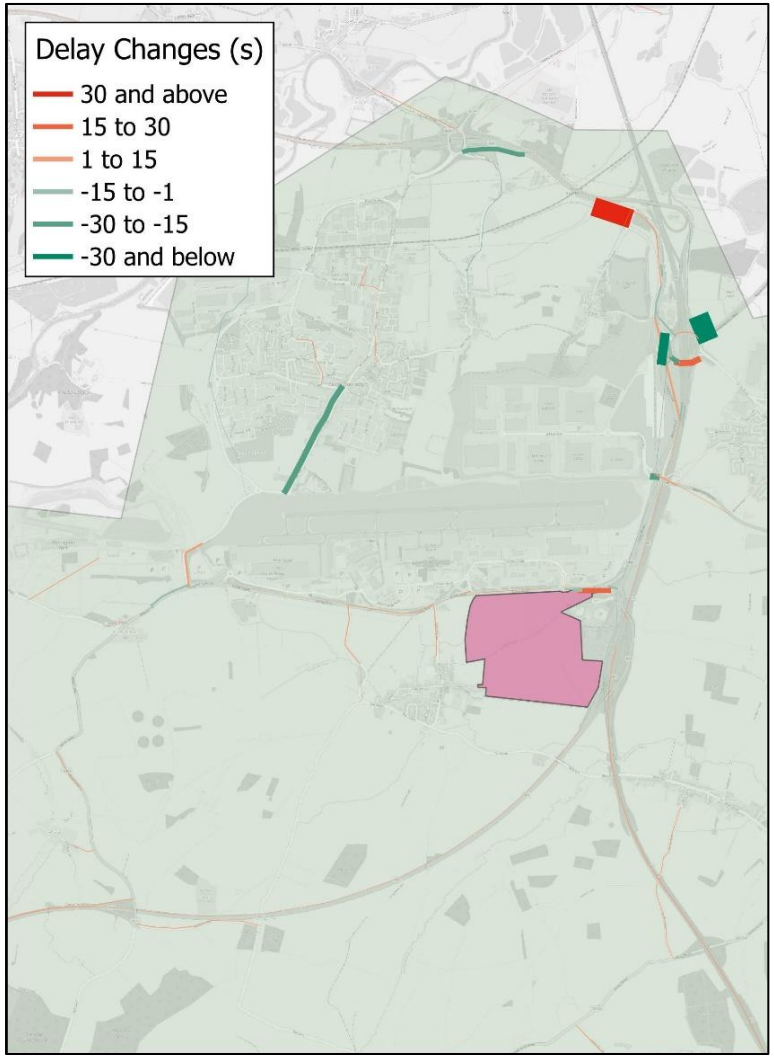
3.5.7 Delays remain largely unchanged across all scenarios when compared with the 'Without Development (1b)' scenarios.

EMGP2 access roundabout and toucan crossing

3.5.8 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 routeing 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 delay at the toucan crossing is not an ‘increase’ compared with the ‘Without Development (1b)’ 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 (2b)' minus 'Without Development (1b)'

AM Peak hour



PM Peak hour

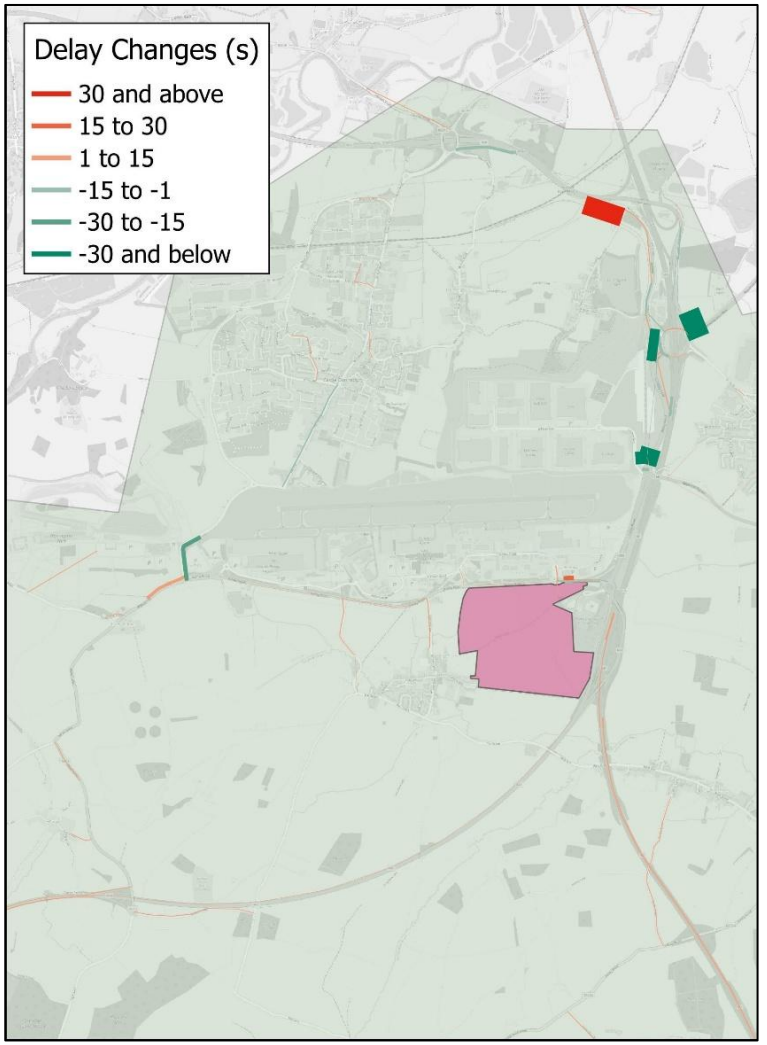


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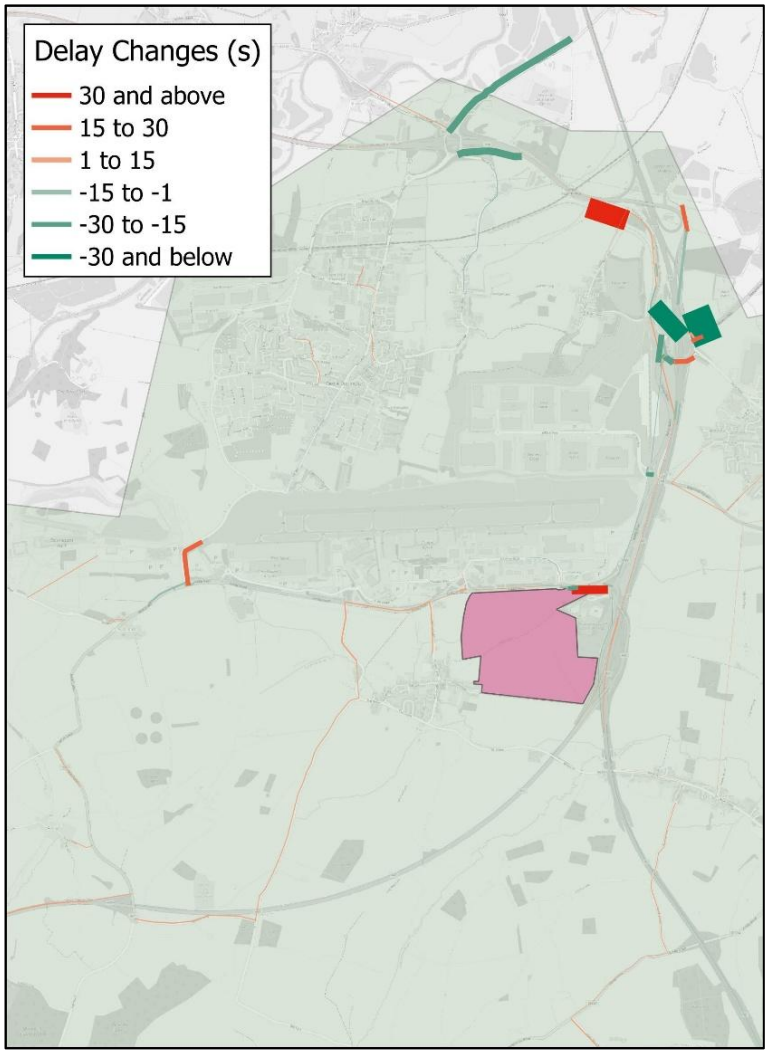
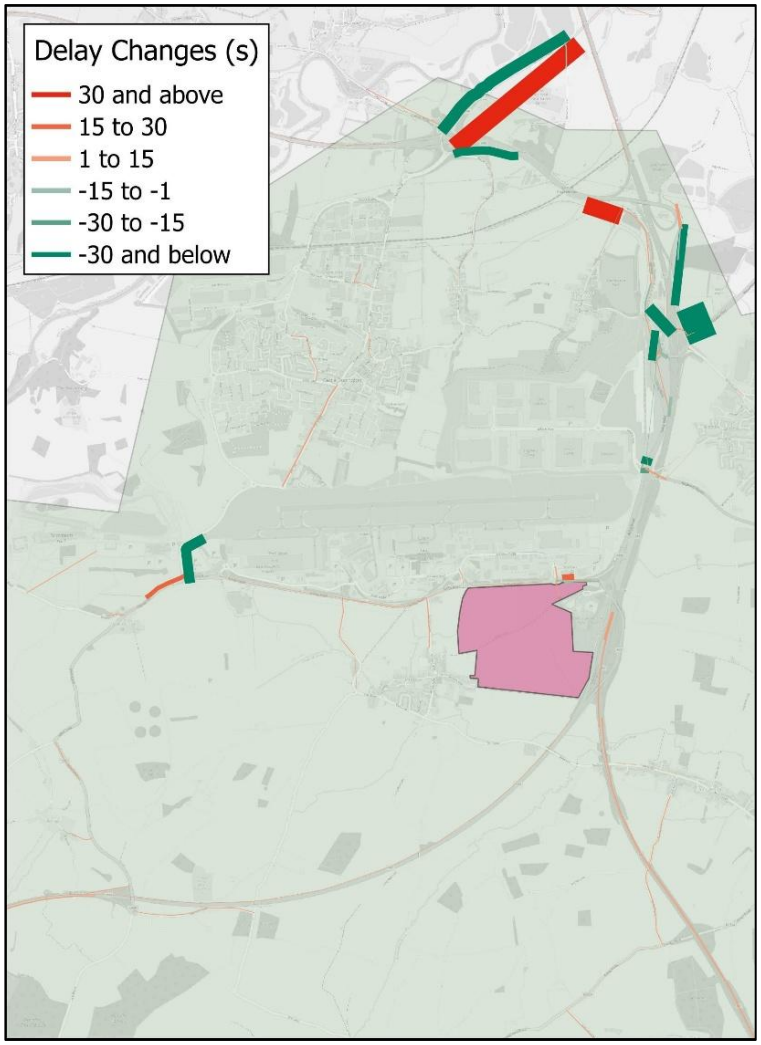
Figure 3.13: Forecast Delay Change for 2038 'With Development (2b)' minus 'Without Development (1b)'

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 several 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 forecast flows are approaching or exceeding 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 (2b)' and 'Without Development (1b)' scenarios in 2028 and 2038. For ease of comparison, the symbology has been designed to show the data for 'With Development (2b)' and 'Without Development (1b)' 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 (2b)' scenarios.

New M1 northbound to A50 westbound interchange link

3.6.6 The annotated node volume-capacity ratios forecasts for the M1 J24 are at or approaching capacity in the 'Without Development (1b)' 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 (2b)' scenarios the node volume-capacity generally remain consistent, however a decrease is forecast in both forecast years and Peak hours on the western side of the M1 J24 at the A453 / A50 junction. This improvement is a result of vehicles diverting off the M1 J24 to use the new link road.

EMGP1 access improvements

3.6.7 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 (2b)' 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

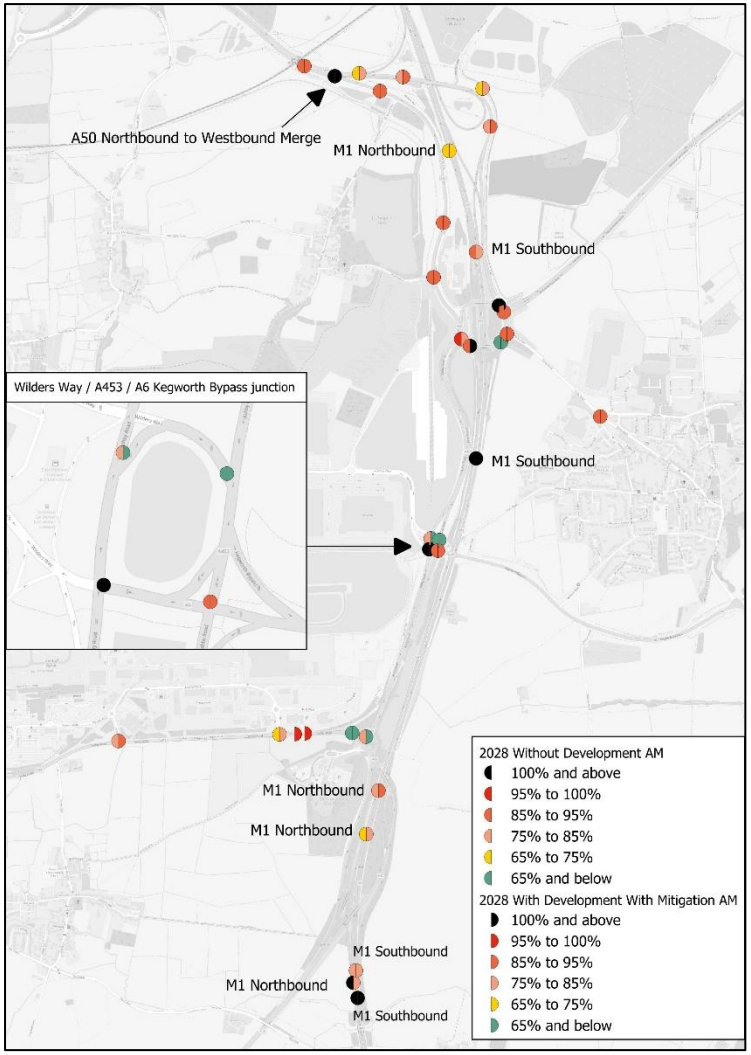
3.6.8 The node volume-capacity ratios for Finger Farm Roundabout are forecast to decrease in the AM Peak hour in both forecast years due to the proposed mitigation measures. The PM Peak is forecast to have nodes with higher node volume-capacity ratios in the 'With Development (2b)' and as shown in Figure 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

3.6.9 The node volume-capacity ratios at EMGP2 access junction are forecast to increase in the 2038 AM and PM Peak hours and the 2028 AM Peak hour, however these scenarios are forecast to have a volume-capacity ratio of less than 85%. The proposed toucan crossing on the A453 (represented by the semi-circle closest to Finger Farn roundabout) is forecast to have a node volume-capacity ratio between 95% and 100% except in the 2038 AM Peak hour where the volume-capacity ratio is forecast to be over 100% (and on further investigation is 100%). 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 (1b)' and 2028 'With Development (2b)'

AM Peak hour



PM Peak hour

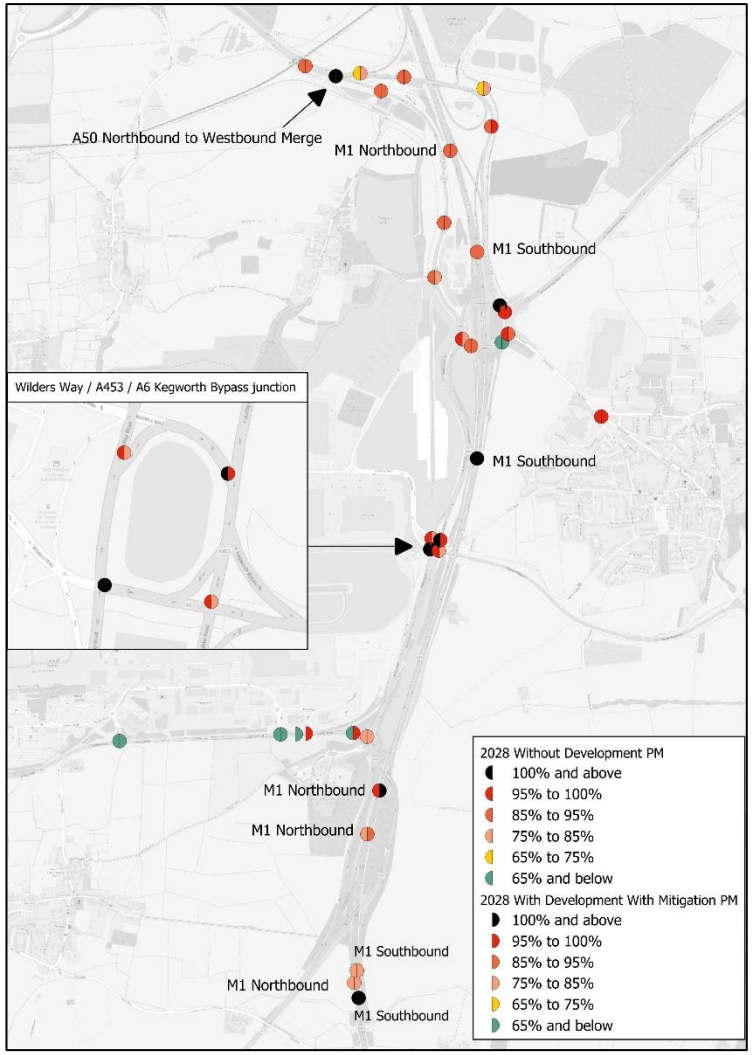


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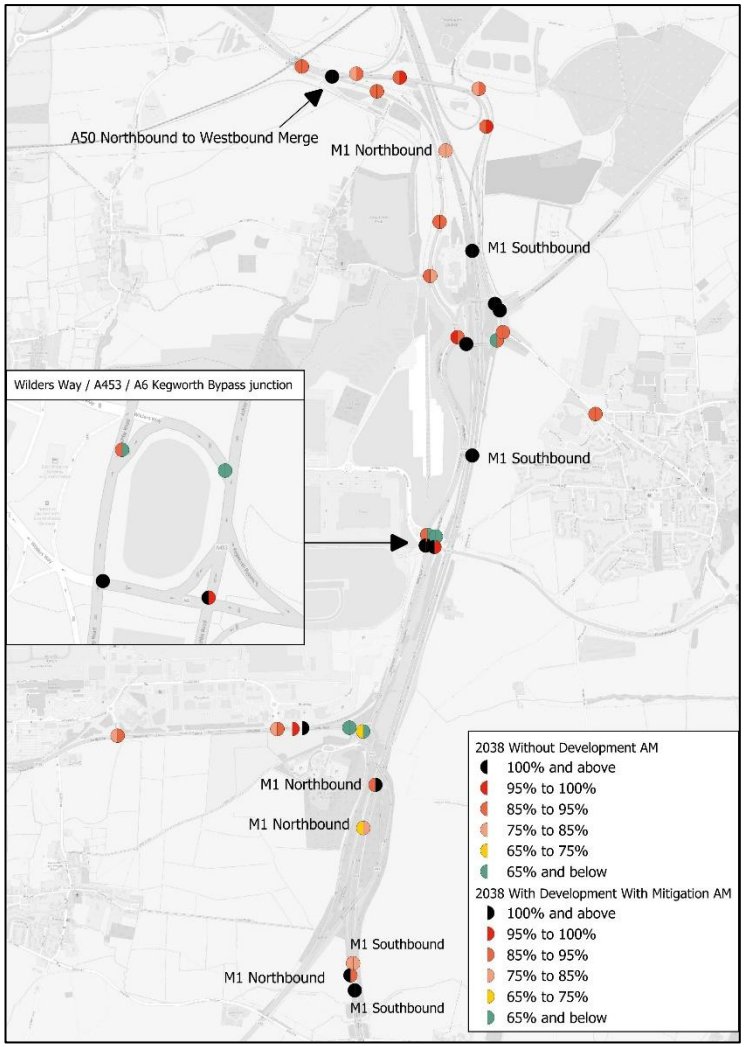
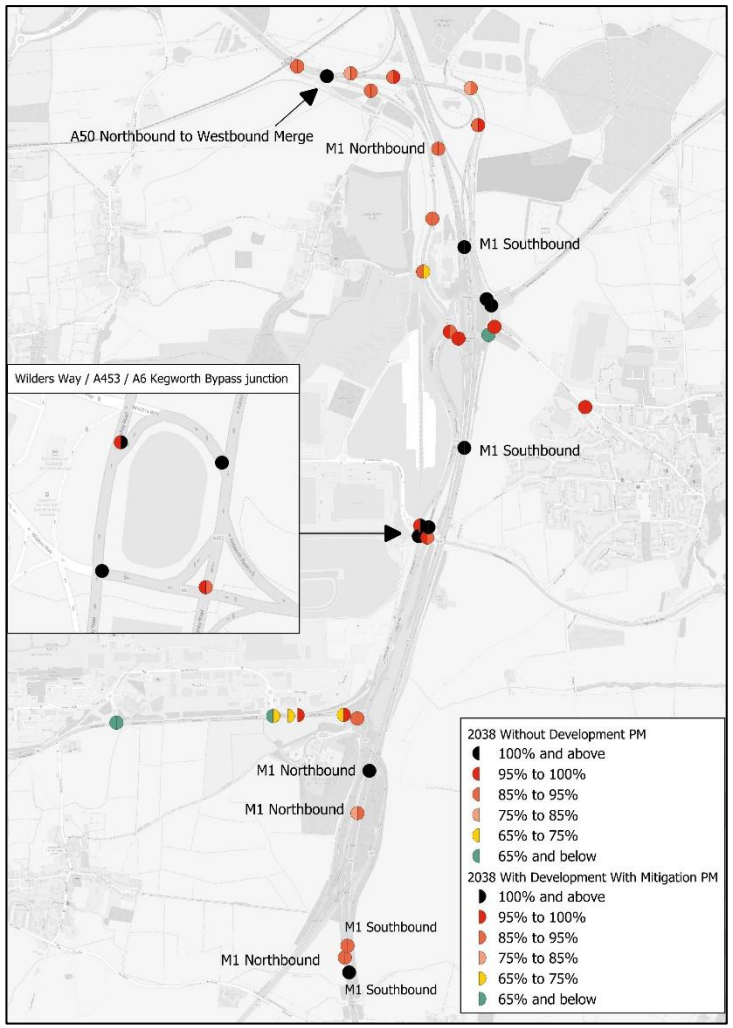
Figure 3.15: Forecast Node Volume-Capacity Ratio for 2038 'Without Development (1b)' and 2038 'With Development (2b)'

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:

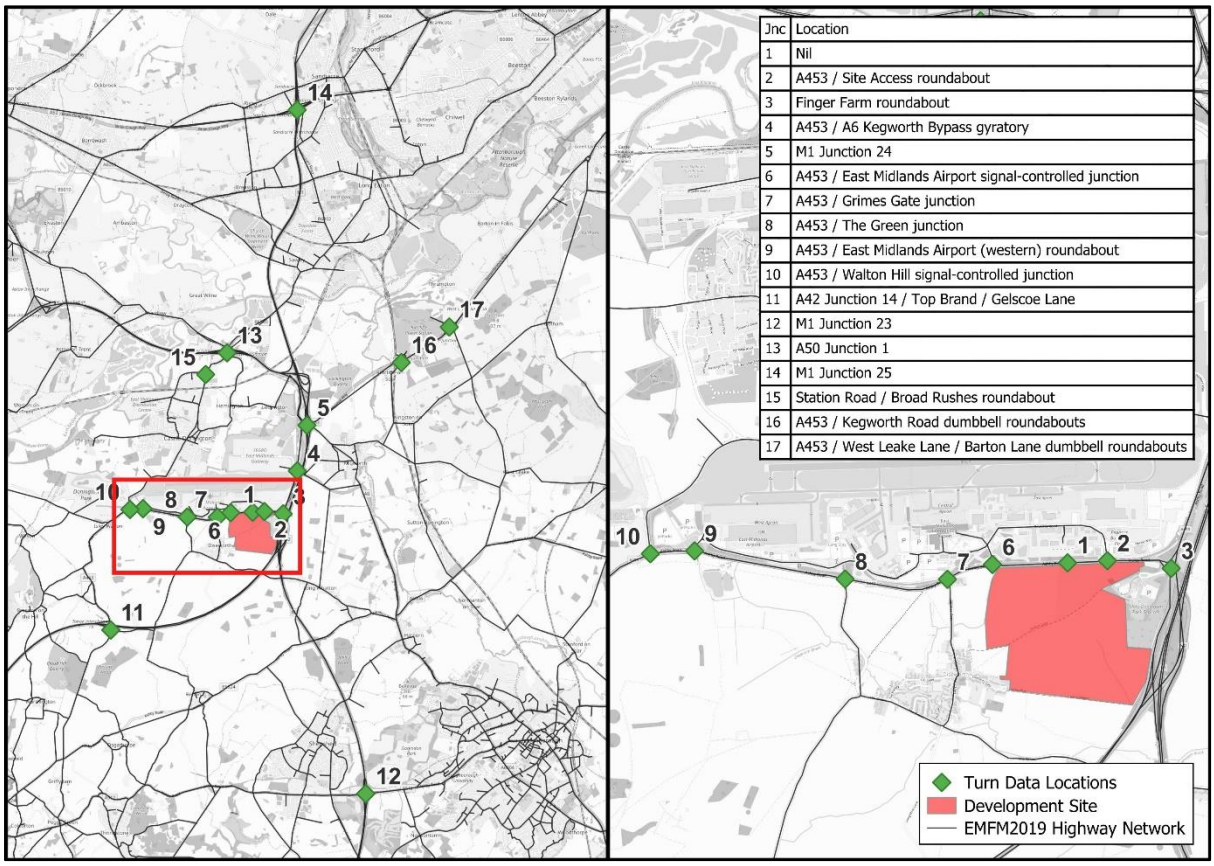
- A453 /Site access Roundabout (Junction 2);
- Finger Farm Roundabout (Junction 3);
- A453 / A6 Kegworth Bypass gyratory (Junction 4);
- M1 Junction 24 (Junction 5);
- A453 / East Midlands Airport signal-controlled junction (Junction 6);
- A453 / Grimes Gate junction (Junction 7);
- A453 / The Green 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 format[6] 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 (2b)' 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 2b) v1.0 - For Issue.xlsx (provided via email)

Figure 3.16: Location of Forecast Turning Flow Data



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Section 4 – Summary of the Mitigation Assessment

4.1 Summary of Assessment

4.1.1 The East Midlands Freeport Model (EMFM) has been used for the strategic assessment of Stage (2b) for both 2028 and 2038 for the AM Peak and PM Peak hours ('With Development (2b)' scenarios). Stage 2b 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.

4.1.2 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.

4.1.3 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 (1b)' (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 (2b)' and 'Without Development (1b)' 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 flow 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 (AoI) has been defined. A comparison between the AoIs for Stage 1b and Stage 2b shows that they are broadly similar.
- The forecast delay changes in 2028 and 2038 between the 'With Development (2b)' and 'Without Development (1b)' 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 (1b)' 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.
- Delays on the M1 J24 are forecast to decrease overall 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 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 as shown in Figure 3.14 and Figure 3.15 for the M1 J24 are at or approaching capacity in the 'Without Development (1b)' 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 (2b)' scenarios the node

volume-capacity general remain consistent, however a decrease is forecast in both forecast years and both peak hours on the western side of the M1 J24 at the A453 / A50 junction. This improvement is a result of vehicles diverting off the M1 J24 to use the new link road.

- The node volume-capacity ratios for Finger Farm Roundabout are forecast to decrease in the AM Peak hour in both forecast years due to the proposed mitigation measures. The PM Peak is forecast to have nodes with higher node volume-capacity ratios in the 'With Development (2b)' due to higher volumes of traffic forecast on the A453 to the west of Finger Farm Roundabout.
- The node volume-capacity ratios at EMGP2 access junction are forecast to increase in the 2038 AM and PM Peak hours and the 2028 AM Peak hour, however these scenarios are forecast to have a volume-capacity ratio of less than 85%. The proposed toucan crossing on the A453 is forecast to have a node volume-capacity ratio between 95% and 100% except in the 2038 AM Peak hour where the volume-capacity ratio is forecast to be 100%. However, it should be noted that the toucan crossing is demand dependant and this demand dependency cannot be accurately reflected in the EMFM.
- 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.
- 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 2b (with mitigation included) and Stage 1b (no mitigation)

Introduction

A.1.1 Appendix A compares Stage 2b, which includes the proposed mitigation measures ('With Development (2b)'), with Stage 1b that does not include the proposed mitigation measures ('With Development (1b)). 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 (2b)' and 'With Development (1b)' scenarios for the AM Peak and PM Peak hours. Red bandwidth represents an increase in traffic flow in the 'With Development (2b)' 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

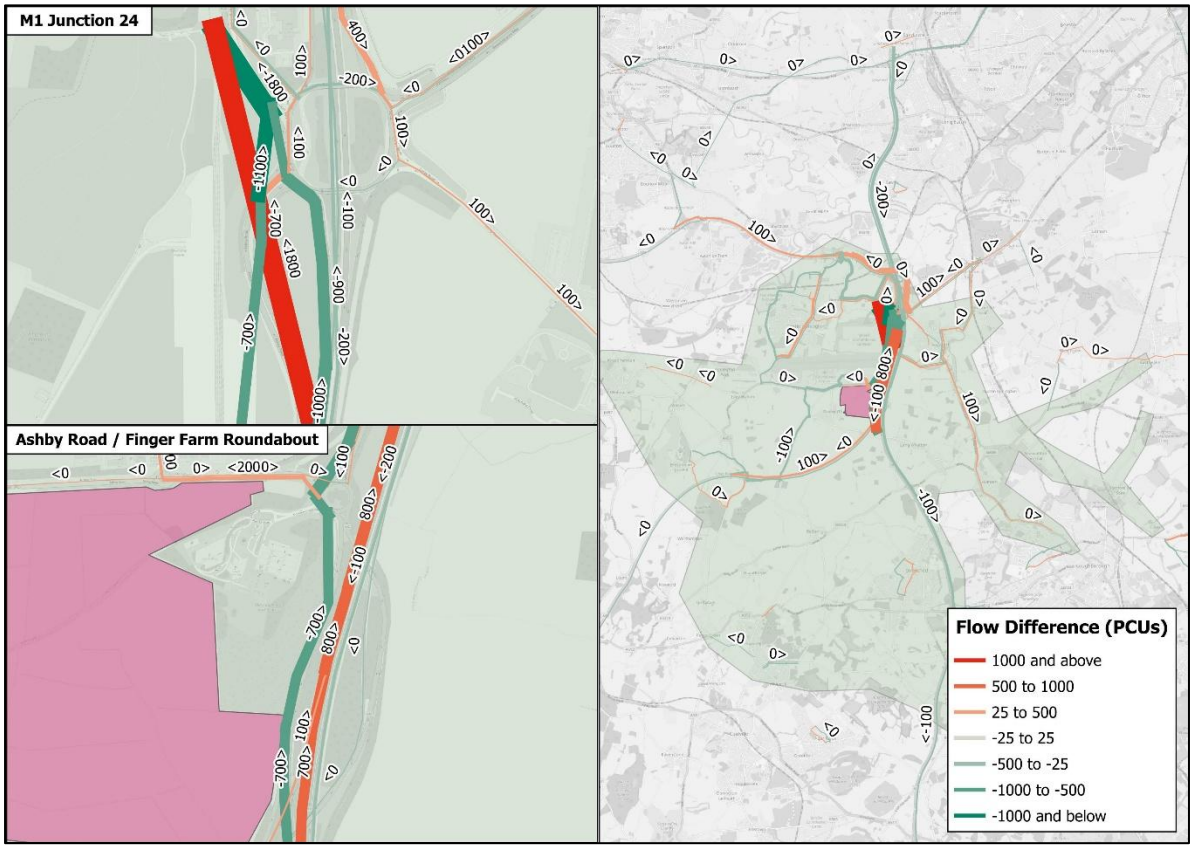
A.1.6 A reduction in northbound traffic on the A453 is forecast at Finger Farm Roundabout primarily as a result of the new link road that is forecast to divert traffic off the A453 northbound.

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 (2b)' 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 (2b)' minus 'With Development (1b)'

AM Peak hour



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PM Peak hour

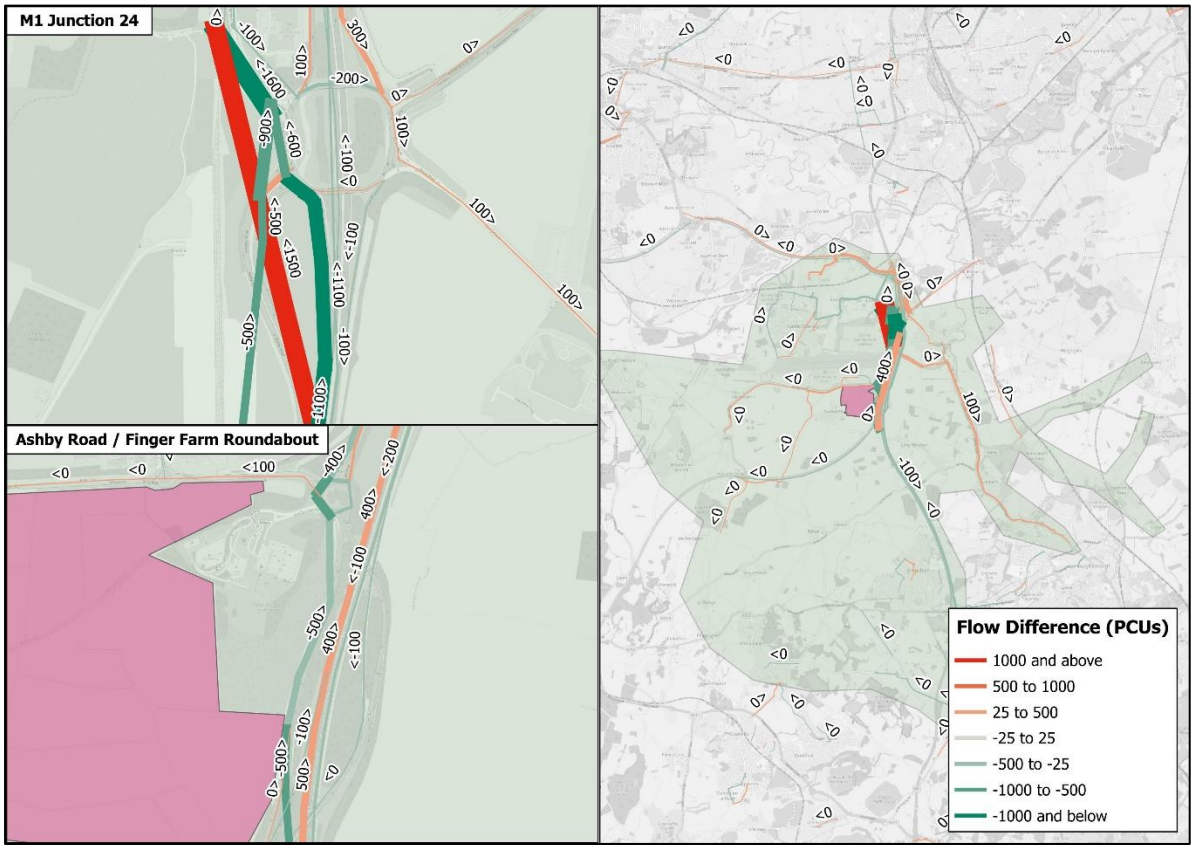

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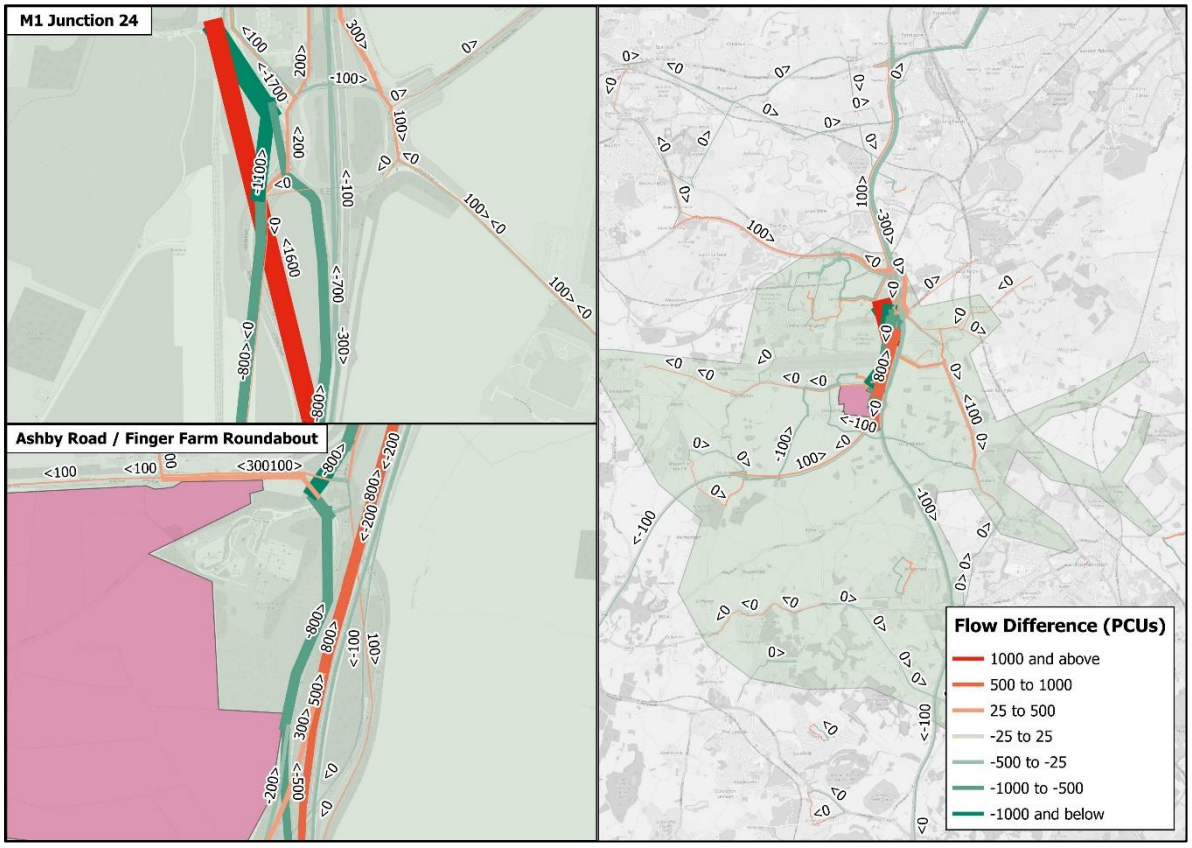
Figure A.2: Forecast Flow Change for 2038 'With Development (2b)' minus 'With Development (1b)'

AM Peak hour



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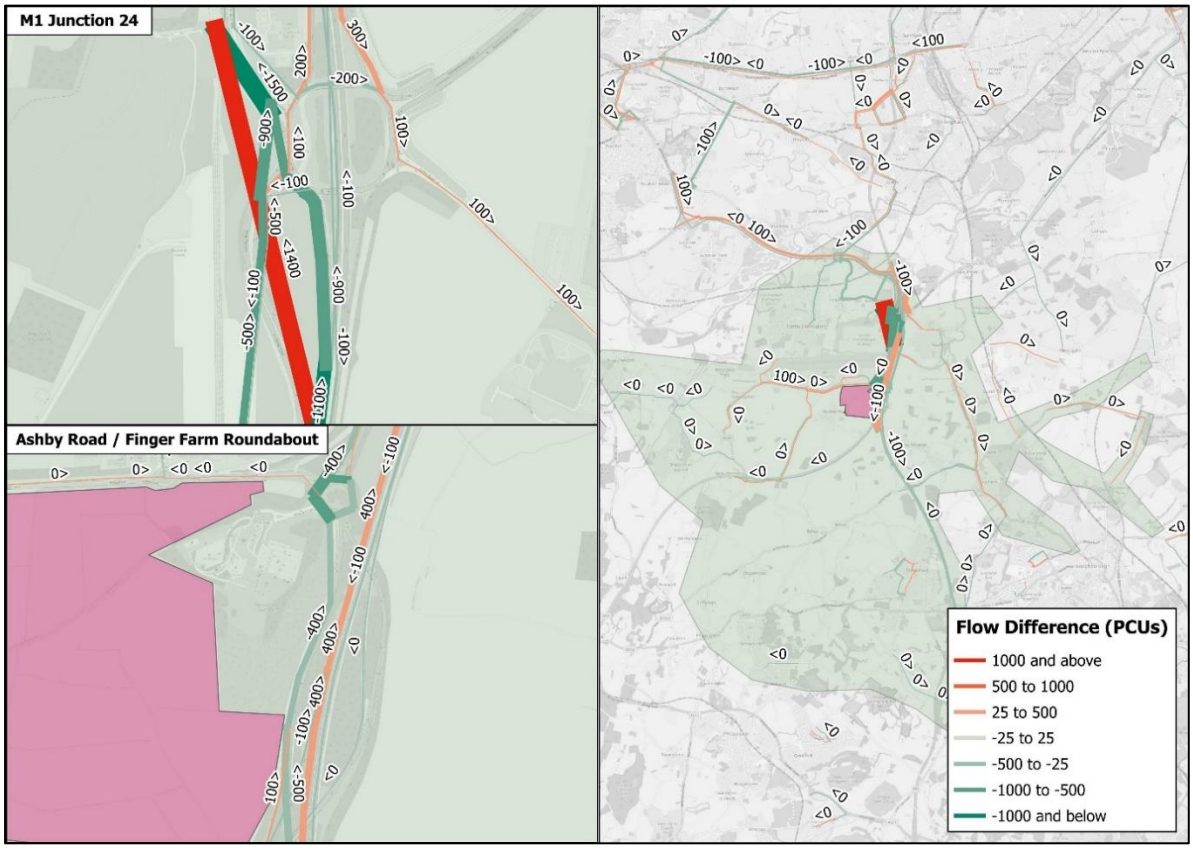
PM Peak hour



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Forecast Delay Change

A.1.8 As a result of forecast flow changes in the 'With development (2b)' 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 (2b)' and 'With Development (1b)' scenarios for the AM Peak and PM Peak hours.

A.1.10 Figure A.4 shows forecast difference in delay on the B6540 Tamworth Road in the PM Peak hour. The decrease in delay (green bandwidth) is forecast in the northbound and an increase in delay in the southbound direction (red bandwidth). The increase in delay is caused by a relatively small increase in flow (as shown in Figure 3.10) causing a large delay as the B6540 Tamworth Road was approaching capacity in the 'With Development (1b)' scenario is forecast to exceed capacity in the 'With Development (2b)'. Optimising the green time at this junction on Sawley Junction would very likely eliminate this increase in delay.

New M1 northbound to A50 westbound interchange link

A.1.11 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 'With Development (1b)' 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

4.1.4 Delays on the M1 J24 are forecast to decrease overall 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

A.1.12 The Wilders Way / A453 / A6 Kegworth Bypass junction is forecast to have a reduction in delays in all scenarios, most notably the PM Peak. 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

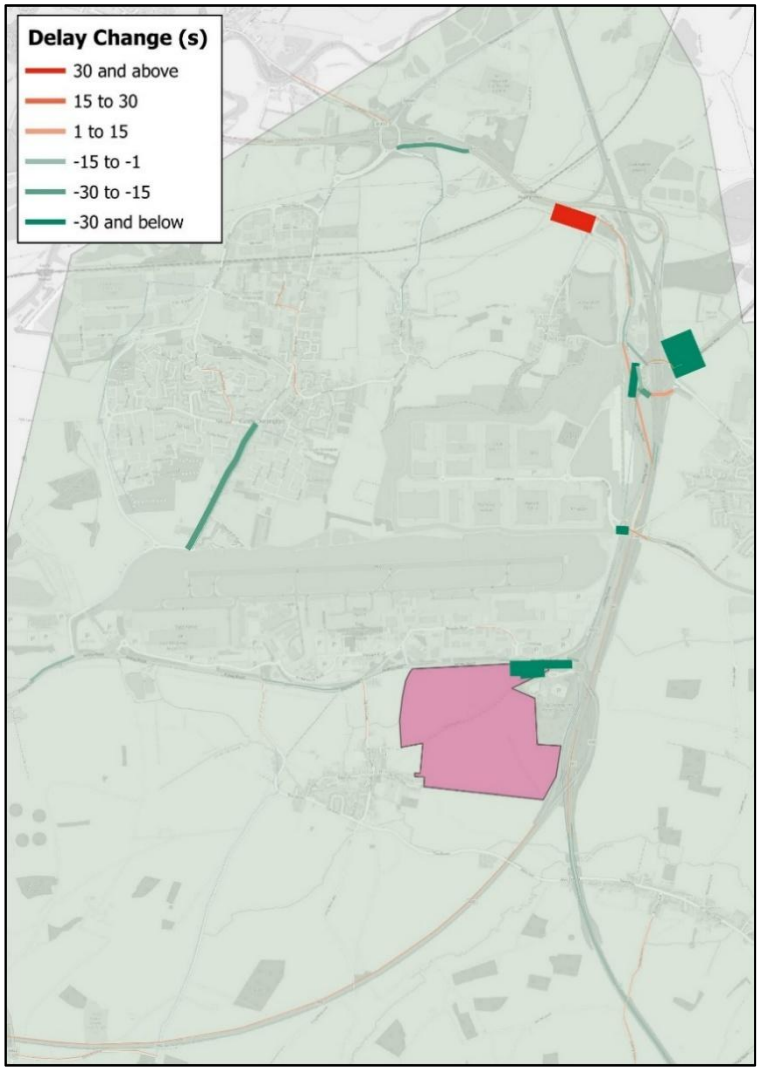
A.1.13 Delays remain largely unchanged across all scenarios when compared with the 'With Development (1b)' scenarios.

EMGP2 access roundabout and toucan crossing

A.1.14 There are reductions in delay forecast in all 'With Development (2b)' 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 (2b)' minus 'With Development (1b)'

AM Peak hour



PM Peak hour

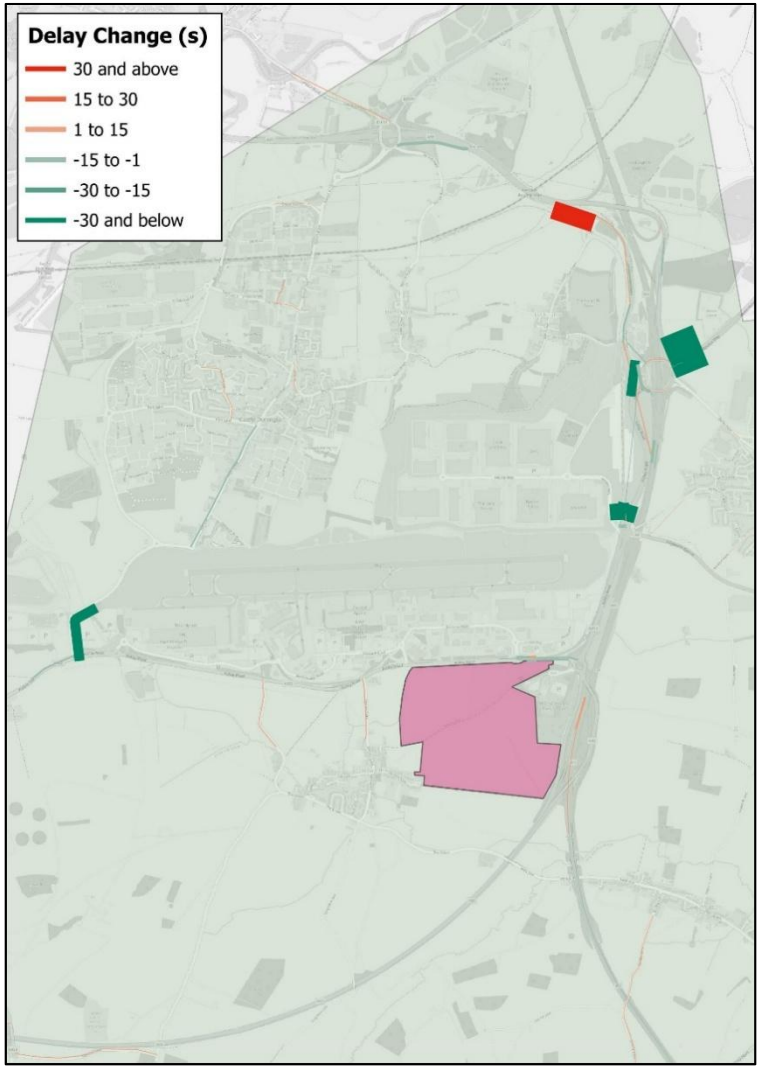


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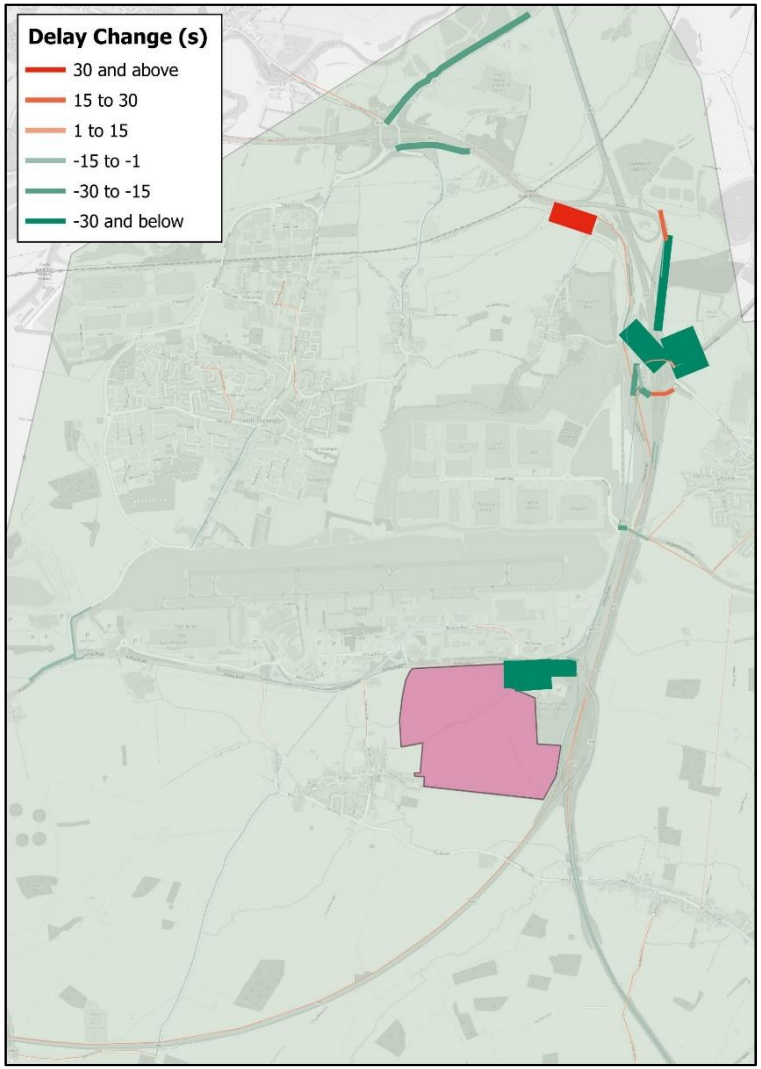
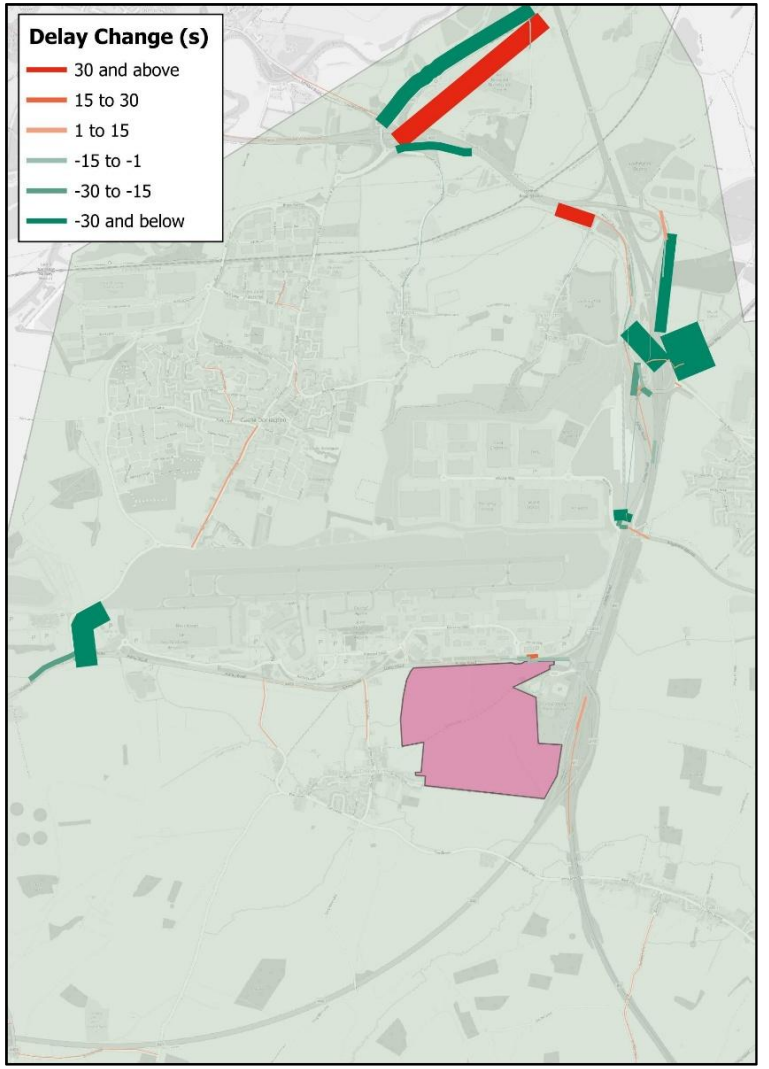
Figure A.4: Forecast Delay Change for 2038 'With Development (2b)' minus 'With Development (1b)'

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 several 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 (2b)’ and ‘With Development (1b)’ scenarios. For ease of comparison, the symbology has been designed to show the data for ‘With Development (2b)’ and ‘With Development (1b)’ 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 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.

A.1.19 The forecast maximum node volume-capacity ratios for 2028 and 2038 are similar in both the ‘With Development (2b)’ and ‘With Development (1b) 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 (2b)’ scenarios.

New M1 northbound to A50 westbound interchange link

A.1.20 The annotated node volume-capacity ratios forecasts for the M1 J24 are at or approaching capacity in the ‘With Development (1b)’ 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 (2b)’ scenarios the node volume-capacity generally remain consistent; however a decrease is forecast in both forecast years and Peak hours on the western side of the M1 J24 at the A453 / A50 junction. This improvement is a result of vehicles 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 (2b)' 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

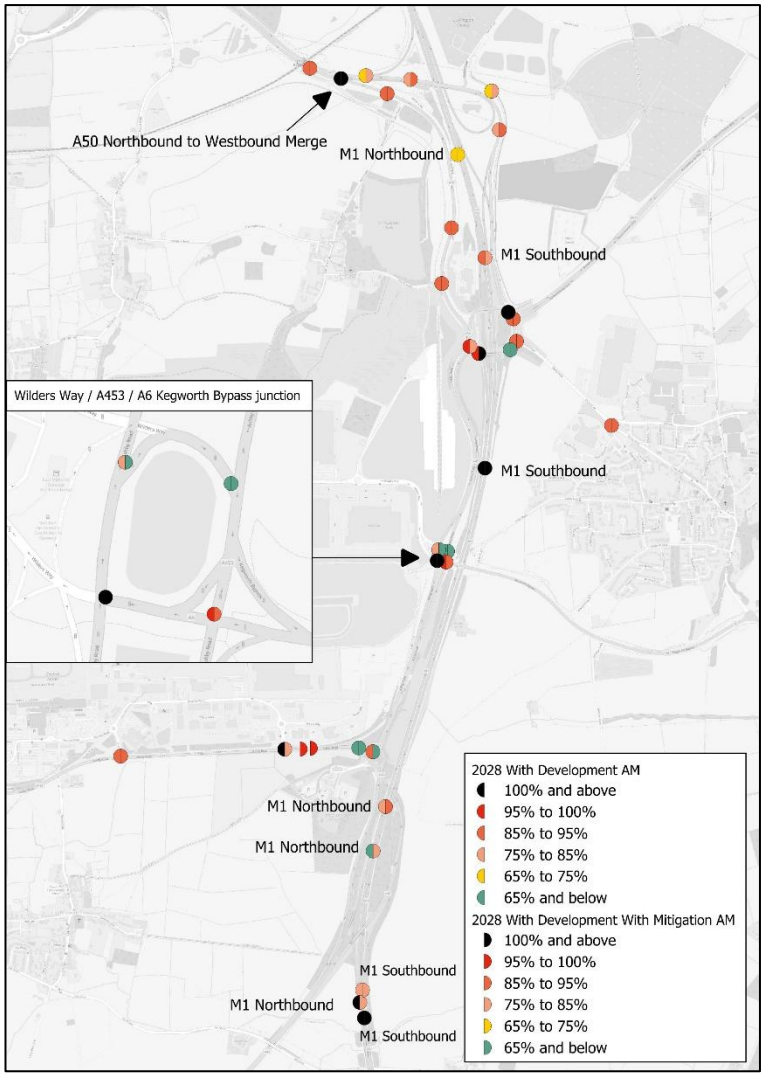
A.1.22 The node volume-capacity ratios for Finger Farm Roundabout are forecast to decrease in the ‘With Development (2b)’ scenarios except in the 2038 PM Peak scenario where it is forecast to remain within the same range as the ‘With Development (1b)’ scenario.

EMGP2 access roundabout and toucan crossing

A.1.23 The node volume-capacity ratios at EMGP2 access roundabout are forecast to reduce in all 'With Development (2b)' scenarios except in the 2038 PM Peak hour forecast volume-capacity ratios remain within the same range. 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 'With Development (2b)' scenarios except in the 2038 AM Peak hour where the volume-capacity ratio is forecast to be over 100% (and on further investigation is 100%).

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

AM Peak hour



PM Peak hour

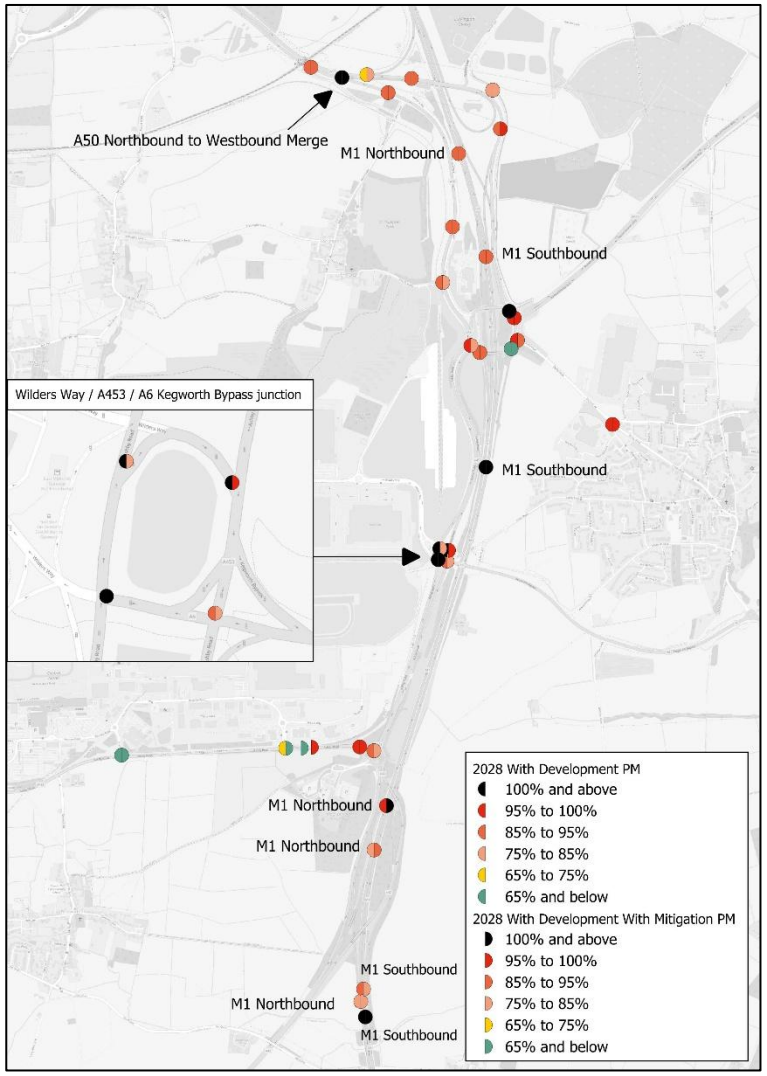


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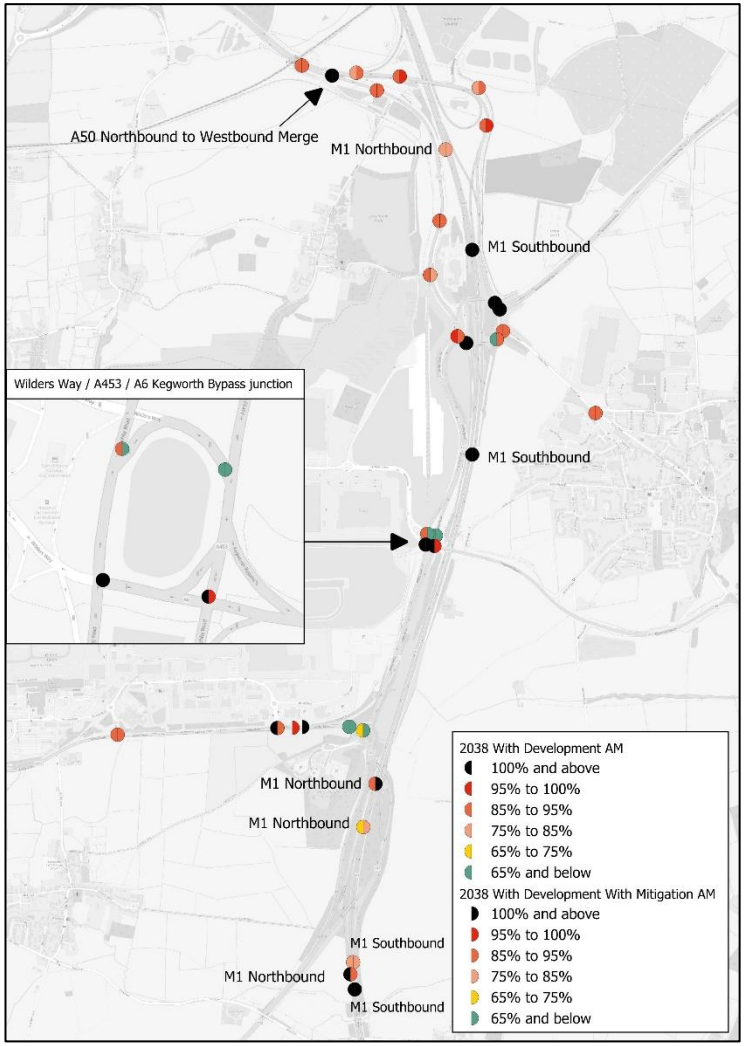
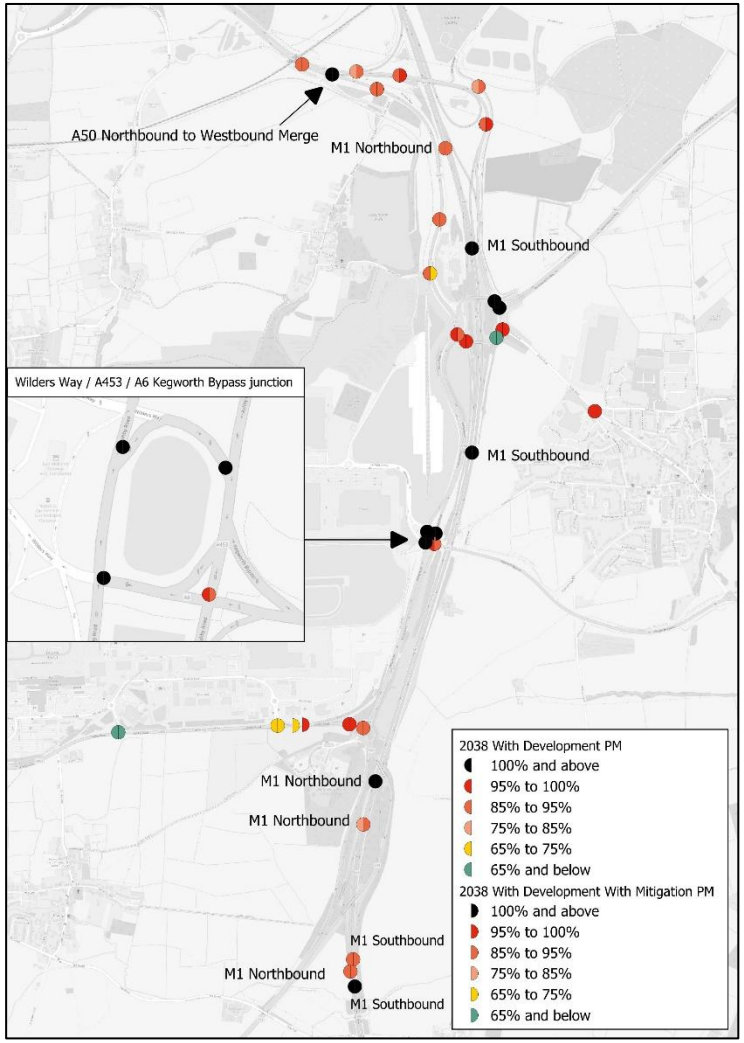
Figure A.6: Forecast Node Volume-Capacity Ratio for 2038 'With Development (1b)' and 2038 'With Development (2b)' Scenarios

AM Peak hour



PM Peak hour



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Appendix B EMFM Indicative Network Statistics

B.1.1 Table B.1 and Table B.2 presents the model network statistics within the AoI (see Figure 3.11). It should be noted that these statistics are high-level and should be considered as indicative only.

B.1.2 The statistics include vehicle kilometre travelled (km), network speed (mph) and junction delay (hours) between 2038 'Without Development (1b)', 2038 'With Development (1b)' and 2038 'With Development (2b) scenarios for both AM Peak and PM Peak hour by motorway and non-motorway roads.

B.1.3 As expected, the forecast vehicle kilometres increase in the 'With Development (1b)' scenario compared to the 'Without Development (1b)' scenario for both motorway and non-motorway links. Overall, vehicle kilometres increase further in the 'With development (2b)' 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.

B.1.4 The forecast speeds in the 'With Development (1b)' scenario are slower than speeds forecast in the 'Without Development (1b)' for both motorway and non-motorway links. Overall speeds are forecast to reduce in the 'With Development (1b)' scenario by -1.5% on motorway links and -1.2% on non-motorway links. Speeds are forecast to reduce by -1.0% on motorway and increase by +0.7% on non-motorway links in the 'With Development (2b)' scenario compared to the 'Without Development (1b)' scenario, indicating lower delay in the 'With Development (2b) 'scenario on motorway links.

B.1.5 Junction delays on motorway links are forecast to increase in both with development scenarios compared to the 'Without Development (1b)' scenario, with the 'With Development (2b)' scenario forecast to have the lowest increase in delay (+4.7%). There is a reduction in delay forecast on non-motorway links in the 'With Development (2b)' (-0.9%) compared to the 'Without Development (1b)' scenario.

Table B.1: Indicative Network Statistics within the AoI for Motorway Links

Scenario	Model Year/ Peak	Veh/km (demand[7])	Speed (mph)	Junction Delay (Hours)
'Without Development (1b)'	2038 AM	293,022	40.1	1,640
'With Development (1b)'		296,942	39.7	1,709
'With Development (2b)'		299,917	39.4	1,753
'Without Development (1b)'	2038 PM	305,464	43.9	1,298
'With Development (1b)'		310,336	43.0	1,410
'With Development (2b)'		309,551	43.8	1,322
'Without Development (1b)'	2038 AM+PM	598,486	41.9	2,938
'With Development (1b)'		607,278	41.3	3,119
'With Development (2b)'		609,468	41.5	3,075
Percentage difference compared with 'Without Development (1b)'				
'With Development (1b)'	2038 AM+PM	1.5%	-1.5%	6.2%
'With Development (2b)'		1.8%	-1.0%	4.7%

[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 B.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 (1b)'	2038 AM	485,162	26.8	4,820
'With Development (1b)'		493,122	26.6	5,003
'With Development (2b)'		490,395	26.8	4,895
'Without Development (1b)'	2038 PM	521,328	25.8	5,408
'With Development (1b)'		530,468	26.6	5,616
'With Development (2b)'		522,787	26.2	5,240
'Without Development (1b)'	2038 AM+PM	1,006,490	26.3	10,228
'With Development (1b)'		1,023,590	26.0	10,619
'With Development (2b)'		1,013,182	26.5	10,136
Percentage difference compared with 'Without Development (1b)'				
'With Development (1b)'	2038 AM+ PM	1.7%	-1.2%	3.8%
'With Development (2b)'		0.7%	0.7%	-0.9%

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APPENDIX 73: COBALT Assessment (document reference EMG2-BWB-GEN-XX-RP-TR-0020_S2-P2)

PROJECT NAME	**East Midlands Gateway Phase 2 – COBALT Assessment**		
DOCUMENT NUMBER	EMG2-BWB-GEN-XX-RP-TR-0018	**BWB REF**	220500
AUTHOR	[redacted]	**STATUS**	S2
CHECKED	[redacted]	**REVISION**	~~P2~~P5
APPROVED	Paul Wilson	**DATE**	~~30/01~~07/04/26

1. INTRODUCTION

1.1 BWB Consulting Ltd (BWB) is working with the Transport Working Group (TWG) consisting of key statutory highway authorities, including National Highways (NH), Leicestershire County Council (LCC) and Nottinghamshire County Council (NCC) on the East Midlands Gateway 2 (EMG2) project.

1.2 A Highway Safety Position Statement was produced in March 2025 (Technical Note EMG2-BWB-GEN-XX-RP-TR-0015 Revision P1) summarising Personal Injury Collision (PIC) records on the highway network in the vicinity of the EMG2 development~~.~~ between 2019 and 2024. This identified existing safety problems at the following three locations:

- ~~**EMG1 access junction**~~**A453/A6 Kegworth Bypass Roundabout** – a cluster of PICs have been recorded due to turning movements from the A6 to EMG1 colliding with drivers travelling southbound on the A453.
- **M1 Junction 24** – a cluster of PICs have been recorded on the M1 northbound off-slip on approach to the roundabout.
- **A453/The Green** – a cluster of PICs have been recorded due to right turning movements from the A453 west into The Green. This junction is located within a dip on the A453 with approaching vehicles travelling downhill from both sides. Looking at historic Google Street View records, the tourist sign to the 'Queen's Head' highlighting a left turn into The Green from the east was obstructed by overgrown vegetation until 2023 and since then there have been no PICs occurring through westbound travelling vehicles. There appear to have been improvements to the warning signs for eastbound vehicles between 2017 and 2020 and since then, collision rates have dropped.

1.3 Traffic modelling has been undertaken using Leicestershire's Pan Regional Transport Model (PRTM), a strategic highway assignment model. This tested forecast years of 2028 and 2038, with and without the EMG2 development and ~~more recently~~ with the inclusion of the proposed highway mitigation.

1.4 The proposed highway mitigation is focused on the A453 corridor between Finger Farm roundabout (M1 Junction 23A) and M1 Junction 24, with the key piece of infrastructure comprising a new free flow link from M1 northbound to A50 westbound, allowing traffic to bypass Junction 24. Traffic flows for each of the forecast year scenarios have been obtained from PRTM and have been used in this COBALT (Cost and Benefit to Accidents – Light Touch) assessment.

1.5 The data shows that the largest flow changes in terms of redistribution as a result of the proposed highway mitigation are expected to occur on the A453 corridor between the Finger Farm roundabout and M1 Junction 24, which includes ~~all three~~the two key

locations with existing safety problems and the area accommodating the proposed highway mitigation.

1.6 A COBALT Methodology Note was prepared in May 2025 (Technical Note EMG2-BWB-GEN-XX-RP-TR-0018 Revision P1) to set out the methodology and study area for the COBALT assessment with the TWG. Comments were received from NH in May 2025, requesting that the study area is extended to include A50 Junction 1.

1.7 An initial COBALT assessment (P1) was undertaken in June 2025 ~~which was issued to~~ , followed by a revision (P2) in August 2025. NH ~~for~~provided comments~~.~~ by email on 11 December 2025. This revised version (~~P2) therefore updates the~~P3) provides an updated assessment ~~based on~~to address the comments received from NH and uses the most recent version of the software. The revisions include updated traffic flows and additional link assessments, including the M1 mainline, the A6 and the A453. This Technical Note therefore reviews the updated COBALT assessment and summarises the outputs.

2. ASSESSMENT INPUTS

2.1 COBALT is a computer program developed by the Department for Transport to assess and quantify the change in PIC rates as a direct result of new road schemes. It does so by comparing the rates of PICs by severity and the associated costs across an identified network in a 'without scheme' and 'with scheme' scenario, using details of link and junction characteristics, PIC rates, casualty costs and projected traffic volumes.

2.2 The COBALT study area is shown in **Figure 1** and includes the following links and junctions;

Links

- the A453 between The Green and Finger Farm roundabout;
- the A453 between Finger Farm roundabout and M1 Junction 24;
- the A50 between M1 Junction 24 and A50 Junction 1;
- the M1 between Junction 23A and Junction 24A;
- the A6 Kegworth Bypass between the ~~EMG1 junction~~A6/A453 Kegworth Bypass roundabout and Whatton Road;
- the A453 between M1 Junction 24 and East Midlands Parkway Station
- the new A50 link from the M1 northbound.

Junctions

- the A453/The Green priority controlled T-junction;
- the A453/Airport Access signal controlled T-junction;
- the A453/Hunter Road roundabout;
- Finger Farm roundabout;
- The A453/EMG1/A6 Kegworth bypass signal controlled roundabout;
- M1 Junction 23, 24 & 24A;
- A50 Junction 1.

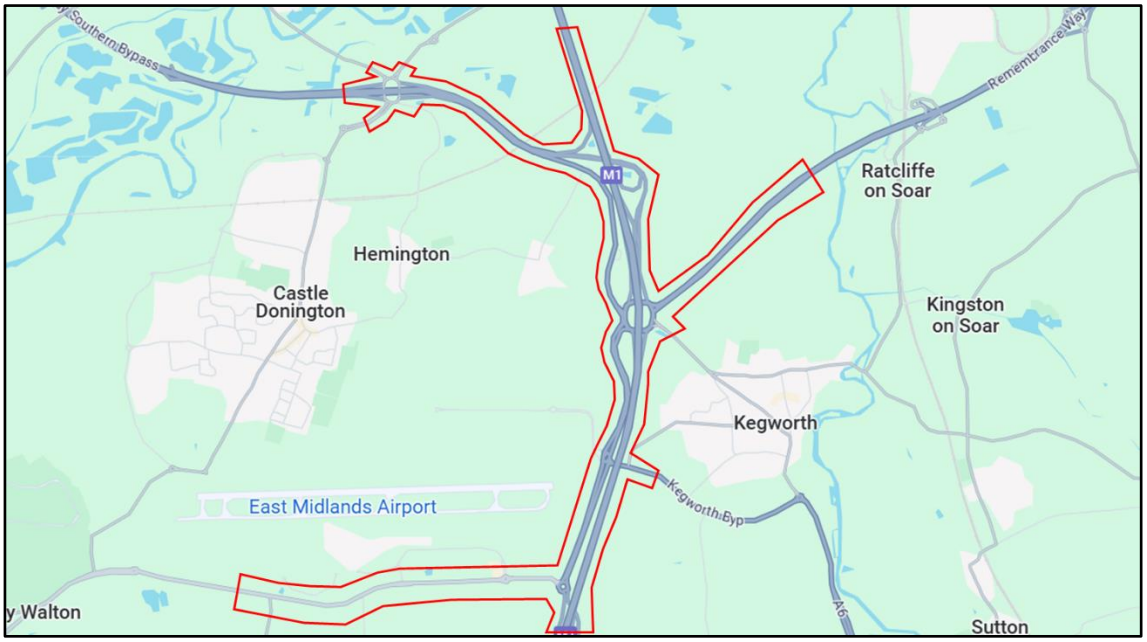


Figure 1 - COBALT Assessment Study Area

2.3 The study area was divided up into Junctions and Links for the COBALT assessment. The A453 was divided into 5 links between The Green and M1 Junction 24, with each link being between each of the junctions assessed (i.e. Link 1 is the A453 between 'The Green' and the Airport Access, Link 2 is between the Airport Access and the EMG2 Main Site Access roundabout etc.) The A50 was divided into two links; between M1 Junction 24 and M1 Junction 24A and between M1 Junction 24A and A50 Junction 1. The M1 was divided into three links between Junction 23A and Junction 24A, the A6 was reviewed between its junction with the A453 and Whatton Road and the A453 was reviewed between Junction 24 and the junction for East Midlands Parkway Station.

2.4 Each of the junctions listed above were assessed as 'junctions' within COBALT aside from Junction 23A and Junction 24A which were assessed as multiple links, due to the nature of these 'junctions' being provided as links with merges and diverges onto the surrounding roads rather than physical junctions. The links and junction locations are included in **Appendix 1**.

2.5 Traffic flows for each of these links and junctions were extracted from ~~the~~ PRTM ~~model~~ to provide AADT flows for the base 2022 scenario, the forecast 2028 without scheme (Stage 1a) and with scheme (Stage 2a) scenarios, along with the forecast 2038 without scheme (Stage 1a) and with scheme (Stage 2a) scenarios. This allows ~~the~~a comparison to be made of the future years background traffic on the existing highway layout ~~to be compared to~~against the future years proposed traffic on the proposed mitigated highway layout.

2.6 COBALT Version 2.9.0.0 was used for this assessment which is the latest version of the software available on the TAG Software website. The 'parameters file' which was also obtained from the TAG Software website includes for the TAG Databook V2.01 parameters which coincides with the latest version of the software. This parameters file consists of a series of data tables of standard parameters required to calculate accident impacts in line with TAG. The tables include the information required to undertake an

economic appraisal, calculate accident and casualty numbers and costs by year and calculate rates of accidents through time using beta factors. The parameters file does not require any editing for the assessment.

2.7 Whilst observed collision data is available for each of the junctions assessed, in every instance the default rates within the TAG data book for each junction/link type are higher than those observed at each of the ~~junction~~junctions. This means that using the default data is ~~considered~~ a more robust assessment. Likewise, some of the links assessed have no observed collision data recorded on them, this would require the default values to be used to obtain any meaningful results in these locations. As a result the default values within the parameters files were not updated which removed the risk of errors and inconsistency.

2.8 The 'scheme data file' is completed by the user and provides all of the AADT Flows for all 5 scenarios listed above at the links in the study area, along with details of the link type, speed limits, link lengths and number of junction ends. The input file also includes the AADT flows on each arm of each of the ~~8~~7 junctions assessed, along with the type of junction, speed limit, number of arms and type of carriageways on each arm.

2.9 Once both of these files have been uploaded into the software, the program then validates both of the input files to ensure all the required information is included and provides any warnings on the data that has been provided, if required. In this assessment the data was validated by the program with no warnings on any of the junctions or links throughout the data.

3. ASSESSMENT OUTPUTS

3.1 A detailed output file was provided by the COBALT assessment when the impacts were run in the software, which provided details of the assessment run, any validation messages or warnings, summary statistics, link summary statistics and junction summary statistics.

3.2 A copy of the outputs from the COBALT assessment are included in **Appendix ~~1~~2** and the summary statistics for the scheme as a whole are summarised in **Tables 1** to **3.**

Economic Summary 2023 values and prices			
	Accident Costs Without – Scheme (£000s)	**Accident Costs With – Scheme (£000s)**	**Benefit of Scheme (£000s)**
Total for all years (2028 – 2087)	231,741.2	~~237,455.4~~241,643.7	-9,902.5~~,714.3~~
2028	5,741.2	5,~~861~~993.8	~~-~~120252.6
2038	5,095.9	5,~~223~~311.9	~~-~~128216.0

Table 1 - Economic Summary

Accidents Summary (PICs)			
	Accident Numbers Without – Scheme	Accident Numbers With – Scheme	Benefit of Scheme
Total for all years (2028 – 2087)	3,238.5	3,~~307.2~~336.0	-~~68.7~~97.5
2028	50.9	~~51.6~~52.2	-~~0.7~~1.3
2038	54.5	~~55.7~~56.2	-1.~~2~~7

Table 2 - Accidents Summary

Casualties Summary									
	Accident Numbers Without – Scheme			Accident Numbers With – Scheme			Benefit of Scheme		
	Fatal	Serious	Slight	Fatal	Serious	Slight	Fatal	Serious	Slight
Total for all years	35.8	278.7	4497.5	~~36.8~~38.0	~~288.1~~294.8	~~4588.8~~4625.7	-~~1.0~~2.2	-~~9.4~~16.1	-~~91.3~~128.1
2028	0.6	4.5	70.6	0.6	4.~~6~~8	~~71.5~~72.3	0.0	-0.~~1~~3	-~~0.9~~1.7
2038	0.6	4.7	75.7	0.6	~~4.8~~5.0	77.~~3~~9	0.0	-0.~~2~~3	-~~1.6~~2.2

Table 3 - Casualties Summary

~~3.3 The assessment summarised that the scheme as a whole would have a benefit on all three factors assessed including; costs, number of collisions and casualties.~~

~~3.~~4~~3.3~~ Examining the results in more detail on a link by link and junction by junction basis, the following tables show the impact of the development traffic for the future years both with and without the scheme in place. **Table 4** summarises the impact on the links~~,~~; any reductions in the number of collisions a year is seen as a beneficial impact and any increase in the number of collisions a year, higher than 0.1, is recorded as an adverse impact. An increase of 0.1 has been recorded as a negligible impact due to the minimal impact resulting from it. However, any reduction is classed as beneficial in this report.

Link		2028 Without Scheme	2028 With Scheme	2028 Scheme Impact	2038 Without Scheme	2038 With Scheme	2038 Scheme Impact
1	A453	0.5	0.6	Negligible	0.5	0.6	Negligible
2	A453	0.4	0.4	Negligible	0.4	0.4	Negligible
3	A453	0.3	0.5	Adverse	0.3	0.4	Negligible
4	A453	0.6	0.5	Beneficial	0.6	0.6	Negligible
5	A453	0.8	0.7	Beneficial	0.8	0.7	Beneficial
6	A50 (6)	1.2	1.2	Negligible	1.1	1.0	Beneficial
7	A50 (7)	2.9	2.9	Negligible	2.7	2.8	Negligible
8	J24A	0.1	0.1	Negligible	0.1	0.1	Negligible
9	J24A	0.5	0.5	Negligible	0.6	0.6	Negligible
10	J24A	0.5	0.5	Negligible	0.4	0.5	Negligible
11	J24A	0.1	0.1	Negligible	0.1	0.1	Negligible
12	J24A	0.1	0.1	Negligible	0.1	0.1	Negligible
13	J24A	0.2	0.2	Negligible	0.2	0.2	Negligible
14	J24A	1.2	1.2	Negligible	1.1	1.0	Beneficial
15	J23A	0.3	0.2	Beneficial	0.3	0.2	Beneficial
16	J23A	0.3	0.3	Negligible	0.3	0.3	Negligible
17	J23A	0.1	0.1	Negligible	0.1	0.1	Negligible
18	J23A	0.4	0.4	Negligible	0.4	0.4	Negligible
19	J23A	0.3	0.3	Negligible	0.3	0.3	Negligible
20	J23A	0.1	0.2	Negligible	0.1	0.1	Negligible
21	J23A	0.1	0.1	Negligible	0.1	0.1	Negligible
22	J23A	0.3	0.2	Beneficial~~Negligible~~	0.3	0.2	Negligible
23	M1 (N)	2.1	2.1	Negligible	2.0	2.0	Negligible

24	**M1**	2.3	2.5	Adverse	2.2	2.3	Negligible
25	**M1 (S)**	3.3	3.4	Negligible	3.1	3.2	Negligible
26	**A6**	0.2	0.2	Negligible	0.2	0.2	Negligible
27	**A453**	1.0	1.0	Negligible	1.1	1.1	Negligible
28	**New A50 Lin**	0.0	0.6	Adverse	0.0	0.5	Adverse
Total		**19.2**	**20.1**	**Adverse**	**18.4**	**19.0**	**Negligible**

Table 4 - Annual Accident Stats (Links)

3.53.4 As shown in **Table 4** the scheme provides a negligible impact on the number of collisions per year in 2028 with a minor beneficial impact being forecast at A453 (L4 & L5) which is either side of the ~~EMG1 Access.~~A453/A6 Kegworth Bypass roundabout between Finger Farm and M1 Junction 24. Adverse impacts are forecast at A453 (L3) which is between Finger Farm roundabout and the EMG2 Main Site access roundabout and on the M1 Mainline centrally~~.~~ between Junctions 23A and Junction 24. By 2038 it is forecast that ~~the~~all adverse impacts would have reduced to a negligible ~~impact and~~impacts with the scheme ~~overall would have more beneficial impacts by~~and mitigation included for, except for the new A50 link from the ~~scheme when compared to~~M1 northbound as this is only included in the ~~without scheme scenarios.~~with development scenario.

3.63.5 **Table 5** summarises the impact on the junctions~~;~~ again, any reductions in the number of collisions a year is seen as a beneficial impact and any increase in the number of collisions a year, higher than 0.1, is recorded as an adverse impact. An increase of 0.1 has been recorded as a negligible impact due to the minimal impact resulting from it. However, any reduction is classed as beneficial in this report.

Link		2028 Without Scheme	2028 With Scheme	2028 Scheme Impact	2038 Without Scheme	2038 With Scheme	2038 Scheme Impact
1	**A453/The Green**	1.2	1.3	Negligible	1.4	1.5	~~Minor~~ Negligible~~Beneficial~~
2	**A453/Airport Access**	1.1	1.2	Negligible	1.2	1.3	~~Minor Beneficial~~Negligible

3	**A453/Site Access (existing)**	0.5	0.0	6 Adverse	0.5	0.0	Adverse
3	**A453/Site Access (proposed)**	0.0	2.5		0.0	2.6	
4	**Finger Farm Roundabout**	3.1	3.5	Adverse	3.8	4.2	Adverse
5	**~~EMG1 Access~~ A453/A6 Kegworth Bypass roundabout**	4.5	4.3	Beneficial	5.3	5.2	Beneficial
6	**M1 Junction 24**	15.3	13.3	Beneficial	16.7	15.3	Beneficial
7	**A50 Junction 1**	5.0	5.0	Negligible	6.0	5.9	Beneficial
Total		**30.7**	**31.1**	**Adverse**	**34.9**	**36.0**	**Adverse**
Total (excluding site access)		**30.2**	**28.6**	**Beneficial**	**34.4**	**33.4**	**Beneficial**

Table 5 - Annual Accident Stats (Junctions)

~~3.9~~3.8 As shown in **Table 5** in 2028 the scheme provides a negligible impact on the A453/The Green junction, A453/Airport Access junction and the A50 Junction 1. The scheme has beneficial impact on the M1 Junction 24 gyratory and A453/A6 Kegworth bypass roundabout, whilst adverse impacts are present at the A453/Site Access roundabout and Finger Farm Roundabout.

~~3.10~~3.9 The adverse ~~impact (2.0 collisions per year)~~impacts at the A453/Site Access roundabout are ~~likely~~ due to the introduction of the additional arm on the roundabout and increase in traffic related to the development. This impact is expected and the

forecast increase should not be of concern~~.~~ noting that the junction would operate within capacity and has been designed to standard.

~~3.11~~3.10 Likewise, the adverse impact (0.4 collisions per year) at Finger Farm Roundabout is also likely due to the increase in traffic related to the development. This impact is expected and the forecast increase should not be of concern, particularly when noting that existing collision patterns have been due to signage and lining, which are being improved as part of the package of mitigation, but is not able to be reflected in the COBALT assessment.

~~3.12~~3.11 The beneficial impact shown at the M1 Junction 24 ~~will be~~is a result of traffic being removed from the M1 northbound off-slip by way of introduction of a new link from the M1 northbound directly to the A50, reducing potential collisions on the M1 northbound off-slip. Similarly, the beneficial impact at ~~EMG1 access~~A453/A6 Kegworth Bypass roundabout is ~~likely~~ because traffic from the M1 and A42 ~~will choose~~northbound travelling to ~~join~~ the A50 ~~using the direct free flow link from~~is being re-assigned to the M1 rather than the A453 ~~and negotiating a~~because of the proposed direct free flow link, which in turn, reduces the number of ~~junctions~~turning movements at the junction.

3.12 The new link from the M1 northbound directly onto the A50 has also been included in the link assessments set out in the tables above, but as the link is not currently in place, the results are showing as an adverse impact. However, the proposed link has been run through COBALT with the proposed parameters and predicted traffic flows to understand what the collision rate is expected to be in both 2028 and 2038 'with development' scenarios. These are 0.60 in 2028 and 0.47 (rounded to 0.5 in Table 4) in 2038 based on a 1.0km link, single carriageway with a hardstrip and a 70mph speed limit, which is less than other links considered in the assessment.

3.13 **Table 5** also shows that by 2038, the impact of the scheme is forecast to be beneficial ~~on all~~at most of the junctions ~~assessed in COBALT, excluding the~~ with existing safety issues, including M1 Junction 24 and A453/A6 Kegworth Bypass roundabout. A negligible impact is forecast at the A453/The Green junction and there would be adverse impacts at the A453/Site Access roundabout and Finger Farm ~~Roundabout.~~but for the reasons set out above, there should be no issues, particularly at Finger Farm where there are changes proposed to signage and markings.

3.14 As a result, it is concluded that overall the scheme provides a ~~benefit to~~negligible impact on the local and Strategic Road Networks in terms of road safety. When reviewing the impact in more detail, it is forecast that initially (2028) there would be ~~a negligible~~an adverse impact~~,~~ (0.3 collisions a year), overall, as a result of the scheme on the links assessed, but this would improve to negligible (0.1 collisions a year), in the future year of 2038 with a number of the links seeing beneficial impacts.

3.15 Similarly, at the junctions assessed, whilst the scheme ~~would~~ initially ~~see negligible and~~ appears to show an adverse impact overall in both 2028 and 2038 scenarios, when excluding the site access junction (for the reasons set out above), it is clear that overall the scheme would have a beneficial impact ~~with the exception of the Site Access roundabout and Finger Farm, which would see an adverse impact. This would improve in the future year of 2038, with all~~at the junctions ~~assessed showing as having a beneficial impact with the mitigation scheme included for with the exception of the Site Access roundabout and Finger Farm which sees the most increase in traffic related to~~

~~the development.~~on the existing highway network in both 2028 and 2038 scenarios. The M1 Junction 24 would see a beneficial impact as a result of the mitigation from 2028.

4. SUMMARY

4.1 This Technical Note has reviewed the COBALT assessment which has been undertaken on the proposed EMG2 scheme, using the study area agreed with NH in the COBALT Methodology Note prepared in May 2025 (Technical Note EMG2-BWB-GEN-XX-RP-TR-0018 Revision P1~~) which~~). This was derived from the Highway Safety Position Statement (Technical Note EMG2-BWB-GEN-XX-RP-TR-0015 Revision P1), which summarised existing Personal Injury Collision records and identified three locations on the highway network where there are existing safety problems.

4.2 The agreed study area has been divided up into a number of links and junctions to be assessed within COBALT. Detailed information about the type of links and junctions were inputted into a data sheet. This was in addition to traffic flows for each of the links and junctions which were extracted from the PRTM model to provide flows for the base 2022 scenario, the forecast 2028 without scheme and with scheme scenarios, along with the forecast 2038 without scheme and with scheme scenarios.

4.3 This information was inputted into COBALT along with the latest 'Parameters file' provided by the software company which reviewed the information input for the scheme against national statistics for similar link and junction types, providing a comparison between the study area, both with and without the scheme in place.

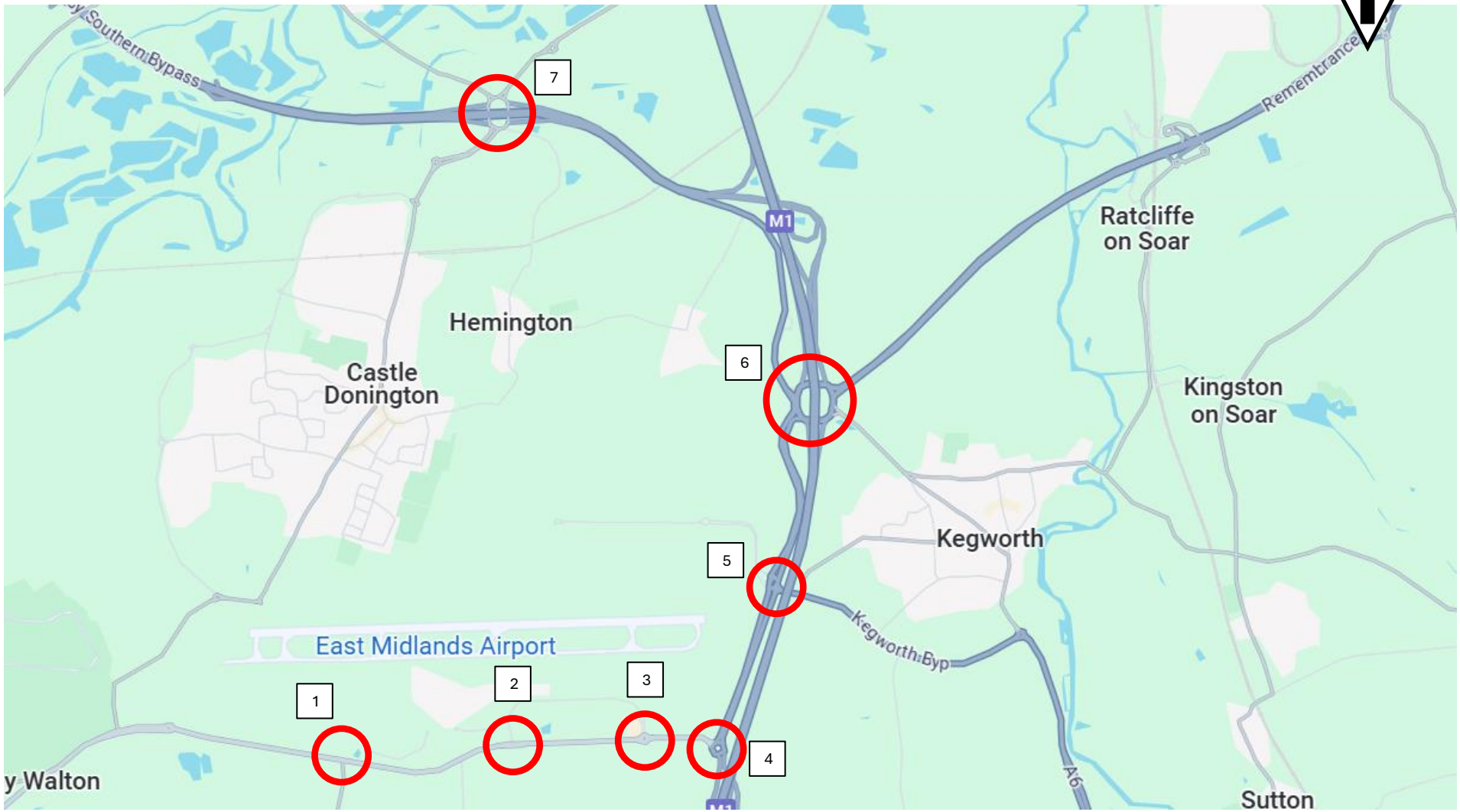
4.4 The COBALT assessment concluded that~~,~~ overall~~,~~ the scheme provides a ~~benefit to~~negligible impact on the local and Strategic Road Networks in terms of road safety. When reviewing the impact in more detail, it is forecast that initially (2028) there would be an adverse impact (0.3 collisions a ~~negligible impact~~year), overall, as a result of the scheme on the links assessed, but this would improve to negligible (0.1 collisions a year), in the future year of 2038 with a number of the links seeing beneficial impacts.

4.5 Similarly, ~~at the junctions assessed,~~whilst the scheme initially appears to show an adverse impact overall in both 2028 and 2038 scenarios, when excluding the site access junction (for the reasons set out above), it is clear that overall the scheme would ~~initially~~ have a beneficial impact at the junctions on the existing highway network in both 2028 and 2038 scenarios. The M1 Junction 24 would see ~~negligible and~~a beneficial impact as a result of the mitigation from 2028.

~~4.5~~4.6 As a result of the above, with the ~~exception of the~~ scheme having beneficial impacts on most junctions with existing safety concerns by 2038, and a benefit at Junction 24 of the M1 overall. There is no further analysis required from a PIC perspective. The impact at the Site Access roundabout and ~~M1 Junction 24. This would however improve in the future year of 2038, with all the junctions assessed showing as having a beneficial impact with the mitigation scheme included for.~~Finger Farm roundabout is due to the increase in traffic flow as a result of the scheme, and these junctions and the relevant mitigation schemes will be designed to standard, operate within capacity and will go through various Road Safety Audits as part of the design process.

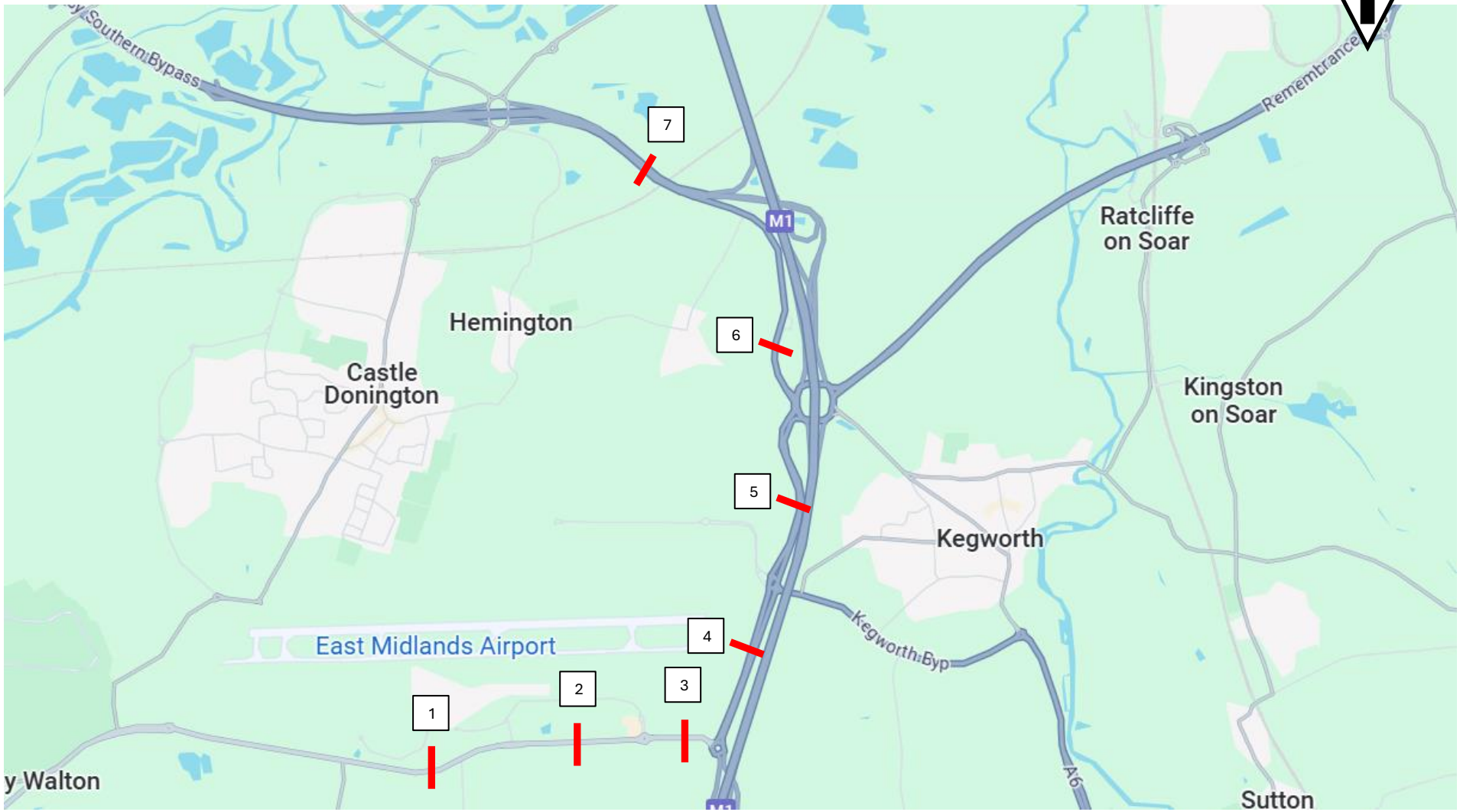
APPENDICES

Appendix ÷1: JUNCTION & LINK LOCATIONS



BWB
A CAF GROUP COMPANY

Junction Locations



BWB
A CAF GROUP COMPANY

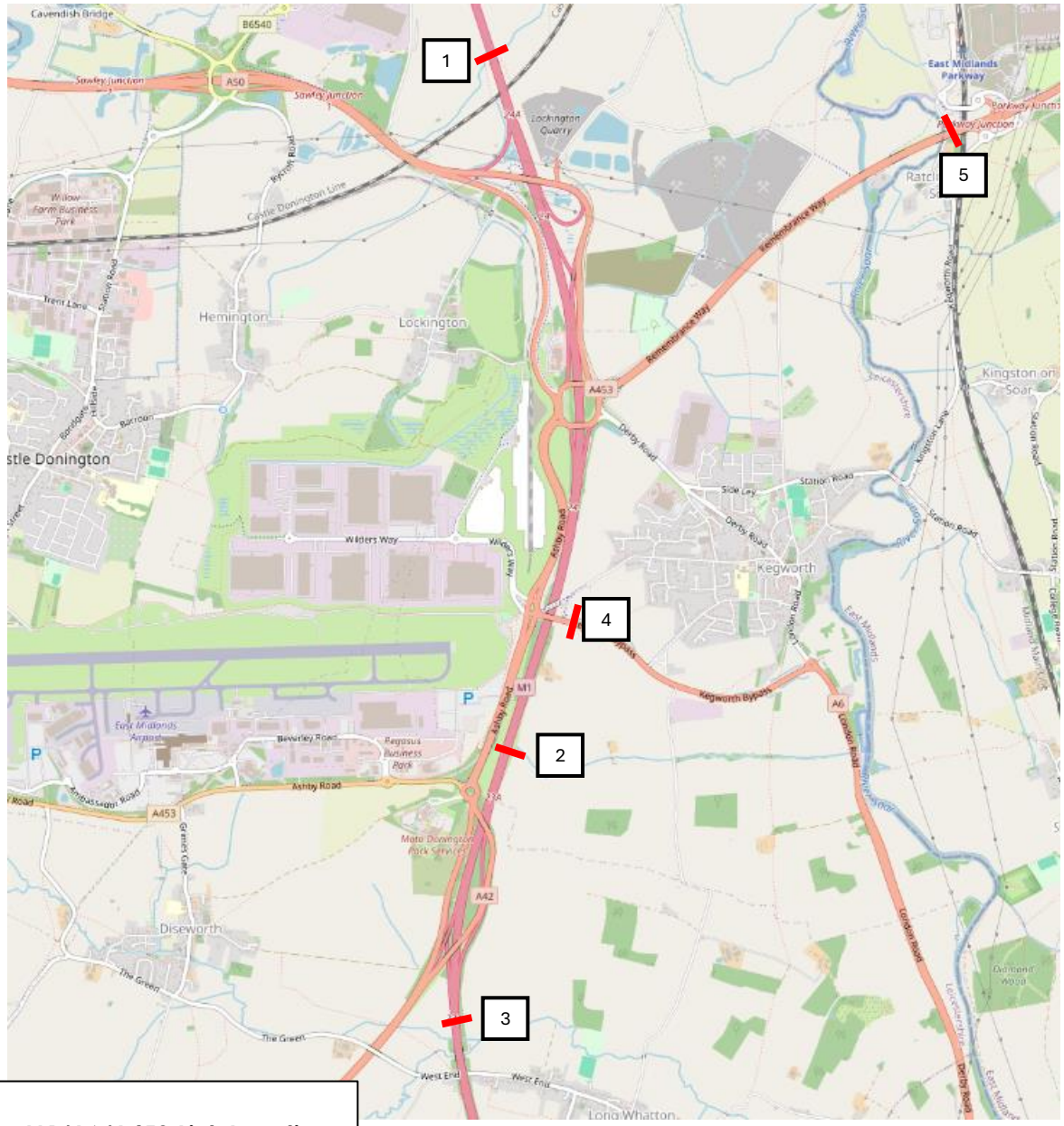
Link Locations

BWB
A CAF GROUP COMPANY

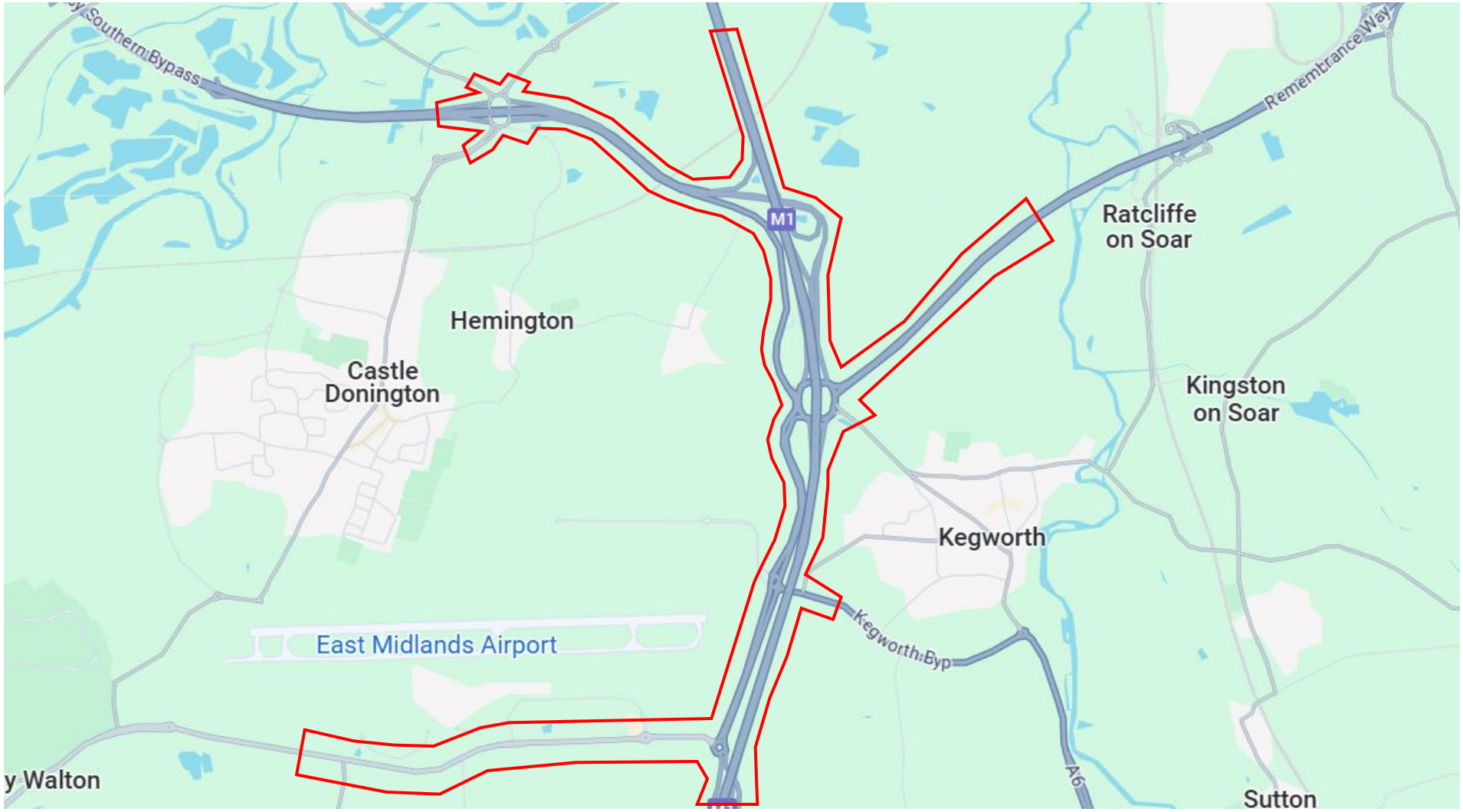
Junction 24A Locations

BWB
A CAF GROUP COMPANY

Junction 23A Locations



M1/A6/A453 Link Locations


Southern Bypass
Remembrance Way
M1
Ratcliffe
on Soar
Hemington
Castle
Donington
Kingston
on Soar
Kegworth
East Midlands Airport
Kegworth Byp
A6
y Walton
Sutton

Appendix 2: COBALT FILES

Department
for Transport

COBALT Parameter File Version:

v3.0 (TAG data book v2.01 May 2025)
Date Created: 16/05/25

Notes

Aligned to TAG data book v2.01 May 2025

Editable Parameter Lists

Road Type ID	Road Type	Road Category	In Use
1	D2 Motorways	Motorways	Yes
2	D3 Motorways	Motorways	Yes
3	D4 Motorways	Motorways	Yes
4	Modern S2 Roads	S2 A Roads	Yes
5	Modern S2 Roads with HS	S2 A Roads	Yes
6	Modern WS2 Roads	S2 A Roads	Yes
7	Modern WS2 Roads with HS	S2 A Roads	Yes
8	Older S2 A Roads	S2 A Roads	Yes
9	Other S2 Roads	Other S2 Roads	Yes
10	Modern D2 Roads	Dual Carriageways	Yes
11	Modern D2 Roads with HS	Dual Carriageways	Yes
12	Older D2 Roads	Dual Carriageways	Yes
13	Modern D3+ Roads	Dual Carriageways	Yes
14	Modern D3+ Roads with HS	Dual Carriageways	Yes
15	Older D3+ Roads	Dual Carriageways	Yes
16	Road Type 16	Not Defined	No
17	Road Type 17	Not Defined	No
18	Road Type 18	Not Defined	No
19	Road Type 19	Not Defined	No
20	Road Type 20	Not Defined	No

Road Category	In Use
Motorways	Yes
S2 A Roads	Yes
Other S2 Roads	Yes
Dual Carriageways	Yes
Road Category 5	No
Road Category 6	No

Cost Base Year
2023

Appraisal Period
60

Green Book Discount Rates

Default Source: TAG data book v2.01 May 2025, Worksheet Discount %

Years from Current Year	Discount Rates	
	Health	Other
0-30	1.50%	3.5%
31-75	1.29%	3.0%
76-125	1.07%	2.5%
126-200	0.86%	2.0%

Costs per Accident / Casualty

Default Source: TAG data book v2.01 May 2025, Worksheet COBALT 1

Cost per Casualty			
Casualty type	**Net output**	**Willingness to pay**	**Medical & ambulance**
Fatal	167,396	2,474,341	1,437
Serious	32,246	242,221	19,534
Slight	3,409	17,731	1,446

Cost per Accident							
Severity	**Insurance Administration**	**Damage to Property**			**Police Cost**		
		Urban	**Rural**	**Motorway**	**Urban**	**Rural**	**Motorway**
Fatal	447	11,642	19,745	25,117	26,115	26,817	27,129
Serious	278	6,240	9,001	21,431	2,883	3,600	3,802
Slight	169	3,681	5,967	10,842	746	1,023	853
Damage	80	2,632	3,935	3,781	55	31	26

Estimated damage only accidents per pia			
	Urban	**Rural**	**Motorway**
Damage only per pia	17.7	7.8	7.6

Annual Rates of Growth of Accident Values

Default Source: TAG data book v2.01 May 2025, Worksheet COBALT 2. Note - 2010 in the table below refers to growth for 2010-2011.

Annual Rates of Growth of Accident Values - up to the appraisal year		
Year	Casualty ('WTP' component') Growth Rate (% p.a.)	Accident (Accident & 'non-WTP' Casualty Components) Growth Rate (% p.a.)
2010	0.39	0.30
2011	1.08	0.83
2012	1.46	1.12
2013	3.17	2.43
2014	1.94	1.49
2015	1.45	1.12
2016	2.74	2.10
2017	1.19	0.91
2018	1.44	1.10
2019	0.28	0.21
2020	0.28	0.21
2021	0.28	0.21
2022	-0.77	-0.59
2023	-0.16	-0.12
2024	0.41	0.32
2025	0.00	1.50
2026	0.00	1.50
2027	0.00	1.50
2028	0.00	1.50
2029	0.00	1.50
2030	0.00	1.50
2031	0.00	1.50
2032	0.00	1.50
2033	0.00	1.50
2034	0.00	1.50
2035	0.00	1.50
2036	0.00	1.50
2037	0.00	1.50
2038	0.00	1.50
2039	0.00	1.50
2040	0.00	1.50
2041	0.00	1.50
2042	0.00	1.50
2043	0.00	1.50
2044	0.00	1.50
2045	0.00	1.50
2046	0.00	1.50
2047	0.00	1.50
2048	0.00	1.50
2049	0.00	1.50
2050	0.00	1.50
2051	0.00	1.50
2052	0.00	1.50
2053	0.00	1.50
2054	0.00	1.50
2055	0.00	1.50
2056	0.00	1.50
2057	0.00	1.50
2058	0.00	1.50
2059	0.00	1.50
2060	0.00	1.50
2061	0.00	1.50
2062	0.00	1.50
2063	0.00	1.50
2064	0.00	1.50
2065	0.00	1.50
2066	0.00	1.50
2067	0.00	1.50
2068	0.00	1.50
2069	0.00	1.50
2070	0.00	1.50
2071	0.00	1.50
2072	0.00	1.50

Annual Rates of Growth of Accident Values - from the appraisal year onwards	
Casualty ('WTP' component') Growth Rate (% p.a.)	Accident (Accident & 'non-WTP' Casualty Components) Growth Rate (% p.a.)
0.00	1.50

2073	0.00	1.50
2074	0.00	1.50
2075	0.00	1.50
2076	0.00	1.50
2077	0.00	1.50
2078	0.00	1.50
2079	0.00	1.50
2080	0.00	1.50
2081	0.00	1.50
2082	0.00	1.50
2083	0.00	1.50
2084	0.00	1.50
2085	0.00	1.50
2086	0.00	1.50
2087	0.00	1.50
2088	0.00	1.50
2089	0.00	1.50
2090	0.00	1.50
2091	0.00	1.50
2092	0.00	1.50
2093	0.00	1.50
2094	0.00	1.50
2095	0.00	1.50
2096	0.00	1.50
2097	0.00	1.50
2098	0.00	1.50
2099	0.00	1.50
2100	0.00	1.50
2101	0.00	1.50
2102	0.00	1.50
2103	0.00	1.50
2104	0.00	1.50
2105	0.00	1.50
2106	0.00	1.50
2107	0.00	1.50
2108	0.00	1.50
2109	0.00	1.50
2110	0.00	1.50
2111	0.00	1.50
2112	0.00	1.50
2113	0.00	1.50
2114	0.00	1.50
2115	0.00	1.50
2116	0.00	1.50
2117	0.00	1.50
2118	0.00	1.50
2119	0.00	1.50
2120	0.00	1.50
2121	0.00	1.50
2122	0.00	1.50
2123	0.00	1.50
2124	0.00	1.50
2125	0.00	1.50
2126	0.00	1.50
2127	0.00	1.50
2128	0.00	1.50
2129	0.00	1.50
2130	0.00	1.50
2131	0.00	1.50
2132	0.00	1.50
2133	0.00	1.50
2134	0.00	1.50
2135	0.00	1.50
2136	0.00	1.50
2137	0.00	1.50
2138	0.00	1.50
2139	0.00	1.50
2140	0.00	1.50
2141	0.00	1.50
2142	0.00	1.50
2143	0.00	1.50
2144	0.00	1.50

2145	0.00	1.50
2146	0.00	1.50
2147	0.00	1.50
2148	0.00	1.50
2149	0.00	1.50
2150	0.00	1.50

Link & Combined Link / Junction: Accident rates & Beta factors

Default Source: TAG data book v2.01 May 2025, Worksheet COBALT 3

Table Source Year:	2009

Link only: Accident Rates and Change Factors

Road Type	Speed Limit (mph)	Accident Rate	Beta Factor	Road Description
1	50	0.063	0.956	Motorways
1	60	0.063	0.956	Motorways
1	70	0.063	0.956	Motorways
2	50	0.063	0.956	Motorways
2	60	0.063	0.956	Motorways
2	70	0.063	0.956	Motorways
3	50	0.075	0.956	Motorways
3	60	0.075	0.956	Motorways
3	70	0.075	0.956	Motorways
4	30	0.175	0.964	Modern S2 Roads
4	40	0.175	0.964	Modern S2 Roads
4	50	0.143	0.958	Modern S2 Roads
4	60	0.143	0.958	Modern S2 Roads
4	70	0.143	0.958	Modern S2 Roads
5	30	0.175	0.964	Modern S2 Roads with HS
5	40	0.175	0.964	Modern S2 Roads with HS
5	50	0.143	0.958	Modern S2 Roads with HS
5	60	0.143	0.958	Modern S2 Roads with HS
5	70	0.143	0.958	Modern S2 Roads with HS
6	30	0.206	0.964	Modern WS2 Roads
6	40	0.206	0.964	Modern WS2 Roads
6	50	0.082	0.958	Modern WS2 Roads
6	60	0.082	0.958	Modern WS2 Roads
6	70	0.082	0.958	Modern WS2 Roads
7	30	0.206	0.964	Modern WS2 Roads with HS
7	40	0.206	0.964	Modern WS2 Roads with HS
7	50	0.082	0.958	Modern WS2 Roads with HS
7	60	0.082	0.958	Modern WS2 Roads with HS
7	70	0.082	0.958	Modern WS2 Roads with HS
8	30	0.206	0.964	Older S2 A Roads
8	40	0.206	0.964	Older S2 A Roads
8	50	0.143	0.958	Older S2 A Roads
8	60	0.143	0.958	Older S2 A Roads
8	70	0.143	0.958	Older S2 A Roads
9	30	0.195	0.957	Other S2 Roads
9	40	0.195	0.957	Other S2 Roads
9	50	0.163	0.935	Other S2 Roads
9	60	0.163	0.935	Other S2 Roads
9	70	0.163	0.935	Other S2 Roads
10	30	0.148	0.965	Modern D2 Roads
10	40	0.148	0.965	Modern D2 Roads
10	50	0.077	0.960	Modern D2 Roads
10	60	0.077	0.960	Modern D2 Roads
10	70	0.077	0.960	Modern D2 Roads
11	30	0.154	0.965	Modern D2 Roads with HS
11	40	0.154	0.965	Modern D2 Roads with HS
11	50	0.059	0.960	Modern D2 Roads with HS

Table Source Year:	2009

Combined Link / Junction: Accident Rates and Change Factors

Road Type	Speed Limit (mph)	Accident Rate	Beta Factor	Road Description
1	50	0.080	0.956	Motorways
1	60	0.080	0.956	Motorways
1	70	0.080	0.956	Motorways
2	50	0.067	0.956	Motorways
2	60	0.067	0.956	Motorways
2	70	0.067	0.956	Motorways
3	50	0.079	0.956	Motorways
3	60	0.079	0.956	Motorways
3	70	0.079	0.956	Motorways
4	30	0.532	0.959	Modern S2 Roads
4	40	0.532	0.959	Modern S2 Roads
4	50	0.244	0.955	Modern S2 Roads
4	60	0.244	0.955	Modern S2 Roads
4	70	0.244	0.955	Modern S2 Roads
5	30	0.532	0.959	Modern S2 Roads with HS
5	40	0.532	0.959	Modern S2 Roads with HS
5	50	0.244	0.955	Modern S2 Roads with HS
5	60	0.244	0.955	Modern S2 Roads with HS
5	70	0.244	0.955	Modern S2 Roads with HS
6	30	0.863	0.959	Modern WS2 Roads
6	40	0.863	0.959	Modern WS2 Roads
6	50	0.163	0.955	Modern WS2 Roads
6	60	0.163	0.955	Modern WS2 Roads
6	70	0.163	0.955	Modern WS2 Roads
7	30	0.863	0.959	Modern WS2 Roads w. HS
7	40	0.863	0.959	Modern WS2 Roads w. HS
7	50	0.163	0.955	Modern WS2 Roads w. HS
7	60	0.163	0.955	Modern WS2 Roads w. HS
7	70	0.163	0.955	Modern WS2 Roads w. HS
8	30	0.863	0.959	Older S2 A Roads
8	40	0.863	0.959	Older S2 A Roads
8	50	0.244	0.955	Older S2 A Roads
8	60	0.244	0.955	Older S2 A Roads
8	70	0.244	0.955	Older S2 A Roads
9	30	0.559	0.951	Other S2 Roads
9	40	0.559	0.951	Other S2 Roads
9	50	0.233	0.933	Other S2 Roads
9	60	0.233	0.933	Other S2 Roads
9	70	0.233	0.933	Other S2 Roads
10	30	0.553	0.967	Modern D2 Roads
10	40	0.553	0.967	Modern D2 Roads
10	50	0.107	0.956	Modern D2 Roads
10	60	0.107	0.956	Modern D2 Roads
10	70	0.107	0.956	Modern D2 Roads
11	30	0.599	0.967	Modern D2 Roads with HS
11	40	0.599	0.967	Modern D2 Roads with HS
11	50	0.072	0.956	Modern D2 Roads with HS

Link only and Combined Link / Junction: Accident Beta Factor Changes over Time

Year	Change to Beta Factor
2004	1.00
2005	1.00
2006	1.00
2007	1.00
2008	1.00
2009	1.00
2010	1.00
2011	1.00
2012	1.00
2013	1.00
2014	1.00
2015	1.00
2016	1.00
2017	1.00
2018	1.00
2019	1.00
2020	0.50
2021	0.50
2022	0.50
2023	0.50
2024	0.50
2025	0.50
2026	0.50
2027	0.50
2028	0.50
2029	0.50
2030	0.25
2031	0.25
2032	0.25
2033	0.25
2034	0.25
2035	0.25
2036	0.25
2037	0.25
2038	0.25
2039	0.25
Later Years	0.00

11	60	0.059	0.960	Modern D2 Roads with HS	11	60	0.072	0.956	Modern D2 Roads with HS
11	70	0.059	0.960	Modern D2 Roads with HS	11	70	0.072	0.956	Modern D2 Roads with HS
12	30	0.154	0.965	Older D2 Roads	12	30	0.599	0.967	Older D2 Roads
12	40	0.154	0.965	Older D2 Roads	12	40	0.599	0.967	Older D2 Roads
12	50	0.077	0.960	Older D2 Roads	12	50	0.107	0.956	Older D2 Roads
12	60	0.077	0.960	Older D2 Roads	12	60	0.107	0.956	Older D2 Roads
12	70	0.077	0.960	Older D2 Roads	12	70	0.107	0.956	Older D2 Roads
13	30	0.184	0.949	Modern D3+ Roads	13	30	0.620	0.951	Modern D3+ Roads
13	40	0.184	0.949	Modern D3+ Roads	13	40	0.620	0.951	Modern D3+ Roads
13	50	0.101	0.956	Modern D3+ Roads	13	50	0.123	0.946	Modern D3+ Roads
13	60	0.101	0.956	Modern D3+ Roads	13	60	0.123	0.946	Modern D3+ Roads
13	70	0.101	0.956	Modern D3+ Roads	13	70	0.123	0.946	Modern D3+ Roads
14	30	0.184	0.949	Modern D3+ Roads with HS	14	30	0.620	0.951	Modern D3+ Roads w. HS
14	40	0.184	0.949	Modern D3+ Roads with HS	14	40	0.620	0.951	Modern D3+ Roads w. HS
14	50	0.101	0.956	Modern D3+ Roads with HS	14	50	0.123	0.946	Modern D3+ Roads w. HS
14	60	0.101	0.956	Modern D3+ Roads with HS	14	60	0.123	0.946	Modern D3+ Roads w. HS
14	70	0.101	0.956	Modern D3+ Roads with HS	14	70	0.123	0.946	Modern D3+ Roads w. HS
15	30	0.184	0.949	Older D3+ Roads	15	30	0.620	0.951	Older D3+ Roads
15	40	0.184	0.949	Older D3+ Roads	15	40	0.620	0.951	Older D3+ Roads
15	50	0.101	0.956	Older D3+ Roads	15	50	0.123	0.946	Older D3+ Roads
15	60	0.101	0.956	Older D3+ Roads	15	60	0.123	0.946	Older D3+ Roads
15	70	0.101	0.956	Older D3+ Roads	15	70	0.123	0.946	Older D3+ Roads
16	20	0	0	Road Type 16	16	20	0	0	Road Type 16
16	30	0	0	Road Type 16	16	30	0	0	Road Type 16
16	40	0	0	Road Type 16	16	40	0	0	Road Type 16
16	50	0	0	Road Type 16	16	50	0	0	Road Type 16
16	60	0	0	Road Type 16	16	60	0	0	Road Type 16
16	70	0	0	Road Type 16	16	70	0	0	Road Type 16
17	20	0	0	Road Type 17	17	20	0	0	Road Type 17
17	30	0	0	Road Type 17	17	30	0	0	Road Type 17
17	40	0	0	Road Type 17	17	40	0	0	Road Type 17
17	50	0	0	Road Type 17	17	50	0	0	Road Type 17
17	60	0	0	Road Type 17	17	60	0	0	Road Type 17
17	70	0	0	Road Type 17	17	70	0	0	Road Type 17
18	20	0	0	Road Type 18	18	20	0	0	Road Type 18
18	30	0	0	Road Type 18	18	30	0	0	Road Type 18
18	40	0	0	Road Type 18	18	40	0	0	Road Type 18
18	50	0	0	Road Type 18	18	50	0	0	Road Type 18
18	60	0	0	Road Type 18	18	60	0	0	Road Type 18
18	70	0	0	Road Type 18	18	70	0	0	Road Type 18
19	20	0	0	Road Type 19	19	20	0	0	Road Type 19
19	30	0	0	Road Type 19	19	30	0	0	Road Type 19
19	40	0	0	Road Type 19	19	40	0	0	Road Type 19
19	50	0	0	Road Type 19	19	50	0	0	Road Type 19
19	60	0	0	Road Type 19	19	60	0	0	Road Type 19
19	70	0	0	Road Type 19	19	70	0	0	Road Type 19
20	20	0	0	Road Type 20	20	20	0	0	Road Type 20
20	30	0	0	Road Type 20	20	30	0	0	Road Type 20
20	40	0	0	Road Type 20	20	40	0	0	Road Type 20
20	50	0	0	Road Type 20	20	50	0	0	Road Type 20
20	60	0	0	Road Type 20	20	60	0	0	Road Type 20
20	70	0	0	Road Type 20	20	70	0	0	Road Type 20

Accident proportions (Link & Combined Link / Junction)

Default Source: TAG data book v2.01 May 2025, Worksheet COBALT 4

Table Source Year:	2009

Link only: Accident Proportions

Road Type	Speed Limit (mph)	Accident Proportions			Road Category
		Fatal	Serious	Slight	
1-3	>40	0.019	0.104	0.877	Motorways
4-8	30/40	0.014	0.145	0.841	S2 A Roads
4-8	>40	0.046	0.206	0.748	S2 A Roads
9	30/40	0.010	0.145	0.846	Other S2 Roads
9	>40	0.026	0.193	0.780	Other S2 Roads
10-15	30/40	0.017	0.135	0.849	Dual Carriageways
10-15	>40	0.028	0.135	0.837	Dual Carriageways
16	20	0.000	0.000	0.000	Not Defined
16	30/40	0.000	0.000	0.000	Not Defined
16	>40	0.000	0.000	0.000	Not Defined
17	20	0.000	0.000	0.000	Not Defined
17	30/40	0.000	0.000	0.000	Not Defined
17	>40	0.000	0.000	0.000	Not Defined
18	20	0.000	0.000	0.000	Not Defined
18	30/40	0.000	0.000	0.000	Not Defined
18	>40	0.000	0.000	0.000	Not Defined
19	20	0.000	0.000	0.000	Not Defined
19	30/40	0.000	0.000	0.000	Not Defined
19	>40	0.000	0.000	0.000	Not Defined
20	20	0.000	0.000	0.000	Not Defined
20	30/40	0.000	0.000	0.000	Not Defined
20	>40	0.000	0.000	0.000	Not Defined

Table Source Year:	2009

Combined Link / Junction: Accident Proportions

Road Type	Speed Limit (mph)	Accident Proportions			Road Description
		Fatal	Serious	Slight	
1-3	>40	0.018	0.101	0.882	Motorways
4-8	30/40	0.008	0.122	0.869	S2 A Roads
4-8	>40	0.034	0.187	0.779	S2 A Roads
9	30/40	0.007	0.126	0.867	Other S2 Roads
9	>40	0.024	0.187	0.789	Other S2 Roads
10-15	30/40	0.009	0.104	0.887	Dual Carriageways
10-15	>40	0.023	0.127	0.850	Dual Carriageways
16	20	0.000	0.000	0.000	Not Defined
16	30/40	0.000	0.000	0.000	Not Defined
16	>40	0.000	0.000	0.000	Not Defined
17	20	0.000	0.000	0.000	Not Defined
17	30/40	0.000	0.000	0.000	Not Defined
17	>40	0.000	0.000	0.000	Not Defined
18	20	0.000	0.000	0.000	Not Defined
18	30/40	0.000	0.000	0.000	Not Defined
18	>40	0.000	0.000	0.000	Not Defined
19	20	0.000	0.000	0.000	Not Defined
19	30/40	0.000	0.000	0.000	Not Defined
19	>40	0.000	0.000	0.000	Not Defined
20	20	0.000	0.000	0.000	Not Defined
20	30/40	0.000	0.000	0.000	Not Defined
20	>40	0.000	0.000	0.000	Not Defined

Total Link Only Accident Proportions	Total Combined Accident Proportions
1.000	1.001
1.000	0.999
1.000	1.000
1.001	1.000
0.999	1.000
1.001	1.000
1.000	1.000
0.000	0.000
0.000	0.000
0.000	0.000
0.000	0.000
0.000	0.000
0.000	0.000
0.000	0.000
0.000	0.000
0.000	0.000
0.000	0.000
0.000	0.000
0.000	0.000
0.000	0.000
0.000	0.000
0.000	0.000

Link & Combined Link / Junction: Casualty Rates & Beta Factors

Default Source: TAG data book v2.01 May 2025, Worksheet COBALT 5

Table Source Year: 2009

Link only: Casualty Rates

Road Type	Speed Limit (mph)	Casualties per P.I.A.			Road Description
		Fatal	Serious	Slight	
1 - 3	50/60/70	0.021	0.129	1.464	Motorways
4 - 8	30/40	0.015	0.162	1.154	S2 A Roads
4 - 8	>40	0.052	0.274	1.251	S2 A Roads
9	30/40	0.010	0.156	1.071	Other S2 Roads
9	>40	0.028	0.230	1.178	Other S2 Roads
10 - 15	30/40	0.018	0.148	1.183	Dual Carriageways
10 - 15	>40	0.031	0.161	1.328	Dual Carriageways
16	20	0	0	0	Not Defined
16	30/40	0	0	0	Not Defined
16	>40	0	0	0	Not Defined
17	20	0	0	0	Not Defined
17	30/40	0	0	0	Not Defined
17	>40	0	0	0	Not Defined
18	20	0	0	0	Not Defined
18	30/40	0	0	0	Not Defined
18	>40	0	0	0	Not Defined
19	20	0	0	0	Not Defined
19	30/40	0	0	0	Not Defined
19	>40	0	0	0	Not Defined
20	20	0	0	0	Not Defined
20	30/40	0	0	0	Not Defined
20	>40	0	0	0	Not Defined

Table Source Year: 2009

Combined Link / Junction: Casualty Rates

Road Type	Speed Limit (mph)	Casualties per P.I.A.			Road Description
		Fatal	Serious	Slight	
1 - 3	50/60/70	0.020	0.123	1.455	Motorways
4 - 8	30/40	0.009	0.132	1.176	S2 A Roads
4 - 8	>40	0.038	0.238	1.300	S2 A Roads
9	30/40	0.007	0.134	1.132	Other S2 Roads
9	>40	0.026	0.222	1.218	Other S2 Roads
10 - 15	30/40	0.009	0.112	1.238	Dual Carriageways
10 - 15	>40	0.025	0.151	1.297	Dual Carriageways
16	20	0	0	0	Not Defined
16	30/40	0	0	0	Not Defined
16	>40	0	0	0	Not Defined
17	20	0	0	0	Not Defined
17	30/40	0	0	0	Not Defined
17	>40	0	0	0	Not Defined
18	20	0	0	0	Not Defined
18	30/40	0	0	0	Not Defined
18	>40	0	0	0	Not Defined
19	20	0	0	0	Not Defined
19	30/40	0	0	0	Not Defined
19	>40	0	0	0	Not Defined
20	20	0	0	0	Not Defined
20	30/40	0	0	0	Not Defined
20	>40	0	0	0	Not Defined

Table Source Year: 2009

Link only: Casualty Beta Factors

Road Type	Speed Limit (mph)	Beta Factor			Road Description
		Fatal	Serious	Slight	
1 - 3	50/60/70	0.978	0.979	1.002	Motorways
4 - 8	30/40	0.971	0.995	1.001	S2 A Roads
4 - 8	>40	0.979	0.983	1.002	S2 A Roads
9	30/40	0.985	0.997	1.001	Other S2 Roads
9	>40	0.987	0.989	0.998	Other S2 Roads
10 - 15	30/40	0.998	0.990	1.002	Dual Carriageways
10 - 15	>40	0.984	0.985	0.998	Dual Carriageways
16	20	0	0	0	Not Defined
16	30/40	0	0	0	Not Defined
16	>40	0	0	0	Not Defined
17	20	0	0	0	Not Defined
17	30/40	0	0	0	Not Defined
17	>40	0	0	0	Not Defined
18	20	0	0	0	Not Defined
18	30/40	0	0	0	Not Defined
18	>40	0	0	0	Not Defined
19	20	0	0	0	Not Defined
19	30/40	0	0	0	Not Defined
19	>40	0	0	0	Not Defined
20	20	0	0	0	Not Defined
20	30/40	0	0	0	Not Defined
20	>40	0	0	0	Not Defined

Table Source Year: 2009

Combined Link / Junction: Casualty Beta Factors

Road Type	Speed Limit (mph)	Beta Factor			Road Description
		Fatal	Serious	Slight	
1 - 3	50/60/70	0.978	0.979	1.002	Motorways
4 - 8	30/40	0.971	0.995	1.001	S2 A Roads
4 - 8	>40	0.979	0.983	1.002	S2 A Roads
9	30/40	0.985	0.997	1.001	Other S2 Roads
9	>40	0.987	0.989	0.998	Other S2 Roads
10 - 15	30/40	0.998	0.99	1.002	Dual Carriageways
10 - 15	>40	0.984	0.985	0.998	Dual Carriageways
16	20	0	0	0	Not Defined
16	30/40	0	0	0	Not Defined
16	>40	0	0	0	Not Defined
17	20	0	0	0	Not Defined
17	30/40	0	0	0	Not Defined
17	>40	0	0	0	Not Defined
18	20	0	0	0	Not Defined
18	30/40	0	0	0	Not Defined
18	>40	0	0	0	Not Defined
19	20	0	0	0	Not Defined
19	30/40	0	0	0	Not Defined
19	>40	0	0	0	Not Defined
20	20	0	0	0	Not Defined
20	30/40	0	0	0	Not Defined
20	>40	0	0	0	Not Defined

Link only and Combined Link / Junction: Casualty Beta Factor Changes over Time

Year	Change to Beta Factor
1995	1
1996	1
1997	1
1998	1
1999	1
2000	1
2001	1
2002	1
2003	1
2004	1
2005	1
2006	1
2007	1
2008	1
2009	1
2010	1
2011	1
2012	1
2013	1
2014	1
2015	1
2016	1
2017	1
2018	1
2019	1
Later Years	0

Junction only: Accident Parameters

Default Source: TAG data book v2.01 May 2025, Worksheet COBALT 6

Table Source Year:	1997

Junction only: Accident Parameters

Junction Type	Speed Limit (mph)	Coefficient 'a'	Power 'b'	Arms	Highest Link (S/D)	Formula type	Junction Description
1	>40	0.195	0.46	3	S	C	Priority
2	20/30/40	0.195	0.46	3	S	C	Priority
3	>40	0.195	0.46	3	D	C	Priority
4	20/30/40	0.195	0.46	3	D	C	Priority
5	>40	0.361	0.44	4	S	I	Priority
6	20/30/40	0.361	0.44	4	S	I	Priority
7	>40	0.240	0.71	4	D	C	Priority
8	20/30/40	0.240	0.71	4	D	C	Priority
9	>40	0.361	0.44	5	S	I	Priority
10	20/30/40	0.361	0.44	5	S	I	Priority
11	>40	0.361	0.44	5	D	I	Priority
12	20/30/40	0.361	0.44	5	D	I	Priority
13	>40	0.195	0.46	3	S	C	Priority w Ghost Island
14	20/30/40	0.195	0.46	3	S	C	Priority w Ghost Island
15	>40	0.195	0.46	3	D	C	Priority w Ghost Island
16	20/30/40	0.195	0.46	3	D	C	Priority w Ghost Island
17	>40	0.361	0.44	4	S	I	Priority w Ghost Island
18	20/30/40	0.361	0.44	4	S	I	Priority w Ghost Island
19	>40	0.240	0.71	4	D	C	Priority w Ghost Island
20	20/30/40	0.240	0.71	4	D	C	Priority w Ghost Island
21	>40	0.361	0.44	5	S	I	Priority w Ghost Island
22	20/30/40	0.361	0.44	5	S	I	Priority w Ghost Island
23	>40	0.361	0.44	5	D	I	Priority w Ghost Island
24	20/30/40	0.361	0.44	5	D	I	Priority w Ghost Island
25	>40	0.195	0.46	3	S	C	Priority w Single Lane Dualling
26	20/30/40	0.195	0.46	3	S	C	Priority w Single Lane Dualling
27	>40	0.195	0.46	3	D	C	Priority w Single Lane Dualling

28	20/30/40	0.195	0.46	3	D	C	Priority w Single Lane Dualling
29	>40	0.361	0.44	4	S	I	Priority w Single Lane Dualling
30	20/30/40	0.361	0.44	4	S	I	Priority w Single Lane Dualling
31	>40	0.240	0.71	4	D	C	Priority w Single Lane Dualling
32	20/30/40	0.240	0.71	4	D	C	Priority w Single Lane Dualling
33	>40	0.361	0.44	5	S	I	Priority w Single Lane Dualling
34	20/30/40	0.361	0.44	5	S	I	Priority w Single Lane Dualling
35	>40	0.361	0.44	5	D	I	Priority w Single Lane Dualling
36	20/30/40	0.361	0.44	5	D	I	Priority w Single Lane Dualling
37	>40	0.223	0.61	3	S	I	Signals
38	20/30/40	0.223	0.61	3	S	I	Signals
39	>40	0.494	0.42	3	D	C	Signals
40	20/30/40	0.291	0.51	3	D	C	Signals
41	>40	1.378	0.20	4	S	C	Signals
42	20/30/40	1.378	0.20	4	S	C	Signals
43	>40	0.494	0.42	4	D	C	Signals
44	20/30/40	0.291	0.51	4	D	C	Signals
45	>40	0.254	0.62	5 / 6	S	I	Signals
46	20/30/40	0.254	0.62	5 / 6	S	I	Signals
47	>40	0.238	0.85	5 / 6	D	I	Signals
48	20/30/40	0.160	0.97	5 / 6	D	I	Signals
49	>40	0.033	0.76	3	S	C	Roundabouts (Standard)
50	20/30/40	0.033	0.76	3	S	C	Roundabouts (Standard)
51	>40	0.033	0.76	3	D	C	Roundabouts (Standard)
52	20/30/40	0.033	0.76	3	D	C	Roundabouts (Standard)
53	>40	0.024	0.89	4	S	C	Roundabouts (Standard)
54	20/30/40	0.048	0.74	4	S	C	Roundabouts (Standard)
55	>40	0.063	0.69	4	D	C	Roundabouts (Standard)
56	20/30/40	0.022	0.85	4	D	C	Roundabouts (Standard)
57	>40	0.007	1.77	5 / 6	S	I	Roundabouts (Standard)
58	20/30/40	0.014	1.53	5 / 6	S	I	Roundabouts (Standard)
59	>40	0.019	1.42	5 / 6	D	I	Roundabouts (Standard)
60	20/30/40	0.006	1.73	5 / 6	D	I	Roundabouts (Standard)

61	>40	0.033	0.76	3	S	C	Roundabouts (Small)
62	20/30/40	0.033	0.76	3	S	C	Roundabouts (Small)
63	>40	0.033	0.76	3	D	C	Roundabouts (Small)
64	20/30/40	0.033	0.76	3	D	C	Roundabouts (Small)
65	>40	0.101	0.66	4	S	C	Roundabouts (Small)
66	20/30/40	0.263	0.54	4	S	C	Roundabouts (Small)
67	>40	0.101	0.66	4	D	C	Roundabouts (Small)
68	20/30/40	0.263	0.54	4	D	C	Roundabouts (Small)
69	>40	0.044	1.28	5 / 6	S	I	Roundabouts (Small)
70	20/30/40	0.095	1.14	5 / 6	S	I	Roundabouts (Small)
71	>40	0.044	1.28	5 / 6	D	I	Roundabouts (Small)
72	20/30/40	0.095	1.14	5 / 6	D	I	Roundabouts (Small)
73	>40	0.012	1.04	3	S	C	Roundabouts (Mini)
74	20/30/40	0.012	1.04	3	S	C	Roundabouts (Mini)
75	>40	0.012	1.04	3	D	C	Roundabouts (Mini)
76	20/30/40	0.012	1.04	3	D	C	Roundabouts (Mini)
77	>40	0.070	0.64	4	S	C	Roundabouts (Mini)
78	20/30/40	0.070	0.64	4	S	C	Roundabouts (Mini)
79	>40	0.070	0.64	4	D	C	Roundabouts (Mini)
80	20/30/40	0.070	0.64	4	D	C	Roundabouts (Mini)
81	>40	0.013	1.47	5 / 6	S	I	Roundabouts (Mini)
82	20/30/40	0.013	1.47	5 / 6	S	I	Roundabouts (Mini)
83	>40	0.013	1.47	5 / 6	D	I	Roundabouts (Mini)
84	20/30/40	0.013	1.47	5 / 6	D	I	Roundabouts (Mini)
85	>40	0.033	0.76	3	S	C	Roundabouts (Signalled)
86	20/30/40	0.033	0.76	3	S	C	Roundabouts (Signalled)
87	>40	0.033	0.76	3	D	C	Roundabouts (Signalled)
88	20/30/40	0.033	0.76	3	D	C	Roundabouts (Signalled)
89	>40	0.024	0.89	4	S	C	Roundabouts (Signalled)
90	20/30/40	0.048	0.74	4	S	C	Roundabouts (Signalled)
91	>40	0.063	0.69	4	D	C	Roundabouts (Signalled)
92	20/30/40	0.022	0.85	4	D	C	Roundabouts (Signalled)
93	>40	0.007	1.77	5 / 6	S	I	Roundabouts (Signalled)

94	20/30/40	0.014	1.53	5 / 6	S	I	Roundabouts (Signalled)
95	>40	0.019	1.42	5 / 6	D	I	Roundabouts (Signalled)
96	20/30/40	0.006	1.73	5 / 6	D	I	Roundabouts (Signalled)

Accident Beta Factors (Junction only)

Default Source: TAG data book v2.01 May 2025, Worksheet COBALT 7

Table Source Year:	2000

Junction only: Accident Beta Factors

Classification	Speed Limit (mph)	Beta Factor
Major	20/30/40	0.991
Major	>40	0.984
Minor	20/30/40	0.976
Minor	>40	0.996

Junction only: Accident Beta Factor Changes over Time

Year	Change to Beta Factor
1995	1.00
1996	1.00
1997	1.00
1998	1.00
1999	1.00
2000	1.00
2001	1.00
2002	1.00
2003	1.00
2004	1.00
2005	1.00
2006	1.00
2007	1.00
2008	1.00
2009	1.00
2010	1.00
2011	0.50
2012	0.50
2013	0.50
2014	0.50
2015	0.50
2016	0.50
2017	0.50
2018	0.50
2019	0.50
2020	0.50

2021	0.25
2022	0.25
2023	0.25
2024	0.25
2025	0.25
2026	0.25
2027	0.25
2028	0.25
2029	0.25
2030	0.25
Future Years	0.00

Accident proportions (Junction only)

Default Source: TAG data book v2.01 May 2025, Worksheet COBALT 8

Table Source Year:	2000

Junction only: Accident Proportions

Junction Type	Speed Limit (mph)	Accident Proportions			Arms	Highest Link (S/D)	Junction Description	Total of Junction Accident Proportions
		Fatal	Serious	Slight				
1	>40	0.0243	0.1883	0.7874	3	S	Priority	1.0000
2	20/30/40	0.0072	0.1240	0.8688	3	S	Priority	1.0000
3	>40	0.0243	0.1883	0.7874	3	D	Priority	1.0000
4	20/30/40	0.0072	0.1240	0.8688	3	D	Priority	1.0000
5	>40	0.0271	0.2064	0.7665	4	S	Priority	1.0000
6	20/30/40	0.0060	0.1162	0.8778	4	S	Priority	1.0000
7	>40	0.0271	0.2064	0.7665	4	D	Priority	1.0000
8	20/30/40	0.0060	0.1162	0.8778	4	D	Priority	1.0000
9	>40	0.0271	0.2064	0.7665	5	S	Priority	1.0000
10	20/30/40	0.0060	0.1162	0.8778	5	S	Priority	1.0000
11	>40	0.0271	0.2064	0.7665	5	D	Priority	1.0000
12	20/30/40	0.0060	0.1162	0.8778	5	D	Priority	1.0000
13	>40	0.0243	0.1883	0.7874	3	S	Priority w Ghost Island	1.0000
14	20/30/40	0.0072	0.1240	0.8688	3	S	Priority w Ghost Island	1.0000
15	>40	0.0243	0.1883	0.7874	3	D	Priority w Ghost Island	1.0000
16	20/30/40	0.0072	0.1240	0.8688	3	D	Priority w Ghost Island	1.0000
17	>40	0.0271	0.2064	0.7665	4	S	Priority w Ghost Island	1.0000
18	20/30/40	0.0060	0.1162	0.8778	4	S	Priority w Ghost Island	1.0000
19	>40	0.0271	0.2064	0.7665	4	D	Priority w Ghost Island	1.0000
20	20/30/40	0.0060	0.1162	0.8778	4	D	Priority w Ghost Island	1.0000
21	>40	0.0271	0.2064	0.7665	5	S	Priority w Ghost Island	1.0000
22	20/30/40	0.0060	0.1162	0.8778	5	S	Priority w Ghost Island	1.0000
23	>40	0.0271	0.2064	0.7665	5	D	Priority w Ghost Island	1.0000
24	20/30/40	0.0060	0.1162	0.8778	5	D	Priority w Ghost Island	1.0000
25	>40	0.0243	0.1883	0.7874	3	S	Priority w Single Lane Dualling	1.0000
26	20/30/40	0.0072	0.1240	0.8688	3	S	Priority w Single Lane Dualling	1.0000
27	>40	0.0243	0.1883	0.7874	3	D	Priority w Single Lane Dualling	1.0000

28	20/30/40	0.0072	0.1240	0.8688	3	D	Priority w Single Lane Dualling	1.0000
29	>40	0.0271	0.2064	0.7665	4	S	Priority w Single Lane Dualling	1.0000
30	20/30/40	0.0060	0.1162	0.8778	4	S	Priority w Single Lane Dualling	1.0000
31	>40	0.0271	0.2064	0.7665	4	D	Priority w Single Lane Dualling	1.0000
32	20/30/40	0.0060	0.1162	0.8778	4	D	Priority w Single Lane Dualling	1.0000
33	>40	0.0271	0.2064	0.7665	5	S	Priority w Single Lane Dualling	1.0000
34	20/30/40	0.0060	0.1162	0.8778	5	S	Priority w Single Lane Dualling	1.0000
35	>40	0.0271	0.2064	0.7665	5	D	Priority w Single Lane Dualling	1.0000
36	20/30/40	0.0060	0.1162	0.8778	5	D	Priority w Single Lane Dualling	1.0000
37	>40	0.0092	0.1171	0.8737	3	S	Signals	1.0000
38	20/30/40	0.0060	0.1066	0.8874	3	S	Signals	1.0000
39	>40	0.0092	0.1171	0.8737	3	D	Signals	1.0000
40	20/30/40	0.0060	0.1066	0.8874	3	D	Signals	1.0000
41	>40	0.0088	0.1153	0.8759	4	S	Signals	1.0000
42	20/30/40	0.0060	0.1069	0.8871	4	S	Signals	1.0000
43	>40	0.0088	0.1153	0.8759	4	D	Signals	1.0000
44	20/30/40	0.0060	0.1069	0.8871	4	D	Signals	1.0000
45	>40	0.0088	0.1153	0.8759	5 / 6	S	Signals	1.0000
46	20/30/40	0.0060	0.1069	0.8871	5 / 6	S	Signals	1.0000
47	>40	0.0088	0.1153	0.8759	5 / 6	D	Signals	1.0000
48	20/30/40	0.0060	0.1069	0.8871	5 / 6	D	Signals	1.0000
49	>40	0.0056	0.0912	0.9032	3	S	Roundabouts (Standard)	1.0000
50	20/30/40	0.0027	0.0746	0.9227	3	S	Roundabouts (Standard)	1.0000
51	>40	0.0056	0.0912	0.9032	3	D	Roundabouts (Standard)	1.0000
52	20/30/40	0.0027	0.0746	0.9227	3	D	Roundabouts (Standard)	1.0000
53	>40	0.0056	0.0912	0.9032	4	S	Roundabouts (Standard)	1.0000
54	20/30/40	0.0027	0.0746	0.9227	4	S	Roundabouts (Standard)	1.0000
55	>40	0.0056	0.0912	0.9032	4	D	Roundabouts (Standard)	1.0000
56	20/30/40	0.0027	0.0746	0.9227	4	D	Roundabouts (Standard)	1.0000
57	>40	0.0056	0.0912	0.9032	5 / 6	S	Roundabouts (Standard)	1.0000
58	20/30/40	0.0027	0.0746	0.9227	5 / 6	S	Roundabouts (Standard)	1.0000
59	>40	0.0056	0.0912	0.9032	5 / 6	D	Roundabouts (Standard)	1.0000
60	20/30/40	0.0027	0.0746	0.9227	5 / 6	D	Roundabouts (Standard)	1.0000

61	>40	0.0056	0.0912	0.9032	3	S	Roundabouts (Small)	1.0000
62	20/30/40	0.0027	0.0746	0.9227	3	S	Roundabouts (Small)	1.0000
63	>40	0.0056	0.0912	0.9032	3	D	Roundabouts (Small)	1.0000
64	20/30/40	0.0027	0.0746	0.9227	3	D	Roundabouts (Small)	1.0000
65	>40	0.0056	0.0912	0.9032	4	S	Roundabouts (Small)	1.0000
66	20/30/40	0.0027	0.0746	0.9227	4	S	Roundabouts (Small)	1.0000
67	>40	0.0056	0.0912	0.9032	4	D	Roundabouts (Small)	1.0000
68	20/30/40	0.0027	0.0746	0.9227	4	D	Roundabouts (Small)	1.0000
69	>40	0.0056	0.0912	0.9032	5 / 6	S	Roundabouts (Small)	1.0000
70	20/30/40	0.0027	0.0746	0.9227	5 / 6	S	Roundabouts (Small)	1.0000
71	>40	0.0056	0.0912	0.9032	5 / 6	D	Roundabouts (Small)	1.0000
72	20/30/40	0.0027	0.0746	0.9227	5 / 6	D	Roundabouts (Small)	1.0000
73	>40	0.0056	0.0912	0.9032	3	S	Roundabouts (Mini)	1.0000
74	20/30/40	0.0028	0.0868	0.9104	3	S	Roundabouts (Mini)	1.0000
75	>40	0.0056	0.0912	0.9032	3	D	Roundabouts (Mini)	1.0000
76	20/30/40	0.0028	0.0868	0.9104	3	D	Roundabouts (Mini)	1.0000
77	>40	0.0056	0.0912	0.9032	4	S	Roundabouts (Mini)	1.0000
78	20/30/40	0.0028	0.0868	0.9104	4	S	Roundabouts (Mini)	1.0000
79	>40	0.0056	0.0912	0.9032	4	D	Roundabouts (Mini)	1.0000
80	20/30/40	0.0028	0.0868	0.9104	4	D	Roundabouts (Mini)	1.0000
81	>40	0.0056	0.0912	0.9032	5 / 6	S	Roundabouts (Mini)	1.0000
82	20/30/40	0.0028	0.0868	0.9104	5 / 6	S	Roundabouts (Mini)	1.0000
83	>40	0.0056	0.0912	0.9032	5 / 6	D	Roundabouts (Mini)	1.0000
84	20/30/40	0.0028	0.0868	0.9104	5 / 6	D	Roundabouts (Mini)	1.0000
85	>40	0.0039	0.0624	0.9337	3	S	Roundabouts (Signalled)	1.0000
86	20/30/40	0.0031	0.0643	0.9326	3	S	Roundabouts (Signalled)	1.0000
87	>40	0.0039	0.0624	0.9337	3	D	Roundabouts (Signalled)	1.0000
88	20/30/40	0.0031	0.0643	0.9326	3	D	Roundabouts (Signalled)	1.0000
89	>40	0.0039	0.0624	0.9337	4	S	Roundabouts (Signalled)	1.0000
90	20/30/40	0.0031	0.0643	0.9326	4	S	Roundabouts (Signalled)	1.0000
91	>40	0.0039	0.0624	0.9337	4	D	Roundabouts (Signalled)	1.0000
92	20/30/40	0.0031	0.0643	0.9326	4	D	Roundabouts (Signalled)	1.0000
93	>40	0.0039	0.0624	0.9337	5 / 6	S	Roundabouts (Signalled)	1.0000

94	20/30/40	0.0031	0.0643	0.9326	5 / 6	S	Roundabouts (Signalled)	1.0000
95	>40	0.0039	0.0624	0.9337	5 / 6	D	Roundabouts (Signalled)	1.0000
96	20/30/40	0.0031	0.0643	0.9326	5 / 6	D	Roundabouts (Signalled)	1.0000

Casualty Rates and Beta Factors (Junction only)

Default Source: TAG data book v2.01 May 2025, Worksheet COBALT 9

Table Source Year:	2000

Junction only: Casualty Rates

Junction Type	Speed Limit (mph)	Casualties per P.I.A.			Arms	Highest Link (S/D)	Junction Description
		Fatal	Serious	Slight			
1	>40	0.0265	0.2413	1.355	3	S	Priority
2	20/30/40	0.0075	0.1350	1.144	3	S	Priority
3	>40	0.0265	0.2413	1.355	3	D	Priority
4	20/30/40	0.0075	0.1350	1.144	3	D	Priority
5	>40	0.0295	0.2793	1.459	4	S	Priority
6	20/30/40	0.0062	0.1292	1.244	4	S	Priority
7	>40	0.0295	0.2793	1.459	4	D	Priority
8	20/30/40	0.0062	0.1292	1.244	4	D	Priority
9	>40	0.0295	0.2793	1.459	5	S	Priority
10	20/30/40	0.0062	0.1292	1.244	5	S	Priority
11	>40	0.0295	0.2793	1.459	5	D	Priority
12	20/30/40	0.0062	0.1292	1.244	5	D	Priority
13	>40	0.0265	0.2413	1.355	3	S	Priority w Ghost Island
14	20/30/40	0.0075	0.1350	1.144	3	S	Priority w Ghost Island
15	>40	0.0265	0.2413	1.355	3	D	Priority w Ghost Island
16	20/30/40	0.0075	0.1350	1.144	3	D	Priority w Ghost Island
17	>40	0.0295	0.2793	1.459	4	S	Priority w Ghost Island
18	20/30/40	0.0062	0.1292	1.244	4	S	Priority w Ghost Island
19	>40	0.0295	0.2793	1.459	4	D	Priority w Ghost Island
20	20/30/40	0.0062	0.1292	1.244	4	D	Priority w Ghost Island
21	>40	0.0295	0.2793	1.459	5	S	Priority w Ghost Island
22	20/30/40	0.0062	0.1292	1.244	5	S	Priority w Ghost Island
23	>40	0.0295	0.2793	1.459	5	D	Priority w Ghost Island
24	20/30/40	0.0062	0.1292	1.244	5	D	Priority w Ghost Island
25	>40	0.0265	0.2413	1.355	3	S	Priority w Single Lane Dualling
26	20/30/40	0.0075	0.1350	1.144	3	S	Priority w Single Lane Dualling
27	>40	0.0265	0.2413	1.355	3	D	Priority w Single Lane Dualling
28	20/30/40	0.0075	0.1350	1.144	3	D	Priority w Single Lane Dualling
29	>40	0.0295	0.2793	1.459	4	S	Priority w Single Lane Dualling
30	20/30/40	0.0062	0.1292	1.244	4	S	Priority w Single Lane Dualling
31	>40	0.0295	0.2793	1.459	4	D	Priority w Single Lane Dualling
32	20/30/40	0.0062	0.1292	1.244	4	D	Priority w Single Lane Dualling
33	>40	0.0295	0.2793	1.459	5	S	Priority w Single Lane Dualling
34	20/30/40	0.0062	0.1292	1.244	5	S	Priority w Single Lane Dualling
35	>40	0.0295	0.2793	1.459	5	D	Priority w Single Lane Dualling
36	20/30/40	0.0062	0.1292	1.244	5	D	Priority w Single Lane Dualling
37	>40	0.0092	0.1631	1.444	3	S	Signals
38	20/30/40	0.0064	0.1157	1.214	3	S	Signals
39	>40	0.0092	0.1631	1.444	3	D	Signals
40	20/30/40	0.0064	0.1157	1.214	3	D	Signals
41	>40	0.0095	0.1423	1.467	4	S	Signals
42	20/30/40	0.0061	0.1177	1.253	4	S	Signals
43	>40	0.0095	0.1423	1.467	4	D	Signals
44	20/30/40	0.0061	0.1177	1.253	4	D	Signals
45	>40	0.0095	0.1423	1.467	5/6	S	Signals
46	20/30/40	0.0061	0.1177	1.253	5/6	S	Signals
47	>40	0.0095	0.1423	1.467	5/6	D	Signals
48	20/30/40	0.0061	0.1177	1.253	5/6	D	Signals
49	>40	0.0060	0.1019	1.214	3	S	Roundabouts (Standard)

Table Source Year:	2000

Junction only: Casualty Beta Factors

Classification	Speed Limit (mph)	Beta Factor		
		Fatal	Serious	Slight
Major	20/30/40	0.949	0.962	1.010
Major	>40	0.961	0.959	1.011
Minor	20/30/40	0.968	0.958	1.006
Minor	>40	0.976	0.972	1.011

Junction only: Casualty Beta Factor Changes over Time

Range of Years	Change to Beta Factor
1995	1.00
1996	1.00
1997	1.00
1998	1.00
1999	1.00
2000	1.00
2001	1.00
2002	1.00
2003	1.00
2004	1.00
2005	1.00
2006	1.00
2007	1.00
2008	1.00
2009	1.00
2010	1.00
Later Years	0.00

50	20/30/40	0.0027	0.0806	1.163	3	S	Roundabouts (Standard)
51	>40	0.0060	0.1019	1.214	3	D	Roundabouts (Standard)
52	20/30/40	0.0027	0.0806	1.163	3	D	Roundabouts (Standard)
53	>40	0.0060	0.1019	1.214	4	S	Roundabouts (Standard)
54	20/30/40	0.0027	0.0806	1.163	4	S	Roundabouts (Standard)
55	>40	0.0060	0.1019	1.214	4	D	Roundabouts (Standard)
56	20/30/40	0.0027	0.0806	1.163	4	D	Roundabouts (Standard)
57	>40	0.0060	0.1019	1.214	5/6	S	Roundabouts (Standard)
58	20/30/40	0.0027	0.0806	1.163	5/6	S	Roundabouts (Standard)
59	>40	0.0060	0.1019	1.214	5/6	D	Roundabouts (Standard)
60	20/30/40	0.0027	0.0806	1.163	5/6	D	Roundabouts (Standard)
61	>40	0.0060	0.1019	1.214	3	S	Roundabouts (Small)
62	20/30/40	0.0027	0.0806	1.163	3	S	Roundabouts (Small)
63	>40	0.0060	0.1019	1.214	3	D	Roundabouts (Small)
64	20/30/40	0.0027	0.0806	1.163	3	D	Roundabouts (Small)
65	>40	0.0060	0.1019	1.214	4	S	Roundabouts (Small)
66	20/30/40	0.0027	0.0806	1.163	4	S	Roundabouts (Small)
67	>40	0.0060	0.1019	1.214	4	D	Roundabouts (Small)
68	20/30/40	0.0027	0.0806	1.163	4	D	Roundabouts (Small)
69	>40	0.0060	0.1019	1.214	5/6	S	Roundabouts (Small)
70	20/30/40	0.0027	0.0806	1.163	5/6	S	Roundabouts (Small)
71	>40	0.0060	0.1019	1.214	5/6	D	Roundabouts (Small)
72	20/30/40	0.0027	0.0806	1.163	5/6	D	Roundabouts (Small)
73	>40	0.0060	0.1019	1.214	3	S	Roundabouts (Mini)
74	20/30/40	0.0028	0.0965	1.182	3	S	Roundabouts (Mini)
75	>40	0.0060	0.1019	1.214	3	D	Roundabouts (Mini)
76	20/30/40	0.0028	0.0965	1.182	3	D	Roundabouts (Mini)
77	>40	0.0060	0.1019	1.214	4	S	Roundabouts (Mini)
78	20/30/40	0.0028	0.0965	1.182	4	S	Roundabouts (Mini)
79	>40	0.0060	0.1019	1.214	4	D	Roundabouts (Mini)
80	20/30/40	0.0028	0.0965	1.182	4	D	Roundabouts (Mini)
81	>40	0.0060	0.1019	1.214	5/6	S	Roundabouts (Mini)
82	20/30/40	0.0028	0.0965	1.182	5/6	S	Roundabouts (Mini)
83	>40	0.0060	0.1019	1.214	5/6	D	Roundabouts (Mini)
84	20/30/40	0.0028	0.0965	1.182	5/6	D	Roundabouts (Mini)
85	>40	0.0039	0.0703	1.258	3	S	Roundabouts (Signalled)
86	20/30/40	0.0031	0.0705	1.221	3	S	Roundabouts (Signalled)
87	>40	0.0039	0.0703	1.258	3	D	Roundabouts (Signalled)
88	20/30/40	0.0031	0.0705	1.221	3	D	Roundabouts (Signalled)
89	>40	0.0039	0.0703	1.258	4	S	Roundabouts (Signalled)
90	20/30/40	0.0031	0.0705	1.221	4	S	Roundabouts (Signalled)
91	>40	0.0039	0.0703	1.258	4	D	Roundabouts (Signalled)
92	20/30/40	0.0031	0.0705	1.221	4	D	Roundabouts (Signalled)
93	>40	0.0039	0.0703	1.258	5/6	S	Roundabouts (Signalled)
94	20/30/40	0.0031	0.0705	1.221	5/6	S	Roundabouts (Signalled)
95	>40	0.0039	0.0703	1.258	5/6	D	Roundabouts (Signalled)
96	20/30/40	0.0031	0.0705	1.221	5/6	D	Roundabouts (Signalled)

Editable Parameter Lists

Road Type ID	Road Type	Road Category	In Use
1	D2 Motorways	Motorways	Yes
2	D3 Motorways	Motorways	Yes
3	D4 Motorways	Motorways	Yes
4	Modern S2 Roads	S2 A Roads	Yes
5	Modern S2 Roads with HS	S2 A Roads	Yes
6	Modern WS2 Roads	S2 A Roads	Yes
7	Modern WS2 Roads with HS	S2 A Roads	Yes
8	Older S2 A Roads	S2 A Roads	Yes
9	Other S2 Roads	Other S2 Roads	Yes
10	Modern D2 Roads	Dual Carriageways	Yes
11	Modern D2 Roads with HS	Dual Carriageways	Yes
12	Older D2 Roads	Dual Carriageways	Yes
13	Modern D3+ Roads	Dual Carriageways	Yes
14	Modern D3+ Roads with HS	Dual Carriageways	Yes
15	Older D3+ Roads	Dual Carriageways	Yes
16	Road Type 16	Not Defined	No
17	Road Type 17	Not Defined	No
18	Road Type 18	Not Defined	No
19	Road Type 19	Not Defined	No
20	Road Type 20	Not Defined	No

Road Category	In Use
Motorways	Yes
S2 A Roads	Yes
Other S2 Roads	Yes
Dual Carriageways	Yes
Road Category 5	No
Road Category 6	No

Note: Road Types and Road Categories must match those contained in the COBALT Parameters file that is used. Road Types 1-15 and the first 4 Road Categories are standard and cannot be changed.

COBALT Scheme Entry Template v2.1
Compatible with COBALT v2.2 and v2.3

Scheme Identifier	EMG2
Scheme Notes	
Current Year	2026
Scheme Traffic Model Base Year	2022
Traffic Model Year 1	2028
Traffic Model Year 2	2038
Traffic Model Year 3	
Traffic Model Year 4	
Traffic Model Year 5	
Scheme Opening Year (start of appraisal period)	2028
Extrapolation Parameter	1

The traffic flow extrapolation parameter is a value between 0 and 1 that is used to determine the extent to which a fully flat-line (extrapolation factor = 0) or full continuation of trend (extrapolation factor = 1) extrapolation is used.
See Section 5.5 of COBALT User Manual for further details.

COBALT Traffic Scheme Links

Scheme Identifier EMG2

Links (Valid)

Links (Invalid)

Validation	Basic Link Information					Forecast Traffic Flows: Volumes (AADT)										Observed PIA Data (Optional)								Comment (Optional)
							Without Scheme Flows					With Scheme Flows													
	Link Identifier	Link Type	Speed Limit	Junction Ends	Link Length (km)	Base 2022	Flow 1 2028	Flow 2 2038	Flow 3	Flow 4	Flow5	Flow 1 2028	Flow 2 2038	Flow 3	Flow 4	Flow 5	Obser-vation Year	Rate (PIA/ mvkm)	Year 1 Volume	Year 2 Volume	Year 3 Volume	Year 4 Volume	Year 5 Volume	Year 6 Volume	
	A453 L1	Older S2 A Roads	50	2	1.2	12353	14733	18265				17363	20553												
	A453 L2	Older S2 A Roads	50	2	0.8	15948	17741	20703				19947	23036												
	A453 L3	Older S2 A Roads	50	2	0.5	24401	26269	29193				37176	38605												
	A453 L4	Older D2 Roads	70	2	1	34879	39609	46613				35028	42356												
	A453 L5	Older D2 Roads	50	1	1.2	39764	43358	47483				36415	41535												
	A50 L6	Older D2 Roads	70	0	1.7	42702	45657	44710				44868	43684												
	A50 L7	Older D3+ Roads	70	1	1.5	91071	101174	107610				102707	110175												
	M1 J24A L1	Older S2 A Roads	70	0	0.5	8218	8620	9551				8324	9304												
	M1 J24A L2	Older D2 Roads	40	0	1.7	5529	8786	12197				8698	12030												
	M1 J24A L3	Modern D2 Roads with HS	50	0	1	34617	38706	41169				40666	44217												
	M1 J24A L4	Modern WS2 Roads with HS	70	0	0.6	7364	7437	7916				8517	8920												
	M1 J24A L5	Modern WS2 Roads with HS	50	0	0.4	18432	17759	17464				20342	20734												
	M1 J24A L6	Modern D2 Roads with HS	70	0	0.8	16186	20948	23704				20413	23482												
	M1 J24A L7	Older D2 Roads	70	0	1.7	42702	45657	44710				44868	43684												
	M1 J23A L1	Older D2 Roads	70	0	0.6	26697	30133	33519				22618	26441												
	M1 J23A L2	Older D2 Roads	70	0	0.7	24102	30326	33696				30187	33399												
	M1 J23A L3	Older D2 Roads	70	0	0.6	10800	12394	14276				14995	16042												
	M1 J23A L4	Older D2 Roads	70	0	0.8	24964	31150	31511				31327	32297												
	M1 J23A L5	Older D2 Roads	70	0	0.6	26293	32865	37121				33058	36714												
	M1 J23A L6	Older D2 Roads	70	0	0.8	8608	9851	10841				12127	12730												
	M1 J23A L7	Older S2 A Roads	70	0	0.7	3017	3915	6553				4591	6219												
	M1 J23A L8	Older D2 Roads	70	0	0.8	23679	26218	26966				18027	20223												
	M1 Mainline N	D4 Motorways	70	0	1	115806	143739	156933				145317	157805												
	M1 Mainline	D4 Motorways	70	0	1	134268	163289	174594				171885	181711												
	M1 Mainline S	D3 Motorways	70	0	2	117481	137839	147121				140499	148925												
	A6 Keg bypass	Modern WS2 Roads with HS	60	1	0.6	17277	19447	23457				21763	25893												
	A453 Ratcliffe	Modern D2 Roads with HS	70	1	1.5	50262	58317	69068				58688	70051												

COBALT Traffic Scheme Junctions

Scheme Identifier EMG2

Junctions (Valid)

Junctions (Invalid)

Validation	Basic Junction Information						Base 2022						Flow 1 2028					
	Junction Identifier	Junction Description	Speed Limit	Highest Carriage way	Highest Standard	Junction Arms	Arm 1 (Major)	Arm 2 (Minor)	Arm 3 (Major)	Arm 4 (Minor)	Arm 5	Arm 6	Arm 1 (Major)	Arm 2 (Minor)	Arm 3 (Major)	Arm 4 (Minor)	Arm 5	Arm 6
	A453/The Green	Priority	50	Single	Major	3	5743	3785	7174				6320	7048	7694			
	Airport Signals	Signals	50	Single	Major	3	4057	7724	6879				5620	7748	9006			
	Site Access Roun	Roundabout – Standard	50	Dual	Major	3	3896	12281	0	8224			3820	12457	0	9993		
	Site Access Roun	Roundabout – Standard	50	Dual	Major	4	3896	12281	0	8224			0	0	0	0		
	Finger Farm Rou	Roundabout – Standard	70	Dual	Major	4	12120	9574	26697	0			13812	10264	30133	0		
	EMG1 Access	Roundabout – Signalled	50	Dual	Major	4	25305	6900	9376	11284			29346	7736	9019	12798		
	M1 Junction 24	Roundabout – Signalled	50	Dual	Major	6	25797	26078	9188	19758	30388	18432	25203	27074	12841	22653	34339	17759
	A50 Junction 1	Roundabout – Standard	60	Dual	Major	6	2513	11498	11272	808	11810	10165	3508	15581	14875	849	13824	14592

Forecast Traffic Flows: Volumes (AADT)																									
Without Scheme Flows																									
Flow 2 2038						Flow 3						Flow 4						Flow5							
Arm 1 (Major)	Arm 2 (Minor)	Arm 3 (Major)	Arm 4 (Minor)	Arm 5	Arm 6	Arm 1 (Major)	Arm 2 (Minor)	Arm 3 (Major)	Arm 4 (Minor)	Arm 5	Arm 6	Arm 1 (Major)	Arm 2 (Minor)	Arm 3 (Major)	Arm 4 (Minor)	Arm 5	Arm 6	Arm 1 (Major)	Arm 2 (Minor)	Arm 3 (Major)	Arm 4 (Minor)	Arm 5	Arm 6	Arm 1 (Major)	Arm 2 (Minor)
8116	7455	10986																						7762	7566
7537	8848	11182																						6266	8728
3831	13510	0	11854																					0	0
0	0	0	0																					3145	17649
15683	12667	33519	0																					19527	12772
33947	7741	9730	15148																					22256	8220
25397	34114	13002	21555	37753	17464																			28872	27092
3662	19052	15139	1187	19011	14607																			3508	15693

With Scheme Flows																									
Flow 1 2028				Flow 2 2038						Flow 3						Flow 4						Flow 5			
Arm 3 (Major)	Arm 4 (Minor)	Arm 5	Arm 6	Arm 1 (Major)	Arm 2 (Minor)	Arm 3 (Major)	Arm 4 (Minor)	Arm 5	Arm 6	Arm 1 (Major)	Arm 2 (Minor)	Arm 3 (Major)	Arm 4 (Minor)	Arm 5	Arm 6	Arm 1 (Major)	Arm 2 (Minor)	Arm 3 (Major)	Arm 4 (Minor)	Arm 5	Arm 6	Arm 1 (Major)	Arm 2 (Minor)	Arm 3 (Major)	Arm 4 (Minor)
8565				9603	8313	10712																			
10470				8133	10143	12118																			
0	0			0	0	0	0																		
8015	11219			3099	18288	8039	12893																		
22618	0			20316	15009	26441	0																		
10031	14351			27347	8194	10499	17096																		
12852	11256	26385	20342	29680	34171	12951	12129	31036	20734																
14697	916	14548	14410	3564	19027	14305	2084	19133	13641																

		Observed PIA Data (Optional)								Comment (Optional)
Arm 5	Arm 6	Obser-vation Year	Rate 'a' parameter	Year 1 Volume	Year 2 Volume	Year 3 Volume	Year 4 Volume	Year 5 Volume	Year 6 Volume	

Link		2028 Baseline Typical Annual Accidents	2028 Typical Annual Accidents with Proposed Development	Proposed Development Impact (2028)	2038 Baseline Typical Annual Accidents	2038 Typical Annual Accidents with Proposed Development	Proposed Development Impact (2038)
1	A453 (Link 1)	0.5	0.6	Negligible	0.5	0.6	Negligible
2	A453 (Link 2)	0.4	0.4	Negligible	0.4	0.4	Negligible
3	A453 (Link 3)	0.3	0.5	Minor Adverse	0.3	0.4	Negligible
4	A453 (Link 4)	0.6	0.5	Minor Beneficial	0.6	0.6	Negligible
5	A453 (Link 5)	0.8	0.7	Minor Beneficial	0.8	0.7	Minor Beneficial
6	A50 (Link 6)	1.2	1.2	Negligible	1.1	1.0	Minor Beneficial
7	A50 (Link 7)	2.9	2.9	Negligible	2.7	2.8	Negligible
8	J24A (Link 1)	0.1	0.1	Negligible	0.1	0.1	Negligible
9	J24A (Link 2)	0.5	0.5	Negligible	0.6	0.6	Negligible
10	J24A (Link 3)	0.5	0.5	Negligible	0.4	0.5	Negligible
11	J24A (Link 4)	0.1	0.1	Negligible	0.1	0.1	Negligible
12	J24A (Link 5)	0.1	0.1	Negligible	0.1	0.1	Negligible
13	J24A (Link 6)	0.2	0.2	Negligible	0.2	0.2	Negligible
14	J24A (Link 7)	1.2	1.2	Negligible	1.1	1.0	Minor Beneficial
15	J23A (Link 1)	0.3	0.2	Minor Beneficial	0.3	0.2	Minor Beneficial
16	J23A (Link 2)	0.3	0.3	Negligible	0.3	0.3	Negligible
17	J23A (Link 3)	0.1	0.1	Negligible	0.1	0.1	Negligible
18	J23A (Link 4)	0.4	0.4	Negligible	0.4	0.4	Negligible
19	J23A (Link 5)	0.3	0.3	Negligible	0.3	0.3	Negligible
20	J23A (Link 6)	0.1	0.2	Negligible	0.1	0.1	Negligible
21	J23A (Link 7)	0.1	0.1	Negligible	0.1	0.1	Negligible
22	J23A (Link 8)	0.3	0.2	Minor Beneficial	0.3	0.2	Minor Beneficial
23	M1 Mainline (North)	2.1	2.1	Negligible	2.0	2.0	Negligible
24	M1 Mainline	2.3	2.5	Minor Adverse	2.2	2.3	Negligible
25	M1 Mainline (South)	3.3	3.4	Negligible	3.1	3.2	Negligible
26	A6 Kegworh Bypass	0.2	0.2	Negligible	0.2	0.2	Negligible
27	A453 Ratcliffe	1.0	1.0	Negligible	1.1	1.1	Negligible
Junction		**2028 Baseline Typical Annual Accidents**	**2028 Typical Annual Accidents with Proposed Development**	**Proposed Development Impact (2028)**	**2038 Baseline Typical Annual Accidents**	**2038 Typical Annual Accidents with Proposed Development**	**Proposed Development Impact (2038)**
1	A453/The Green Priority T junction	1.2	1.3	Negligible	1.4	1.5	Negligible
2	A453/Airport Signals T Junction	1.1	1.2	Negligible	1.2	1.3	Negligible
3	A453/Site Access Roundabout (Existing)	0.5	0.0	N/A	0.5	0.0	N/A
3	A453/Site Access Roundabout (Proposed)	0.0	2.5	Adverse	0.0	2.6	Adverse
4	Finger Farm Roundabout	3.1	3.5	Minor Adverse	3.8	4.2	Minor Adverse
5	EMG1 Access Roundabout	4.5	4.3	Minor Beneficial	5.3	5.2	Minor Beneficial
6	M1 Junction 24 Roundabout	15.3	13.3	Beneficial	16.7	15.3	Beneficial
7	A50 Junction 1 Roundabot	5.0	5.0	Negligible	6.0	5.9	Beneficial

APPENDIX 74: EMFM Construction Traffic Forecasting Report Assessment (document reference EMFM 2019 East Midlands Gateway Phase 2: Forecasting Report 1a Construction Traffic)

EMFM 2019

East Midlands Gateway Phase 2: Forecasting Report 1a Construction Traffic

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Quality Information

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Section 1 – Overview

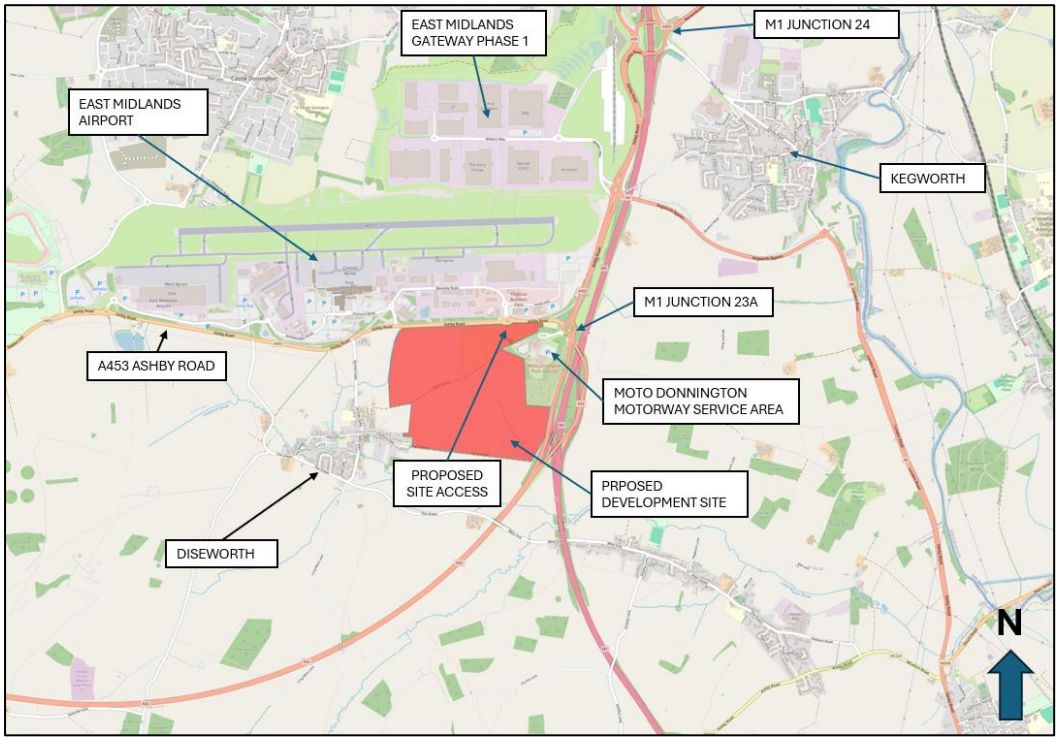
1.1 Introduction

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 (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 Development[1]



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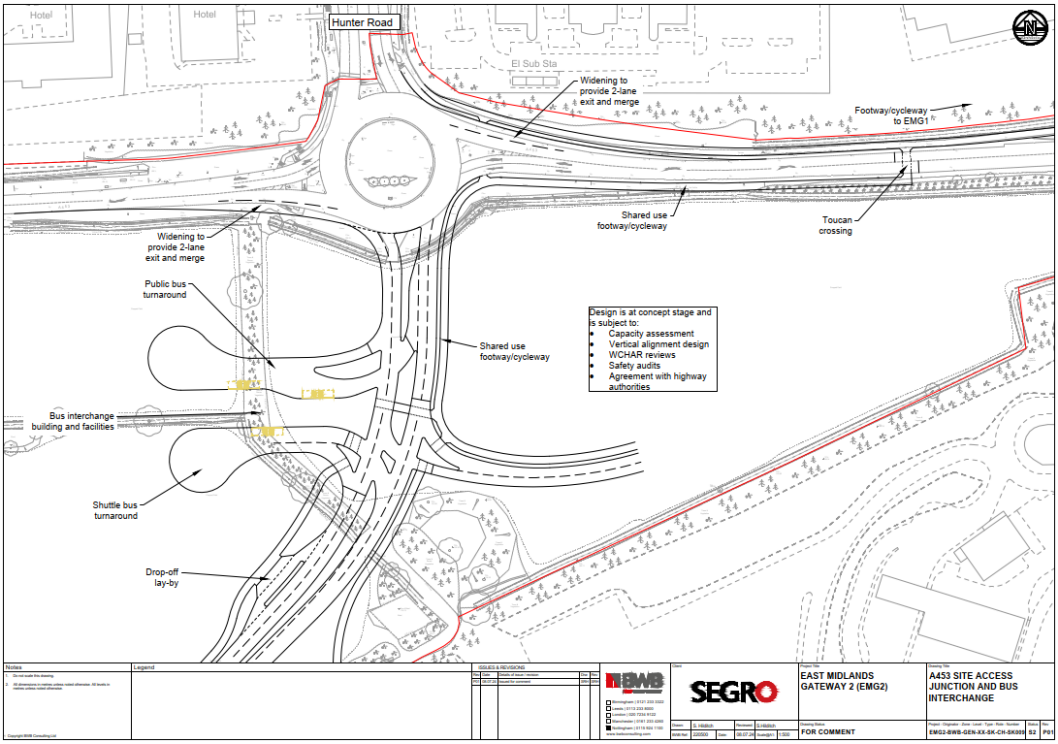
1.1.4 The proposed EMGP2 development will access the highway network via a fourth arm off the existing A453 / Hunter Road roundabout, as shown in Figure 1.2.

1.1.5 The proposed EMG Phase 1 (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 Junction[2]



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 Freeport 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 Freeport and Local Plan sites).

2028 'With Construction Traffic (1a)'. With construction traffic, without EMGP2 development (with all Freeport and Local Plan sites).

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

Stage 1b modelling (Proforma 14a)

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

2028 'With Construction Traffic (1b)'. With construction traffic, 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 Freeport and Local Plan sites).

[2] EMG2-BWB-GEN-XX-SK-CH-SK009 S2 P01

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 report[3], which details the calibrated 2019 base year model review and performance in the vicinity of the proposed development site. It forms an addendum to the Stage 1a forecast results documented in the Forecasting Report[4]. This addendum documents the forecast model results for 'With Construction Traffic (1a)' of the EMFM strategic modelling assessment.

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 within this assessment, including the assumed construction traffic and trip distribution.
- Section 3 – Forecast Model Results: this section details the forecast results with the construction traffic included and assigned using EMFM.
- Section 4– Summary of the Assessment: this section provides a summary of the assessment with the construction traffic included.

[3] EMFM 2019 – East Midlands Gateway Phase 2: Base Year Model Review Addendum v1.0 (2024-08-19)
[4] EMFM 2019 – East Midlands Gateway Phase 2: Forecasting Report v1.0 (2025-02-04)

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 scenario has been produced for this version of the addendum:

Stage 1a modelling (Proforma 14)

2028 'With Construction Traffic (1a)'. With construction traffic, without the EMGP2 or EMGP1 proposed developments (with all Freeport and Local Plan sites).

2.1.3 To produce the 'With Construction Traffic (1a)' forecasts, the highway demand for the construction traffic has been added to the EMFM 2028 'Without Development (1a)' highway demand matrices and assigned in the EMFM. To estimate the trip distribution, the in-built PRTM gravity model has been used.

2.1.4 With no network assumptions associated with the construction, the 'With Construction Traffic (1a)' scenario network is identical to the 'Without Development (1a)' scenario.

2.1.5 Sections 2.3 to 2.4 provide the trip generation and trip distribution assumptions for the construction traffic.

2.2 'Without Development' Assumptions

2.2.1 The forecast planning and infrastructure schemes, in the format of an uncertainty log, were reviewed by the client and stakeholders. The planning data assumptions and forecast assumptions are stated in the Forecasting Report[5].

2.3 Construction Traffic Trip Generation Assumptions

2.3.1 The construction traffic trip generation methodology and assumptions have been provided by BWB in the form of a technical note[6]. This includes a breakdown of construction traffic by vehicle type (namely HGVs, LGVs, cars, and vans) and by construction site (EMGP2, EMGP1 and 'external highway works' (predominantly related to works on the M1 Junction 24)).

2.3.2 The construction trip generation calculations assume all construction activities begin in 'Year 1' (assumed to be 2026) with 'Year 1' forecast to generate the highest volume of construction traffic. It has been agreed that 'Year 1' construction traffic should be assessed using the existing 2028 EMFM model; 'Without Development (1a). This approach provides a conservative basis for assessing the impact of construction traffic.

2.3.3 The construction traffic trip generation by vehicle type and construction site is provided in Table 2.1 for both the AM and PM Peak hours.

[5] EMFM 2019 – East Midlands Gateway Phase 2: Forecasting Report v1.0 (2025-02-04)
[6] EMG2-BWB-GEN-XX-RP-TR-0013_Construction Traffic Calculations-S2-P3.pdf (Email dated 2025-05-14)

Table 2.1: Construction Traffic Trip Generation

	Car and Van (in vehicles)			Light Vehicle (in vehicles)			HGV (in vehicles)			Total (in vehicles)		
	Departing (Out)	Arriving (In)	Total	Departing (Out)	Arriving (In)	Total	Departing (Out)	Arriving (In)	Total	Departing (Out)	Arriving (In)	Total
EMGP1												
AM Peak hour (08:00 to 09:00)	3	13	**16**	1	1	**2**	4	4	**8**	8	18	**26**
PM Peak hour (17:00 to 18:00)	19	3	**22**	0	0	**0**	1	1	**2**	20	4	**24**
EMGP2												
AM Peak hour (08:00 to 09:00)	7	34	**40**	2	2	**4**	7	7	**14**	16	43	**58**
PM Peak hour (17:00 to 18:00)	51	9	**60**	0	0	**0**	1	1	**2**	52	10	**62**
External Highway Works												
AM Peak hour (08:00 to 09:00)	3	10	**13**	1	1	**2**	5	5	**10**	9	16	**25**
PM Peak hour (17:00 to 18:00)	15	3	**18**	0	0	**0**	1	1	**2**	16	4	**20**
Total Construction Traffic												
AM Peak hour (08:00 to 09:00)	12	57	**68**	3	3	**6**	17	17	**34**	32	77	**108**
PM Peak hour (17:00 to 18:00)	85	14	**99**	1	1	**2**	3	3	**6**	89	18	**107**

2.3.4 The construction traffic arriving and departing the EMGP1 and EMGP2 sites has been assigned to the respective development zones in the EMFM model. For the 'external highway works', the majority of the traffic is associated with construction activities at M1 Junction 24. As there is no EMFM zone in the immediate vicinity of M1 Junction 24, the EMGP1 zone was identified as the most appropriate zone for loading the 'external highway works' construction traffic.

2.4 Proposed Construction Traffic Distribution Assumptions

2.4.1 As no designated routeing for construction traffic was available, it was agreed that the trip distribution would be based on the PRTM 'gravity model' approach. To reflect the longer distance nature of HGV construction traffic (e.g. earthworks, landscaping, etc.) the trip distribution for HGV traffic was adjusted such that shorter distance trips of fewer than 8 kilometres have been excluded from the trip distribution.

2.4.2 Figure 2.1 to Figure 2.4 show the forecast construction traffic trip distribution for HGVs, cars, vans and light vehicles for the 2028 'With Construction Traffic (1a)' scenario 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, vans and LGVs) is 1.0. These figures reflect the estimated trip generation values presented in Table 2.1

2.4.3 As noted in Paragraph 2.3.4, the 'external highway works' construction traffic has been loaded into the same zone as the EMGP1 construction traffic.

2.4.4 The forecast HGV construction traffic has a broadly similar distribution to and from the construction site in both the AM Peak and PM Peak hours, albeit there is more HGV construction traffic forecast in the AM Peak hour compared with the PM Peak hour. As expected, HGVs are forecast to use the

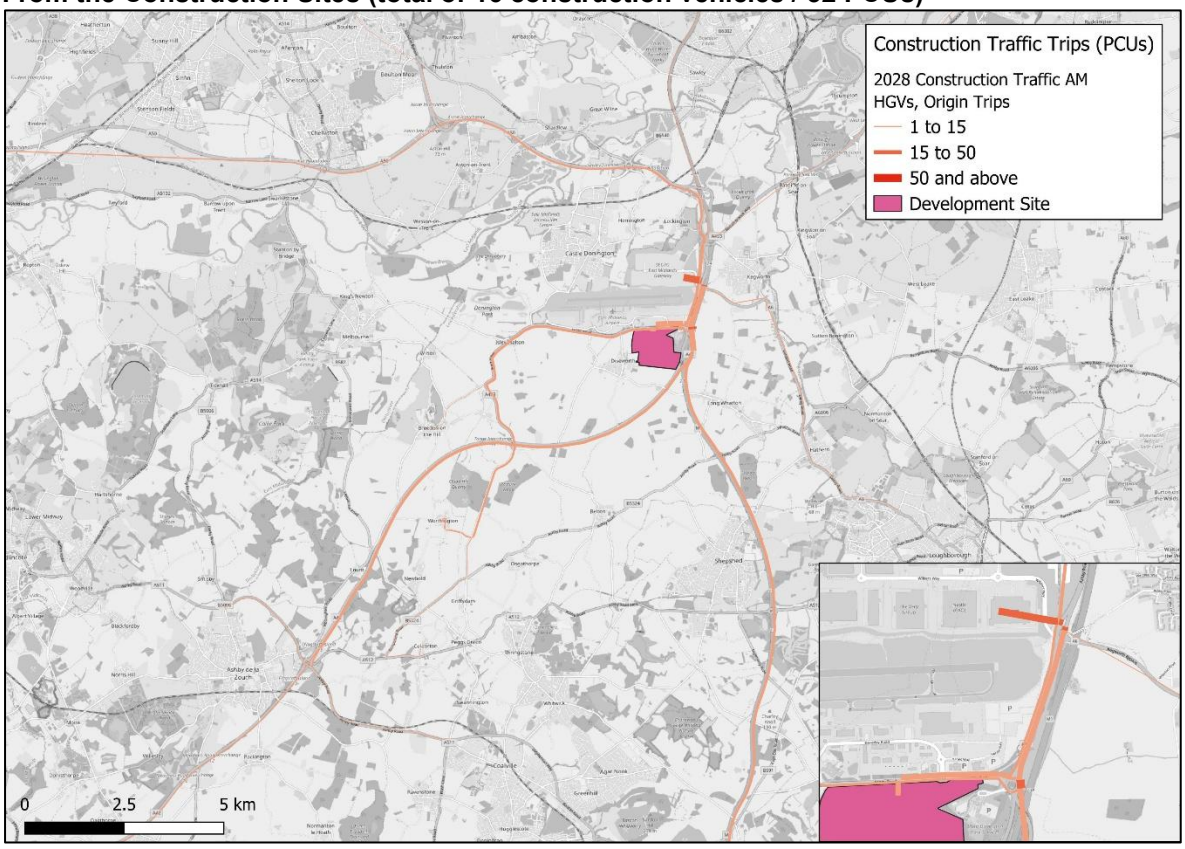
Strategic Road Network (SRN) such as the M1, A50, A42 and the A453 Remembrance Way towards Nottingham.

2.4.5 It should be noted that the local networks through Diseworth, Castle Donington and Kegworth have weight restrictions applied in the model. These restrictions are represented in the EMFM, and therefore HGV construction trips cannot route via these roads.

2.4.6 For car, van and light vehicle construction traffic, the majority of traffic arriving at the construction sites in the AM Peak hour is forecast to use the M1 northbound. This pattern is broadly reversed in the PM Peak hour whereby the majority of car, van and light vehicle construction traffic leaving the construction sites route via the M1 southbound. Other roads used by car, van and light vehicles construction traffic include the A42, A40 and the A6 Kegworth Bypass but these are forecast to carry fewer than 20 construction vehicles.

Figure 2.1: 2028 HGV Trip Distribution (AM)

From the Construction Sites (total of 16 construction vehicles / 32 PCUs)



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To the Construction Sites (total of 16 construction vehicles / 32 PCUs)

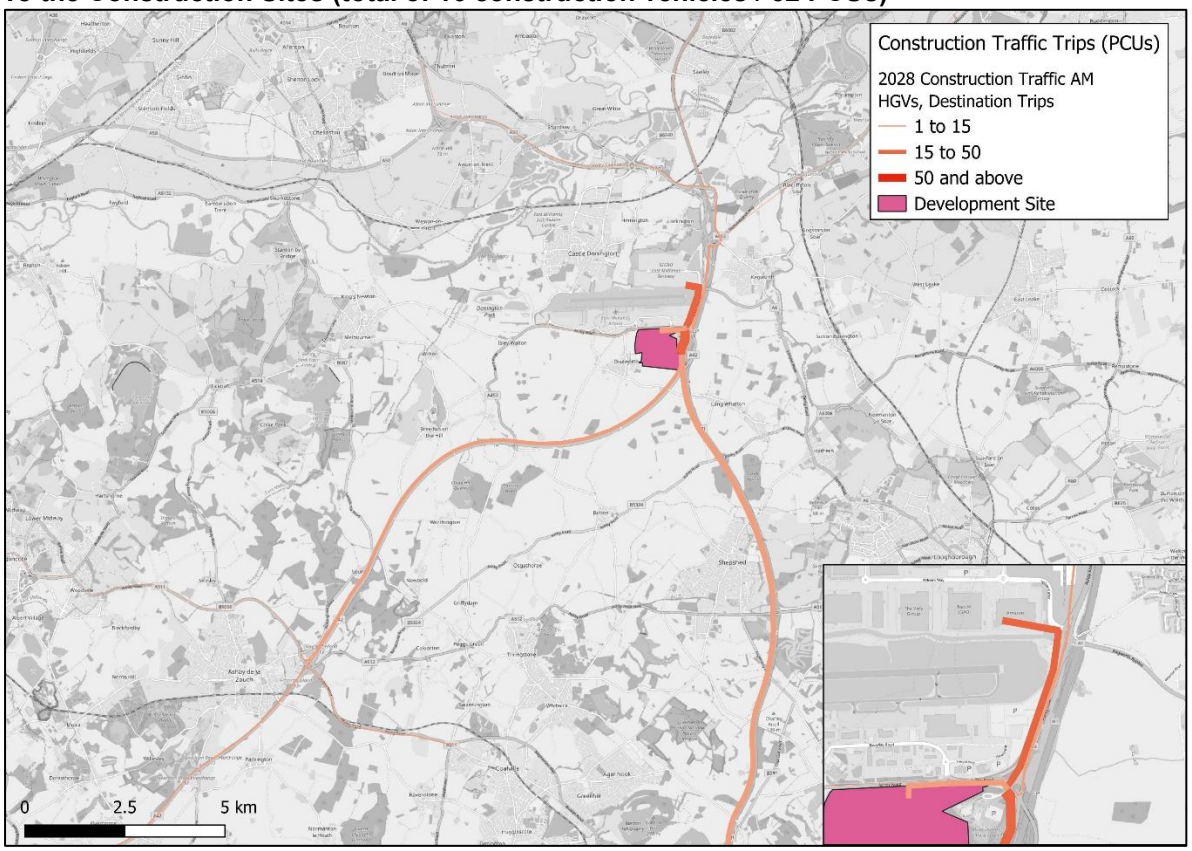

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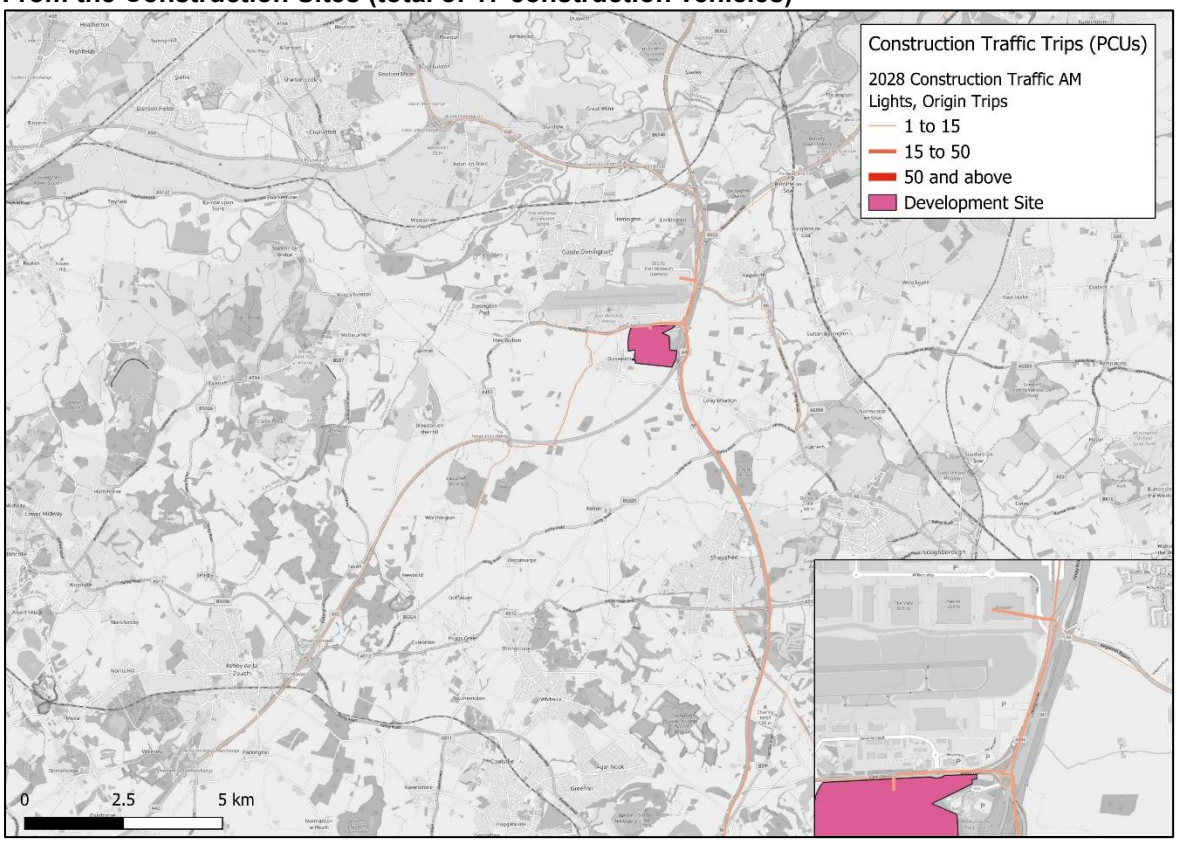
Figure 2.2: 2028 Car, Van and Light Vehicle Trip Distribution (AM)

From the Construction Sites (total of 17 construction vehicles)



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To the Construction Sites (total of 61 construction vehicles)

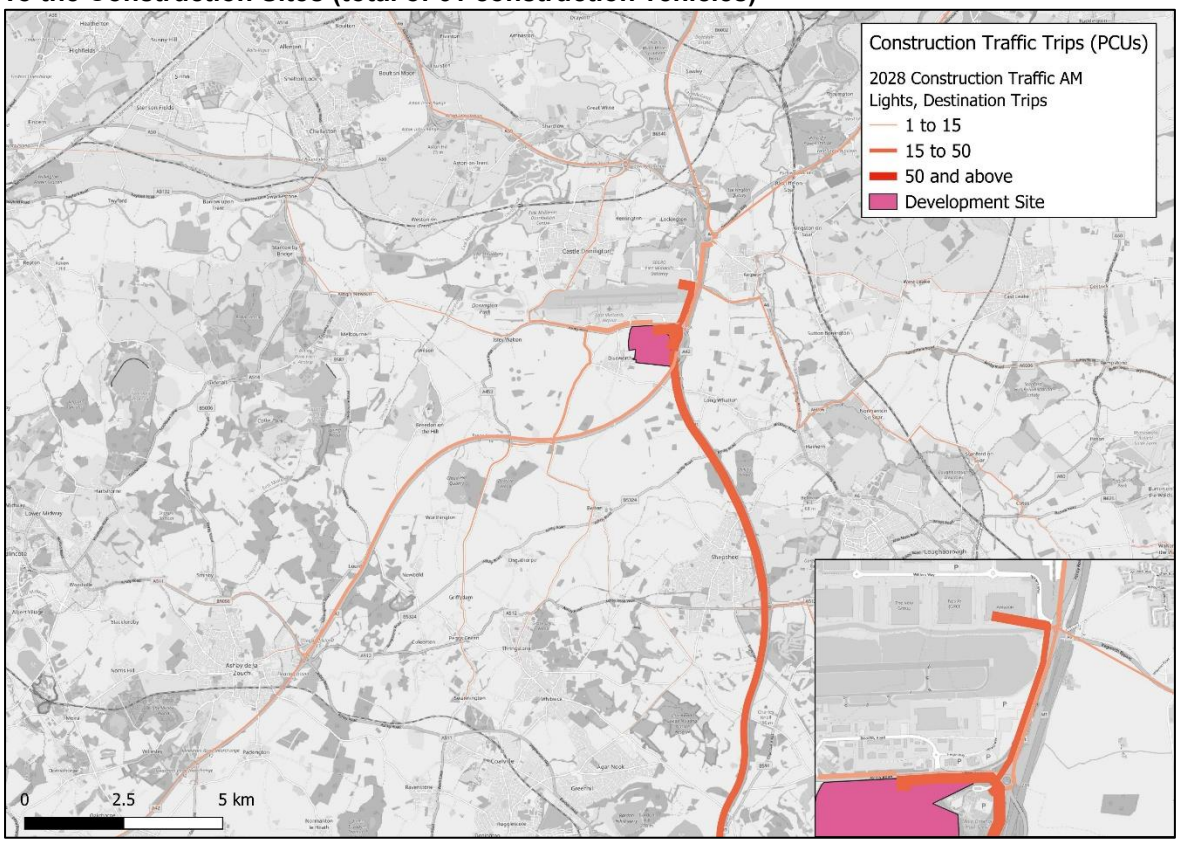

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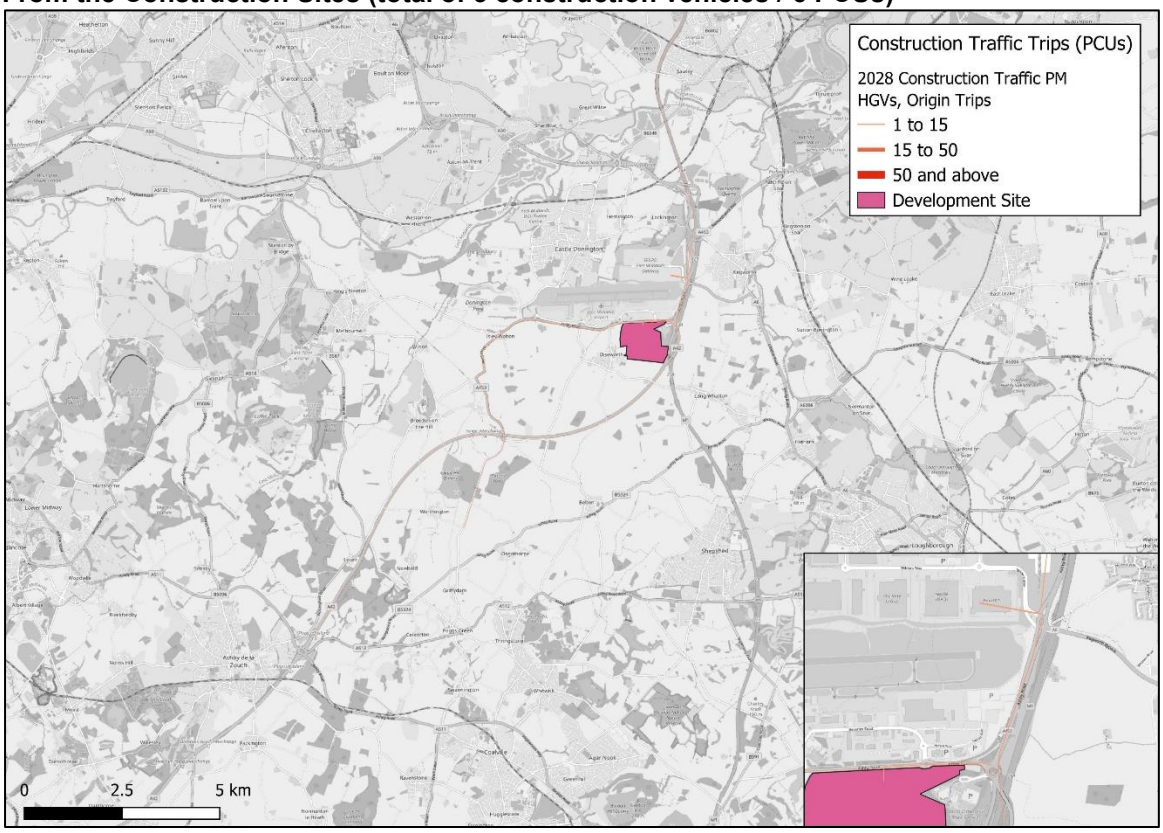
Figure 2.3: 2028 HGV Trip Distribution (PM)

From the Construction Sites (total of 3 construction vehicles / 6 PCUs)



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To the Construction Sites (total of 3 construction vehicles / 6 PCUs)

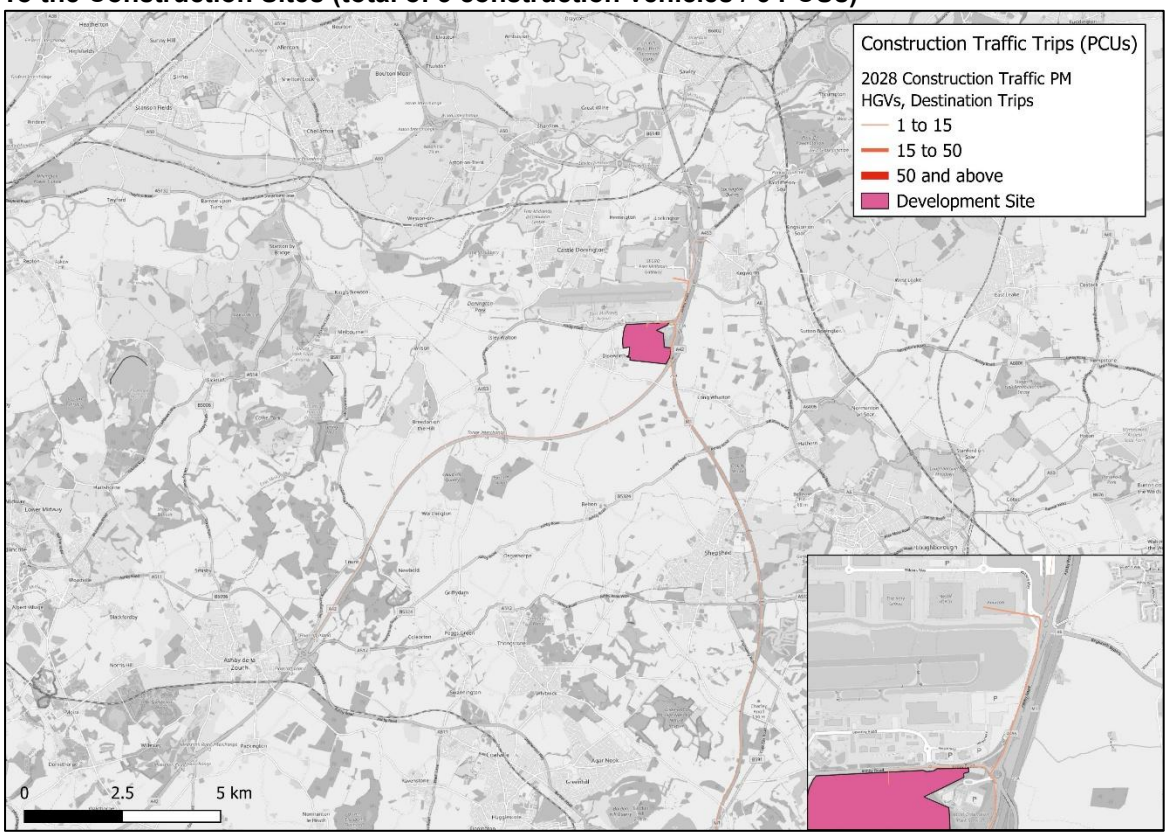

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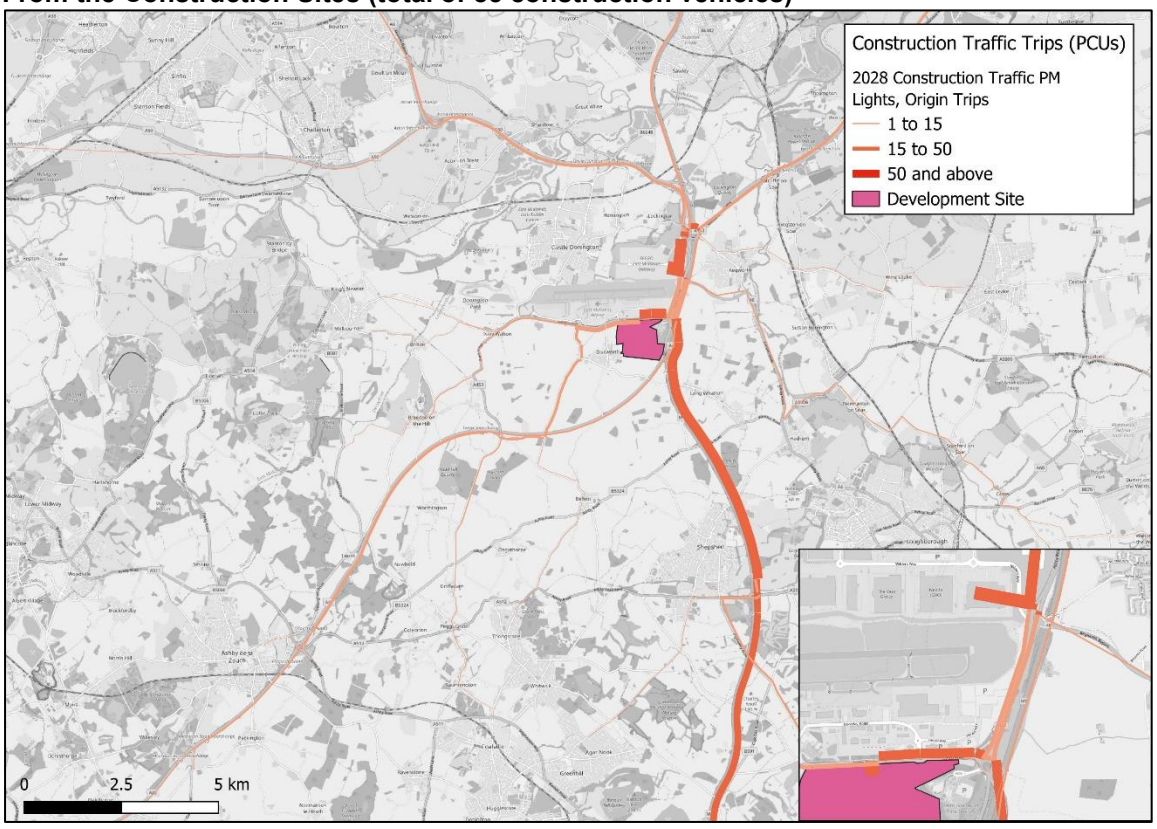
Figure 2.4: 2028 Car, Van and Light Vehicle Trip Distribution (PM)

From the Construction Sites (total of 85 construction vehicles)



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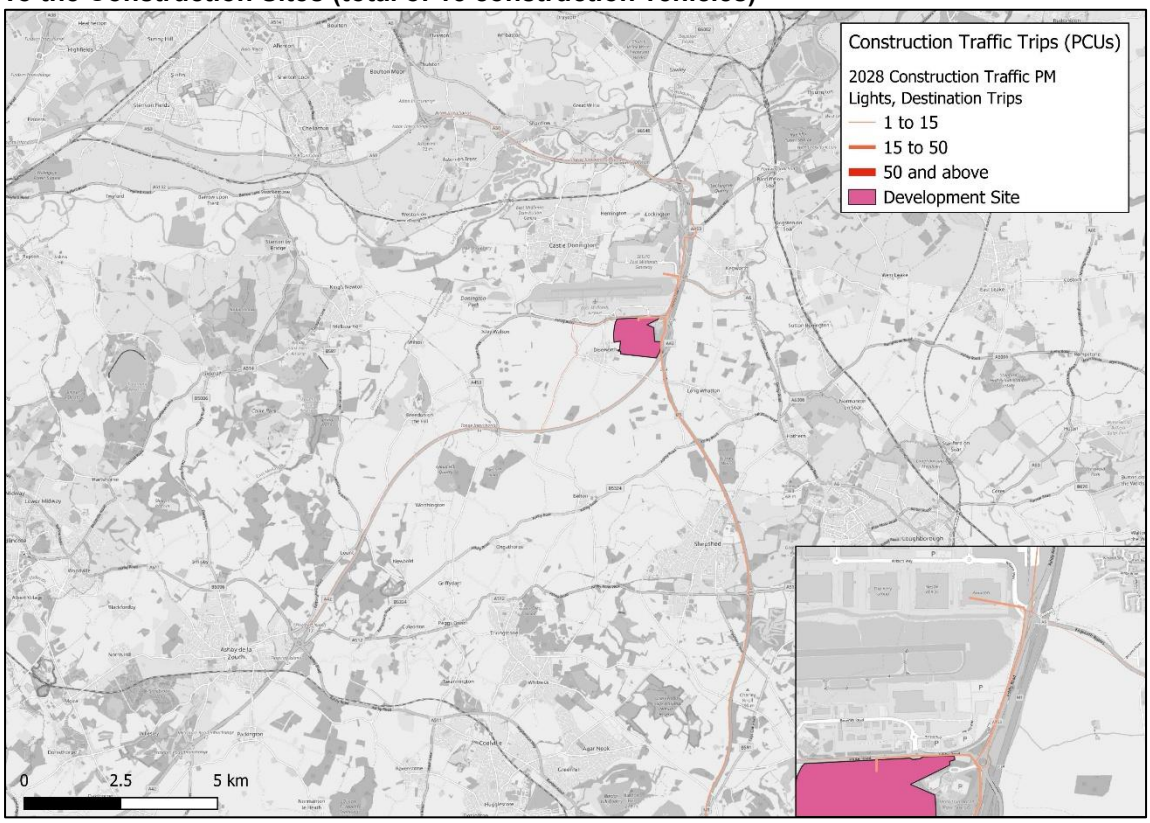
To the Construction Sites (total of 15 construction vehicles)



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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:

- routeing of the forecast construction traffic in the 2028 'With Construction Traffic (1a)' scenarios (Section 0 and Section 3.2);
- forecast flow changes in 2028 between the 'With Construction Traffic (1a)' and 'Without Development (1a)' scenarios (Section 3.3); and
- forecast maximum node volume-capacity ratios in the 2028 'With Construction Traffic (1a)' scenarios (Section 3.4).

3.2 Forecast Construction Traffic

3.2.1 It was agreed that the construction traffic trip distributions were to be based on the PRTM 'gravity model' approach.

3.2.2 Figure 2.1 to Figure 2.4 in Section 2 show the forecast trip distribution for HGVs, cars, vans and light vehicles travelling to and from the construction site in 2028, in PCUs, for both AM Peak and PM Peak hours.

3.2.3 As discussed in Section 2.4, the figures show that HGV construction traffic, although relatively small, primarily route via the SRN including the M1, A42, A50 and the A453 Remembrance Way. For car, van and light vehicle construction traffic, most traffic access the construction sites via the M1 south of the Wilders Way / A453 / A6 Kegworth Bypass junction.

3.3 Forecast Flow Change

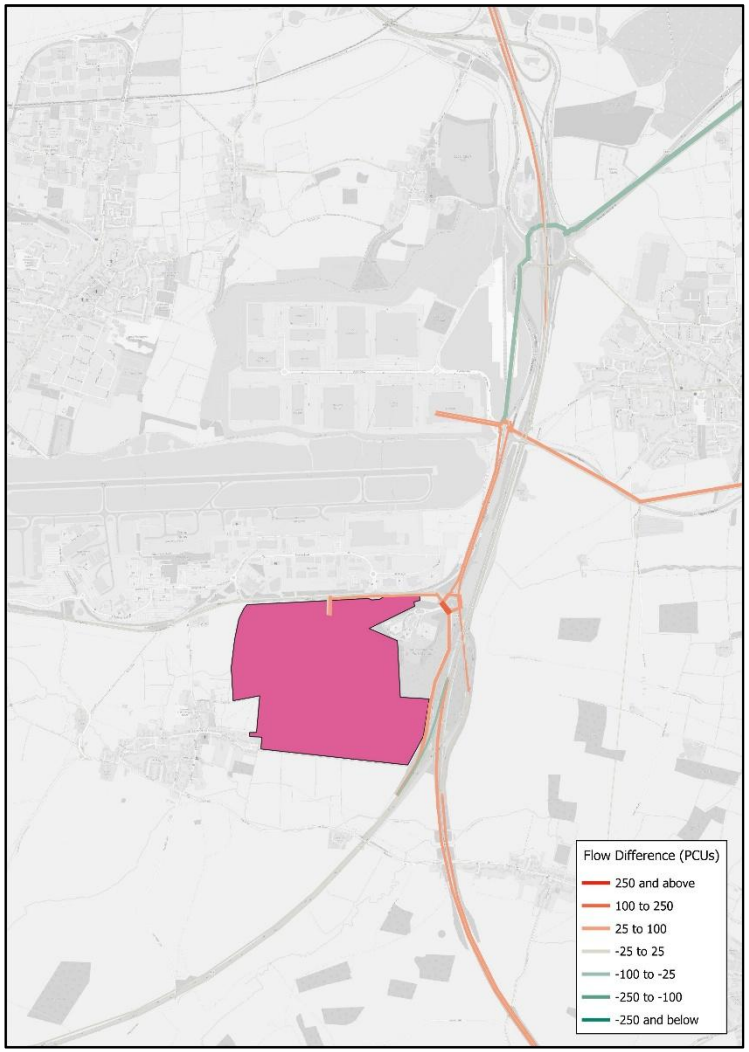
3.3.1 Figure 3.1 shows the forecast flow changes in 2028 between the 'With Construction Traffic (1a)' and 'Without Development (1a)' scenarios for the AM Peak and PM Peak hours. Red /orange bandwidth represents an increase in traffic flow in the 'With Construction Traffic (1a)' scenario and green bandwidth represents a decrease.

3.3.2 Considering these forecast flow changes in light of the forecast development traffic for the construction traffic (as shown in Section 2.4), there are forecast flow increases on the M1 in both peak hours and on A6 Kegworth Bypass in the AM Peak hour. The increase in traffic on the SRN broadly corresponds with the forecast routeing of traffic to / from the proposed construction sites.

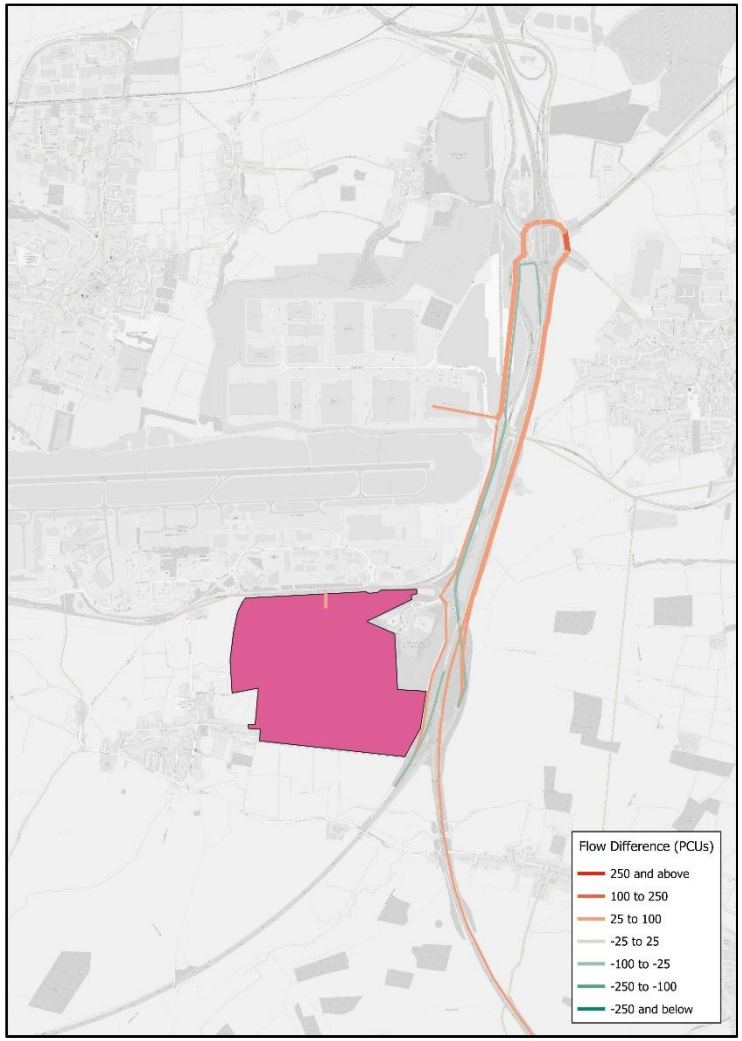
3.3.3 In terms of the A453 parallel to the M1 and the M1 Junction 24, there is evidence of forecast displacement of traffic, albeit for very few trips. The impact of construction traffic on the local road network is forecast to be minimal.

Figure 3.1: Forecast Flow Change for 2028 'With Construction Traffic (1a)' minus 'Without Development (1a)'

AM Peak hour



PM Peak hour



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3.4 Forecast Node Volume-Capacity Ratios

3.4.1 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.

3.4.2 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.

3.4.3 Figure 3.2 shows the forecast maximum junction volume-capacity ratios for 2028 ‘With Construction Traffic (1a)’ and ‘Without Development (1a)’ scenarios. For ease of comparison, the symbology has been designed to show the data for ‘Without Development (1a)’ and ‘With Construction Traffic (1a)’ scenarios on the same plot.

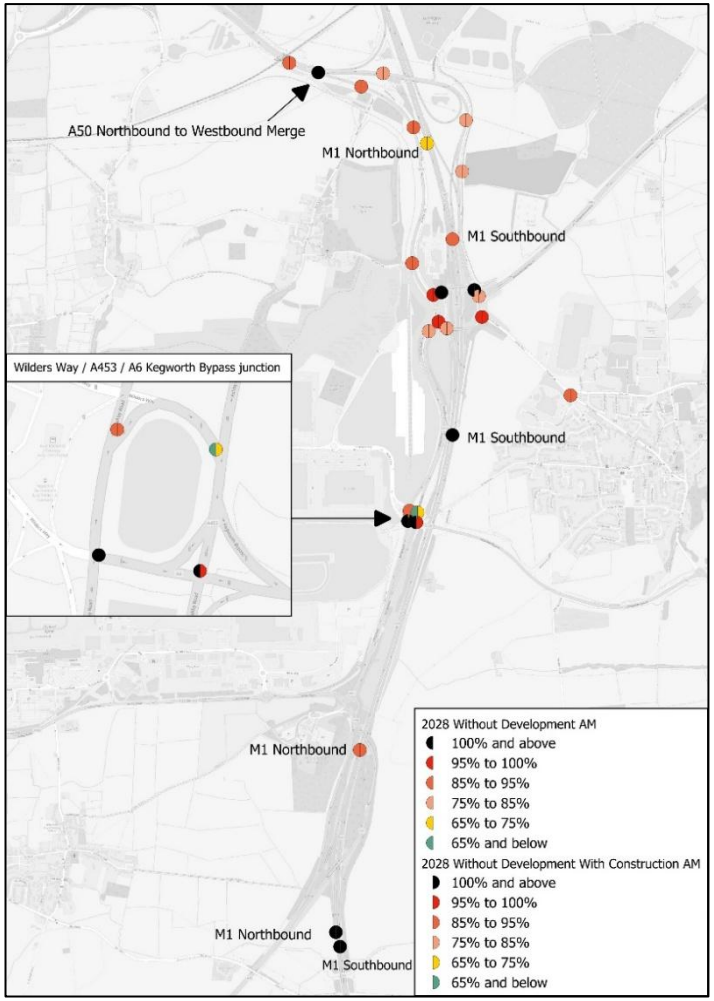
3.4.4 The reader should note that Figure 3.2 shows a subset of all nodes within the EMFM to reduce the number of data points within the plots. Nodes which do not fall within the AoI are not shown. Nodes with maximum volume-capacity ratios below 85% in all forecast scenarios are not shown.

3.4.5 As expected, given the relatively low forecast construction traffic flows, the forecast maximum node volume-capacity ratio plots show that the construction traffic has little impact on the node volume-capacity ratios in both the AM Peak and PM Peak hour on the wider SRN.

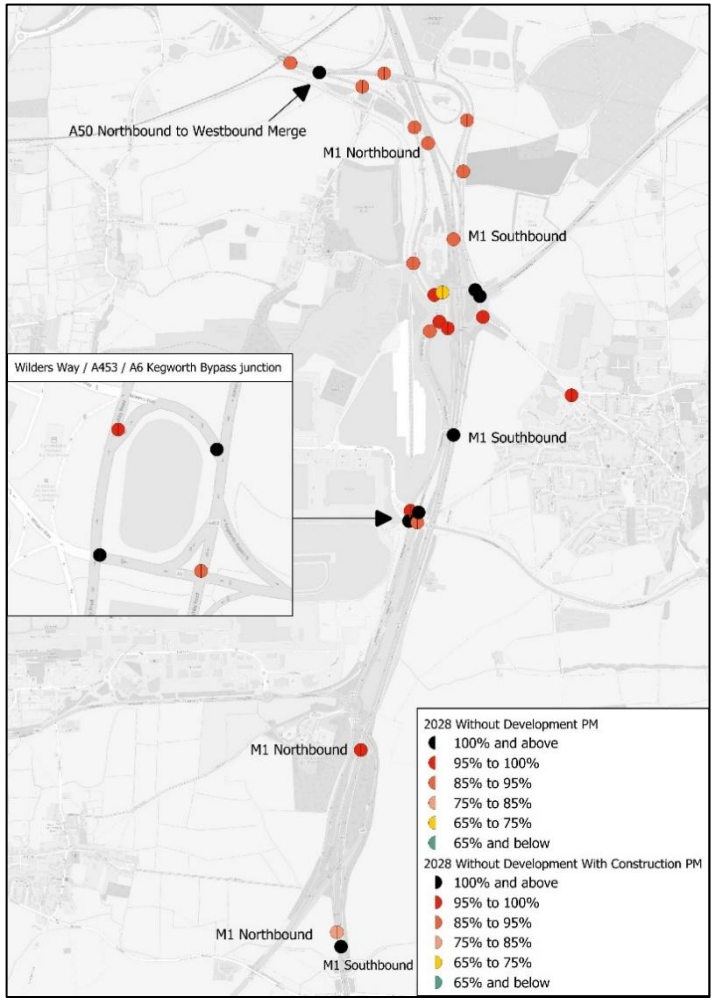
3.4.6 However, the volume-capacity ratio on the Wilders Way / A453 / A6 Kegworth Bypass junction in the AM Peak hour is forecast to increase at the A453 southbound approach (up to a maximum of 75%, so still within capacity) and decrease at the A453 southbound exit. It should also be noted that the forecast node volume-capacity ratios at this junction and M1 Junction 24 are high in the ‘Without Development (1a)’ scenarios, with multiple nodes exceeding 85% in both peaks.

Figure 3.2: Forecast Node Volume-Capacity Ratio for 2028 'Without Development (1a)' and the 2028 'With Construction Traffic (1a)' Scenarios

AM Peak hour



PM Peak hour



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Section 4 – Summary of the Assessment

4.1 Summary of Assessment

4.1.1 Using the East Midlands Freeport Model (EMFM), forecasts have been undertaken to produce the 2028 'With Construction Traffic (1a)' scenario for both the AM Peak and PM Peak hours for the strategic assessment of the impact of construction traffic.

4.1.2 The construction traffic trip generation forecasts were provided by BWB by vehicle type and by construction site. 'Year 1' construction traffic is forecast to generate the highest volume of construction traffic and these forecasts were assessed in the 2028 EMFM.

4.1.3 HGV construction traffic primarily routes via the SRN including the M1, A42, A50 and the A453 Remembrance Way. For car, van and light vehicle construction traffic, most access the construction sites via the M1 south of the Wilders Way / A453 / A6 Kegworth Bypass junction.

4.1.4 The forecast flow changes in 2028 between the 'With Construction Traffic (1a)' and 'Without Development (1a)' scenarios show that there are forecast flow increases on the M1 in both peak hours and A6 Kegworth Bypass on the PM Peak hour.

4.1.5 There is evidence of forecast displacement of traffic on the A453 parallel to the M1 and the M1 Junction 24, albeit for very few trips. The impact of construction traffic on the local road network is forecast to be minimal.

4.1.6 The forecast maximum node volume-capacity ratio plots show that the construction traffic has little impact in either peak hour on the wider SRN compared with the 'Without Development (1a)'

4.1.7 However, the volume-capacity ratio on the Wilders Way / A453 / A6 Kegworth Bypass junction in the AM Peak hour is forecast to increase at the A453 southbound approach and decrease at the A453 southbound exit. It should also be noted that the forecast node volume-capacity ratios at this junction and the M1 Junction 24 are high in the 'Without Development (1a)' scenarios, with multiple nodes exceeding 85% in both peaks.

4.1.8 The forecasts undertaken reflect the forecast impact of the construction traffic at EMGP2. 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.

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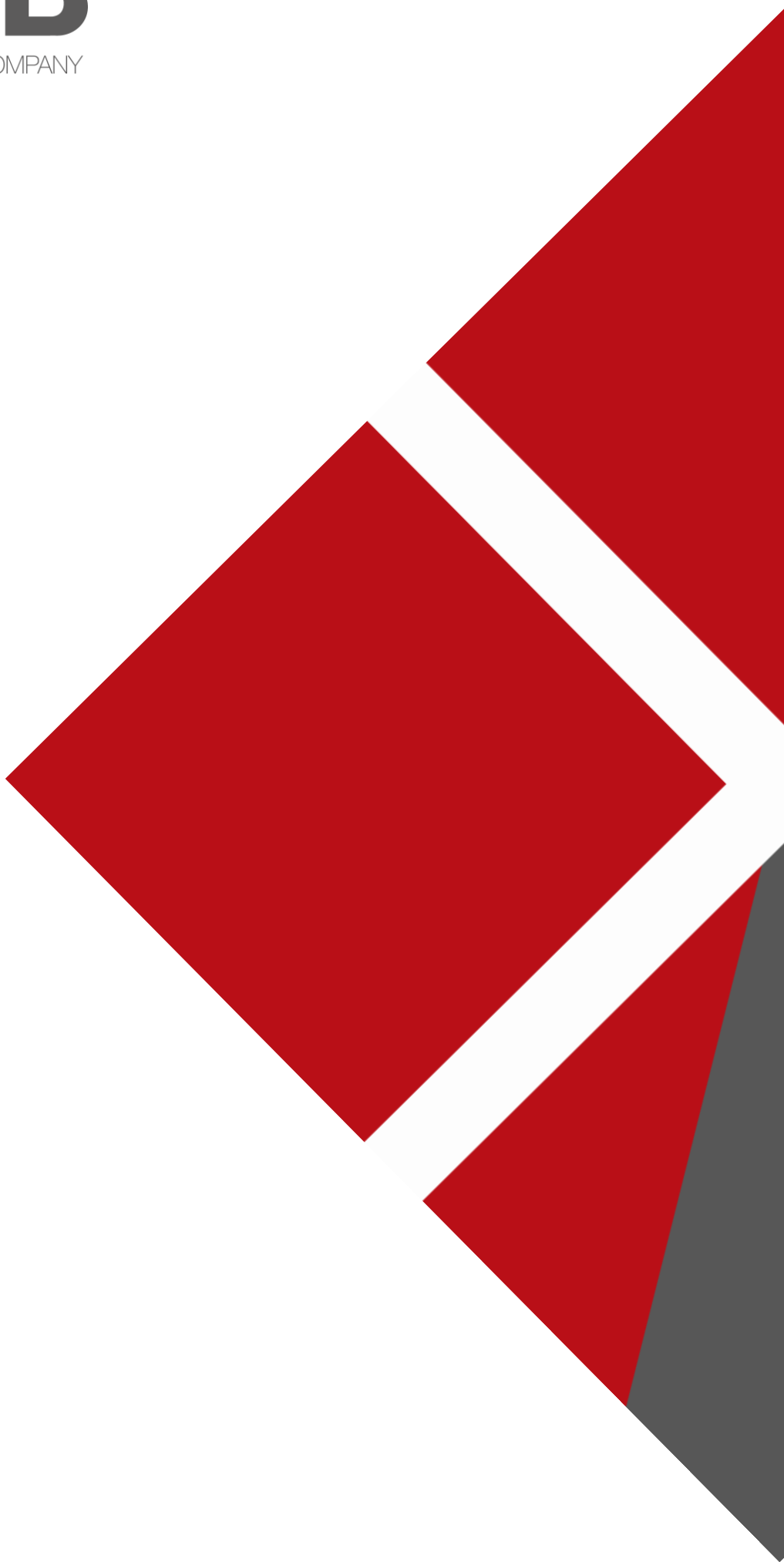

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