M5 Junction 10 Improvements Scheme

Transport Assessment Supplementary Report

TR010063 – APP 9.17

Gloucestershire
COUNTY COUNCIL

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Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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9.17 Transport Assessment Supplementary Report

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1. Introduction

1.1. Background

1.1.1.   The strategic transport modelling used in the Development Consent Order (DCO) application for the M5 Junction 10 Improvements Scheme was developed in accordance with the prevailing Department for Transport (DfT) Transport Analysis Guidance (TAG) with a 2015 base year validated against observed traffic data, including counts and journey times.

1.1.2.   The validated 2015 base year model was then used as basis for traffic forecasting which has been undertaken in accordance with the traffic growth estimates provided by the DfT National Trip End Model (NTEM V.08) for cars and National Road Traffic Projections 2022 (NRTP22) for goods vehicles.

1.1.3.   The strategic model has been updated on several occasions since its development to reflect the emergence of new DfT guidance or scheme design changes. It is worth noting that the base year for the model remains 2015. The intervening updates relate to the forecast models.

1.1.4.   Through Section 51 Advice, the Examining Authority (ExA) recommended in November 2023 that the current traffic model is assessed against present day (2023) observed traffic data to confirm that it remains valid in light of the impact of the COVID-19 pandemic on travel patterns.

1.1.5.   The ExA has also suggested that the Transport Assessment (TA) (APP-138) is updated to include the current year (2023) assessments so that the future operational performance of the modelled road network can be considered against current operational performance.

1.1.6.   This supplementary report provides the results of the traffic modelling work undertaken to address the ExA's recommendation regarding the potential impact of the COVID-19 on the validity of the current forecast models.

1.1.7.   The work reported in this document includes development of two 2023 forecast models, namely 'without' and 'with' COVID-19 adjustments and their comparisons against 2023 observed data which includes journey time and traffic counts data obtained from Gloucestershire County Council (GCC), National Highways (NH) and Department for Transport (DfT).

1.2. Structure of the Report

1.2.1.   The remainder of this supplementary report is structured as follows:

- Section 2 – Details of the collation of the observed traffic and travel data.

- Section 3 – Provides details of development of the new 2023 forecast model.

- Section 4 – Details the results of the new 2023 model forecasts without COVID-19 adjustment.

- Section 5 – Details the results of the new 2023 model forecasts with COVID-19 adjustment.

- Section 6 – Provides summary and conclusions of the study.

- Appendix A – Details update of the Uncertainty Log.

- Appendix B – Contains details of the modelled and observed journey times ((without COVID-19 adjustment).

- Appendix C – Details the locations of the counts used in the study and

comparisons of the modelled flows and observed link counts (without COVID-19 adjustment).

- Appendix D – Provides the results of the modelled and route choice comparisons (without COVID-19 adjustment).

- Appendix E – Contains details of the modelled and observed journey times (with COVID-19 adjustment).

- Appendix F – Includes comparisons of the modelled flows and observed link flows (with COVID-19 adjustment).

- Appendix G – Provides the results of the modelled and route choice comparisons (with COVID-19 adjustment).

2.   Collation of Observed Data

2.1.   Background

2.1.1.   The observed data including traffic counts and journey time information for this exercise was collated from GCC, NH and DfT databases. The details of 2023 observed data used for comparison against the forecast model outputs are presented in this section.

2.2.   Traffic Count Data

2.2.1.   The 2023 traffic link count data was obtained from GCC for the roads that do not form part of the Strategic Road Network (SRN) in the model area. For the SRN part of the model area highway network, the link count data was collated from the National Highways' WebTRIS site. Figure 1 shows the locations of link 113 counts collected at 77 sites used in this study.
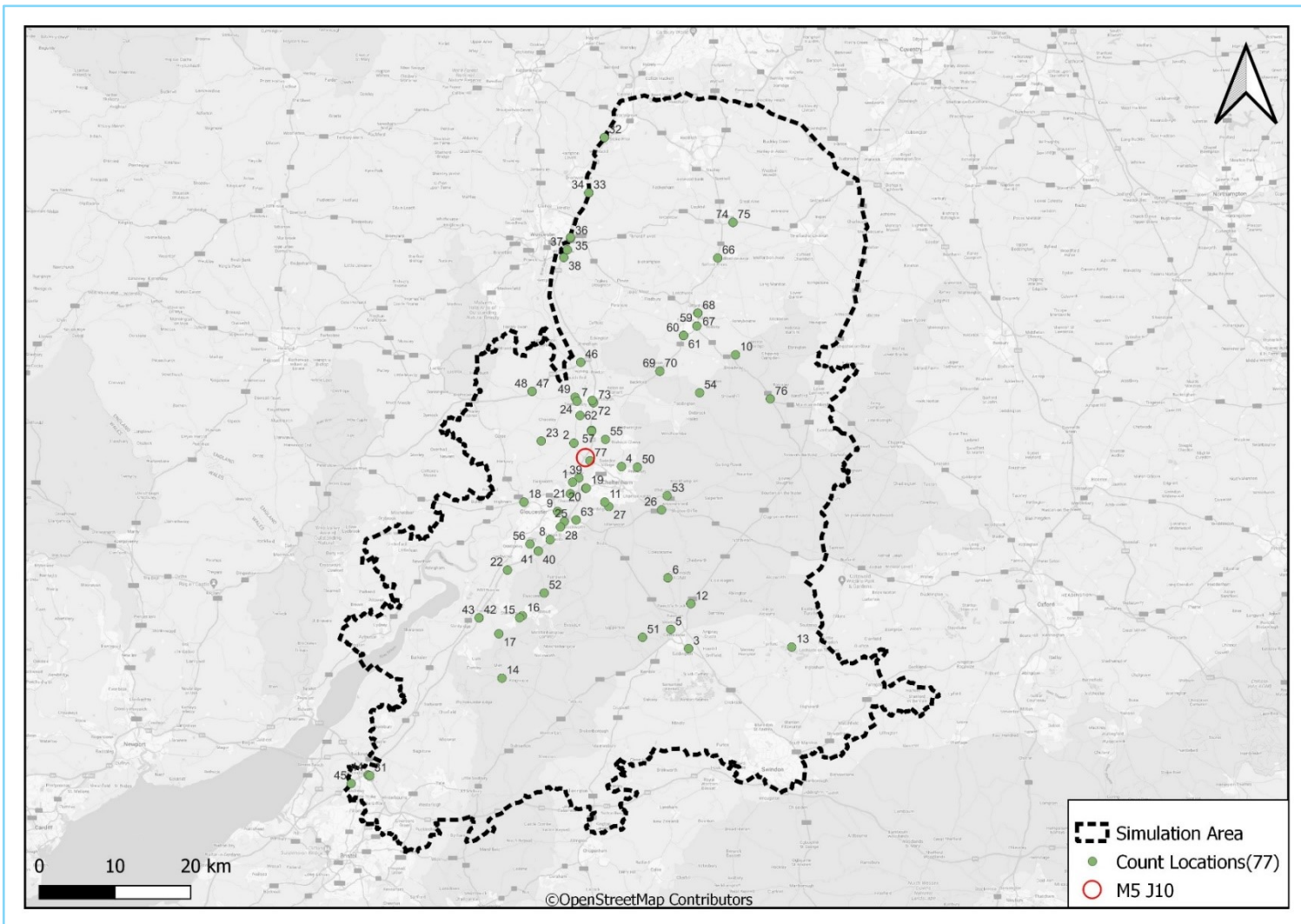
Figure 1 – Locations of the Link Counts Used in the Study

2.2.2.   With the M5 J10 2015 base year model representing average weekday in the neutral month of March, the 2023 data used was for weekdays during the same neutral month. In the absence of March data for some sites, count data from another neutral month was selected.

2.2.3.　　The count data was then checked to identify and remove anomalies and outliers as well as periods where special events such as the Cheltenham Cup, which took place in March 2023.

2.3.　Journey Time Data

2.3.1.　　Data from the DfT INRIX database was collected to provide information relating to journey times and speeds on highway links in the study area for all available months in 2023, which covered the period between January and September.

2.3.2.　　For comparison, the journey time data for weekdays in March 2023 was processed with the same methodology as the 2015 base year model for the same journey time routes covering the three modelled time periods, namely AM peak, Inter-peak and PM Peak.

2.3.3.　　The journey time was processed for a total of 56 individual routes covering all the key routes in the model area. Similar to the traffic count data, the anomalies and outliers in the journey time data, as well as periods where special events such as the Cheltenham Cup, which was held in March 2023, were removed from the dataset used in this study.

3.   Development of the 2023 Forecast Model

3.1.   Background

3.1.1.   The forecast model for 2023 was developed based on the same forecasting methodology used for the opening (2027) and design (2042) years forecast models which has been reported in Section 2 of the Transport Forecasting Report (APP-142). The overall forecasting approach to produce the M5 J10 scheme 2023 forecast model is summarised in Figure 2.

Figure 2 – Overview of the Forecasting Process
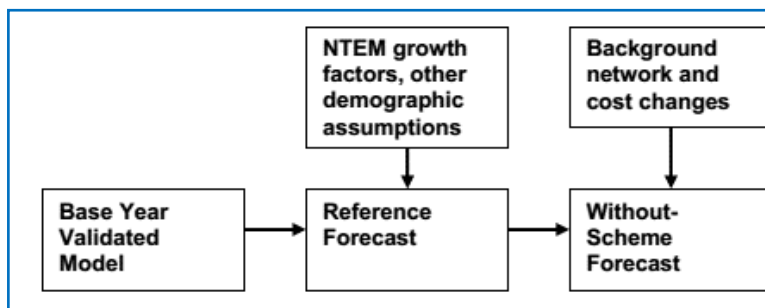
3.2.   Key Features of the 2023 Forecast Model

3.2.1.   The key features of the 2023 forecast models are as follows:

Modelling System and Software

- The M5 J10 forecast model known as GCTM V2.3 consists of the following components:
- Demand model – required for estimating how travellers respond to changes in their travel costs. The software used is DIADEM Version 7.0.
- Highway assignment model – required for estimating travel costs and identifying the routes travellers may choose through the road network. The software used is SATURN Version 11.4.07H.

Model Area

3.2.2.   The Fully Modelled Area (FMA) or Simulation area for the M5 J10 scheme model (GCTM V2.3), where highway junctions are generally explicitly modelled, has evolved from the A417 model and South West Regional Model (SWRTM).

3.2.3.   Figure 3 shows the Fully Modelled Area (FMA) including the areas extended during the development of the current M5 J10 scheme model (GCTM V2.3). Full details of the evolvement of the M5 J10 scheme model area can be found in Section 4.4 of the Transport Model Package (APP-140).

Figure 3 – M5 J10 Scheme GCTM Version 2.3 Fully Modelled Area
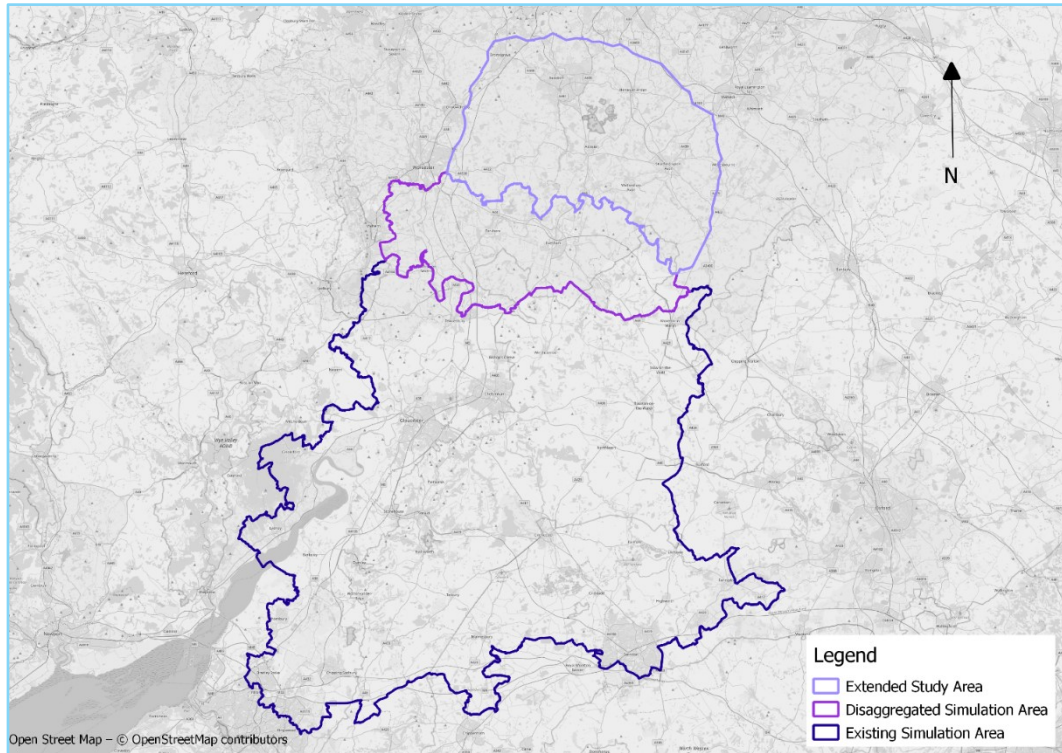
Values of Time and Vehicle Operating Cost

3.2.4. The Values of Time (VoT) and Vehicle Operating Costs (VOC) used for the 2023 forecast (GCTM V2.3) model were calculated based on the same TAG Databook (v1.20.2) which has been used for the opening year (2027) and design year (2042) models. Table 1 shows the VoT in Pence per Minute (PPM) and VOC in Pence per Kilometre (PPK) for the five user classes used in the 2023 model.

Table 1 – 2023 Forecast Model Values of Time and Vehicle Operating Cost Parameters

User Class No	Description	AM Peak	Inter-peak	PM Peak
Values of Time in Pence per Minute				
1	Car (business)	30.75	31.51	31.20
2	Car (commute)	20.62	20.96	20.69
3	Car (other)	14.23	15.16	14.90
4	LGV	22.87	22.87	22.87
5	HGV	54.94	54.94	54.94
Vehicle Operating Costs in Pence per Kilometre				
1	Car (business)	13.57	13.57	13.57
2	Car (commute)	7.58	7.58	7.58
3	Car (other)	7.58	7.58	7.58
4	LGV	14.93	14.93	14.93

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User Class No	Description	AM Peak	Inter-peak	PM Peak
5	HGV	46.95	46.95	46.95

Time Periods

- Model Time Periods: AM weekday average hour: 07:00 – 10:00

- IP (Inter-peak) weekday average hour: 10:00 – 16:00

- PM weekday average hour: 16:00 – 19:00

- OP (Off Peak) weekday average hour: 19:00 – 07:00

User Classes

- User Class 1 (UC1): Cars – Employers' Business

- User Class 1 (UC2): Cars – Commuting

- User Class 3 (UC3): Cars – Other

- User Class 4 (UC4): Light Goods Vehicles

- User Class 5 (UC5): Heavy Goods Vehicles

3.3.   Update of the Uncertainty Log

3.3.1.   TAG Unit M4 sets out the guidelines for the treatment of uncertainty in model forecasting. Determining uncertainty around input assumptions on demand forecasts is used to develop and assess alternative scenarios. The guidance anticipates that a 'core' scenario will be developed and to account for future uncertainty, a range of sensitivity tests or alternative scenarios will also be developed.

3.3.2.   To analyse uncertainty, an Uncertainty Log is developed. This log highlights all the local and external uncertainties and factors likely to affect the traffic and delivery of scheme benefits. The Uncertainty Log includes an assessment of the uncertainty of each individual input by placing it into one of four categories, as defined in Table 4 (from TAG Unit M4, Appendix A, Table A2).

3.3.3.   The Uncertainty Log developed for the M5 J10 scheme models for the opening (2027) and design (2042) years has been reviewed and updated with the data provided by GCC for the status of the planned developments and highway networks in 2023. The purpose of developing a 2023 model is to enable its outputs to be compared with observed data to establish the model's validity in simulating the current year (2023) traffic levels. Consequently, only developments and highway schemes that have been completed by 2023 are included in the 2023 model, with all other developments excluded from the model, regardless of their classifications.

Planned Highway Networks

3.3.4.   The status of the planned highway networks in 2023 was updated and the changes identified during this process were used to develop the 2023 highway network. Table A-1 in Appendix A shows the status of highway schemes in 2023.

Planned Developments

3.3.5.   The status of the planned developments in 2023 was updated and the changes identified in various types of developments including housing and employment were accounted for in preparing the 2023 trip matrices. Tables A-2 and A-3 in Appendix A show the status of the planned developments in 2023.

3.4.   Demand Matrices

3.4.1.   The 2023 forecast model has been developed using Variable Demand Modelling (VDM). In this process, the Reference Case (RC) forecast matrices are a key input to the VDM process which creates the final post-VDM matrices.

3.4.2.   The RC matrices reflect the changes in demand from the base year attributable to demographic changes, such as the number of jobs in an area, the number of residents in an area and car ownership levels. They represent the travel demand that would arise if there were no changes in travel costs from the base year model.

3.4.3.   The demand model then creates forecast assignments using the Reference Case matrices to extract travel costs which are pivoted off the model base year assignment. Using this methodology, the forecast matrices for 2023 were created accounting for:

- Transport interventions between the base year and the forecast year;
- Changes in the value of time resulting from real changes in income;
- Changes in levels of congestion arising from changes in car usage; and
- Increases in fuel efficiency which make car travel cheaper.

3.4.4.   Figure 4 shows the main steps in the methodology adopted for producing demand matrices. Full details of the development of demand matrices are provided in Section 3.2 of the Transport Forecasting Report (APP-142).

Figure 4 – Demand Development Methodology Flow Chart
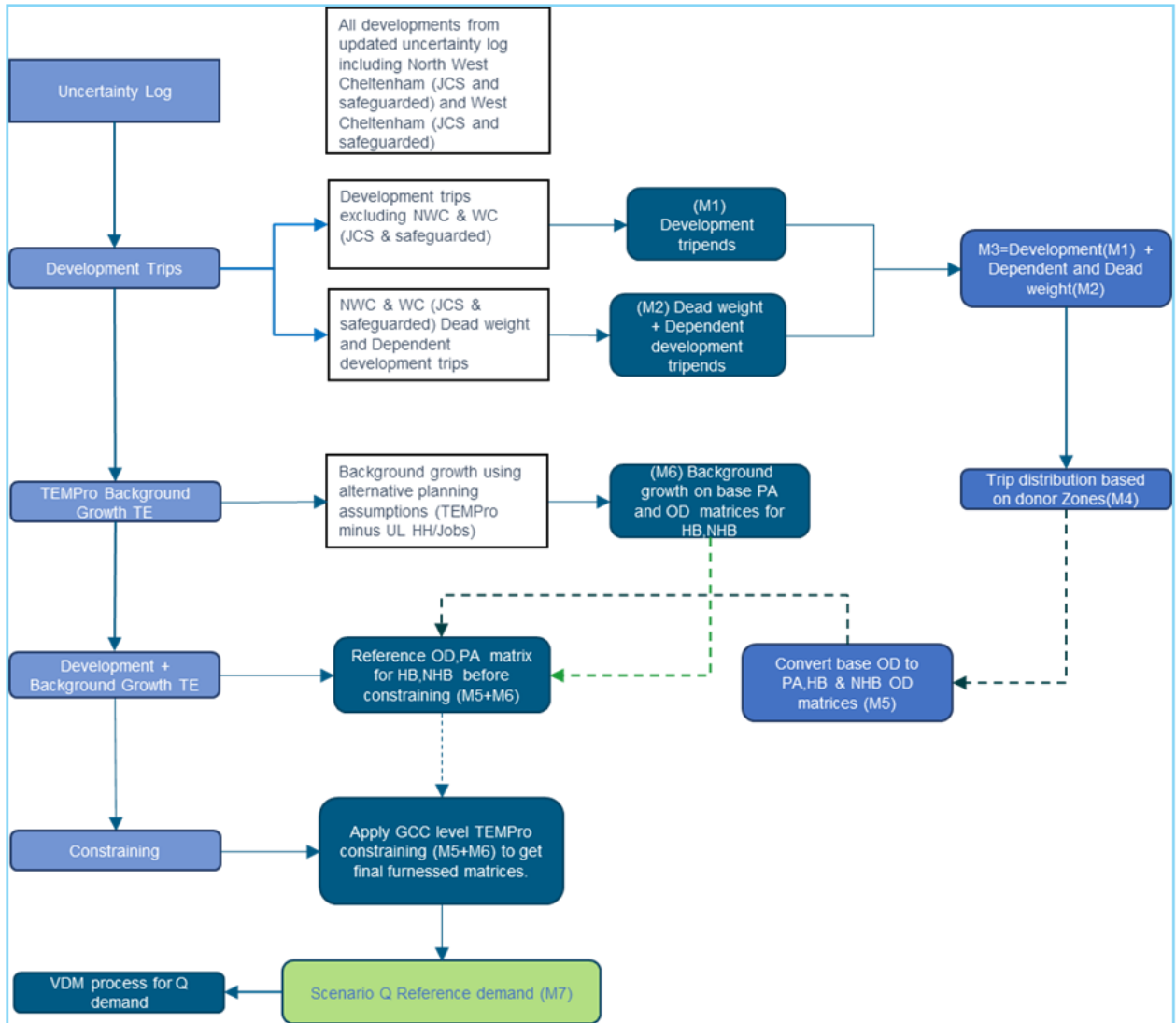
4. 2023 Model Forecasts without COVID-19 Adjustment

4.1. Background

4.1.1. The 2023 forecast VDM run was undertaken in a consistent manner with the other opening year and design year forecast models which are shown in Figures 2 and 3 above. Full model details of forecasting methodology are available in Sections 2.4 and 5 of the Transport Forecasting Report (APP-142).

4.2. Model Convergence

Demand Model Convergence

4.2.1. The VDM process is iterative, modifying the model demand matrices between SATURN assignments until a balance is achieved between demand and the capacity of the road network. The success in achieving this balance of equilibrium is defined using convergence criteria such as the demand/supply gap, commonly termed '%Gap'.

4.2.2. The objective of this process is to achieve well-converged VDM models with realistic demand responses, thereby improving the accuracy of the model results. TAG Unit M2.1 recommends, where possible, to aim to achieve an overall demand/supply gap on the range of less than 0.1% and no greater than 0.2%.

4.2.3. The DIADEM convergence results for the 2023 forecast scenario assignments are shown in Table 2 below. The results confirm that the model has achieved the desired criteria at both the fully modelled area and subset area level.

Table 2 – DIADEM Convergence Statistics

Year	Final Loop	%Gap	
		Fully Modelled Area	Subset Area
2023	7	0.08%	0.18%

Highway Assignment Model Convergence

4.2.4. Convergence of the post-VDM highway assignment model is considered important to providing consistent and robust model results. Guidance on the degree of model convergence is provided in TAG Unit M3.1 which is a s following:

- Delta and %GAP: Less than 0.1% or at least stable with convergence fully documented and all other criteria met.

- Percentage of links with flow change with four consecutive iterations greater than 98%.

- Percentage of links with cost change with four consecutive iterations greater than 98%.

4.2.5. The highway assignment convergence results of the SATURN models without COVID-19 adjustment are shown in Table 3 below. The results show that all the highway assignments have reached the required convergence.

Table 3 – 2023 Forecast SATURN Models Without COVID-19 Adjustment - Highway Assignment Convergence Statistics

Time Period	%Gap	%Flows	%Delays	Iterations
AM Peak	0.004	99.6	99.6	24
	0.003	99.5	99.6	25
	0.003	99.7	99.6	26
	0.004	99.7	99.8	27
Inter-peak	0.001	99.6	99.9	17
	0.001	99.8	99.8	18
	0.001	99.8	99.9	19
	0.001	99.8	99.9	20
PM Peak	0.008	99.6	99.5	28
	0.005	99.5	99.5	29
	0.005	99.6	99.6	30
	0.005	99.7	99.6	31

4.2.6.　The forecast model outputs for this scenario have been compared against the observed data including journey time routes and link counts, which are reported below.

4.3.　Comparison of 2023 Forecast Model Outputs Without COVID-19 Adjustment Against Observed Data

Criteria for Comparison

4.3.1.　The validation of highway assignment traffic models is undertaken in accordance with TAG M3 Unit where the base year model, which is calibrated using observed trip and traffic data, is then compared against observed data collected from the same year and period that has not been directly used in development of the model. The main validation criteria as well as associated tolerances and thresholds, which include traffic flows and journey times, are defined in TAG Unit M3-1.

4.3.2.　In the case of the comparison reported in this supplementary report it needs to be noted that the 2023 model is a forecast model and has not had the benefit of being enhanced with any observed data from 2023. It is therefore suggested that application of the TAG thresholds in its entirety for the comparison of forecast model outputs and observed data without considering this important distinction is too stringent and may lead to drawing unrealistic conclusions about the suitability of forecast models.

4.3.3.　The general criteria in TAG Unit M3-1 for comparison of modelled and observed data include journey times and link counts. Other criteria which could result in further assurance is correlation between the ability of the model in selecting the routes between key origin and destinations which can be matched against routes recorded in Google Journey Planner.

4.3.4.　The criteria for comparing the modelled journey times and link counts as defined in TAG Unit M3-1 are as following:

Journey Time

4.3.5.　Modelled times along routes should be within 15% of surveyed times (or 1 minute, if higher than 15%).

Link Counts

4.3.6. The measures used for link flow validation are the absolute and percentage differences between modelled flows and observed counts, and the Geoffrey E Haver (GEH) measure.

- The GEH measure uses the GEH statistic as defined below:

$$GEH = \sqrt{\frac{(M - C)^2}{\frac{1}{2}(M + C)}}$$

Where:
GEH is the GEH statistic;
M is the modelled flow; and
C is the observed flow

4.3.7. TAG Unit M3-1 describes two criteria for the link flow acceptability criteria as following:

- Individual flows within 100 veh/h of counts for flows less than 700 veh/h;

- Individual flows within 15% of counts for flows from 700 to 2,700 veh/h;

- Individual flows within 400 veh/h of counts for flows more than 2,700 veh/h;

- GEH <5 for individual flows.

4.4. Journey Time Comparison

4.4.1. A total of 56 journey time routes covering all key routes including M5 motorway, A4019, A38 and A40 in the model area were used in validation of the 2015 base year model area. Journey time data for the same routes as the 2015 base year for March 2023 was obtained from DfT and processed for comparison against the 2023 forecast modelled journey time across the three modelled time periods.

4.4.2. The summary results of journey time comparisons between the 2023 forecast model and observed journey times are shown in Table 4 below across the three modelled time periods. Figure 5 shows the journey time routes used in this study for the Fully Modelled Area (Simulation Area).

Table 4 – Summary Results of Comparing 2023 Forecast Model Without COVID-19 Adjustment and Observed Journey Time

Time Period	Total No of Journey Time Routes	No of Journey Time Routes Meeting the TAG Criteria	% of Journey Time Routes Meeting the TAG Criteria
AM Peak	56	54	96%
Inter-peak	56	55	98%
PM Peak	56	51	91%

4.4.3. The comparison of the 2023 modelled and observed journey time for the M5 J10 scheme model across the entire simulation area shows a good match (91% to 98%) for all three time periods and exceeds the 85% journey time validation criteria recommended in TAG M3-1 Unit.

4.4.4. The performance of journey times is the most tangible indicator on change in travel conditions across a highway network simulated by traffic models. Simulating journey times

with a high level of accuracy along many routes, covering various distances across a sizeable geographical area in the model, is indicative of the validity of the model. This level of validation requires accurate alignment of the demand matrices and representation of the network.

4.4.5.   The level of validation between the forecast model and observed journey time reported in Table 4 above, which is observed across many journey time routes (56) and in all time periods, is quite significant as no additional observed travel data has been used to enhance the 2023 forecast model.

4.4.6.   The result of the journey time validation is evidence that the 2023 forecast models reflects the operational performance of the road network in 2023 with a high degree of accuracy.

4.4.7.   The full details of journey time comparisons along the 56 routes in the model area are provided in Tables B1 to B3 of Appendix B.

Figure 5 – Locations of the Journey Time Routes

Legend

Journey Time Routes

- Route 1 - A46 (M5J9) to A46 (M5J9)
- Route 2 - M5 J9 to M5 J8
- Route 3 - A438(B4211) to A438(M5J9)
- Route 4 - A435(New Barn Lane) to B4079 (Main Road)
- Route 6 - A46 (Evesham Bypass) to A46 (Salford Rd)
- Route 44 - A40 (Brize Norton) to B4063 Gloucester
- Route 45 - A419 Swindon (Merlin Way) to B4063 Gloucester
- Route 50 - M5 J11 to M5 J10
- Route 101 - A46 Stroud to A46 Cheltenham
- Route 102 - B4070 Stroud to B4070 Cheltenham
- Route 103 - A435 Circencester to A46 Cheltenham
- Route 104 - A435 Circencester to A417 Cheltenham
- Route 105_1 - A46 Stroud to A46 Cranham Corner
- Route 105_2 - B4070(Birdlip Rd Crossroads) to A436 (A40 Crossroads)
- Route 106 - Stroud (Toadsmoor Rd) to A417 Gloucester
- Route 107 - Gloucester (Barnwood Rd) to Cheltenham (Andoversford)
- Route 108 - A40 Gloucester (Highnam Rbt) to A4013 Cheltenham (PE Way)
- Route 109_1 - A417 Cirencester (Burford Rd) to A46 Crosshand Rbt
- Route 109_2 - A46 Crosshand Rbt to M5 J11
- Route 201 - M5 J14 to A430 (Cole Avenue)
- Route 202 - B4008 Bath Rd to B4008 (Cole Avenue)
- Route 203 - A4173 (Pitchcombe) to A4173 (Southern Avenue)
- Route 204 - M5 J13 to A419 (Cirencester)
- Route 205 - A46 Nailsworth to A46 Stroud
- Route 208 - A419 (Kingsditch Rbt) to M5 J10
- Route 209 - A38 (Jubilee Way) to A419 (Kingsditch Rbt)
- Route 210 - A38 Gloucester (Longford Rbt) to A38 (Jubilee Way)
- Route 211 - A4135 (A38 Bristol Rd) to B4066 Selsley Hill (A419)
- Simulation Area M5J10

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4.5.   Link Counts Comparison

4.5.1.   The flows output by the forecast 2023 model have been compared against observed counts in different parts of the model highway network across the three modelled periods (AM peak, Inter-peak and PM peak) and the results of the comparisons are detailed below.

4.5.2.   A total of 113 links counts by direction at 77 sites collected at consistent locations with the 2015 base year model shown in Figure 1 were used for comparison against 2023 forecast modelled flows. The 2015 counts at these sites were used in calibration and validation of the original base year model, which makes comparisons at these locations more informative. Table C1 in Appendix C provides details of the counts used in this study.

4.5.3.   The comparison of the 2023 forecast model flows and observed counts at these locations show that out of 113 link counts, 81 sites in the AM peak; 98 sites in the Inter-peak; and 83 sites in the PM peak meet the validation criteria set out in the TAG guidance. These are equivalent to about 72% in the AM peak, 87% in the Inter-peak and 73% in the PM peak respectively.

4.5.4.   Table 5 below shows the summary results of the modelled flows and link counts comparison whilst Tables C2 to C4 in Appendix C provide full details of link flow comparison at all count sites used in this study for the three modelled time periods.

4.5.5.   Figures 6 to 8 display the locations and performance of the links in the model area where comparisons have been undertaken. These Figures (6 to 8) show that there is an acceptable level of link validation around the immediate area of M5 J10 where the impact of the proposed scheme is focused across all modelled time periods.

Table 5 – Summary Comparison of Modelled Flows Without COVID-19 Adjustment and Observed Link Counts

Time Period	No of Link Counts	No of Modelled Links Meeting the Validation Criteria	% of Modelled Links Meeting the Validation Criteria
AM Peak	113	81	72%
Inter-peak	113	98	87%
PM Peak	113	83	73%

4.5.6.   Out of 113 observed counts used for comparison against modelled flows, a total of 53 are located on the links which are part of the journey time routes covering the model area. Comparison of modelled link flows against observed counts at these locations show 33 links in the AM peak; 45 links in the Inter-peak; and 38 links in the PM peak validate which are equivalent to about 62%, 85% and 72% respectively. This provides further assurance on validity of forecast flow levels across journey times routes.

4.5.7.   Given that the 2023 models are forecast from a 2015 base, and also considering that the forecast models have not had the benefit of being enhanced with any observed travel or traffic data from 2023, this level of reported link flow validation is in line with that of many base year models when the data used for development of the model and subsequent validation has been collected in the same year. The reported level of link validation for the 2023 forecast model (without COVID-19 adjustment) is therefore considered acceptable.

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Figure 6 – Comparison of Modelled Link Flows and Observed Link Counts – AM Peak (Without COVID-19 Adjustment)
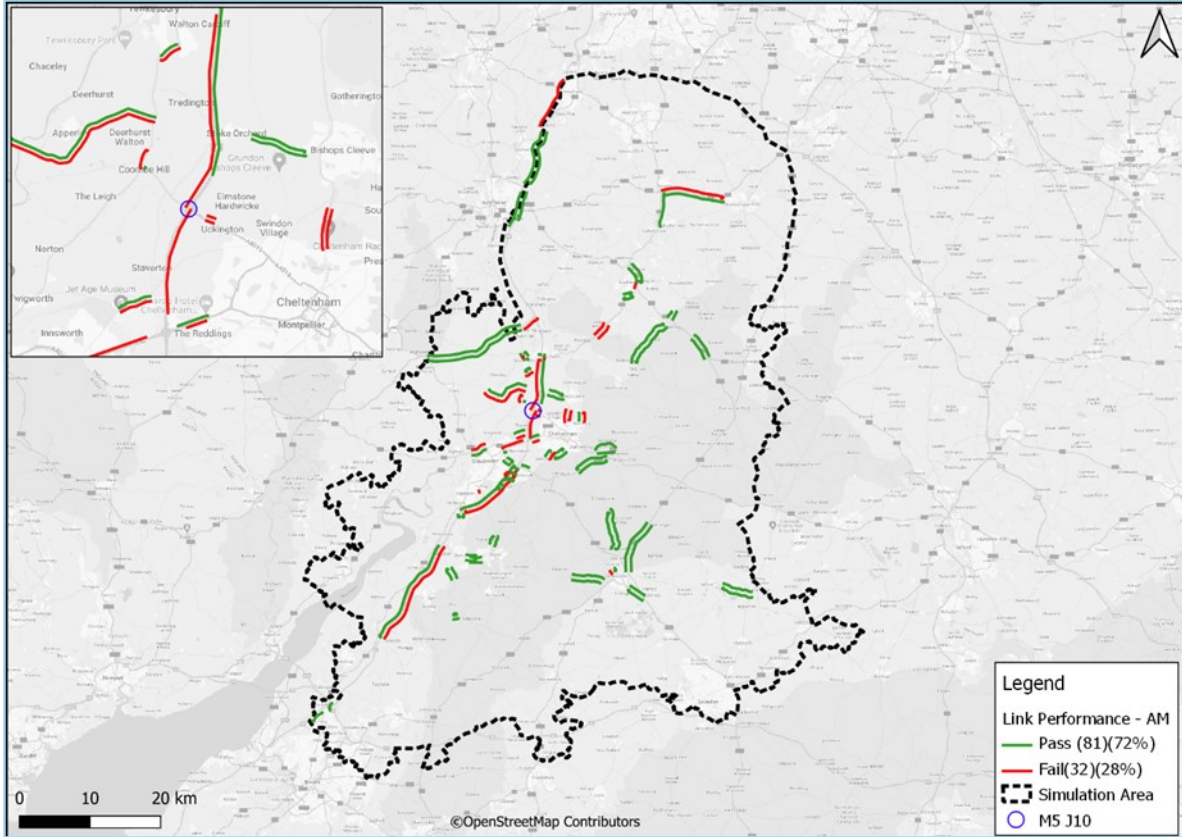
Figure 7 – Comparison of Modelled Link Flows and Observed Link Counts – Inter-peak (Without COVID-19 Adjustment)
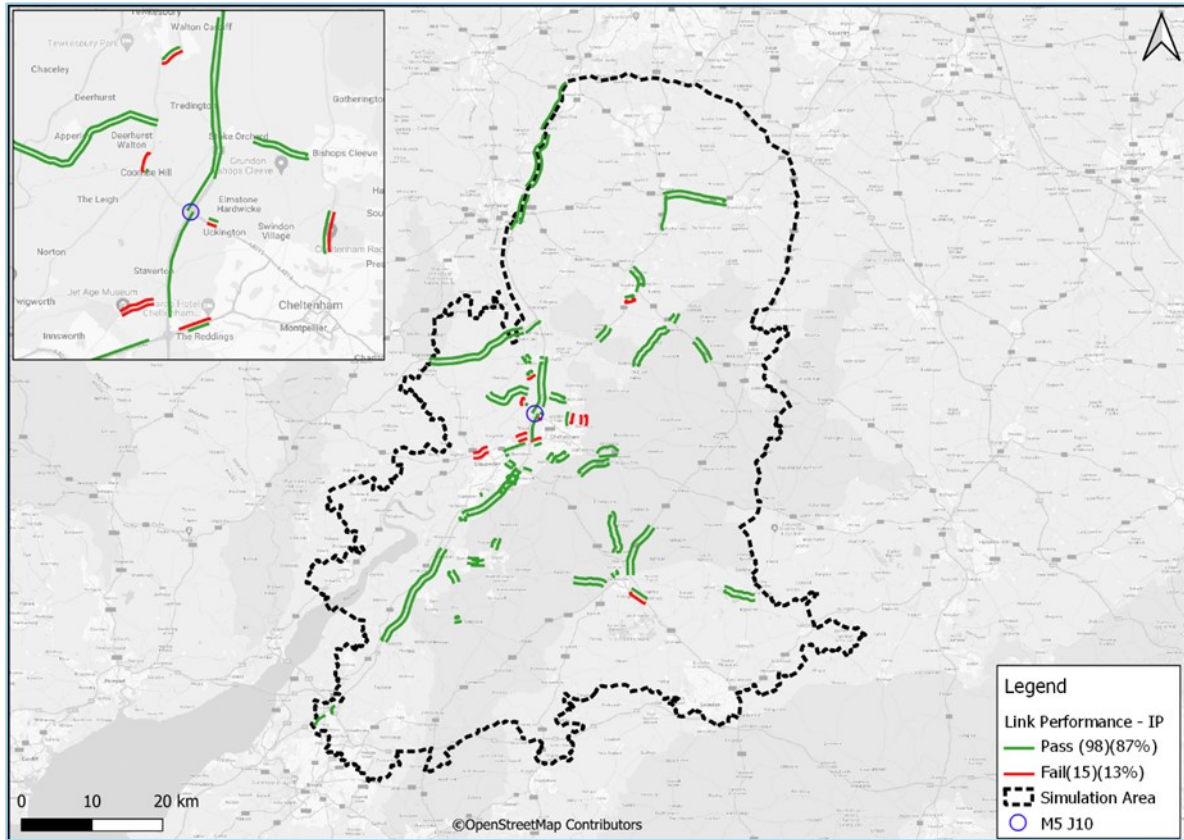
Figure 8 – Comparison of Modelled Link Flows and Observed Counts - PM Peak (Without COVID-19 Adjustment
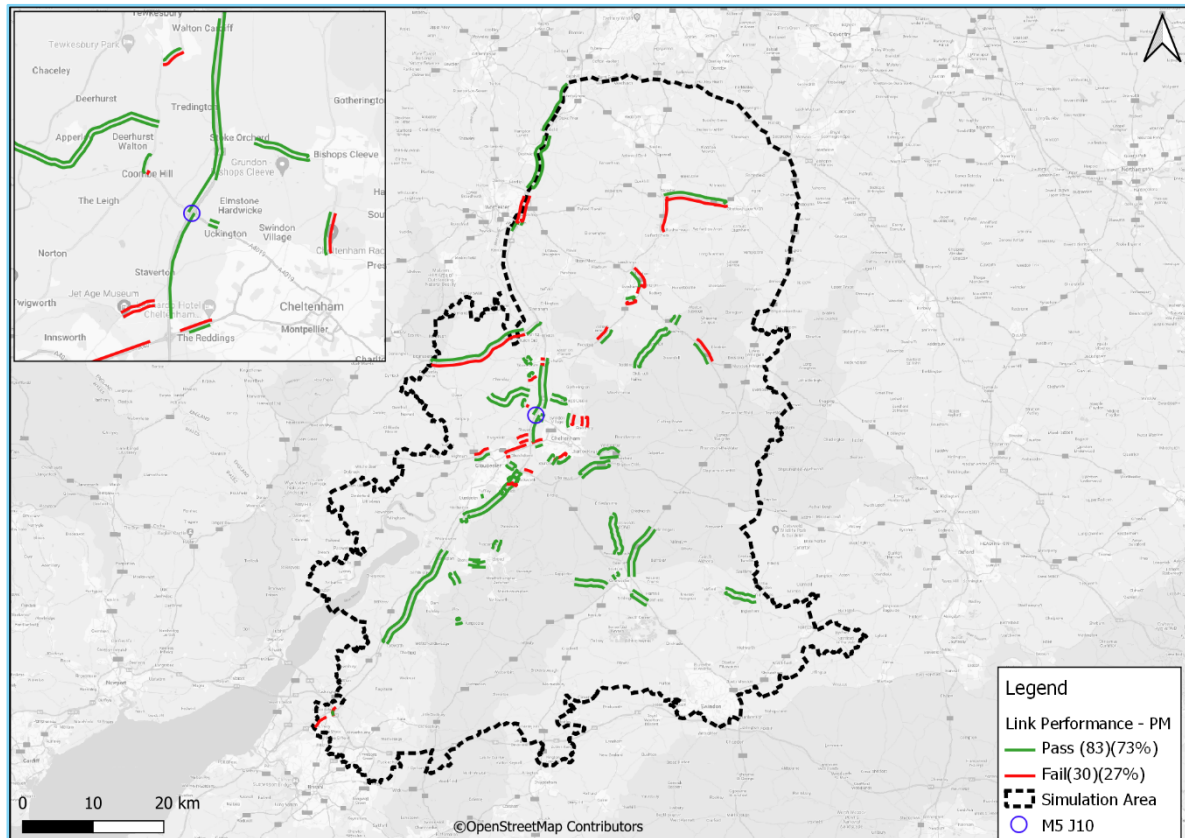
4.6.   Route Choice Comparison

4.6.1.   In the network calibration and validation stages of developing the M5 J10 base year model (2015), reviews of route choice for key routes within the model were undertaken, by comparing them against Google Map's online journey planner.

4.6.2.   The analysis indicated that routes predicted by the base year model were logical for each time period. Several routes were compared to Google Maps data, for the AM and PM peaks in both directions between a pair of locations. In all cases, the optimal route presented by the 2015 base year model was equivalent to that suggested by Google Maps. In several cases, the alternative route suggested by the model was also equivalent to that suggested by Google Maps, suggesting that route choice validation has been achieved.

4.6.3.   The following routes between several key origin and destinations, that were analysed in validation of the base year model (2015), were also analysed in the forecast 2023 model, and compared against Google Map's journey planner.

- Gloucester to Evesham (main route uses A40, M5, A46 alternative routes use A38, A40, A435)

- Gloucester to Worcester (routes use A40 and M5)

- Cheltenham to Tewkesbury (main route uses A4019, A38; alternative routes use M5 and M50, or A435 and Stoke Road)

- Cheltenham to Worcester (main route uses A4019, M5; alternative route uses M50 and A38)

4.6.4.   The routes shown for the above origins and destinations in the 2023 forecast model are shown to be consistent with the routes reported by the Google Map's journey planner. This provides additional assurance that the 2023 forecast model provides an acceptable representation of the highway network conditions in 2023.

4.6.5.   Figures D1 to D16 which show the comparison of model routes and Google Map's journey planner for the above origins and destinations are included in Appendix D.

5.   2023 Model Forecasts with COVID-19 Adjustment

5.1.   Background

5.1.1.   The development of the 2023 forecast model has been set out in the previous sections of this document. The only difference between the two 2023 forecast models is the application of TAG COVID-19 adjustment factors. Under this scenario which is set out in this section of the document, the 2023 post VDM trip matrices are adjusted to account for the impact of COVID-19, through application of TAG COVID-19 adjustment factors. Using SATURN suite of software these matrices were then assigned to the same highway network as the model forecasts without COVID-19 adjustment.

5.1.2.   This section discusses the various TAG options to account for the impact of COVID-19 on traffic models developed, calibrated, and validated prior to the COVID pandemic. It also describes the selected option and provides the results of comparisons of 2023 model forecasts, with COVID-19 adjustment, against 2023 observed data, including journey time and link counts.

5.2.   Impact of COVID-19 on Demand

5.2.1.   The strategic transport modelling used in the DCO application was developed following the prevailing DfT guidance with a 2015 base year validated against observed traffic data, including counts and journey times. The validated base year model was then used as the basis for traffic forecasting in accordance with the latest growth estimates provided by DfT through the NTEM V08 and NRTP22.

5.2.2.   In the context of the current modelling framework in the UK, only base year traffic models are validated, which remain the basis of the subsequent forecasting. The emergence of COVID-19, however, interrupted the usual patterns of traffic during 2020 and 2021. The impact of COVID-19 on long-term growth of traffic across the country is not fully known, and as such, DfT has not yet published a new version of future traffic growth estimates to account for the potential impact of COVID-19.

5.2.3.   In May 2023, the DfT issued updated advice within its *"Transport Appraisal Guidance (TAG) Unit M4: Forecasting and Uncertainty"* on how to account for the impact of COVID-19 in the existing traffic models.

5.2.4.   In Section B.2.5 of the guidance, it states that "the analysts should continue to use the growth factors from the National Trip End Model data set (NTEM) to grow demand from their base year. The main drivers of trip-end growth in NTEM are demographic and economic. Whilst we acknowledge that household trip rates in NTEM 8.0 may have changed due to COVID-19, the growth rates should remain robust, since they remain in-line with official socio-economic projections".

5.2.5.   The guidance in Section 3.0 acknowledges that most existing models have been calibrated to pre-pandemic traffic levels and rebasing of models takes significant time and resources and thus the Department accepts in many circumstances, the practical course of action is to make *proportionate and transparent adjustments at this time.*

5.2.6.   The guidance provides the three options listed in the guidance to account for COVID-19, which are as follows:

1.   Create a forecast to the present day by applying adjustments to include COVID-19 impact, based on observed data. This forecast can be used as a "new base year" and used as basis for scheme forecasts.

2. Apply adjustments to a forecast year model to produce a new scheme opening year forecast, or the first required forecast year, that includes a COVID-19 impact to that point. This will be the new pivot on which further forecast years are based.

3. Apply the adjustment globally to model results as a post-model adjustment.

5.2.7.   Option (1) is not considered to be both proportionate and practicable in the case of the M5 J10 scheme as validating and calibrating the present year forecast such that it is verified as a suitable basis for forecasting would take a substantial amount of time and some of the datasets needed to calibrate/validate a present year forecast are subject to at least a one-year data lag.

5.2.8.   Option (2) allows the practitioner to account for COVID-19 impacts at the reference case stage, which is the input to variable demand modelling. This requires making use of official statistics or observed data after the model base year where possible and account for changes after that point up to the opening year, such as the use of NTEM growth factors. However, as cited in section B3.4 of the guidance "*this option comes with the significant disadvantage that there will be no existing observed data (trips and traffic) to ensure validity of the opening year forecast*". In addition, the longer-term impacts of COVID-19 that will be included in the forecasts produced by this option are not certain to be attributable to the pandemic. The guidance in Section B1.1 acknowledges this issue and states "*It is difficult to isolate the individual impact of COVID-19 and the extent to which impacts will be sustained long-term is unclear.*" There is debate as to what extent the decrease in traffic volumes seen in 2022 and 2023 has been caused by impacts other than COVID-19, including the general cost of living pressure and the increase in the price of fuel. For these reasons, this option is not also considered proportionate or suitable for the M5 J10 scheme assessment.

5.2.9.   Option (3) is the most proportionate for the M5 J10 scheme traffic in terms of both application and required length of time. This option can be applied in a relatively short space of time and will not require a re-run of variable demand models which is quite a lengthy process. In addition, this option aligns with the approach taken by DfT in the National Road Traffic Projections 2022, which applied a 5% reduction factor for COVID-19 in each forecast year.

5.2.10.   Option (3) has been selected as the most proportionate and appropriate method to account for the potential impact of COVID-19 on the M5 J10 forecast models, which is based on the application of regional adjustment factors developed by NH to post VDM car matrices by trip purpose.

5.2.11.   NH derived these factors in line with the new DfT Guidance to account for COVID-19 as part of a methodology to apply initially to the Regional Traffic Models (RTMs) for different forecast years between 2023 and 2041. These factors are equally applicable to other traffic models that have been based on RTMs and enhanced for use in assessment of major highway schemes. The M5 J10 traffic model has been developed from the South West Regional Model (SWRTM) which makes the application of the COVID-19 factors derived by National Highways suitable in this instance.

5.2.12.   The COVID-19 adjustment factors applied to the 2023 forecast post-VDM matrices are shown in Table 6 below.

Table 6 – COVID19 Adjustment Factors for M5 J10 2023 Forecast Model

Trip Purpose	Factor
Car Business	0.898
Car Commuting	0.930
Car Other	0.951

5.2.13.   The COVID-19 factor for models, when the car trips are combined, has been calculated by NH as 0.945 in 2023. It is worth noting that COVID-19 is only considered to have impacted car journeys, which accounts for the overwhelming majority of daily trips. Goods vehicles traffic volumes are considered to be unaffected by the impact of COVID-19.

5.3.   Model Convergence

5.3.1.   The SATURN assignment models used in this scenario have the same high level of convergence as those used for the model runs without COVID-19 adjustment as shown in Table 7 below.

Table 7 – 2023 Forecast SATURN Models With COVID-19 Adjustment – Highway Assignment Convergence Statistics

Time Period	%Gap	%Flows	%Delays	Iterations
AM Peak	0.002	99.7	99.7	25
	0.002	99.6	99.7	26
	0.002	99.7	99.8	27
	0.003	99.7	99.7	28
Inter-peak	0.002	99.5	99.8	14
	0.001	99.6	99.9	15
	0.001	99.9	99.9	16
	0.000	99.8	99.9	17
PM Peak	0.010	99.6	99.6	23
	0.004	99.6	99.7	24
	0.010	99.6	99.7	25
	0.003	99.7	99.8	26

5.4.   Impact of COVID-19 Adjustment Factors on Matrix Totals

5.4.1.   The COVID-19 adjustment factors as stated previously were applied to post VDM car matrices by purpose, with goods vehicles trips not being impacted upon by the pandemic. Table 8 below shows the 2023 forecast model matrix totals by user class before and after the application of COVID-19 adjustment factors.

Table 8 – Comparison of Matrix Totals for 2023

User Class	Matrix Totals (PCU) Before Application of COVID-19 Factors	Matrix Totals (PCU) After Application of COVID-19 Factors	Difference (PCU)	% Change
AM Peak				
UC1 - Car Business	399,056	358,301	-40,755	-10%
UC2 – Car Commute	2,060,924	1,916,659	-144,265	-7%
UC3 – Car Other	2,272,234	2,161,871	-110,363	-5%
UC1 to UC3 : All Cars	4,732,214	4,436,831	-295,383	-6%
LGV	762,536	762,536	0	0%
HGV	317,624	317,624	0	0%
Total (UC1 to UC5)	*5,812,374*	*5,516,991*	*-295,383*	*-5%*
Inter-peak				
UC1 - Car Business	384,444	345,181	-39,263	-10%
UC2 – Car Commute	895,944	833,227	-62,717	-7%
UC3 – Car Other	2,970,000	2,825,746	-144,254	-5%
UC1 to UC3 : All Cars	4,250,388	4,004,154	-246,234	-6%
LGV	727,938	727,938	0	0%
HGV	305,007	305,007	0	0%
Total (UC1 to UC5)	*5,283,332*	*5,037,099*	*-246,234*	*-5%*
PM Peak				
UC1 - Car Business	364,908	327,640	-37,268	-10%
UC2 – Car Commute	1,989,475	1,850,211	-139,264	-7%
UC3 – Car Other	3,326,275	3,164,717	-161,558	-5%
UC1 to UC3 : All Cars	5,680,658	5,342,568	-338,090	-6%
LGV	615,994	615,994	0	0%
HGV	199,057	199,057	0	0%
Total (UC1 to UC5)	*6,495,708*	*6,157,619*	*-338,089*	*-5%*

5.4.2.   Table 8 shows that the application of the COVID-19 adjustment factors to the 2023 forecast model post VDM matrices leads to a reduction of about 5% in the matrix totals of the combined user classes across the three modelled time periods. With the demand of goods vehicles assumed not to be affected by the COVID-19 impact, the individual car user classes expectantly show a higher level of impact.

5.4.3.   The impact of COVID-19 on the 2023 forecast trip matrices when annualised using standard annualisation factors (759 hours for each of AM and PM peak and 1518 hours of Inter-peak) is a reduction of about 5%. This is in line with the average reduction of 4% derived by GCC in the daily (24hr) traffic counts recorded at 32 monitoring sites across Gloucestershire for the period before and after COVID-19 impact between 2019 and 2023. Locations of the 32 traffic monitoring sites in Gloucestershire where the 2019 and 2023 counts have been compared along with the model boundary have been shown in Figure 9 below.

Figure 9 – Locations of Traffic Monitoring Sites in Gloucestershire
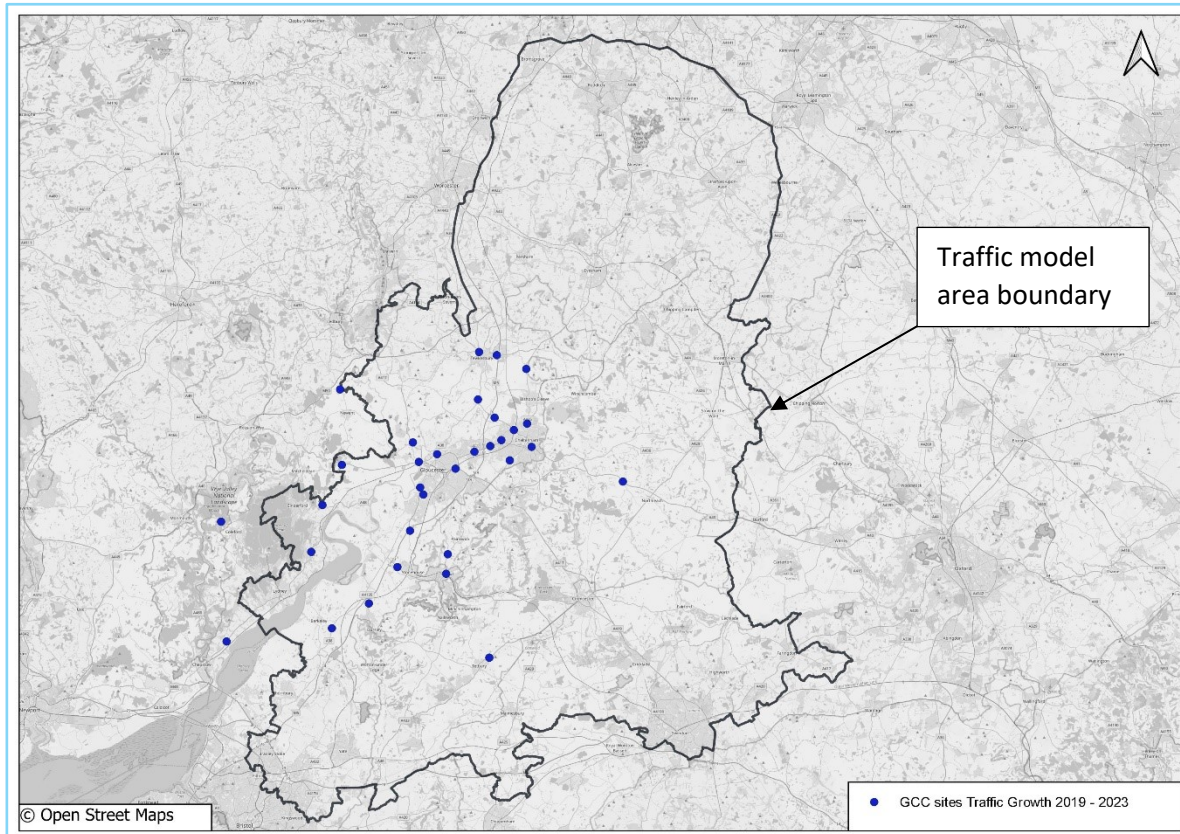
5.5.   Journey Time Comparison

5.5.1.   The summary results of the comparisons between the modelled and observed journey time routes are shown in Table 9 below.

Table 9 – Summary Results of Comparing 2023 Forecast Model With COVID-19 Adjustment and Observed Journey Time

Time Period	Total No of Journey Time Routes	No of Journey Time Routes Meeting the TAG Criteria	% of Journey Time Routes Meeting the TAG Criteria
AM Peak	56	55	98%
Inter-peak	56	55	98%
PM Peak	56	51	91%

5.5.2.   The comparison of the 2023 modelled and observed journey time for the M5 J10 scheme model under this forecast scenario (with COVID-19 adjustment) shows a good match (91% to 98%) for all three time periods, which exceeds the 85% journey time validation criteria recommended in TAG M3-1 Unit.

5.5.3.   The result of the journey time validation is evidence that the 2023 forecast models (with COVID19 adjustment) reflects the operational performance of the road network in 2023 with a good degree of accuracy.

5.5.4.   The full details of the journey time comparisons along the 56 routes in the model area for this scenario are provided in Tables E1 to E3 of Appendix E.

5.6.   Link Counts Comparison

5.6.1.   The comparison of the 2023 forecast modelled flows and observed counts under the *'with'* COVID-19 adjustment scenario is summarised in Table 10 below. The table shows that 89 sites in the AM peak; 92 sites in the Inter-peak; and 81 sites in the PM peak validate. These are equivalent to about 79% in the AM peak, 81% in the Inter-peak and 72% in the PM peak.

Table 10 – Summary Comparison of Modelled Flows With COVID-19 Adjustment and Observed Link Counts

Time Period	No of Link Counts	No of Modelled Links Meeting the Validation Criteria	% of Modelled Links Meeting the Validation Criteria
AM Peak	113	89	79%
Inter-peak	113	92	81%
PM Peak	113	81	72%

5.6.2.   Figures 10 to 12 display the locations and performance of the links in the model area where comparisons have been undertaken against observed count data.

5.6.3.   The comparison of 53 out of 113 observed counts which are located on journey time routes with modelled flows show that 33 links in the AM peak; 45 links in the Inter-peak; and 38 links in the PM peak validate which are equivalent to about 62%, 85% and 72% respectively.

5.6.4.   Given that the forecast model in this scenario (with COVID-19 adjustment) has not had the benefit of being enhanced with any observed travel or traffic data from 2023, this level of reported link flow validation is considered acceptable.

5.6.5.   Tables F2 to F4 in Appendix F provide full details of link flow comparisons in this scenario for the three modelled time periods.

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Figure 10 – Comparison of Modelled Link Flows and Observed Link Counts – AM Peak (With COVID-19 Adjustment)
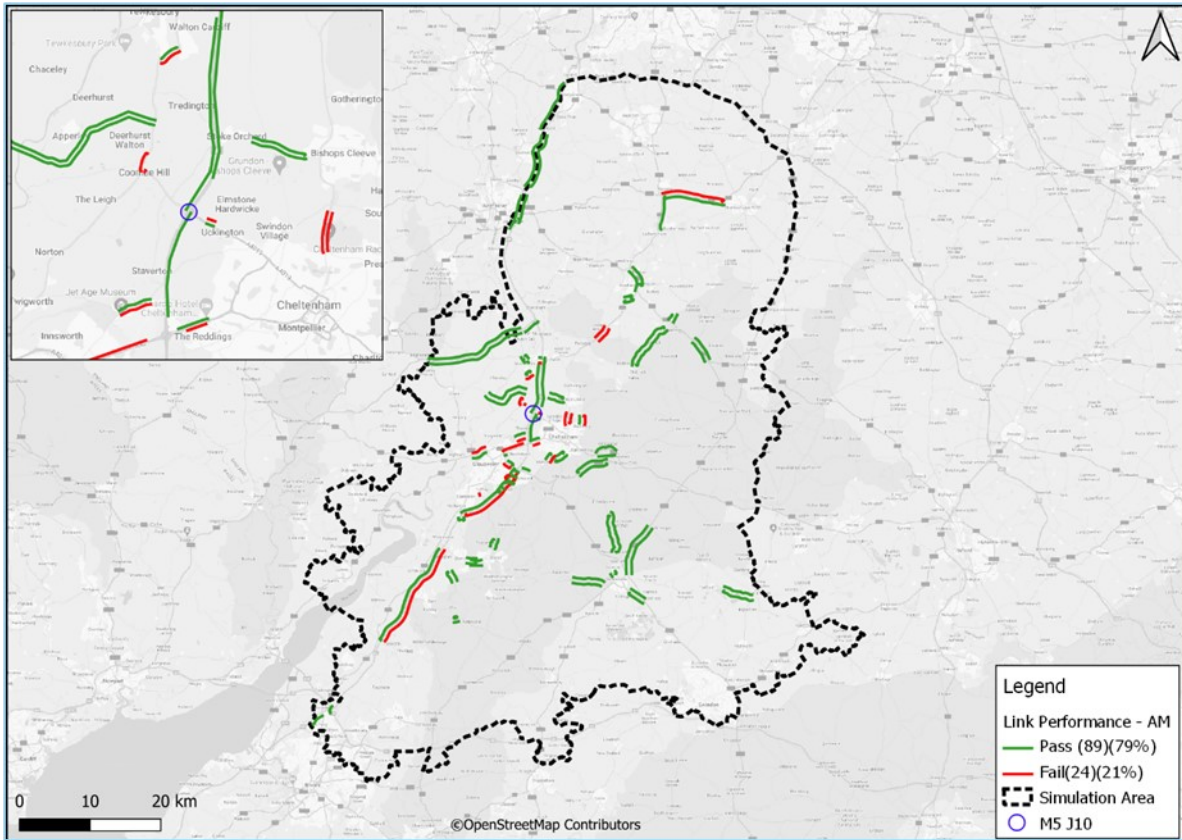
Figure 11 – Comparison of Modelled Link Flows and Observed Link Counts – Inter-peak (With COVID-19 Adjustment)
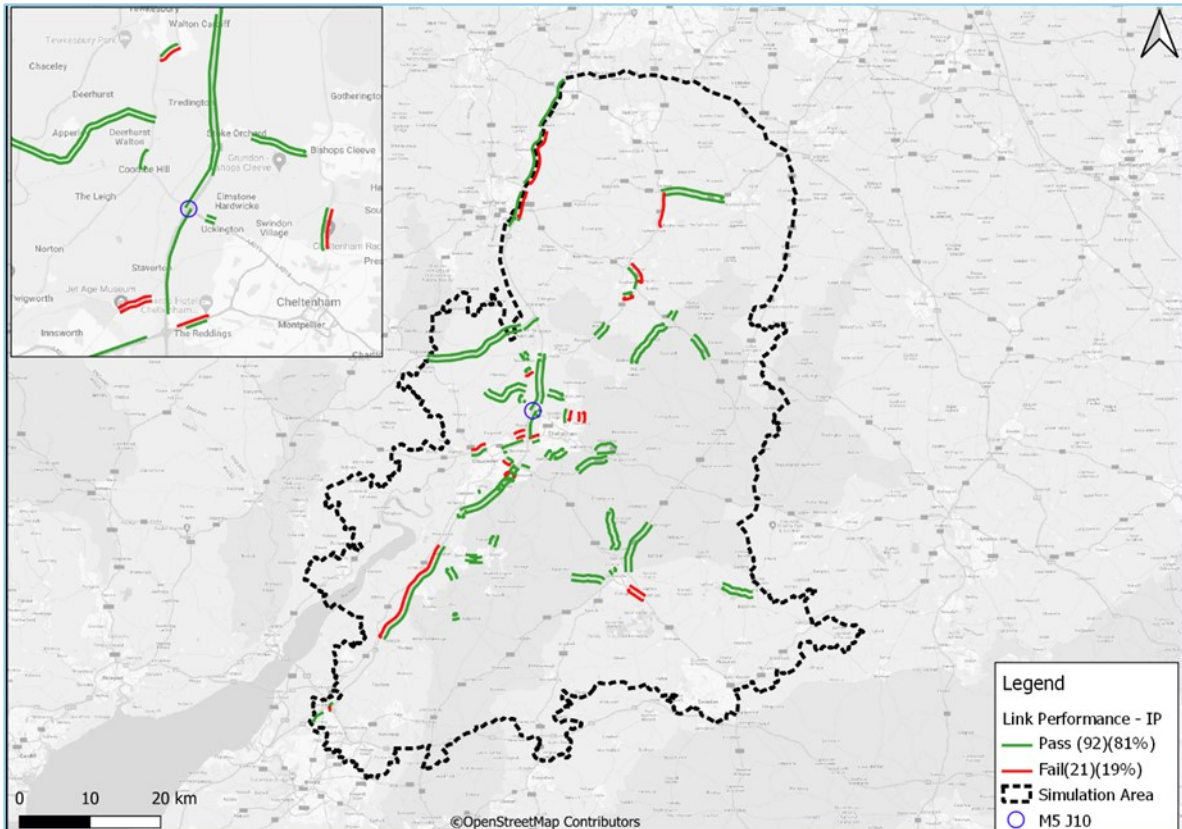
Figure 12 – Comparison of Modelled Link Flows and Observed Link Counts – PM Peak (With COVID-19 Adjustment
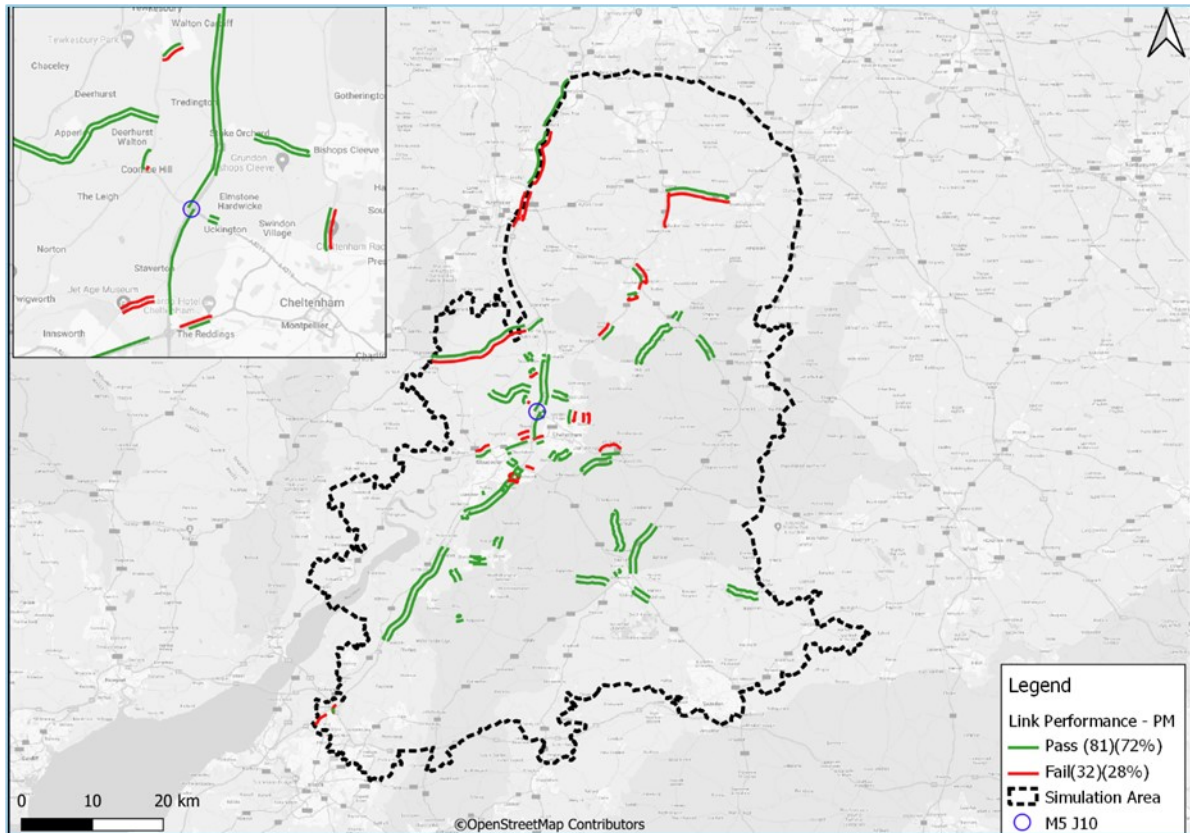
5.7. Route Choice Comparison

5.7.1.   Under this scenario the same four key origin and destinations as those used for the scenario *without* COVID-19 adjustment were selected for comparison of the modelled routes and Google Maps' journey planner route selection. The results of the comparisons show that the routes selected by the forecast model are consistent with those identified by Google Map's journey planner. This provides additional assurance that the 2023 forecast model provides an acceptable representation of the highway network conditions in 2023.

5.7.2.   Figures G1 to G16 which show the comparison of model routes and Google Map's journey planner for the above origins and destinations are included in Appendix G

5.8. Impact of COVID-19 Adjustment on Forecast Models

5.8.1.   The impact of COVID-19 adjustment factors on the forecast models (without and with COVID-19 impact) show an expected trend regarding traffic flows and highway network operational performance.

5.8.2.   The flow difference plots between the two forecast models show that the lower demand in the forecast model with COVID-19 adjustment leads to a consistent reduction in link flows across the highway network. This is in line with expectation as the application of the COVID-19 factors lead to an overall reduction of about 5% in demand matrices.

5.8.3.   Figure 13 shows the flow difference plot around the M5 J10 area for the AM peak. This plot which has been produced by SATURN highway assignment model shows a uniform reduction in link flows denoted by blue colour bandwidth. The same reduction in link flows is also reported across the wider highway network in all modelled periods.

Figure 13 – Link Flow Differences Between 2023 Forecast Models Without and With COVID-19 Adjustment – AM Peak
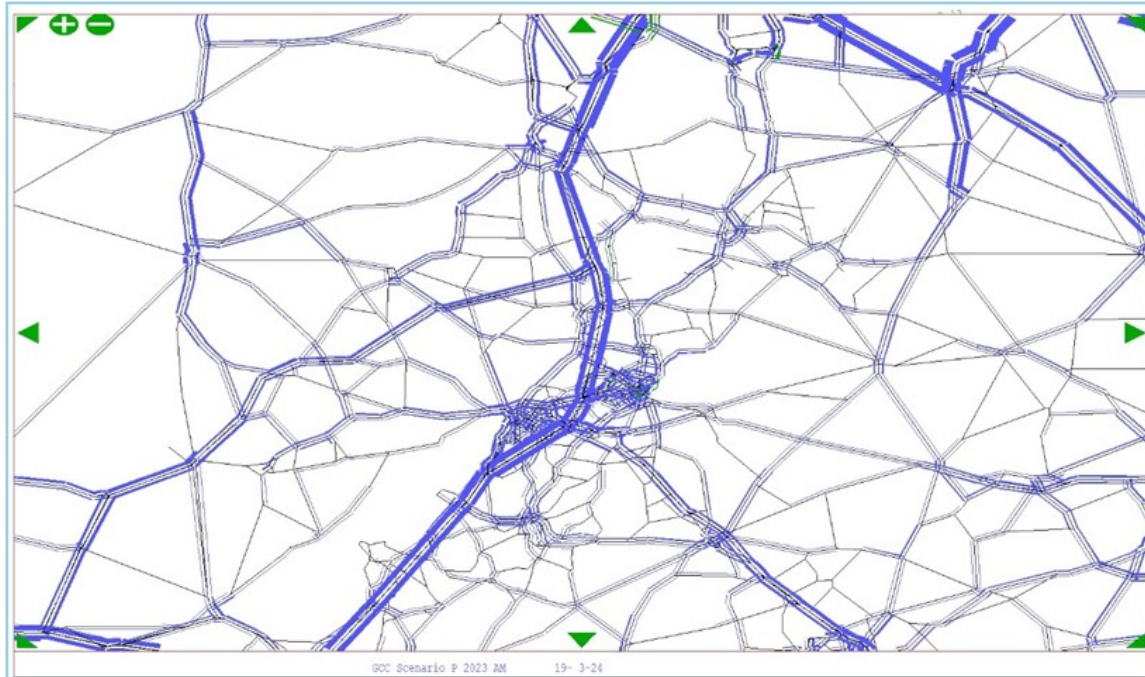
5.8.4.   The key highway network performance indicators show an expected trend with application of COVID-19 adjustment factors. Table 11 shows that there is a consist reduction in total travel time and distance reported across the network with the application of COVID-19 adjustment factors.

5.8.5.   The reported range of reduction in the network travel time is between about 5% to 6.5%. This is consistent with reported range of reductions along the individual journey time routes in the forecast models with COVID-19 adjustment applied across all three modelled periods.

5.8.6.   The total travel distance across the network shows a reduction in the range of about 4% to 5% across the three modelled periods. The magnitude of the reductions in total network travel time and distance is consistent with the size of COVID-19 adjustment factors of about 5%. The reduced demand in the model with COVID-19 adjustment also leads to consistent increase in the average network speed and reduction of the overall network delay across all three modelled periods.

Table 11– Comparison of Network Statistics

Measure	Unit	Without COVID-19 Adjustment		
		AM Peak	Inter Peak	PM Peak
Total Travel Times	PCU Hrs	53,093	41,897	52,902
Travel Distance	PCU Kms	3,598,456	3,010,848	3,512,592
Average Speed	kmph	67.8	71.9	66.4
Delay	PCU Hrs	5,757	3,629	6,148
Measure	Unit	Without COVID-19 Adjustment		
		AM Peak	Inter Peak	PM Peak
Total Travel Times	PCU Hrs	50,009	39,906	49,501
Travel Distance	PCU Kms	3,437,752	2,894,508	3,338,838
Average Speed	kmph	68.7	72.5	67.4
Delay	PCU Hrs	5,123	3,315	5,389
Measure	Unit	% Change		
		AM Peak	Inter Peak	PM Peak
Total Travel Times	PCU Hrs	-5.8%	-4.8%	-6.4%
Travel Distance	PCU Kms	-4.5%	-3.9%	-4.9%
Average Speed	kmph	1.3%	0.8%	1.5%
Delay	PCU Hrs	-11.0%	-8.6%	-12.3%

5.8.7. The proximity of the modelled flows and the observed link counts at 113 locations used to assess the correlation of the two forecast models with observed data was measured. For this analysis the ratios between the modelled flows and observed link counts was calculated at all the 113 count sites, for the three modelled time periods, under both forecast scenarios (without and with COVID-19 adjustment). The distribution of the differences between the modelled flows and observed link counts under both forecast scenarios were compared under three distribution envelops, namely less than 0.9; 0.9 to 1.1; and greater than 1.1. The results of this analysis are shown in Table 12 below.

Table 12– Distribution of Modelled Flows and Link Counts Comparisons

Interval	Without COVID-19 Adjustment	With COVID-19 Adjustment
AM Peak		
Less than 0.9	17	26
0.9 to 1.1	45	52
Greater than 1.1	51	35
Total	113	113
Inter Peak		
Less than 0.9	31	41
0.9 to 1.1	57	56
Greater than 1.1	25	16
Total	113	113
PM Peak		
Less than 0.9	31	37
0.9 to 1.1	43	48
Greater than 1.1	39	28
Total	113	113

5.8.8. Table 12 shows two distinct patterns of distributions regarding the impact of COVID-19 adjustment. The first impact is the higher number of links in the 0.9 to 1.1. distribution in the models with the COVID-19 adjustment. Given that this distribution provides a narrow envelop with regard to observed link counts, the results indicate that the application of the COVID-19 factors leads to a closer fit between the modelled flows and observed link counts in the AM and PM peak periods with the inter-peak remaining at the same level. This could be due to the higher levels of congestion in the peak periods compared to the inter-peak.

5.8.9. The other impact of COVID-19 adjustment is a reduction in the number of links with higher differences between the modelled and observed link counts, as measured in the distribution of greater than 1.1. This is consistent and notable in all modelled time periods.

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6. Summary and Conclusions

6.1. Summary

6.1.1. The strategic traffic model used to support the DCO application for the M5 Junction 10 Improvements Scheme was developed in accordance with the prevailing DfT guidance. It has a 2015 base year, which was used as basis for traffic forecasting utilising growth estimates published by the DfT National Trip End Model (NTEM V.08) for cars and NRTP22 for goods vehicles.

6.1.2. Through Section 51 Advice, the Examining Authority (ExA) recommended in November 2023 that the current traffic model is assessed against present day (2023) observed traffic data to confirm that it remains valid in light of the impact of the COVID-19 pandemic on travel patterns.

6.1.3. To address the ExA recommendation, two 2023 forecast models have been developed and compared against the same 2023 observed data. The only difference between these two models is that one has been produced without the application of TAG COVID-19 adjustment and the other one produced with COVID-19 adjustment.

6.1.4. The 2023 forecast models were developed using the same methodology as the opening year (2027) and design year (2042) forecast models. The process of developing the 2023 forecast model included the following main stages:

- Collation and processing of 2023 journey time and link count data obtained from GCC, NH and DfT.

- Updating the Uncertainty Log data to identify the changes in the highway networks and completed developments since 2015 and reflect them in the forecast 2023 models.

- The forecast 2023 models were developed using Variable Demand Modelling (VDM) for three modelled time periods namely AM peak, Inter-peak and PM peak.

- For the scenario 'with' the COVID-19 adjustment, the factors developed by NH based on the DfT Guidance were applied to the post VDM car matrices. Using SATURN suite of software these matrices were then assigned to the 2023 highway networks to produce the forecasts 'with' COVID-19 adjustment.

- The model outputs for both forecast scenarios (without and with COVID-19 adjustment) were compared against observed data including journey time, link counts and route choices.

6.2. Conclusions

6.2.1. The following conclusions can be drawn from this study:

6.2.2. The highway assignment traffic models are calibrated and validated in the base year against observed data. The 2023 model is a forecast model and has not been calibrated using any observed data from the same year. This is an important distinction when considering the appropriate criteria for comparison of the 2023 forecast models with observed traffic data. The TAG validation thresholds are deigned to be applicable for the validation of base year models that have been calibrated using observed traffic data. Consequently, they can be considered overly stringent for the comparison of the 2023 forecast model with observed data and thus, not fully meeting the TAG validation criteria in this instance could lead to unrealistic conclusions being drawn about the validity of the model.

6.2.4.   The results of this study show that both the 2023 models, without and with COVID-19 adjustment factors, correlate with observed traffic data within acceptable validation tolerances. This implies that the differences in the modelled traffic demand between the two models, without and with the COVID-19 adjustment, fall within the range of acceptable validation tolerances for strategic traffic models.

6.2.5.   Interrogation of the two models shows that the modelled traffic flows on the road network are consistently higher for the without COVID adjustment model compared to the with COVID adjustment model, but in both cases the variation from the 2023 observed data is within acceptable validation tolerances. This indicates that the model is performing as expected in response to changes in traffic demand. It also indicates that, overall, the with COVID-19 adjustment model compares marginally better with observed traffic flow data.

6.2.6.   The differences between the outputs of the 2023 forecast models without and with COVID-19 adjustment are in line with the relatively small impact of the COVID-19 on traffic levels in Gloucestershire of about 4% between 2019 and 2023 reported by GCC from monitoring of 32 count sites across the county.

6.2.7.   The findings of this supplementary report demonstrate that the 2015 base used in the traffic modelling submitted for the DCO application remains valid and is fit for purpose in assessing the proposed Scheme. Consequently, the traffic model does not need to be re -based to the current year (2023) traffic flows and the potential impact of the COVID-19 pandemic on forecast traffic demand on the road network for the Scheme opening (2027)and design (2042) years can be assessed by applying the NH COVID-19 adjustment factors to the current forecast year models in accordance with TAG.

Appendix A   Update of Uncertainty Logs

Table A1 – M5 J10 Highway Schemes Uncertainty Log Status in 2023

Ref	Scheme name	Scheme status	2023 Status Update	Status in the 2023 Model
1	Fiddington developments (residential, employment, retail)	Near certain	A46 Highway Network Improvements Completed end of 2022	Included
2	A417 Missing Link	More than likely	Autumn 2023 - Initial off site Surveys commenced. Main carriageway works to commence late 2024, with 36 month construction period.	Excluded
3	West of Cheltenham (WoC) A40 Phase 1 - Arle Court	Near certain	Work Completed in 2021/22	Included
4	WoC A40 Phase 2 - M5 J11	Near certain	Work Completed in 2021/22	Included
5	WoC A40 Phase 3 - Arle Court to Benhall	Near certain	Work Completed in 2021/22	Included
6	WoC A40 Phase 4 - Benhall to Griffiths Ave	Near certain	Work Completed in 2021/22	Included
7	Elmbridge Transport Scheme and A40 Elmbridge Court, Gloucester	Completed (2017)	Completed in September 2017	Included
8	A417/A40 Barnwood Link	Under construction	Work Completed in 2020. Comprises 'T' junction signalisation scheme at Centre Severn Development	Included
9	A435/Hyde Lane/Southam Lane Signalised Junction improvements	Near certain	Completed in May 2022	Included
10	A419 corridor improvements, Stonehouse	Near certain	Completed by 2022. Improvements for A419 corridor, Stonehouse	Included
11	A419 White Hart junction improvement, Swindon	Near certain	Completed by 2022	Included

Ref	Scheme name	Scheme status	2023 Status Update	Status in the 2023 Model
12	A38 Cross Keys roundabout	Near certain	Roundabout capacity improvements scheme completed 2021/22, comprising widening of A38 Nth & A430 Sth junction approaches & additional circulatory lanes.	Included
13	A40 Longford roundabout junction improvement, Gloucester	Near certain	Capacity improvements scheme completed 2021/22, comprising widening of junction approaches & additional circulatory lanes.	Included
14	A40 access roundabout addition, Innsworth	Near certain	New 3-Arm Roundabout completed in early 2023, but 'side access' to Innsworth Development not opened as yet	Excluded
15	Innsworth Development Roundabout Improvement	Near certain	Not completed by 2023	Excluded
17	A40 Over Roundabout improvement (phase 2), Gloucester	Near certain/ partially complete	Not built by 2023	Excluded
18	A38 Tewkesbury Road (Twigworth)	Near certain	Scheme Completed 2021/22. Twigworth Development Access (new roundabout on A38, and new roundabout within site)	Included
19	Perrybrook (Brockworth) development	Under construction	Scheme Completed 2021/22. Perrybrook Development Access (New roundabout on Court Road for site access)	Included
20	M4 J15-17	Certain	Scheme completed in October 2021	Included
21	A38, M5 J16 to Aztec West, Almondsbury	Certain	Scheme now completed	Included
22	M49 Avonmouth Junction	More than likely	New Junction built South Gloucestershire now looking how to connect the new motorway junction at Western Approach Distribution Park. https://nationalhighways.co.uk/our-roads/south-west/m49-avonmouth-junction/#:~:text=The%20new%20junction%20we%27ve,built%20immediately%20next%20to%20it.	Included
23	M5 J25	Certain	Completed Summer 2021	Included
24	Staplegrove, Taunton	Certain	New Junction off the A358 still to be built, as at Dec 2023.	Excluded

Ref	Scheme name	Scheme status	2023 Status Update	Status in the 2023 Model
25	Northern Inner Distribution Road (NIDR), Taunton	Complete (2018)	Complete	Included
26	A358 Taunton to Southfields	More than likely	7/12/23 Update - Upgrade of A358 to dual carriageway between Southfields roundabout on the A303 and the M5 at Taunton - DCO application yet to be submitted.	Excluded
27	A303 Sparkford - Ilchester dualling	More than likely	Upgrading a 3-mile section. Start Date: March 2021, End Date: 2024-2025.	Excluded
28	A303 Stonehenge (Amesbury to Berwick Down)	More than likely	DCO Granted in July 2023; Anticipated preparatory work to start in late 2024.	Excluded
29	A34 Milton Interchange Improvement	Certain	Completed in May 2016	Included
30	A34 Chilton Interchange Improvement	Certain	Improvements to Chilton interchange (northern slip roads for access to Harwell Campus) completed in 2016	Included
31	A380 South Devon Highway (Kingskerswell Bypass)	Certain	Completed in December 2015	Included
32	Fiddington Development Mitigation measures	More than likely	Complete, see Reference 1.	Included

Table A2 –M5 J10 Uncertainty Log - Forecast Residential Sites

Table A1 - M5 J10 : Uncertainty Log - Forecast Residential Sites	Development name	District	Planning reference (if available)	No. dwellings	Certainty	% Completion at 2023	Status in the 2023 Model
90101	West Cheltenham JCS R (Cheltenham Cyber Park R)	Cheltenham	None	2,371	MTL	0%	Excluded
90103	Haines And Strange Albion Street Cheltenham Gloucestershire GL52 2RH	Cheltenham	13/00827/OUT	50	NC	100%	Included
90104	GCHQ Oakley Priors Road Cheltenham Gloucestershire GL52 5AJ	Cheltenham	13/01683/REM	311	NC	100%	Included
90105	Car Park North Place Cheltenham Gloucestershire GL50 4DW	Cheltenham	12/01612/FUL	143	MTL	0%	Excluded
90106	Central Cheltenham Police Station Talbot House Lansdown Road Cheltenham Gloucestershire GL51 SQT	Cheltenham	17/00337/FUL	67	NC	100%	Included
90107	Cotswold Court Lansdown Road Cheltenham Gloucestershire GL50 2JA	Cheltenham	13/01501/FUL	53	NC	100%	Included
90108	Land To Rear Of Nuffield Hospital Hatherley Lane Cheltenham Gloucestershire R	Cheltenham	15/01048/OUT	27	MTL	0%	Excluded
90111	Land At Starvehall Farm New Barn Lane Cheltenham Gloucestershire	Cheltenham	10/01243/OUT	300	NC	95%	Included
90112	Christ College Arle Road Cheltenham Gloucestershire GL51 8LE	Cheltenham	14/01317/REM	90	NC	100%	Included
90113	Travis Perkins Gloucester Road Cheltenham Gloucestershire GL51 0SX	Cheltenham	13/00106/FUL	107	NC	100%	Included
90114	John Dower House 24 Crescent Place Cheltenham Gloucestershire GL50 3RA	Cheltenham	15/00362/FUL	68	NC	100%	Included
90115	Premier Products Ltd Bouncers Lane Cheltenham Gloucestershire GL52 5JD	Cheltenham	17/00929/OUT	58	NC	100%	Included
90116	Phase 1 Land At Old Gloucester Road Cheltenham Gloucestershire	Cheltenham	17/01411/OUT	90	NC	0%	Excluded
90118	Land at Perrybrook, Brockworth R	Tewkesbury	12/01256/OUT	1,500	NC	10%	Included
90120	Innsworth R	Tewkesbury	15/00749/OUT	1,300	NC	5%	Included
90122	Elms Park R	Tewkesbury	16/02000/OUT	4,285	MTL	0%	Excluded
90124	Land To The Rear Of Invista Green Street Brockworth GL3 4LS	Tewkesbury	11/00091/OUT	145	NC	100%	Included
90125	Nerva Meadows Plots 3200, 7400, 7520 Gloucester Business Park Brockworth	Tewkesbury	15/01378/OUT	106	MTL	50%	Included
90126	Parcel 3745 Cheltenham Road East Churchdown Gloucester Gloucestershire	Tewkesbury	16/00738/OUT	465	MTL	75%	Included
90127	Land At Tewkesbury Road Twigworth	Tewkesbury	15/01149/OUT	995	NC	40%	Included
90128	Land To East Of Tewkesbury Road And North Of Longford Lane Longford Gloucester Gloucestershire	Tewkesbury	15/00814/APP	269	NC	100%	Included
90129	Land To East Of Tewkesbury Road And North Of Longford Lane Longford Gloucester Gloucestershire	Tewkesbury	16/00853/FUL	197	MTL	100%	Included
90130	Cleevelands Evesham Road Bishops Cleeve R	Tewkesbury	10/01216/OUT	550	NC	100%	Included
90132	Land To The West Of Farm Lane Shurdington	Tewkesbury	14/00838/FUL	377	NC	90%	Included
90134	Homelands Farm Gotherington Lane Bishops Cleeve GL52 8EN R	Tewkesbury	10/01005/OUT	450	NC	100%	Included
90136	Land To The West Of Lassington Lane Highnam Gloucester Gloucestershire	Tewkesbury	14/00583/OUT / 16/00858/APP	88	NC	100%	Included
90137	Part Parcel 3400 Columbine Road Walton Cardiff Tewkesbury Gloucestershire	Tewkesbury	16/00177/FUL	261	NC	100%	Included
90138	Adjacent 74 Evesham Road Bishops Cleeve Cheltenham Gloucestershire	Tewkesbury	15/01177/FUL	71	NC	100%	Included
90139	Parcel 7561 Malleson Road Gotherington Cheltenham Gloucestershire	Tewkesbury	16/00965/OUT	50	MTL	100%	Included
90140	Part Parcel 0085 Land West Of Bredon Road Bredon Road Tewkesbury Gloucestershire	Tewkesbury	16/00663/APP	68	MTL	100%	Included

Planning Inspectorate scheme reference: TR010063
Application document reference: TR010063 – APP 9.17
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Table A1 - M5 J10 : Uncertainty Log - Forecast Residential Sites	Development name	District	Planning reference (if available)	No. dwellings	Certainty	% Completion at 2023	Status in the 2023 Model
90142	Land Parcels 4331 4619 And 5837 Pamington Lane Pamington Tewkesbury Gloucestershire	Tewkesbury	14/00972/OUT	150	NC	90%	Included
90143	Land Adjacent Cornerways High Street Twyning	Tewkesbury	13/00978/FUL	58	NC	100%	Included
90145	Coopers Edge - Parcels 25A, 25B, 26A, 26B, 27A, 27B	Tewkesbury	15/01274/APP	214	NC	100%	Included
90146	Land at A38/A4019 Jct	Tewkesbury	17/01337/OUT	50	NC	60%	Included
90147	Land adj to Hucclecote Road and Golf Club	Tewkesbury	18/01239/FUL	166	NC	75%	Included
90148	Roman Way, Bourton-on-the-Water	Cotswolds	16/03834/FUL	111	NC	100%	Included
90149	Land parcel off Station Road, Bourton-on-the-Water	Cotswolds	14/02923/REM	100	NC	100%	Included
90150	Kingshill Development, London Road, Cirencester R	Cotswolds	15/03117/REM	94	NC	100%	Included
90152	Land west of Siddington Road and south of North Hill Road, Cirencester	Cotswolds	14/02871/REM	55	NC	100%	Included
90153	Land west of Pips Field, Cirencester Road, Fairford	Cotswolds	12/02133/FUL	68	NC	100%	Included
90154	Land at London Road, Fairford	Cotswolds	15/04461/REM	117	NC	100%	Included
90155	Land parcel south of Home Farm, Fairford	Cotswolds	15/02707/REM	120	NC	100%	Included
90156	Land at Top Farm, West Lane, Kemble	Cotswolds	14/03638/REM	50	NC	100%	Included
90157	Old Station Site, Lechlade	Cotswolds	14/04198/REM	61	NC	100%	Included
90158	Former Meon Hill Nurseries, Canada Lane, Mickleton	Cotswolds	14/01578/REM	75	NC	100%	Included
90159	Land parcel off Broad Marston Road, Mickleton	Cotswolds	16/02049/REM	90	NC	100%	Included
90160	Land adjacent to Arbour Close and Cotswold Edge, Mickleton	Cotswolds	14/03019/REM	70	NC	100%	Included
90161	Land at Fire Service College, London Road, Moreton-in-Marsh	Cotswolds	11/00940/REM	54	NC	100%	Included
90162	The Fire Service College, London Road, Moreton-in-Marsh	Cotswolds	16/00858/REM	250	NC	100%	Included
90163	Land off Todenham Road, Moreton-in-Marsh	Cotswolds	14/04503/REM	105	NC	100%	Included
90164	Land north of Cirencester Road, GL8 8SA, Tetbury	Cotswolds	17/04978/FUL	128	NC	100%	Included
90165	Land parcel at Quercus Park, Tetbury	Cotswolds	14/03567/REM	50	NC	100%	Included
90166	Highfield Farm, Tetbury	Cotswolds	15/02517/REM	133	NC	100%	Included
90167	Land parcel south of Quercus Road, Quercus Road, Tetbury	Cotswolds	15/03479/REM	123	NC	100%	Included
90168	Land parcel at Upper Rissington, Upper Rissington	Cotswolds	12/03810/REM	194	NC	100%	Included
90169	Land at Chesterton Farm, Cranhams Lane, GL7 6JP, Cirencester R	Cotswolds	16/00054/OUT	2,350	MTL	5%	Included
90171	Land at Siddington Park Farm, GL7 6ET, Preston	Cotswolds	17/00076/OUT	171	MTL	60%	Included
90172	Land to the south of Love Lane, Siddington	Cotswolds	15/05165/OUT	88	MTL	5%	Included
90173	Land adjacent to Bretton House, Station Road, Stow-on-the-Wold	Cotswolds	17/01218/REM	106	NC	50%	Included
90174	Highfield Farm, Tetbury	Cotswolds	15/02517/REM	117	NC	100%	Included

M5 Junction 10 Improvements Scheme
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Table A1 - M5 J10 : Uncertainty Log - Forecast Residential Sites	Development name	District	Planning reference (if available)	No. dwellings	Certainty	% Completion at 2023	Status in the 2023 Model
90176	Land at Evenlode Road, Moreton-in-Marsh	Cotswolds	19/00086/OUT	67	NC	25%	Included
90177	Land south east of Fosseway Avenue, Moreton-in-Marsh	Cotswolds	M_19A - 19/02248/FUL	91	NC	25%	Included
90179	Former Gloucester Academy Estcourt Close Gloucester GL1 3LR	Gloucester	16/00631/OUT	90	NC	100%	Included
90180	Hucclecote Centre Churchdown Lane Gloucester GL3 3QN	Gloucester	11/00742/OUT	53	NC	100%	Included
90181	Former Contract Chemicals Site Bristol Road Gloucester GL2 5BX	Gloucester	07/00474/OUT	86	NC	100%	Included
90182	Former Wellman Graham St Gobain Industrial Sites Bristol Road Gloucester GL2 5BX	Gloucester	07/00472/OUT	172	NC	100%	Included
90183	Land East Of Hempsted Lane Hempsted Lane Gloucester	Gloucester	13/01032/OUT	50	MTL	90%	Included
90184	Old Hempsted Fuel Depot Hempsted Lane Gloucester	Gloucester	12/00725/OUT	85	NC	0%	Excluded
90185	Norville Optical Co Ltd Paul Street Gloucester GL1 4NY	Gloucester	16/00815/FUL	63	NC	100%	Included
90186	Former Kwik Save 103 Northgate Street Gloucester	Gloucester	16/00142/FUL	95	NC	100%	Included
90187	Land South Of Grange Road Gloucester	Gloucester	16/00165/OUT	250	NC	75%	Included
90188	Business School & Student Accommodation	Gloucester	None	80	Complete	100%	Included
90189	Barbican Carpark, Blackfriars (Phase 1)	Gloucester	None	118	Complete	100%	Included
90190	Former Gloucester Prison, Barrack Square	Gloucester	None	202	MTL	0%	Excluded
90191	Barbican Carpark, Blackfriars (Phase 2)	Gloucester	None	74	MTL	100%	Included
90192	McCarthy & Stone, Land at Bakers Quay	Gloucester	None	50	NC	100%	Included
90193	Former Civil Service Club, Estcourt Road	Gloucester	None	100	NC	100%	Included
90194	Land At Bakers Quay Provender Mill	Gloucester	15/01144/FUL	166	NC	100%	Included
90195	Mayos Land Bristol Road Quedgeley Gloucester	Gloucester	13/01013/REM	49	Complete	100%	Included
90196	Former Gloscat Buildings Brunswick Road Gloucester	Gloucester	11/00107/FUL	190	Complete	100%	Included
90197	Flats - Land At Bakers Quay Monk Meadow	Gloucester	14/00709/FUL	409	NC	70%	Included
90198	Kingsway Framework All Areas	Gloucester	None	692	NC	50%	Included
90199	Larger Winnycroft Development Site (close to B4073 Painswick Rd, west of M5)	Gloucester	14/01063/OUT	420	NC	5%	Included
90200	Little Winnycroft Development Site (close to B4073 Painswick Rd, west of M5)	Gloucester	14/01063/OUT	217	NC	0	Excluded
90203	Sellars Farm Sellars Road Hardwicke Glos.	Stroud	S.12/2528/REM	64	Complete	100%	Included
90204	Land at Box Road Cam Durlsey Glos.	Stroud	S.11/1682/FUL	54	Complete	100%	Included
90205	Parcel 16B And 19B Land To The West And South Of Gloucester Business Park Upton St Leonards	Stroud	S.16/1558/REM	79	Complete	100%	Included
90206	Land South Of Leonard Stanley Primary School Bath Road Leonard Stanely Glos.	Stroud	S.16/1398/REM	75	Complete	100%	Included
90207	Land At Colethrop Farm Bath Road Hardwicke	Stroud	S.17/2215/REM	53	Complete	100%	Included

Table A3 –M5 J10 Uncertainty Log - Forecast Employments Sites

SATURN Model Zone No	Development name	District	Planning Reference (if Available)	Land Use	Site Area (m2)	Size (sqm GFA)	Certainty	Jobs post March	B1 (%)	B2 (%)	B8 (%)	% Completion at 2023	Status in the 2023 Model
91102	West Cheltenham Employment (Cheltenham Cyber Park Employment)	Cheltenham	None	50% B1 (a); 24% B2 (c); 24% B2 (d)	515,900	210,287	MTL	8,178	50%	50%	0%	0%	Excluded
91109	Land To Rear Of Nuffield Hospital Hatherley Lane Cheltenham Gloucestershire E	Cheltenham	15/01048/OUT	100% B1 (a)	8,787	3,680	MTL	201	100%	0%	0%	50%	Included
91110	Land At North Road West And Grovefield Way Cheltenham Gloucestershire	Cheltenham	18/01004/FUL	73% B1 (a); 11% B2 (c); 11% B2 (d); 2% B8 (e); 2% B8 (f); 2% B8 (g)	41,300	8,158	MTL	544	73%	21%	6%	30%	Included
91117	JCS Strategic Allocation Site A9 - Ashchurch	Tewkesbury	13/01003/OUT	100% retail	143,000	25,545	NC	581	0%	0%	0%	50%	Included
91119	Land at Perrybrook, Brockworth Employment	Tewkesbury	12/01256/OUT	50% B1 (a); 17% B8 (e); 17% B8 (f); 17% B8 (g)	33,000	22,000	NC	540	50%	0%	50%	0%	Excluded
91121	Innsworth Employment	Tewkesbury	15/00749/OUT	80% B1 (a); 10% B2 (c); 10% B2 (d)	40,800	16,320	NC	750	80%	20%	0%	0%	Excluded
91123	Elms Park Employment	Tewkesbury	16/02000/OUT	100% B1 (a)	100,000	36,000	MTL	1,852	50%	22%	28%	0%	Excluded
91131	Cleevelands Evesham Road Bishops Cleeve Employment	Tewkesbury	10/01216/OUT	100% B1 (a)	-	3,750	NC	250	100%	0%	0%	100%	Included
91133	Plot 6200 Gloucester Business Park Brockworth Gloucester Gloucestershire	Tewkesbury	17/00005/APP	100% B2 (c)	35,500	9,738	MTL	293	0%	100%	0%	50%	Included
91135	Homelands Farm Gotherington Lane Bishops Cleeve GL52 8EN Employment	Tewkesbury	10/01005/OUT	100% B1 (a)	-	500	NC	50	100%	0%	0%	100%	Included
91144	Land On The East Side Of Cheltenham Road East Churchdown Gloucester	Tewkesbury	15/01115/FUL	20% B1 (a); 40% B2 (c); 40% B2 (d)	45,527	18,933	NC	300	20%	80%	0%	50%	Included
91151	Kingshill Development, London Road, Cirencester Employment	Cotswolds	15/03117/REM	100% B1 (a)	-	5,000	NC	503	100%	0%	0%	100%	Included
91170	Land at Chesterton Farm, Cranhams Lane, GL7 6JP, Cirencester Employment	Cotswolds	16/00054/OUT	70% B1 (a); 7% B2 (c); 7% B2 (d); 5% B8 (e); 5% B8 (f); 5% B8 (g)	-	43,664	MTL	500	70%	15%	15%	0%	Excluded
91178	Land At Barnwood Link Road Gloucester	Gloucester	14/01035/OUT	33% B1 (a); 17% B2 (c); 17% B2 (d); 11% B8 (e); 11% B8 (f); 11% B8 (g)	570,000	28,673	NC	1,156	33%	32%	0%	75%	Included

SATURN Model Zone No	Development name	District	Planning Reference (if Available)	Land Use	Site Area (m2)	Size (sqm GFA)	Certainty	Jobs post March	B1 (%)	B2 (%)	B8 (%)	% Completion at 2023	Status in the 2023 Model
91201	Gateway 12 Davy Way, Hardwicke, Gloucester, Gloucestershire	Stroud	S.14/1518/FUL	33% B1 (a); 17% B2 (c); 17% B2 (d); 11% B8 (e); 11% B8 (f); 11% B8 (g)	21,900	7,562	NC	467	33%	33%	33%	100%	Included
91202	Land at Quedgeley Trading Estate East Haresfield Stonehouse	Stroud	16/1724/OUT	100% B1 (a)	148,000	66,011	MTL	2,149	100%	0%	0%	75%	Included
95001	South Churchdown	Tewkesbury	N/A	50% B1; 22% B2; 28% B8	174,000	62,640	H	3,223	0%	0%	0%	0%	Excluded
95002	West Cheltenham Safeguarded Land	Cheltenham	N/A	50% B1; 22% B2; 28% B8	0	0	H	0	0%	0%	0%	0%	Excluded
95003	Northwest Cheltenham Safeguarded Land	Cheltenham	N/A	50% B1; 22% B2; 28% B8	300,000	108,000	H	5,556	50%	22%	28%	0%	Excluded
95004	Fiddington Employment	Tewkesbury	N/A	38% B1; 63% B8	1,200,000	480,000	H	18,896	38%	0%	63%	0%	Excluded
91203	Stoke Road Employment	Tewkesbury	18/00249/OUT	61% B1; 39% B8	22,000	6,880	NC	468	61%	0%	39%	80%	Included
91204	StokeRoad_T	Tewkesbury	18/00249/OUT		2000	280		16				80%	Included

Note : The abbreviation for certainty categorisation stand for :
NC – Near Certain
MTL – More than Likely
H – Hypothetical

Appendix B   Journey Time Comparisons (Without COVID-19 Adjustment)

Table B1 –Comparison of 2023 Forecast Model and Observed Journey Times Without COVID-19 Adjustment – AM Peak

Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 1	A46 (M5J9) to A46 (M5J9)	EB	16.05	15:30	15:47	-00:17	-2%	✓
		WB	16.59	17:04	18:40	-01:36	-9%	✓
Route 2	M5 J9 to M5 J8	NB	5.77	03:33	03:30	00:03	1%	✓
		SB	6.33	04:12	04:10	00:02	1%	✓
Route 3	A438(B4211) to A438(M5J9)	EB	7.80	10:35	12:19	-01:44	-16%	✗
		WB	8.21	10:49	11:05	-00:16	-3%	✓
Route 4	A435(New Barn Lane) to B4079 (Main Road)	NB	14.29	15:45	17:29	-01:44	-11%	✓
		SB	14.10	17:08	19:34	-02:26	-14%	✓
Route 6	A46 (Evesham Bypass) to A46 (Salford Rd)	NB	13.62	09:58	10:02	-00:04	-1%	✓
		SB	13.31	09:36	09:49	-00:13	-2%	✓
Route 44	A40 (Brize Norton) to B4063 Gloucester	NB	54.09	55:19	52:39	02:40	5%	✓
		SB	54.27	58:15	55:48	02:27	4%	✓
Route 45	A419 Swindon (Merlin Way) to B4063 Gloucester	NB	53.29	41:17	39:40	01:37	4%	✓
		SB	53.38	40:31	37:28	03:03	8%	✓
Route 50	M5 J11 to M5 J10	NB	4.18	02:24	02:30	-00:06	-4%	✓
		SB	4.53	02:37	02:47	-00:10	-6%	✓
Route 101	A46 Stroud to A46 Cheltenham	NB	20.34	24:17	23:30	00:47	3%	✓
		SB	20.36	24:22	22:31	01:51	8%	✓
Route 102	B4070 Stroud to B4070 Cheltenham	EB	20.85	24:37	24:25	00:12	1%	✓
		WB	20.90	25:06	22:24	02:42	11%	✓
Route 103	A435 Cirencester to A46 Cheltenham	NB	30.79	30:10	28:41	01:29	5%	✓
		SB	30.45	28:51	27:33	01:18	5%	✓

Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 104	A435 Cirencester to A417 Cheltenham	NB	22.38	19:38	19:08	00:30	3%	✓
		SB	22.26	18:55	19:28	-00:33	-3%	✓
Route 105_1	A46 Stroud to A46 Cranham Corner	NB	9.39	10:55	10:12	00:43	7%	✓
		SB	9.28	11:11	10:22	00:49	7%	✓
Route 105_2	B4070 (Birdlip Rd Crossroads) to A436 (A40 Crossroads)	EB	15.27	15:42	16:47	-01:05	-7%	✓
		WB	15.27	14:46	13:24	01:22	9%	✓
Route 106	Stroud (Toadsmoor Rd) to A417 Gloucester	NB	22.76	26:34	25:03	01:31	6%	✓
		SB	22.91	26:48	24:52	01:56	7%	✓
Route 107	Gloucester (Barnwood Rd) to Cheltenham (Andoversford)	EB	19.79	23:18	22:40	00:38	3%	✓
		WB	19.68	22:55	22:30	00:25	2%	✓
Route 108	A40 Gloucester (Highnam Rbt) to A4013 Cheltenham (Princess Elizabeth Way)	NB	16.07	19:24	17:28	01:56	10%	✓
		SB	16.21	17:55	16:13	01:42	10%	✓
Route 109_1	A417 Cirencester (Burford Rd) to A46 Crosshand Rbt	NB	22.02	20:47	17:46	03:01	14%	✓
		SB	21.71	20:41	17:52	02:49	14%	✓
Route 109_2	A46 Crosshand Rbt to M5 J11	NB	7.78	05:39	05:45	-00:06	-2%	✓
		SB	6.86	05:09	05:17	-00:08	-3%	✓
Route 201	M5 J14 to A430 (Cole Avenue)	EB	27.27	24:54	24:11	00:43	3%	✓
		WB	27.43	25:47	24:15	01:32	6%	✓
Route 202	B4008 Bath Rd to B4008 (Cole Avenue)	NB	11.82	15:27	15:19	00:08	1%	✓
		SB	11.83	15:34	15:49	-00:15	-2%	✓
Route 203	A4173 (Pitchcombe) to A4173 (Southern Avenue)	NB	8.89	09:44	09:34	00:10	2%	✓
		SB	8.89	09:34	09:00	00:34	6%	✓
Route 204	M5 J13 to A419 (Cirencester)	EB	27.48	33:10	30:10	03:00	9%	✓
		WB	27.28	32:40	29:05	03:35	11%	✓

Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 205	A46 Nailsworth to A46 Stroud	NB	6.25	08:13	08:35	-00:22	-5%	✓
		SB	6.25	08:22	08:15	00:07	1%	✓
Route 208	A419 (Kingsditch Rbt) to M5 J10	NB	11.22	08:53	09:09	-00:16	-3%	✓
		SB	10.53	08:52	10:32	-01:40	-19%	✗
Route 209	A38 (Jubilee Way) to A419 (Kingsditch Rbt)	EB	11.96	13:49	15:31	-01:42	-12%	✓
		WB	11.98	13:42	15:28	-01:46	-13%	✓
Route 210	A38 Gloucester (Longford Rbt) to A38 (Jubilee Way)	NB	15.18	16:11	15:50	00:21	2%	✓
		SB	15.36	16:19	16:00	00:19	2%	✓
Route 211	A4135 (A38 Bristol Rd) to B4066 Selsley Hill (A419)	EB	18.78	23:10	21:38	01:32	7%	✓
		WB	18.78	23:38	21:55	01:43	7%	✓

Table B2 –Comparison of 2023 Forecast Model and Observed Journey Times Without COVID-19 Adjustment – Inter-peak

Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 1	A46 (M5J9) to A46 (M5J9)	EB	16.05	15:13	15:12	00:01	0%	✓
		WB	16.59	16:18	16:19	-00:01	0%	✓
Route 2	M5 J9 to M5 J8	NB	5.77	03:31	03:34	-00:03	-2%	✓
		SB	6.33	04:13	04:01	00:12	5%	✓
Route 3	A438(B4211) to A438(M5J9)	EB	7.80	10:35	11:21	-00:46	-7%	✓
		WB	8.21	11:11	11:08	00:03	1%	✓
Route 4	A435(New Barn Lane) to B4079 (Main Road)	NB	14.29	15:37	17:23	-01:46	-11%	✓
		SB	14.10	15:44	17:24	-01:40	-11%	✓
Route 6	A46 (Evesham Bypass) to A46 (Salford Rd)	NB	13.62	09:54	09:42	00:12	2%	✓
		SB	13.31	09:35	09:31	00:04	1%	✓
Route 44	A40 (Brize Norton) to B4063 Gloucester	NB	54.09	54:22	50:25	03:57	7%	✓
		SB	54.27	54:35	53:29	01:06	2%	✓
Route 45	A419 Swindon (Merlin Way) to B4063 Gloucester	NB	53.29	41:26	38:36	02:50	7%	✓
		SB	53.38	38:51	35:30	03:21	9%	✓
Route 50	M5 J11 to M5 J10	NB	4.18	02:24	02:31	-00:07	-5%	✓
		SB	4.53	02:40	02:36	00:04	3%	✓
Route 101	A46 Stroud to A46 Cheltenham	NB	20.34	23:58	21:56	02:02	8%	✓
		SB	20.36	24:10	21:47	02:23	10%	✓
Route 102	B4070 Stroud to B4070 Cheltenham	EB	20.85	26:27	22:52	03:35	14%	✓
		WB	20.90	24:15	21:51	02:24	10%	✓
		NB	30.79	29:35	27:22	02:13	8%	✓

Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 103	A435 Cirencester to A46 Cheltenham	SB	30.45	28:46	26:08	02:38	9%	✓
Route 104	A435 Cirencester to A417 Cheltenham	NB	22.38	19:27	18:41	00:46	4%	✓
		SB	22.26	19:27	18:17	01:10	6%	✓
Route 105_1	A46 Stroud to A46 Cranham Corner	NB	9.39	10:52	09:50	01:02	9%	✓
		SB	9.28	11:06	10:02	01:04	10%	✓
Route 105_2	B4070 (Birdlip Rd Crossroads) to A436 (A40 Crossroads)	EB	15.27	16:08	15:07	01:01	6%	✓
		WB	15.27	14:13	13:14	00:59	7%	✓
Route 106	Stroud (Toadsmoor Rd) to A417 Gloucester	NB	22.76	26:29	24:28	02:01	8%	✓
		SB	22.91	27:10	24:11	02:59	11%	✓
Route 107	Gloucester (Barnwood Rd) to Cheltenham (Andoversford)	EB	19.79	22:53	21:31	01:22	6%	✓
		WB	19.68	22:57	22:07	00:50	4%	✓
Route 108	A40 Gloucester (Highnam Rbt) to A4013 Cheltenham (Princess Elizabeth Way)	NB	16.07	17:35	16:28	01:07	6%	✓
		SB	16.21	16:53	15:42	01:11	7%	✓
Route 109_1	A417 Cirencester (Burford Rd) to A46 Crosshand Rbt	NB	22.02	19:32	17:39	01:53	10%	✓
		SB	21.71	19:19	17:28	01:51	10%	✓
Route 109_2	A46 Crosshand Rbt to M5 J11	NB	7.78	05:32	05:35	-00:03	-1%	✓
		SB	6.86	05:04	05:07	-00:03	-1%	✓
Route 201	M5 J14 to A430 (Cole Avenue)	EB	27.27	24:55	23:47	01:08	5%	✓
		WB	27.43	25:45	24:03	01:42	7%	✓
Route 202	B4008 Bath Rd to B4008 (Cole Avenue)	NB	11.82	15:38	14:58	00:40	4%	✓
		SB	11.83	15:25	15:28	-00:03	0%	✓
Route 203	A4173 (Pitchcombe) to A4173 (Southern Avenue)	NB	8.89	09:37	09:06	00:31	5%	✓
		SB	8.89	09:37	08:55	00:42	7%	✓
		EB	27.48	31:48	28:04	03:44	12%	✓

Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 204	M5 J13 to A419 (Cirencester)	WB	27.28	33:15	28:36	04:39	14%	✓
Route 205	A46 Nailsworth to A46 Stroud	NB	6.25	08:29	08:15	00:14	3%	✓
		SB	6.25	08:35	07:57	00:38	7%	✓
Route 208	A419 (Kingsditch Rbt) to M5 J10	NB	11.22	09:00	09:24	-00:24	-4%	✓
		SB	10.53	08:37	09:25	-00:48	-9%	✓
Route 209	A38 (Jubilee Way) to A419 (Kingsditch Rbt)	EB	11.96	13:29	13:56	-00:27	-3%	✓
		WB	11.98	13:27	15:39	-02:12	-16%	✗
Route 210	A38 Gloucester (Longford Rbt) to A38 (Jubilee Way)	NB	15.18	15:43	15:20	00:23	2%	✓
		SB	15.36	16:06	15:31	00:35	4%	✓
Route 211	A4135 (A38 Bristol Rd) to B4066 Selsley Hill (A419)	EB	18.78	23:26	21:28	01:58	8%	✓
		WB	18.78	23:44	21:37	02:07	9%	✓

Table B3 –Comparison of 2023 Forecast Model and Observed Journey Times Without COVID-19 Adjustment – PM Peak

Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 1	A46 (M5J9) to A46 (M5J9)	EB	16.05	15:16	16:26	-01:10	-8%	✓
		WB	16.59	16:42	16:26	00:16	2%	✓
Route 2	M5 J9 to M5 J8	NB	5.77	03:25	03:38	-00:13	-7%	✓
		SB	6.33	04:02	03:52	00:10	4%	✓
Route 3	A438(B4211) to A438(M5J9)	EB	7.80	10:07	11:28	-01:21	-13%	✓
		WB	8.21	10:46	11:34	-00:48	-8%	✓
Route 4	A435(New Barn Lane) to B4079 (Main Road)	NB	14.29	15:50	18:11	-02:21	-15%	✓
		SB	14.10	15:36	17:36	-02:00	-13%	✓
Route 6	A46 (Evesham Bypass) to A46 (Salford Rd)	NB	13.62	10:16	10:02	00:14	2%	✓
		SB	13.31	09:26	09:51	-00:25	-4%	✓
Route 44	A40 (Brize Norton) to B4063 Gloucester	NB	54.09	55:18	53:02	02:16	4%	✓
		SB	54.27	57:26	55:25	02:01	4%	✓
Route 45	A419 Swindon (Merlin Way) to B4063 Gloucester	NB	53.29	42:24	40:46	01:38	4%	✓
		SB	53.38	39:09	35:55	03:14	8%	✓
Route 50	M5 J11 to M5 J10	NB	4.18	02:19	02:35	-00:16	-12%	✓
		SB	4.53	02:31	02:42	-00:11	-7%	✓
Route 101	A46 Stroud to A46 Cheltenham	NB	20.34	24:09	22:52	01:17	5%	✓
		SB	20.36	23:58	23:27	00:31	2%	✓
Route 102	B4070 Stroud to B4070 Cheltenham	EB	20.85	26:00	24:01	01:59	8%	✓
		WB	20.90	25:12	24:37	00:35	2%	✓
Route 103	A435 Cirencester to A46 Cheltenham	NB	30.79	32:20	30:10	02:10	7%	✓
		SB	30.45	28:04	27:23	00:41	2%	✓

Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 104	A435 Cirencester to A417 Cheltenham	NB	22.38	19:32	19:59	-00:27	-2%	✓
		SB	22.26	19:35	18:49	00:46	4%	✓
Route 105_1	A46 Stroud to A46 Cranham Corner	NB	9.39	11:01	10:02	00:59	9%	✓
		SB	9.28	11:02	10:23	00:39	6%	✓
Route 105_2	B4070 (Birdlip Rd Crossroads) to A436 (A40 Crossroads)	EB	15.27	16:45	16:12	00:33	3%	✓
		WB	15.27	17:19	15:30	01:49	10%	✓
Route 106	Stroud (Toadsmoor Rd) to A417 Gloucester	NB	22.76	26:22	25:05	01:17	5%	✓
		SB	22.91	27:00	24:54	02:06	8%	✓
Route 107	Gloucester (Barnwood Rd) to Cheltenham (Andoversford)	EB	19.79	22:41	21:56	00:45	3%	✓
		WB	19.68	26:03	24:24	01:39	6%	✓
Route 108	A40 Gloucester (Highnam Rbt) to A4013 Cheltenham (Princess Elizabeth Way)	NB	16.07	18:11	17:35	00:36	3%	✓
		SB	16.21	17:37	17:19	00:18	2%	✓
Route 109_1	A417 Cirencester (Burford Rd) to A46 Crosshand Rbt	NB	22.02	20:00	18:06	01:54	9%	✓
		SB	21.71	25:58	17:37	08:21	32%	✗
Route 109_2	A46 Crosshand Rbt to M5 J11	NB	7.78	05:24	05:46	-00:22	-7%	✓
		SB	6.86	05:01	05:19	-00:18	-6%	✓
Route 201	M5 J14 to A430 (Cole Avenue)	EB	27.27	24:26	24:14	00:12	1%	✓
		WB	27.43	25:03	23:44	01:19	5%	✓
Route 202	B4008 Bath Rd to B4008 (Cole Avenue)	NB	11.82	15:44	15:31	00:13	1%	✓
		SB	11.83	15:34	15:41	-00:07	-1%	✓
Route 203	A4173 (Pitchcombe) to A4173 (Southern Avenue)	NB	8.89	13:54	09:42	04:12	30%	✗
		SB	8.89	14:04	09:11	04:53	35%	✗
Route 204	M5 J13 to A419 (Cirencester)	EB	27.48	32:12	28:44	03:28	11%	✓
		WB	27.28	31:40	30:12	01:28	5%	✓

Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 205	A46 Nailsworth to A46 Stroud	NB	6.25	08:30	08:32	-00:02	0%	✓
		SB	6.25	08:23	08:06	00:17	3%	✓
Route 208	A419 (Kingsditch Rbt) to M5 J10	NB	11.22	08:49	10:06	-01:17	-15%	✓
		SB	10.53	08:15	09:30	-01:15	-15%	✗
Route 209	A38 (Jubilee Way) to A419 (Kingsditch Rbt)	EB	11.96	13:02	13:53	-00:51	-7%	✓
		WB	11.98	12:57	16:29	-03:32	-27%	✗
Route 210	A38 Gloucester (Longford Rbt) to A38 (Jubilee Way)	NB	15.18	15:24	15:55	-00:31	-3%	✓
		SB	15.36	15:41	15:47	-00:06	-1%	✓
Route 211	A4135 (A38 Bristol Rd) to B4066 Selsley Hill (A419)	EB	18.78	22:55	21:43	01:12	5%	✓
		WB	18.78	22:56	21:40	01:16	6%	✓

Appendix C   Link Flow Comparisons (Without COVID-19 Adjustment)

Table C1 – Details of Link Counts Used for Comparison with Modelled Flows

Count Site No	Data Source	Location	Month/Year	Co-ordinates of Count Locations	
				Latitude	Longitude
1	GCC	B4063, Cheltenham Road East,	Mar-23	51.8996	-2.1641
2	GCC	A38 N Coombe Hill	Mar-23	51.9460	-2.1618
3	GCC	A419 Cirencester Road	Mar-23	51.7021	-1.9417
4	GCC	A435 Cheltenham Racecourse	Mar-23	51.9182	-2.0702
5	GCC	A435 Gloucester Road, Cirencester	Mar-23	51.7250	-1.9758
6	GCC	A435 Rendcomb	Oct-23	51.7861	-1.9813
7	GCC	Ashchurch Rd Tewkesbury	Oct-23	51.9968	-2.1266
8	GCC	B4073 Painswick Road, west of M5	Mar-23	51.8312	-2.2069
9	GCC	A417 Brockworth Bypass, Barnwood	Mar-23	51.8648	-2.1928
10	GCC	B4632 Broadway Road	Mar-23	52.0509	-1.8507
11	GCC	A46 Shurdington Road, Chargrove	Mar-23	51.8760	-2.1024
12	GCC	A429 Strow Road	Mar-23	51.7553	-1.9373
13	GCC	A417 Whelford Turn	Mar-23	51.7036	-1.7445
14	GCC	A4135, East of Dursley	Mar-23	51.6666	-2.2982
15	GCC	A419 Ebley Bypass	Mar-23	51.7384	-2.2650
16	GCC	B4008 Ebley Road	Mar-23	51.7408	-2.2596
17	GCC	Frocester Hill	Oct-23	51.7192	-2.3045
18	GCC	A40, Walham Viaduct	Mar-23	51.8758	-2.2573
19	GCC	Golden Valley East of M5	Mar-23	51.8926	-2.1379
20	GCC	Golden Valley East of M5	Mar-23	51.8925	-2.1388
21	GCC	A40 Golden Valley, West of M5	Mar-23	51.8859	-2.1683
22	GCC	B4008 Gloucester Road, Haresfield	Mar-23	51.7950	-2.2884
23	GCC	B4213, Haw Bridge Tirley	Mar-23	51.9484	-2.2245
24	GCC	High Street, Tewkesbury	Mar-23	51.9959	-2.1560
25	GCC	Hucclecote Road East of M5	Mar-23	51.8528	-2.1799
26	GCC	A436 Gloucester Road Andoversford	Oct-23	51.8668	-1.9932
27	GCC	Leckhampton Lane Cheltenham	Mar-23	51.8708	-2.0944
28	GCC	Lobleys Drive	Mar-23	51.8464	-2.1872
29	Webtris	A27 within the A3(M) junction	Mar-23	50.8465	-1.0103
30	Webtris	M275 between J2 and J12	Mar-23	50.8336	-1.0859
31	Webtris	M4 Almondsbury Roundabout	Mar-23	51.5499	-2.5490
32	Webtris	M5 Upton Warren	Mar-23	52.3090	-2.1042
33	Webtris	M5 Oddingley	Mar-23	52.2433	-2.1338
34	Webtris	M5 Oddingley	Mar-23	52.2434	-2.1340
35	Webtris	South of M5 J6	Oct-23	52.1905	-2.1690
36	Webtris	South of M5 J6	Oct-23	52.1893	-2.1691
37	Webtris	North of M5 J7	Oct-23	52.1757	-2.1751

Count Site No	Data Source	Location	Month/Year	Co-ordinates of Count Locations	
				Latitude	Longitude
38	Webtris	South of M5 J7	Oct-23	52.1665	-2.1821
39	Webtris	M5 between J10 and J11	Mar-23	51.9047	-2.1519
40	Webtris	M5 between J11a and J12	Mar-23	51.8176	-2.2294
41	Webtris	M5 between J11a and J12	Mar-23	51.8177	-2.2295
42	Webtris	South of M5 J13	Oct-23	51.7380	-2.3423
43	Webtris	South of M5 J13	Oct-23	51.7382	-2.3425
44	Webtris	M4 Almondsbury Roundabout	Mar-23	51.5506	-2.5523
45	Webtris	M5 between J17 and J16	Mar-23	51.5403	-2.5844
46	Webtris	M50 South of Strensham Interchange	Mar-23	52.0421	-2.1488
47	Webtris	M50 Longdon	Oct-23	52.0073	-2.2424
48	Webtris	M50 Longdon	Oct-23	52.0073	-2.2426
49	GCC	Mythe Water Tower, Tewkesbury	Mar-23	52.0005	-2.1597
50	GCC	B4632 North of Prestbury	Mar-23	51.9175	-2.0399
51	GCC	A419 Stroud Road North of Coates	Mar-23	51.7155	-2.0297
52	GCC	A46 Painswick Road, Pitchcombe	Mar-23	51.7679	-2.2179
53	GCC	Sandywell Lodge, Cheltenham	Mar-23	51.8837	-1.9827
54	GCC	B4632 Stanton	Mar-23	52.0059	-1.9201
55	GCC	Stoke Orchard Road, West of Bishops	Mar-23	51.9505	-2.1012
56	GCC	Stroud Road, Gloucester	Mar-23	51.8260	-2.2454
57	Webtris	M5 between J10 and J9	Mar-23	51.9614	-2.1278
58	Webtris	A31 eastbound between A338 near	Mar-23	50.9116	-1.6050
59	Webtris	A46 between A44 near Evesham (east)	Mar-23	52.0853	-1.9252
60	Webtris	A46 between A44 near Evesham (south)	Mar-23	52.0740	-1.9507
61	Webtris	A46 between A44 near Evesham (east)	Mar-23	52.0739	-1.9507
62	GCC	A38 Jubilee Way	Mar-23	51.9788	-2.1499
63	Webtris	A417 between A46 and M5	Mar-23	51.8547	-2.1573
64	Webtris	M27 between J3 and J2	Oct-23	50.9459	-1.5061
65	Webtris	A27 within the A3(M) junction	Mar-23	50.8458	-1.0123
66	Webtris	A46 between B439 and A435 near	Mar-23	52.1659	-1.8847
67	Webtris	A46 between A4184 and B4035	Mar-23	52.1005	-1.9231
68	Webtris	A46 between B4035 and A4184	Mar-23	52.1005	-1.9232
69	Webtris	A46 between A435 near Bishop's	Mar-23	52.0316	-1.9965
70	Webtris	A46 between A44 near Evesham (south)	Mar-23	52.0316	-1.9965
71	Webtris	M5 between J9 and J10	Mar-23	51.9603	-2.1277
72	Webtris	M5 J9 exit	Mar-23	51.9943	-2.1244
73	Webtris	M5 within J9	Mar-23	51.9942	-2.1241
74	Webtris	A46 between A435 near Alcester and	Mar-23	52.2082	-1.8552
75	Webtris	A46 between A422 and A435 near	Mar-23	52.2082	-1.8552

Count Site No	Data Source	Location	Month/Year	Co-ordinates of Count Locations	
				Latitude	Longitude
76	GCC	A44 Five Mile Drive, Bourton on the Hill	Mar-23	51.9985	-1.7841
77	GCC	A4019 Tewkesbury Road, Uckington	Oct-23	51.9251	-2.1307

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Table C2 – Comparison of Modelled Link Flows with Observed Counts Without COVID-19 Adjustment - AM Peak

Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
1	B4063, Cheltenham Road East, Gloucester Airport	EB	401	643	242	60%	10.6	✘
		WB	370	375	5	1%	0.2	✓
2	A38 N Coombe Hill	NB	580	482	-98	-17%	4.2	✓
		SB	383	837	454	119%	18.4	✘
3	A419 Cirencester Road	EB	538	521	-18	-3%	0.8	✓
		WB	627	606	-21	-3%	0.9	✓
4	A435 Cheltenham Racecourse	NB	560	391	-169	-30%	7.7	✘
		SB	790	637	-153	-19%	5.7	✘
5	A435 Gloucester Road, Cirencester	NB	388	462	74	19%	3.6	✓
		SB	531	659	128	24%	5.3	✘
6	A435 Rendcomb	NB	122	178	56	46%	4.6	✓
		SB	161	246	86	53%	6.0	✓
7	Ashchurch Rd Tewkesbury	EB	600	766	166	28%	6.3	✘
		WB	704	732	28	4%	1.0	✓
8	B4073 Painswick Road, west of M5	NB	175	271	96	55%	6.4	✓
		SB	194	204	10	5%	0.7	✓
9	A417 Brockworth Bypass, Barnwood	NB	1,584	1,473	-111	-7%	2.8	✓
		SB	1,443	1,252	-191	-13%	5.2	✓
10	B4632 Broadway Road	NB	71	94	23	33%	2.6	✓
		SB	98	79	-19	-19%	2.0	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
11	A46 Shurdington Road, Chargrove	NB	438	578	140	32%	6.2	✗
		SB	492	469	-23	-5%	1.1	✓
12	A429 Strow Road	NB	333	348	15	4%	0.8	✓
		SB	297	328	31	10%	1.7	✓
13	A417 Whelford Turn	EB	225	298	72	32%	4.5	✓
		WB	197	145	-52	-27%	4.0	✓
14	A4135, East of Dursley	EB	370	337	-32	-9%	1.7	✓
		WB	244	242	-1	-1%	0.1	✓
15	A419 Ebley Bypass	EB	789	859	71	9%	2.5	✓
		WB	787	787	-1	0%	0.0	✓
16	B4008 Ebley Road	EB	314	328	14	4%	0.8	✓
		WB	355	385	30	8%	1.5	✓
17	Frocester Hill	NB	192	208	16	8%	1.1	✓
		SB	215	203	-12	-6%	0.8	✓
18	A40, Walham Viaduct	NB	1,203	1,340	137	11%	3.8	✓
		SB	781	986	205	26%	6.9	✗
19	Golden Valley East of M5	SB	2,262	2,346	85	4%	1.8	✓
20	Golden Valley East of M5	NB	1,832	2,637	805	44%	17.0	✗
21	A40 Golden Valley, West of M5	NB	1,658	1,872	213	13%	5.1	✓
		SB	1,458	1,875	418	29%	10.2	✗
22	B4008 Gloucester Road, Haresfield	NB	235	293	58	25%	3.6	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
		SB	342	372	30	9%	1.6	✓
23	B4213, Haw Bridge Tirley	WB	183	304	121	66%	7.8	✗
		EB	117	107	-10	-9%	1.0	✓
24	High Street, Tewkesbury	NB	352	335	-16	-5%	0.9	✓
		SB	473	599	125	26%	5.4	✗
25	Hucclecote Road East of M5	EB	492	606	113	23%	4.8	✓
		WB	371	375	4	1%	0.2	✓
26	A436 Gloucester Road Andoversford	EB	420	459	39	9%	1.9	✓
		WB	355	368	13	4%	0.7	✓
27	Leckhampton Lane Cheltenham	NB	280	261	-19	-7%	1.1	✓
		SB	265	241	-24	-9%	1.5	✓
28	Lobleys Drive	EB	471	398	-73	-15%	3.5	✓
		WB	292	150	-142	-49%	9.5	✗
29	A27 within the A3(M) junction	EB	2,439	3,208	769	32%	14.5	✗
30	M275 between J2 and J12	NB	2,911	1,397	-1,515	-52%	32.6	✗
31	M4 Almondsbury Roundabout	EB	888	941	53	6%	1.8	✓
32	M5 Upton Warren	SB	3,745	4,154	409	11%	6.5	✗
33	M5 Oddingley	SB	3,683	3,973	290	8%	4.7	✓
34	M5 Oddingley	NB	3,256	3,600	344	11%	5.9	✓
35	South of M5 J6	NB	2,850	3,031	181	6%	3.3	✓
36	South of M5 J6	SB	3,346	3,674	328	10%	5.5	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
37	North of M5 J7	NB	2,839	3,031	192	7%	3.5	✓
38	South of M5 J7	SB	2,592	2,812	219	8%	4.2	✓
39	M5 between J10 and J11	NB	2,396	2,832	436	18%	8.5	✗
40	M5 between J11a and J12	SB	2,859	3,107	248	9%	4.5	✓
41	M5 between J11a and J12	NB	2,796	3,522	726	26%	12.9	✗
42	South of M5 J13	SB	2,576	2,836	260	10%	5.0	✓
43	South of M5 J13	NB	2,098	2,881	783	37%	15.7	✗
44	M4 Almondsbury Roundabout	EB	1,622	1,759	137	8%	3.3	✓
45	M5 between J17 and J16	NB	3,698	3,742	43	1%	0.7	✓
46	M50 South of Strensham Interchange	EB	1,352	1,556	204	15%	5.4	✗
47	M50 Longdon	WB	796	923	126	16%	4.3	✓
48	M50 Longdon	EB	992	1,099	108	11%	3.3	✓
49	Mythe Water Tower, Tewkesbury	NB	349	420	71	20%	3.6	✓
49	Mythe Water Tower, Tewkesbury	SB	433	464	31	7%	1.4	✓
50	B4632 North of Prestbury	NB	290	476	186	64%	9.5	✗
50	B4632 North of Prestbury	SB	378	406	28	7%	1.4	✓
51	A419 Stroud Road North of Coates	EB	484	582	98	20%	4.2	✓
51	A419 Stroud Road North of Coates	WB	288	293	5	2%	0.3	✓
52	A46 Painswick Road, Pitchcombe	NB	495	531	36	7%	1.6	✓
52	A46 Painswick Road, Pitchcombe	SB	538	603	65	12%	2.7	✓
53	Sandywell Lodge, Cheltenham	EB	437	357	-79	-18%	4.0	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
		WB	341	335	-6	-2%	0.3	✓
54	B4632 Stanton	NB	126	144	18	14%	1.6	✓
		SB	127	187	60	47%	4.8	✓
55	Stoke Orchard Road, West of Bishops Cleeve	WB	346	302	-44	-13%	2.4	✓
		EB	341	414	73	21%	3.8	✓
56	Stroud Road, Gloucester	SB	371	212	-158	-43%	9.3	✗
57	M5 between J10 and J9	NB	2,745	3,136	391	14%	7.2	✓
58	A31 eastbound between A338 near Ringwood (east) and M27	EB	2,296	2,672	377	16%	7.6	✗
59	A46 between A44 near Evesham (east) and B4035	NB	889	1,055	166	19%	5.3	✗
60	A46 between A44 near Evesham (south) and A44 near Evesham (east)	NB	700	700	0	0%	0.0	✓
61	A46 between A44 near Evesham (east) and A44 near Evesham (south)	SB	693	653	-40	-6%	1.5	✓
62	A38 Jubilee Way	NB	252	110	-142	-56%	10.6	✗
		SB	334	264	-70	-21%	4.0	✓
63	A417 between A46 and M5	NB	1,993	1,903	-90	-5%	2.0	✓
64	M27 between J3 and J2	WB	3,229	2,927	-302	-9%	5.5	✓
65	A27 within the A3(M) junction	WB	2,221	2,488	267	12%	5.5	✓
66	A46 between B439 and A435 near Alcester	NB	874	802	-72	-8%	2.5	✓
67	A46 between A4184 and B4035	SB	1,009	1,131	122	12%	3.7	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
68	A46 between B4035 and A4184	NB	1,060	1,051	-9	-1%	0.3	✓
69	A46 between A435 near Bishop's Cleeve and A44 near Evesham (south)	NB	637	833	196	31%	7.2	✗
70	A46 between A44 near Evesham (south) and A435 near Bishop's Cleeve	SB	795	635	-161	-20%	6.0	✗
71	M5 between J9 and J10	SB	3,535	3,989	454	13%	7.4	✗
72	M5 J9 exit	NB	890	1,058	168	19%	5.4	✗
73	M5 within J9	NB	1,816	2,078	262	14%	5.9	✓
74	A46 between A435 near Alcester and A422	NB	783	432	-351	-45%	14.2	✗
75	A46 between A422 and A435 near Alcester	SB	552	669	117	21%	4.7	✓
76	A44 Five Mile Drive, Bourton on the Hill	NB	247	294	46	19%	2.8	✓
		SB	458	552	94	20%	4.2	✓
77	A4019 Tewkesbury Road, Uckington	WB	536	392	-145	-27%	6.7	✗
		EB	886	1,096	209	24%	6.7	✗

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Table C3 – Comparison of Modelled Link Flows with Observed Counts Without COVID-19 Adjustment – Inter-peak

Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
1	B4063, Cheltenham Road East, Gloucester Airport	EB	323	492	168	52%	8.3	✗
		WB	313	476	163	52%	8.2	✗
2	A38 N Coombe Hill	NB	408	475	67	16%	3.2	✓
		SB	418	534	116	28%	5.3	✗
3	A419 Cirencester Road	EB	582	435	-146	-25%	6.5	✗
		WB	529	439	-90	-17%	4.1	✓
4	A435 Cheltenham Racecourse	NB	573	447	-126	-22%	5.6	✗
		SB	577	537	-40	-7%	1.7	✓
5	A435 Gloucester Road, Cirencester	NB	418	464	46	11%	2.2	✓
		SB	376	418	43	11%	2.1	✓
6	A435 Rendcomb	NB	107	124	17	16%	1.6	✓
		SB	101	122	21	20%	2.0	✓
7	Ashchurch Rd Tewkesbury	EB	576	678	102	18%	4.1	✓
		WB	620	642	22	4%	0.9	✓
8	B4073 Painswick Road, west of M5	NB	161	209	48	30%	3.5	✓
		SB	153	173	20	13%	1.6	✓
9	A417 Brockworth Bypass, Barnwood	NB	1,146	1,084	-62	-5%	1.9	✓
		SB	1,138	972	-166	-15%	5.1	✓
10	B4632 Broadway Road	NB	90	71	-20	-22%	2.2	✓
		SB	104	74	-29	-28%	3.1	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
11	A46 Shurdington Road, Chargrove	NB	422	439	17	4%	0.8	✓
		SB	447	426	-21	-5%	1.0	✓
12	A429 Strow Road	NB	296	302	6	2%	0.3	✓
		SB	294	311	17	6%	1.0	✓
13	A417 Whelford Turn	EB	181	169	-13	-7%	1.0	✓
		WB	189	170	-19	-10%	1.4	✓
14	A4135, East of Dursley	EB	214	187	-27	-13%	1.9	✓
		WB	230	193	-37	-16%	2.5	✓
15	A419 Ebley Bypass	EB	696	716	20	3%	0.7	✓
		WB	764	750	-15	-2%	0.5	✓
16	B4008 Ebley Road	EB	313	296	-18	-6%	1.0	✓
		WB	275	260	-15	-5%	0.9	✓
17	Frocester Hill	NB	155	126	-29	-19%	2.4	✓
		SB	144	140	-4	-2%	0.3	✓
18	A40, Walham Viaduct	NB	899	1,062	163	18%	5.2	✗
		SB	808	1,023	215	27%	7.1	✗
19	Golden Valley East of M5	SB	1,280	1,683	402	31%	10.4	✗
20	Golden Valley East of M5	NB	1,538	1,546	8	1%	0.2	✓
21	A40 Golden Valley, West of M5	NB	1,161	1,260	98	8%	2.8	✓
		SB	1,146	1,250	104	9%	3.0	✓
22	B4008 Gloucester Road, Haresfield	NB	268	274	6	2%	0.4	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
		SB	290	300	10	3%	0.6	✓
23	B4213, Haw Bridge Tirley	WB	101	113	12	12%	1.2	✓
		EB	112	108	-4	-4%	0.4	✓
24	High Street, Tewkesbury	NB	434	434	0	0%	0.0	✓
		SB	410	444	34	8%	1.6	✓
25	Hucclecote Road East of M5	EB	407	346	-61	-15%	3.2	✓
		WB	446	370	-77	-17%	3.8	✓
26	A436 Gloucester Road Andoversford	EB	314	336	22	7%	1.2	✓
		WB	374	375	1	0%	0.1	✓
27	Leckhampton Lane Cheltenham	NB	197	164	-33	-17%	2.4	✓
		SB	173	156	-17	-10%	1.3	✓
28	Lobleys Drive	EB	289	205	-84	-29%	5.3	✓
		WB	329	238	-91	-28%	5.4	✓
29	A27 within the A3(M) junction	EB	2,018	2,680	663	33%	13.7	✗
30	M275 between J2 and J12	NB	2,315	1,469	-845	-37%	19.4	✗
31	M4 Almondsbury Roundabout	EB	693	672	-21	-3%	0.8	✓
32	M5 Upton Warren	SB	3,358	3,413	55	2%	0.9	✓
33	M5 Oddingley	SB	3,252	3,209	-44	-1%	0.8	✓
34	M5 Oddingley	NB	3,696	3,414	-282	-8%	4.7	✓
35	South of M5 J6	NB	3,312	3,016	-296	-9%	5.3	✓
36	South of M5 J6	SB	3,088	3,036	-52	-2%	0.9	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
37	North of M5 J7	NB	3,237	3,016	-221	-7%	4.0	✓
38	South of M5 J7	SB	2,487	2,363	-124	-5%	2.5	✓
39	M5 between J10 and J11	NB	2,893	2,810	-83	-3%	1.6	✓
40	M5 between J11a and J12	SB	2,437	2,424	-13	-1%	0.3	✓
41	M5 between J11a and J12	NB	2,475	2,785	310	13%	6.1	✓
42	South of M5 J13	SB	2,453	2,185	-268	-11%	5.6	✓
43	South of M5 J13	NB	2,386	2,512	126	5%	2.6	✓
44	M4 Almondsbury Roundabout	EB	1,656	1,454	-201	-12%	5.1	✓
45	M5 between J17 and J16	NB	3,775	3,569	-206	-5%	3.4	✓
46	M50 South of Strensham Interchange	EB	1,015	997	-18	-2%	0.6	✓
47	M50 Longdon	WB	834	871	37	4%	1.3	✓
48	M50 Longdon	EB	912	816	-97	-11%	3.3	✓
49	Mythe Water Tower, Tewkesbury	NB	366	347	-19	-5%	1.0	✓
49	Mythe Water Tower, Tewkesbury	SB	360	357	-3	-1%	0.2	✓
50	B4632 North of Prestbury	NB	304	480	176	58%	8.9	✗
50	B4632 North of Prestbury	SB	268	399	131	49%	7.2	✗
51	A419 Stroud Road North of Coates	EB	292	310	18	6%	1.1	✓
51	A419 Stroud Road North of Coates	WB	319	343	24	8%	1.3	✓
52	A46 Painswick Road, Pitchcombe	NB	441	439	-2	-1%	0.1	✓
52	A46 Painswick Road, Pitchcombe	SB	413	485	72	17%	3.4	✓
53	Sandywell Lodge, Cheltenham	EB	306	263	-43	-14%	2.6	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
		WB	346	285	-61	-18%	3.5	✓
54	B4632 Stanton	NB	124	141	17	14%	1.5	✓
		SB	124	151	27	21%	2.3	✓
55	Stoke Orchard Road, West of Bishops Cleeve	WB	220	234	14	6%	0.9	✓
		EB	252	227	-25	-10%	1.6	✓
56	Stroud Road, Gloucester	SB	276	191	-85	-31%	5.5	✓
57	M5 between J10 and J9	NB	3,033	3,147	115	4%	2.1	✓
58	A31 eastbound between A338 near Ringwood (east) and M27	EB	1,927	1,811	-116	-6%	2.7	✓
59	A46 between A44 near Evesham (east) and B4035	NB	917	880	-37	-4%	1.2	✓
60	A46 between A44 near Evesham (south) and A44 near Evesham (east)	NB	583	567	-16	-3%	0.7	✓
61	A46 between A44 near Evesham (east) and A44 near Evesham (south)	SB	667	537	-130	-19%	5.3	✗
62	A38 Jubilee Way	NB	250	150	-101	-40%	7.1	✗
		SB	230	168	-62	-27%	4.4	✓
63	A417 between A46 and M5	NB	1,686	1,484	-202	-12%	5.1	✓
64	M27 between J3 and J2	WB	2,818	2,698	-120	-4%	2.3	✓
65	A27 within the A3(M) junction	WB	1,970	1,888	-82	-4%	1.9	✓
66	A46 between B439 and A435 near Alcester	NB	693	597	-96	-14%	3.8	✓
67	A46 between A4184 and B4035	SB	1,038	911	-127	-12%	4.1	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
68	A46 between B4035 and A4184	NB	950	939	-11	-1%	0.4	✓
69	A46 between A435 near Bishop's Cleeve and A44 near Evesham (south)	NB	582	562	-20	-3%	0.8	✓
70	A46 between A44 near Evesham (south) and A435 near Bishop's Cleeve	SB	594	543	-51	-9%	2.1	✓
71	M5 between J9 and J10	SB	2,972	2,941	-31	-1%	0.6	✓
72	M5 J9 exit	NB	676	720	44	6%	1.7	✓
73	M5 within J9	NB	2,481	2,427	-53	-2%	1.1	✓
74	A46 between A435 near Alcester and A422	NB	534	480	-54	-10%	2.4	✓
75	A46 between A422 and A435 near Alcester	SB	570	479	-91	-16%	4.0	✓
76	A44 Five Mile Drive, Bourton on the Hill	NB	343	379	37	11%	1.9	✓
		SB	307	348	41	13%	2.3	✓
77	A4019 Tewkesbury Road, Uckington	WB	607	506	-100	-17%	4.3	✓
		EB	597	744	146	25%	5.7	✗

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Table C4 – Comparison of Modelled Link Flows with Observed Counts Without COVID-19 Adjustment – PM Peak

Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
1	B4063, Cheltenham Road East, Gloucester Airport	EB	352	491	139	40%	6.8	✖
		WB	355	603	248	70%	11.3	✖
2	A38 N Coombe Hill	NB	415	669	254	61%	10.9	✖
		SB	525	561	36	7%	1.5	✔
3	A419 Cirencester Road	EB	682	592	-91	-13%	3.6	✔
		WB	566	527	-38	-7%	1.6	✔
4	A435 Cheltenham Racecourse	NB	778	606	-172	-22%	6.6	✖
		SB	658	587	-71	-11%	2.9	✔
5	A435 Gloucester Road, Cirencester	NB	570	688	118	21%	4.7	✔
		SB	415	475	60	14%	2.8	✔
6	A435 Rendcomb	NB	164	232	69	42%	4.9	✔
		SB	132	154	21	16%	1.8	✔
7	Ashchurch Rd Tewkesbury	EB	682	837	155	23%	5.6	✖
		WB	677	832	156	23%	5.7	✖
8	B4073 Painswick Road, west of M5	NB	195	274	79	41%	5.2	✔
		SB	167	232	65	39%	4.6	✔
9	A417 Brockworth Bypass, Barnwood	NB	1,459	1,369	-90	-6%	2.4	✔
		SB	1,494	1,413	-81	-5%	2.1	✔
10	B4632 Broadway Road	NB	92	74	-18	-19%	2.0	✔
		SB	90	90	0	0%	0.0	✔

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
11	A46 Shurdington Road, Chargrove	NB	483	575	92	19%	4.0	✓
		SB	513	569	55	11%	2.4	✓
12	A429 Strow Road	NB	286	292	6	2%	0.4	✓
		SB	324	356	32	10%	1.7	✓
13	A417 Whelford Turn	EB	182	177	-6	-3%	0.4	✓
		WB	218	232	14	6%	0.9	✓
14	A4135, East of Dursley	EB	235	225	-10	-4%	0.7	✓
		WB	342	266	-76	-22%	4.4	✓
15	A419 Ebley Bypass	EB	768	907	139	18%	4.8	✓
		WB	817	856	39	5%	1.4	✓
16	B4008 Ebley Road	EB	410	424	14	3%	0.7	✓
		WB	294	299	5	2%	0.3	✓
17	Frocester Hill	NB	220	169	-51	-23%	3.7	✓
		SB	195	203	9	4%	0.6	✓
18	A40, Walham Viaduct	NB	1,003	1,054	51	5%	1.6	✓
		SB	1,049	1,410	361	34%	10.3	✗
19	Golden Valley East of M5	SB	1,663	2,559	896	54%	19.5	✗
20	Golden Valley East of M5	NB	2,156	2,223	67	3%	1.4	✓
21	A40 Golden Valley, West of M5	NB	1,394	1,666	271	19%	6.9	✗
		SB	1,585	1,861	277	17%	6.7	✗
22	B4008 Gloucester Road, Haresfield	NB	223	293	70	31%	4.4	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
		SB	287	354	67	23%	3.8	✓
23	B4213, Haw Bridge Tirley	WB	109	109	0	0%	0.0	✓
		EB	180	230	50	28%	3.5	✓
24	High Street, Tewkesbury	NB	499	582	82	17%	3.5	✓
		SB	417	463	45	11%	2.2	✓
25	Hucclecote Road East of M5	EB	420	424	4	1%	0.2	✓
		WB	548	616	68	12%	2.8	✓
26	A436 Gloucester Road Andoversford	EB	356	383	27	8%	1.4	✓
		WB	399	465	66	17%	3.2	✓
27	Leckhampton Lane Cheltenham	NB	273	197	-76	-28%	5.0	✓
		SB	217	357	140	64%	8.2	✗
28	Lobleys Drive	EB	371	216	-154	-42%	9.0	✗
		WB	529	424	-105	-20%	4.8	✓
29	A27 within the A3(M) junction	EB	2,547	3,935	1,388	55%	24.4	✗
30	M275 between J2 and J12	NB	3,660	2,298	-1,362	-37%	25.0	✗
31	M4 Almondsbury Roundabout	EB	1,017	850	-167	-16%	5.5	✗
32	M5 Upton Warren	SB	4,152	4,291	139	3%	2.1	✓
33	M5 Oddingley	SB	3,963	3,879	-83	-2%	1.3	✓
34	M5 Oddingley	NB	4,211	3,909	-302	-7%	4.7	✓
35	South of M5 J6	NB	4,002	3,461	-541	-14%	8.8	✗
36	South of M5 J6	SB	4,049	3,428	-621	-15%	10.2	✗

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
37	North of M5 J7	NB	3,847	3,461	-386	-10%	6.4	✓
38	South of M5 J7	SB	2,868	2,520	-348	-12%	6.7	✓
39	M5 between J10 and J11	NB	3,350	3,295	-54	-2%	0.9	✓
40	M5 between J11a and J12	SB	3,378	3,446	69	2%	1.2	✓
41	M5 between J11a and J12	NB	3,226	3,300	74	2%	1.3	✓
42	South of M5 J13	SB	2,917	2,825	-91	-3%	1.7	✓
43	South of M5 J13	NB	2,797	2,827	30	1%	0.6	✓
44	M4 Almondsbury Roundabout	EB	2,263	2,401	138	6%	2.9	✓
45	M5 between J17 and J16	NB	4,863	4,218	-645	-13%	9.6	✗
46	M50 South of Strensham Interchange	EB	1,009	982	-27	-3%	0.9	✓
47	M50 Longdon	WB	1,135	1,143	8	1%	0.2	✓
48	M50 Longdon	EB	936	752	-185	-20%	6.4	✗
49	Mythe Water Tower, Tewkesbury	NB	443	515	72	16%	3.3	✓
49	Mythe Water Tower, Tewkesbury	SB	372	464	92	25%	4.5	✓
50	B4632 North of Prestbury	NB	398	674	276	69%	11.9	✗
		SB	291	452	161	55%	8.3	✗
51	A419 Stroud Road North of Coates	EB	285	289	4	1%	0.2	✓
		WB	447	556	109	24%	4.9	✓
52	A46 Painswick Road, Pitchcombe	NB	539	565	26	5%	1.1	✓
		SB	479	593	114	24%	4.9	✓
53	Sandywell Lodge, Cheltenham	EB	325	359	34	10%	1.8	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
		WB	461	360	-101	-22%	5.0	✓
54	B4632 Stanton	NB	132	200	68	52%	5.3	✓
		SB	132	151	19	15%	1.6	✓
55	Stoke Orchard Road, West of Bishops Cleeve	WB	331	374	43	13%	2.3	✓
		EB	377	306	-71	-19%	3.8	✓
56	Stroud Road, Gloucester	SB	309	266	-43	-14%	2.5	✓
57	M5 between J10 and J9	NB	4,087	3,916	-171	-4%	2.7	✓
58	A31 eastbound between A338 near Ringwood (east) and M27	EB	2,305	2,006	-299	-13%	6.4	✓
59	A46 between A44 near Evesham (east) and B4035	NB	1,169	986	-183	-16%	5.6	✗
60	A46 between A44 near Evesham (south) and A44 near Evesham (east)	NB	719	701	-18	-2%	0.7	✓
61	A46 between A44 near Evesham (east) and A44 near Evesham (south)	SB	949	680	-269	-28%	9.4	✗
62	A38 Jubilee Way	NB	347	244	-102	-29%	5.9	✗
		SB	269	185	-83	-31%	5.5	✓
63	A417 between A46 and M5	NB	2,433	2,042	-391	-16%	8.3	✗
64	M27 between J3 and J2	WB	4,507	4,311	-196	-4%	3.0	✓
65	A27 within the A3(M) junction	WB	2,626	2,331	-295	-11%	5.9	✓
66	A46 between B439 and A435 near Alcester	NB	918	699	-219	-24%	7.7	✗
67	A46 between A4184 and B4035	SB	1,362	1,113	-249	-18%	7.1	✗

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
68	A46 between B4035 and A4184	NB	1,167	1,187	20	2%	0.6	✓
69	A46 between A435 near Bishop's Cleeve and A44 near Evesham (south)	NB	902	643	-259	-29%	9.3	✗
70	A46 between A44 near Evesham (south) and A435 near Bishop's Cleeve	SB	824	875	51	6%	1.8	✓
71	M5 between J9 and J10	SB	3,431	3,562	131	4%	2.2	✓
72	M5 J9 exit	NB	949	1,013	64	7%	2.0	✓
73	M5 within J9	NB	3,108	2,903	-205	-7%	3.7	✓
74	A46 between A435 near Alcester and A422	NB	625	680	55	9%	2.2	✓
75	A46 between A422 and A435 near Alcester	SB	903	573	-330	-37%	12.2	✗
76	A44 Five Mile Drive, Bourton on the Hill	NB	446	560	114	26%	5.1	✗
		SB	260	299	39	15%	2.3	✓
77	A4019 Tewkesbury Road, Uckington	WB	839	818	-22	-3%	0.8	✓
		EB	683	658	-25	-4%	1.0	✓

Appendix D   Route Choice Comparisons (Without COVID-19 Adjustment)

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Gloucester to Evesham

Figure D1 – Gloucester to Evesham OD Route Choice in the 2023 Forecast Model Without COVID-19 Adjustment - AM Peak and PM Peak

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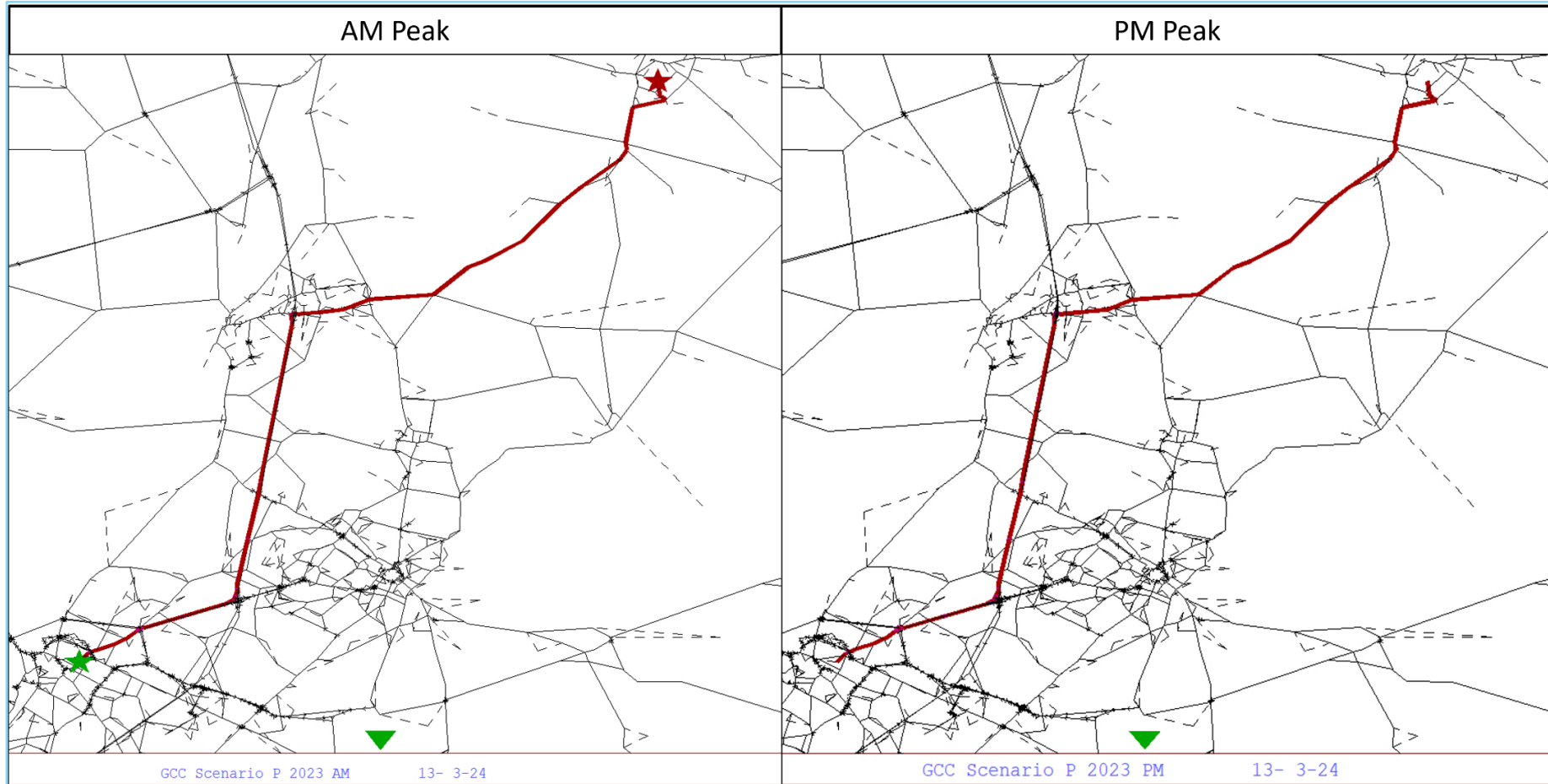
Gloucester to Evesham

Figure D2 - Gloucester to Evesham Route Choice in Google Journey Time Planner AM Peak (8 am) and PM Peak (6 pm)

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Evesham to Gloucester

Figure D3 – Evesham to Gloucester OD Route Choice in in the 2023 Forecast Model Without COVID-19 Adjustment - AM Peak and PM Peak

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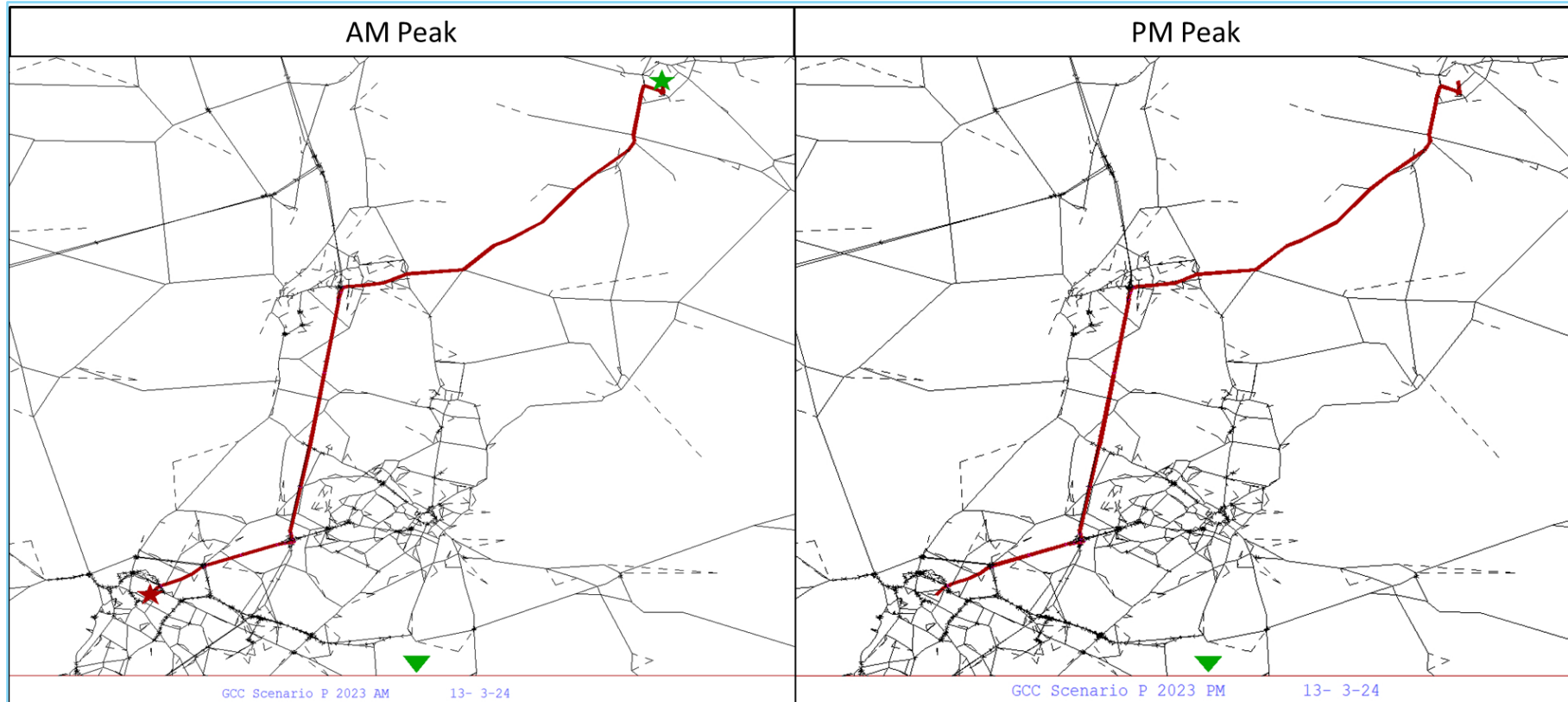
Evesham to Gloucester

Figure D4 – Evesham to Gloucester Route Choice in Google Journey Time Planner AM Peak (8 am) and PM Peak (6 pm)

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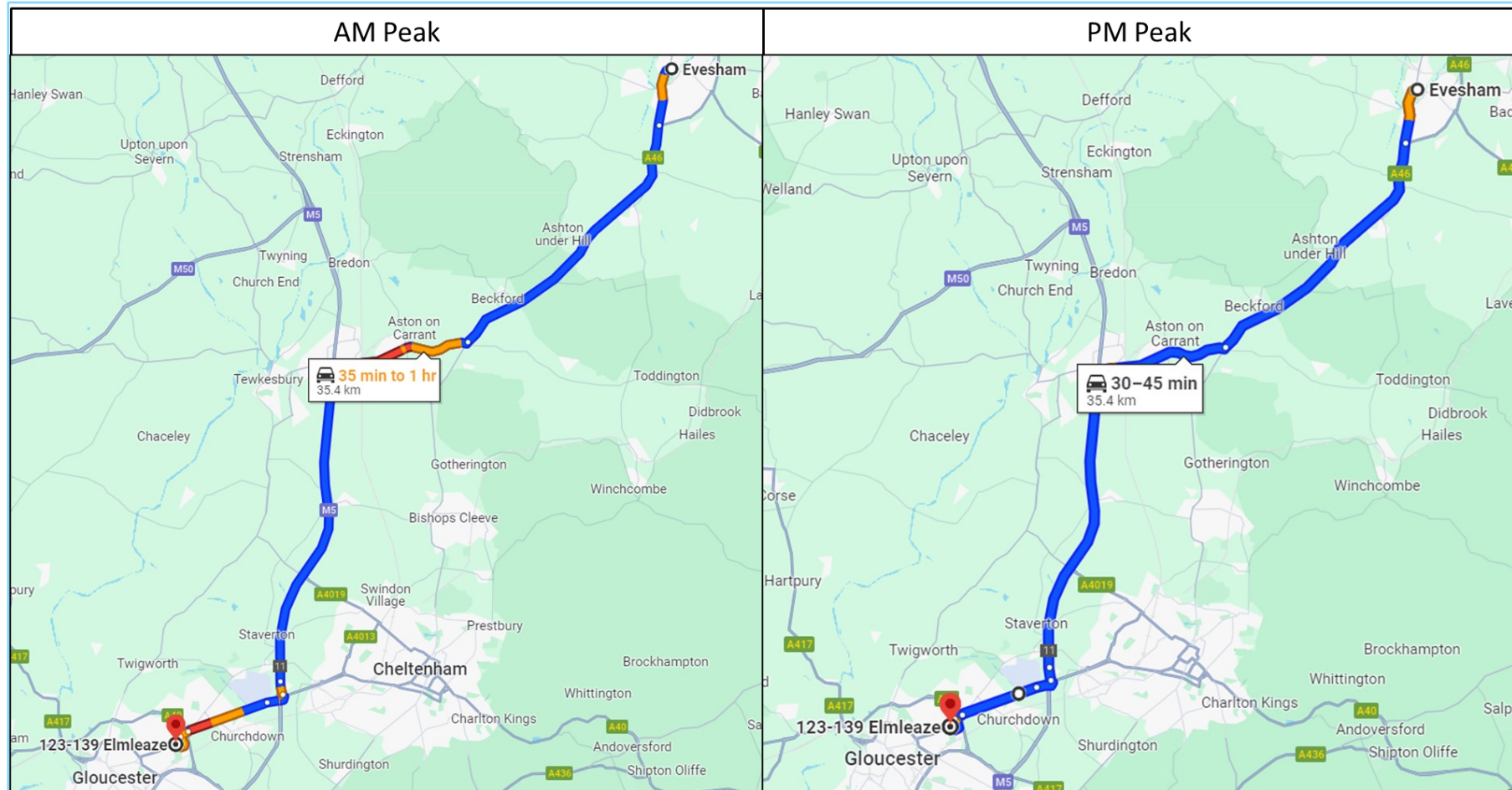
Gloucester to Worcester

Figure D5 – Gloucester to Worcester OD Route Choice in the 2023 Forecast Model Without COVID-19 Adjustment - AM Peak and PM Peak

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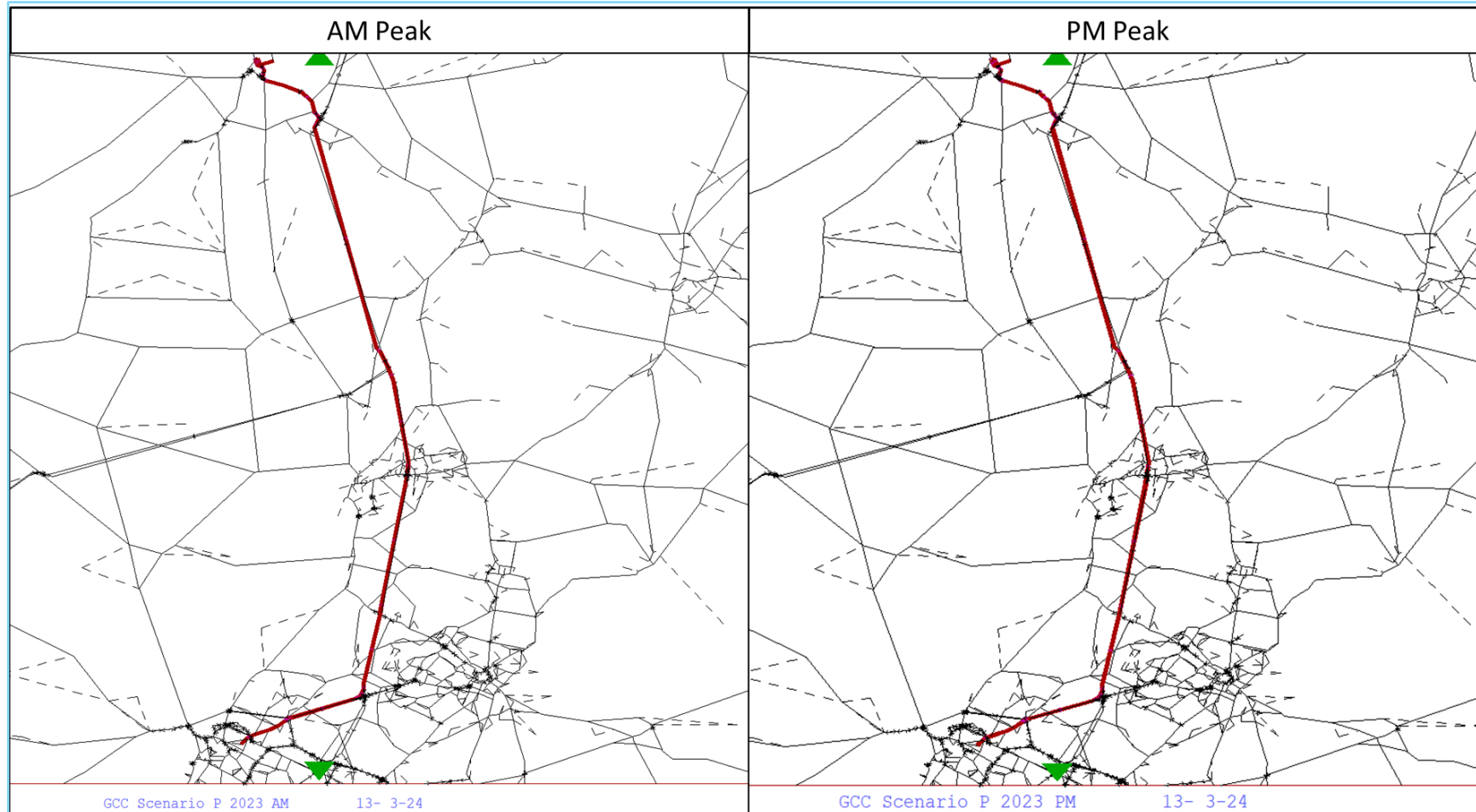
Gloucester to Worcester

Figure D6 – Gloucester to Worcester Route Choice in Google Journey Time Planner AM Peak (8 am) and PM Peak (6 pm)

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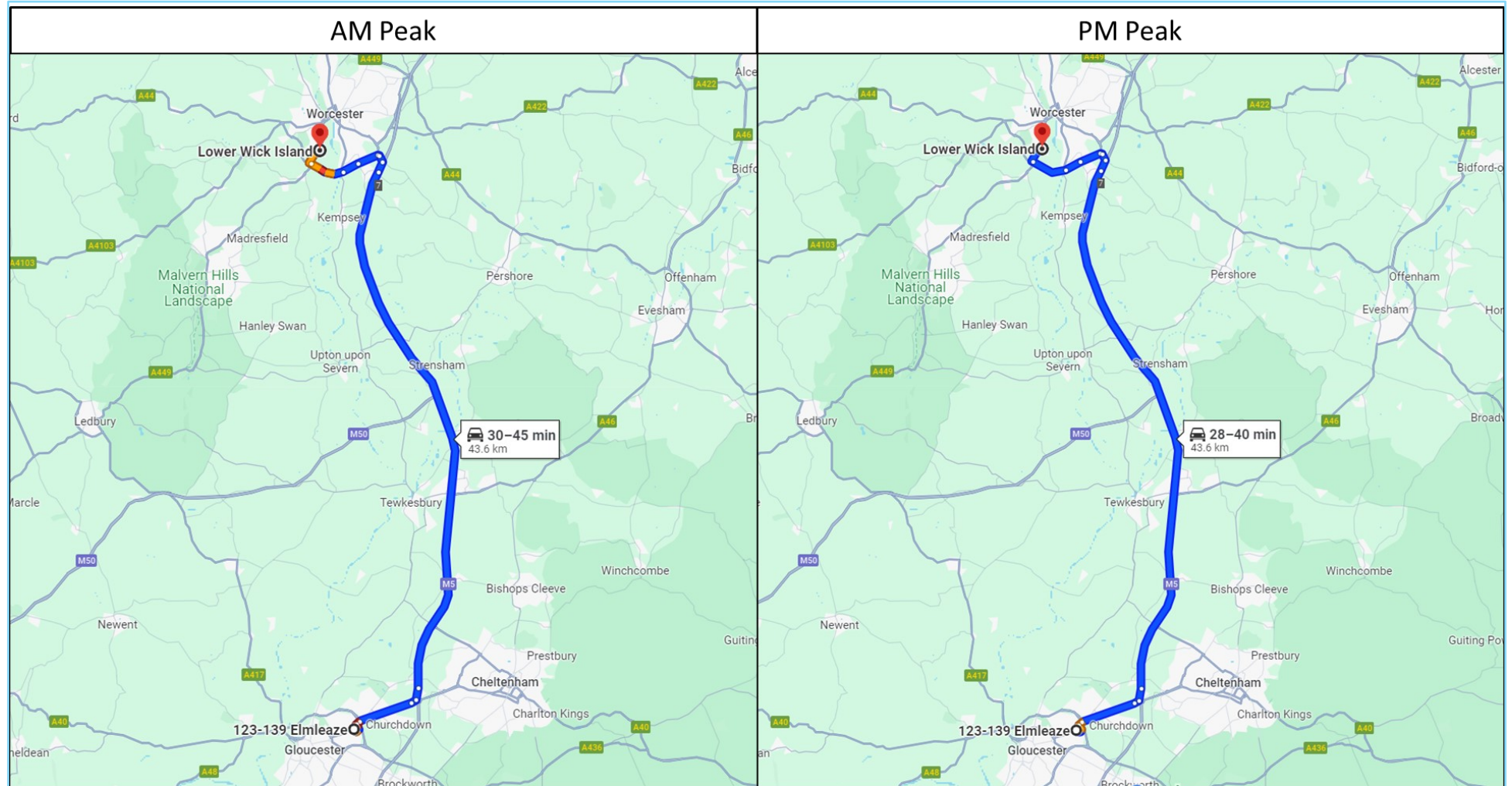
Worcester to Gloucester

Figure D7 – Worcester to Gloucester OD Route Choice in in the 2023 Forecast Model Without COVID-19 Adjustment - AM Peak and PM Peak

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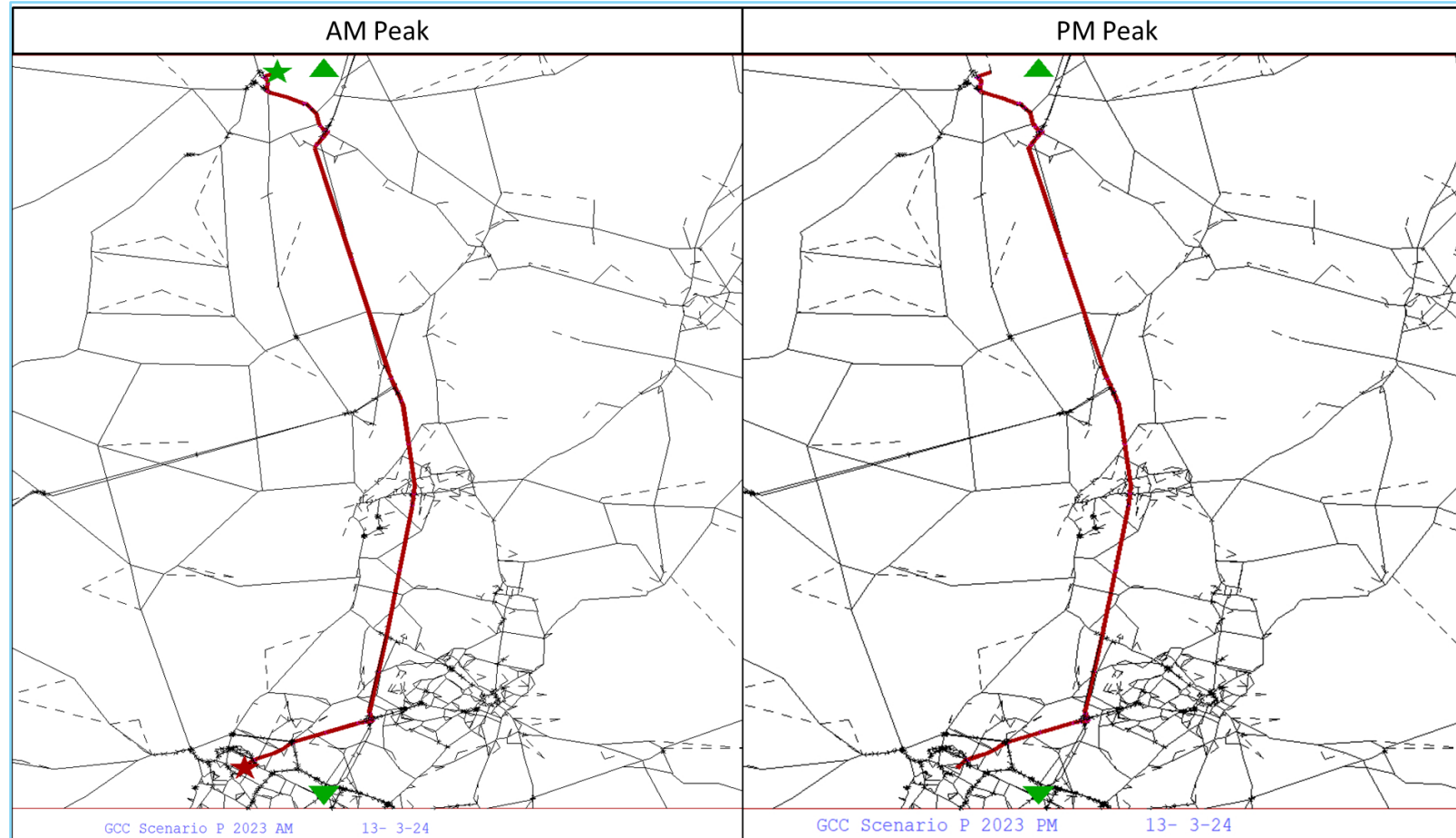
Worcester to Gloucester

Figure D8 – Worcester to Gloucester Route Choice in Google Journey Time Planner AM Peak (8 am) and PM Peak (6 pm)

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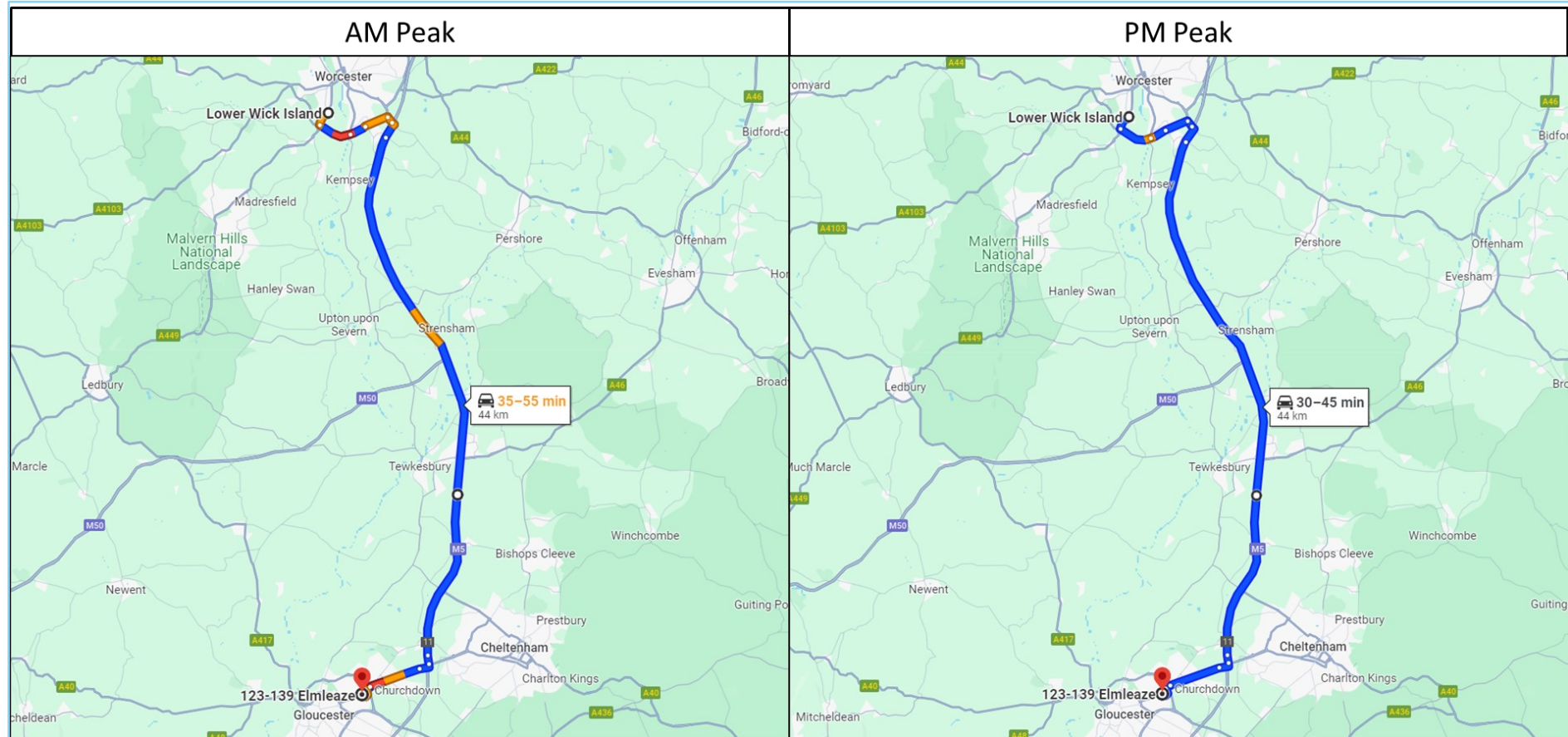
Cheltenham to Worcester

Figure D9 – Cheltenham to Worcester OD Route choice in the 2023 Forecast Model Without COVID-19 Adjustment - AM Peak and PM Peak

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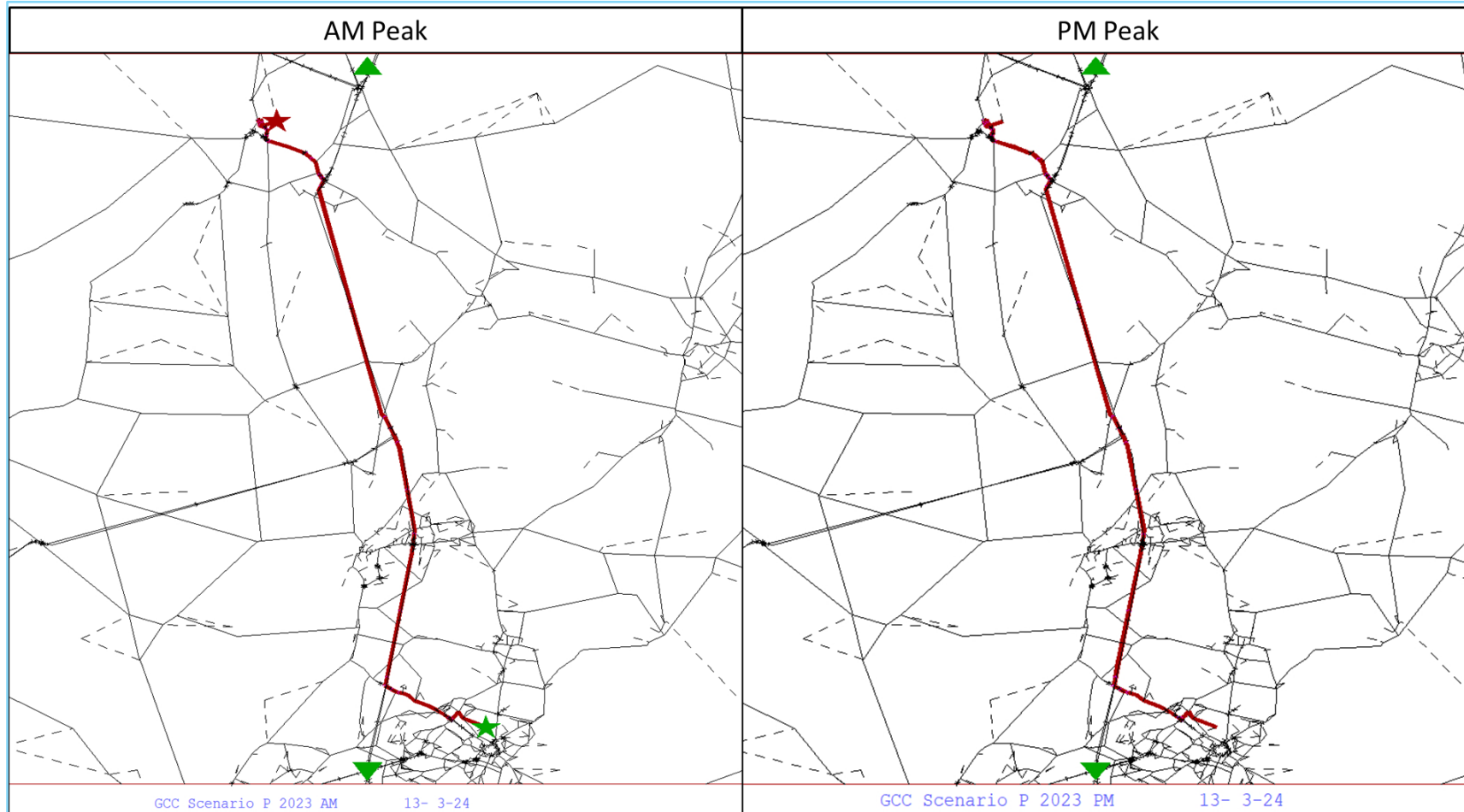
Cheltenham to Worcester

Figure D10 – Cheltenham to Worcester Route Choice in Google Journey Time Planner AM Peak (8 am) and PM Peak (6 pm)

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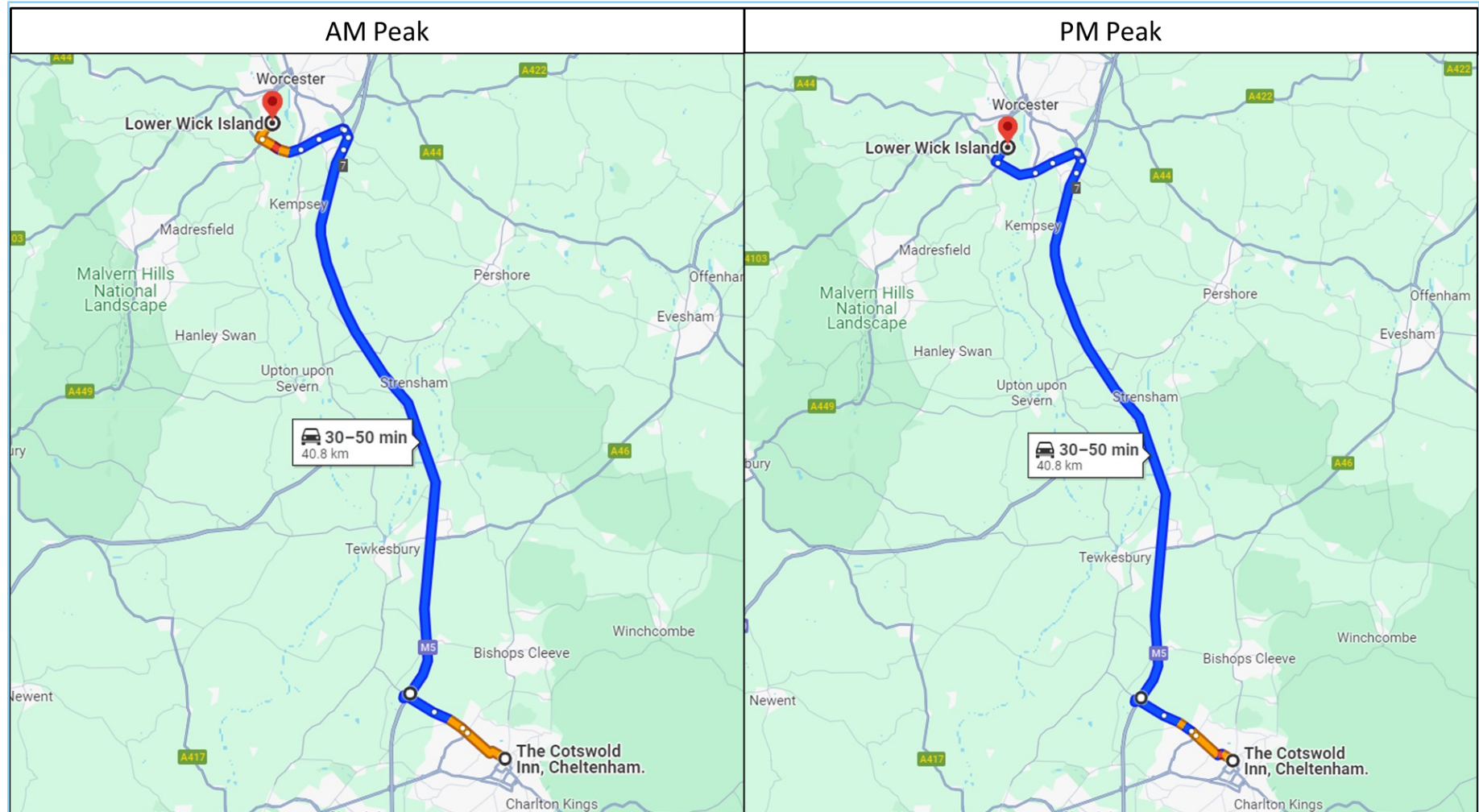
Worcester to Cheltenham

Figure D11 – Worcester to Cheltenham OD Route choice in the 2023 Forecast Model Without COVID-19 Adjustment - AM Peak and PM Peak

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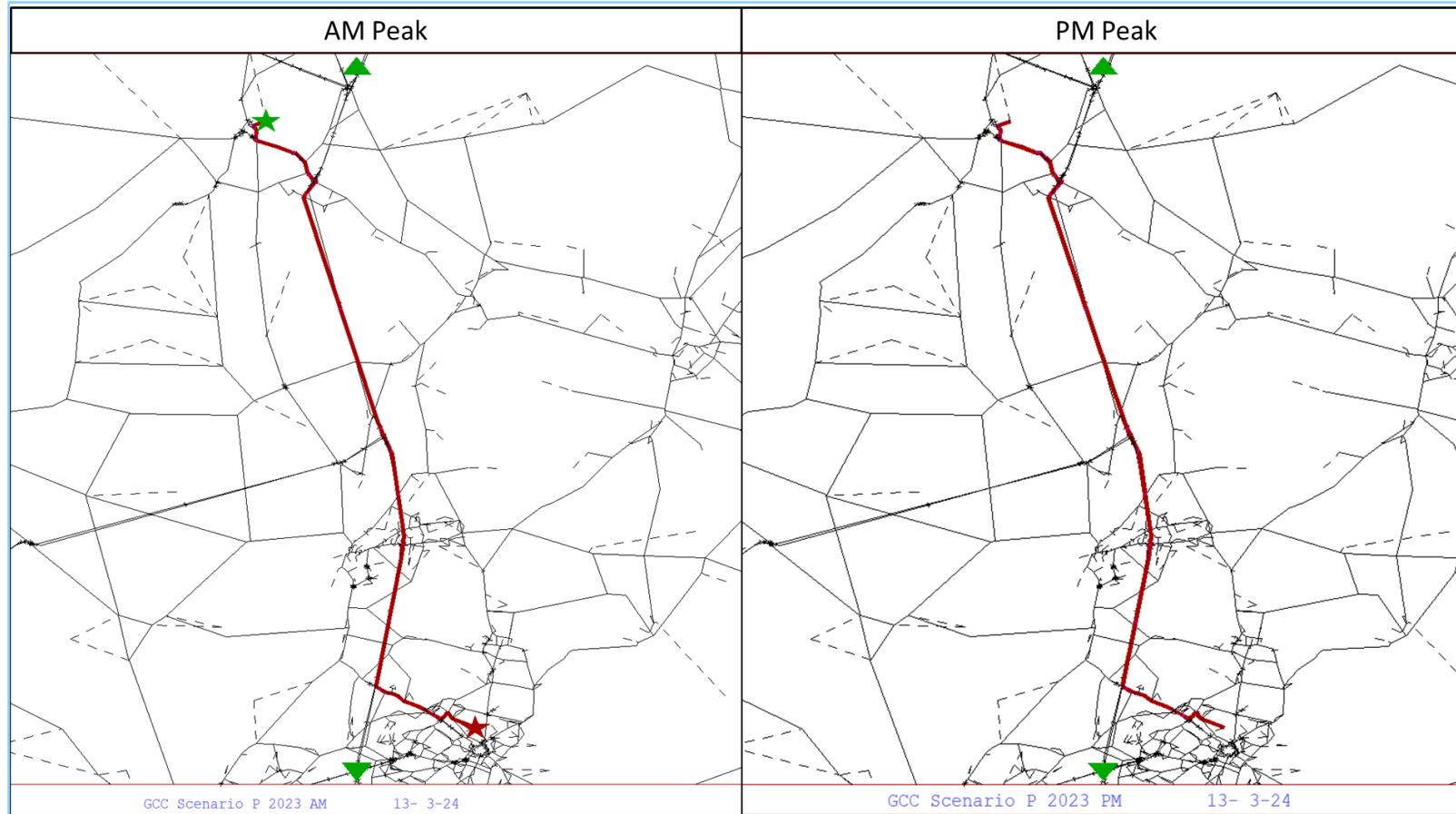
Worcester to Cheltenham

Figure D12 – Worcester to Cheltenham Route Choice in Google Journey Time Planner AM Peak (8 am) and PM Peak (6 pm)

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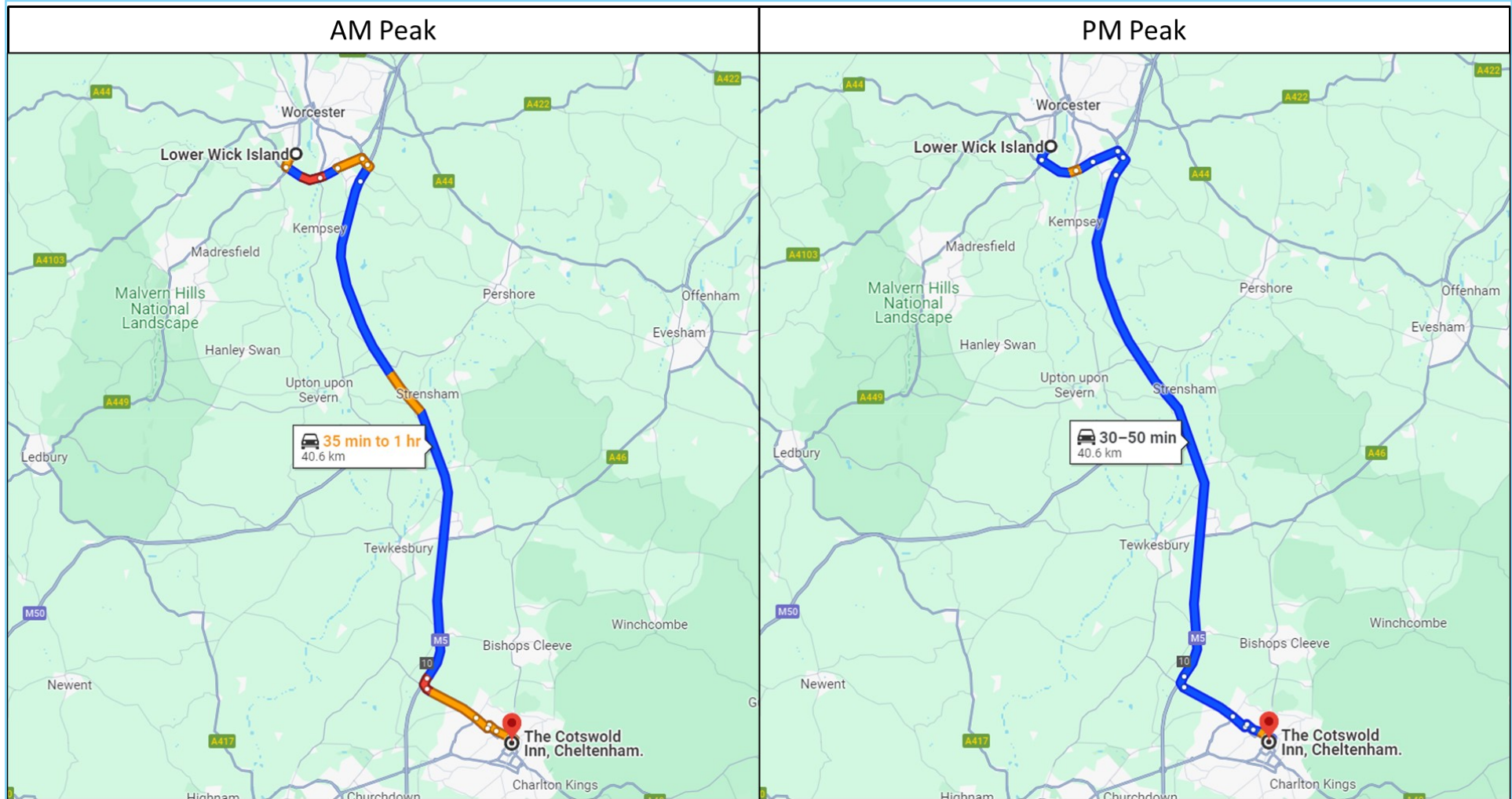
Cheltenham to Tewkesbury

Figure D13 – Cheltenham to Tewkesbury OD Route Choice in the 2023 Forecast Model Without COVID-19 Adjustment - AM Peak and PM Peak

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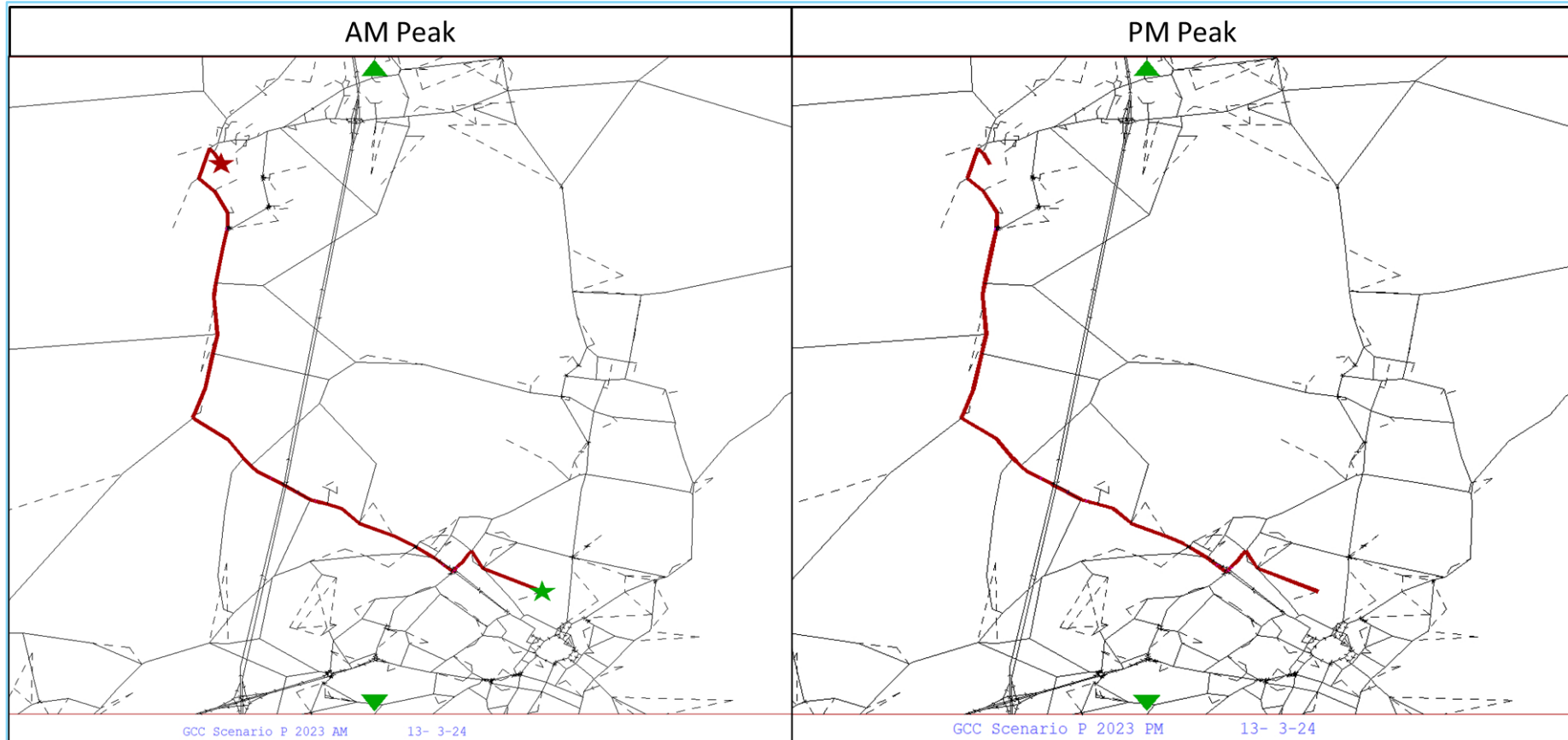
Cheltenham to Tewkesbury

Figure D14 – Cheltenham to Tewkesbury Route Choice in Google Journey Time Planner AM Peak (8 am) and PM Peak (6 pm)

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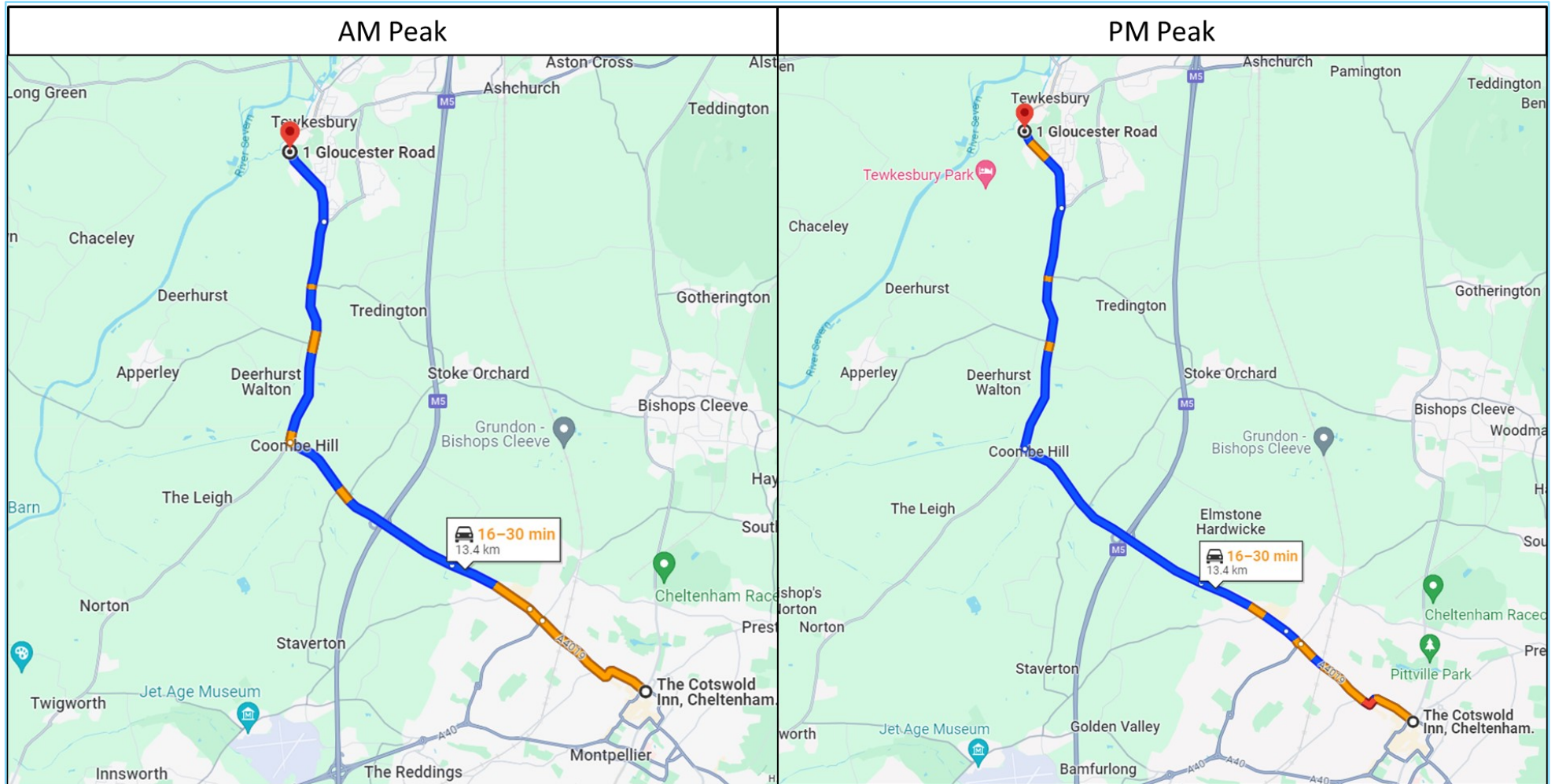
Tewkesbury to Cheltenham

Figure D15 – Tewkesbury to Cheltenham OD Route Choice in the 2023 Forecast Model Without COVID-19 Adjustment - AM Peak and PM Peak

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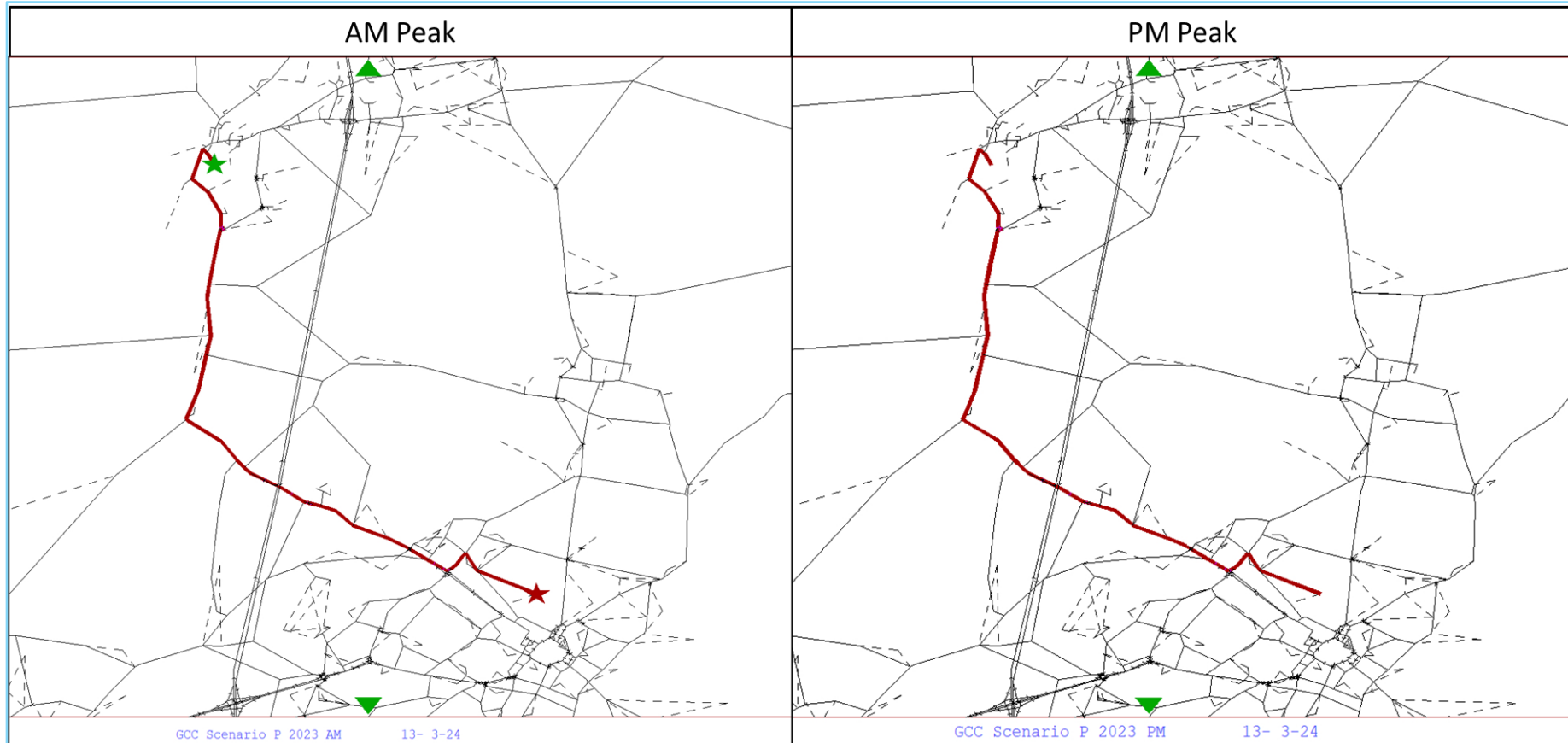
D.1. Tewkesbury to Cheltenham

Figure D16 - Tewkesbury to Cheltenham Route choice in Google Journey Time Planner AM Peak (8 am) and PM Peak (6 pm)
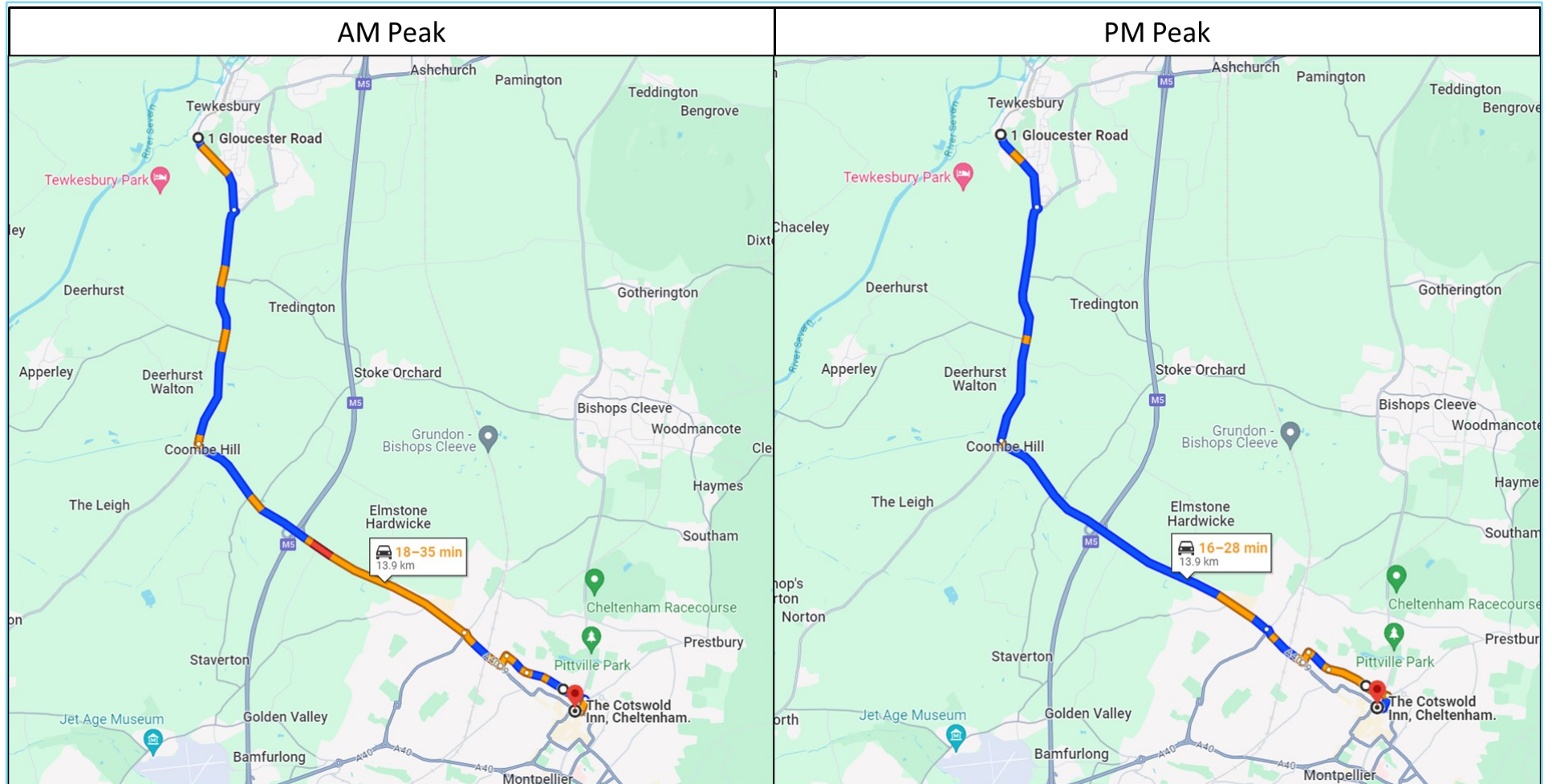
Appendix E   Journey Time Comparisons (With COVID-19 Adjustment)

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Table E1 –Comparison of 2023 Forecast Model and Observed Journey Times With COVID-19 Adjustment – AM Peak

Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 1	A46 (M5J9) to A46 (M5J9)	EB	16.05	15:30	15:31	-00:01	0%	✓
		WB	16.59	17:04	17:55	-00:51	-5%	✓
Route 2	M5 J9 to M5 J8	NB	5.77	03:33	03:29	00:04	2%	✓
		SB	6.33	04:12	04:02	00:10	4%	✓
Route 3	A438(B4211) to A438(M5J9)	EB	7.80	10:35	12:12	-01:37	-15%	✗
		WB	8.21	10:49	11:02	-00:13	-2%	✓
Route 4	A435(New Barn Lane) to B4079 (Main Road)	NB	14.29	15:45	17:20	-01:35	-10%	✓
		SB	14.10	17:08	19:08	-02:00	-12%	✓
Route 6	A46 (Evesham Bypass) to A46 (Salford Rd)	NB	13.62	09:58	09:54	00:04	1%	✓
		SB	13.31	09:36	09:44	-00:08	-1%	✓
Route 44	A40 (Brize Norton) to B4063 Gloucester	NB	54.09	55:19	51:48	03:31	6%	✓
		SB	54.27	58:15	54:53	03:22	6%	✓
Route 45	A419 Swindon (Merlin Way) to B4063 Gloucester	NB	53.29	41:17	39:01	02:16	6%	✓
		SB	53.38	40:31	37:05	03:26	8%	✓
Route 50	M5 J11 to M5 J10	NB	4.18	02:24	02:28	-00:04	-3%	✓
		SB	4.53	02:37	02:45	-00:08	-5%	✓
Route 101	A46 Stroud to A46 Cheltenham	NB	20.34	24:17	23:09	01:08	5%	✓
		SB	20.36	24:22	22:16	02:06	9%	✓
Route 102	B4070 Stroud to B4070 Cheltenham	EB	20.85	24:37	23:49	00:48	3%	✓
		WB	20.90	25:06	22:13	02:53	12%	✓
Route 103	A435 Cirencester to A46 Cheltenham	NB	30.79	30:10	28:21	01:49	6%	✓
		SB	30.45	28:51	27:12	01:39	6%	✓

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Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 104	A435 Cirencester to A417 Cheltenham	NB	22.38	19:38	19:02	00:36	3%	✓
		SB	22.26	18:55	19:17	-00:22	-2%	✓
Route 105_1	A46 Stroud to A46 Cranham Corner	NB	9.39	10:55	10:05	00:50	8%	✓
		SB	9.28	11:11	10:16	00:55	8%	✓
Route 105_2	B4070 (Birdlip Rd Crossroads) to A436 (A40 Crossroads)	EB	15.27	15:42	16:08	-00:26	-3%	✓
		WB	15.27	14:46	13:16	01:30	10%	✓
Route 106	Stroud (Toadsmoor Rd) to A417 Gloucester	NB	22.76	26:34	24:53	01:41	6%	✓
		SB	22.91	26:48	24:46	02:02	8%	✓
Route 107	Gloucester (Barnwood Rd) to Cheltenham (Andoversford)	EB	19.79	23:18	22:20	00:58	4%	✓
		WB	19.68	22:55	22:15	00:40	3%	✓
Route 108	A40 Gloucester (Highnam Rbt) to A4013 Cheltenham (Princess Elizabeth Way)	NB	16.07	19:24	17:00	02:24	12%	✓
		SB	16.21	17:55	15:59	01:56	11%	✓
Route 109_1	A417 Cirencester (Burford Rd) to A46 Crosshand Rbt	NB	22.02	20:47	17:42	03:05	15%	✓
		SB	21.71	20:41	17:49	02:52	14%	✓
Route 109_2	A46 Crosshand Rbt to M5 J11	NB	7.78	05:39	05:41	-00:02	-1%	✓
		SB	6.86	05:09	05:15	-00:06	-2%	✓
Route 201	M5 J14 to A430 (Cole Avenue)	EB	27.27	24:54	24:01	00:53	4%	✓
		WB	27.43	25:47	24:05	01:42	7%	✓
Route 202	B4008 Bath Rd to B4008 (Cole Avenue)	NB	11.82	15:27	15:09	00:18	2%	✓
		SB	11.83	15:34	15:38	-00:04	0%	✓
Route 203	A4173 (Pitchcombe) to A4173 (Southern Avenue)	NB	8.89	09:44	09:28	00:16	3%	✓
		SB	8.89	09:34	08:58	00:36	6%	✓
Route 204	M5 J13 to A419 (Cirencester)	EB	27.48	33:10	29:46	03:24	10%	✓
		WB	27.28	32:40	28:47	03:53	12%	✓

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Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 205	A46 Nailsworth to A46 Stroud	NB	6.25	08:13	08:30	-00:17	-4%	✓
		SB	6.25	08:22	08:11	00:11	2%	✓
Route 208	A419 (Kingsditch Rbt) to M5 J10	NB	11.22	08:53	09:05	-00:12	-2%	✓
		SB	10.53	08:52	10:09	-01:17	-15%	✓
Route 209	A38 (Jubilee Way) to A419 (Kingsditch Rbt)	EB	11.96	13:49	15:07	-01:18	-9%	✓
		WB	11.98	13:42	15:20	-01:38	-12%	✓
Route 210	A38 Gloucester (Longford Rbt) to A38 (Jubilee Way)	NB	15.18	16:11	15:39	00:32	3%	✓
		SB	15.36	16:19	15:43	00:36	4%	✓
Route 211	A4135 (A38 Bristol Rd) to B4066 Selsley Hill (A419)	EB	18.78	23:10	21:34	01:36	7%	✓
		WB	18.78	23:38	21:51	01:47	8%	✓

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Table E2 –Comparison of 2023 Forecast Model and Observed Journey Times With COVID-19 Adjustment – Inter-peak

Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 1	A46 (M5J9) to A46 (M5J9)	EB	16.05	15:13	15:02	00:11	1%	✓
		WB	16.59	16:18	16:10	00:08	1%	✓
Route 2	M5 J9 to M5 J8	NB	5.77	03:31	03:33	-00:02	-1%	✓
		SB	6.33	04:13	03:58	00:15	6%	✓
Route 3	A438(B4211) to A438(M5J9)	EB	7.80	10:35	11:18	-00:43	-7%	✓
		WB	8.21	11:11	11:05	00:06	1%	✓
Route 4	A435(New Barn Lane) to B4079 (Main Road)	NB	14.29	15:37	17:17	-01:40	-11%	✓
		SB	14.10	15:44	17:17	-01:33	-10%	✓
Route 6	A46 (Evesham Bypass) to A46 (Salford Rd)	NB	13.62	09:54	09:38	00:16	3%	✓
		SB	13.31	09:35	09:28	00:07	1%	✓
Route 44	A40 (Brize Norton) to B4063 Gloucester	NB	54.09	54:22	50:05	04:17	8%	✓
		SB	54.27	54:35	53:04	01:31	3%	✓
Route 45	A419 Swindon (Merlin Way) to B4063 Gloucester	NB	53.29	41:26	37:53	03:33	9%	✓
		SB	53.38	38:51	35:23	03:28	9%	✓
Route 50	M5 J11 to M5 J10	NB	4.18	02:24	02:30	-00:06	-5%	✓
		SB	4.53	02:40	02:35	00:05	3%	✓
Route 101	A46 Stroud to A46 Cheltenham	NB	20.34	23:58	21:46	02:12	9%	✓
		SB	20.36	24:10	21:38	02:32	10%	✓
Route 102	B4070 Stroud to B4070 Cheltenham	EB	20.85	26:27	22:19	04:08	16%	✗
		WB	20.90	24:15	21:47	02:28	10%	✓
Route 103	A435 Cirencester to A46 Cheltenham	NB	30.79	29:35	27:12	02:23	8%	✓
		SB	30.45	28:46	26:01	02:45	10%	✓

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Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 104	A435 Cirencester to A417 Cheltenham	NB	22.38	19:27	18:37	00:50	4%	✓
		SB	22.26	19:27	18:14	01:13	6%	✓
Route 105_1	A46 Stroud to A46 Cranham Corner	NB	9.39	10:52	09:47	01:05	10%	✓
		SB	9.28	11:06	09:59	01:07	10%	✓
Route 105_2	B4070 (Birdlip Rd Crossroads) to A436 (A40 Crossroads)	EB	15.27	16:08	14:30	01:38	10%	✓
		WB	15.27	14:13	13:09	01:04	8%	✓
Route 106	Stroud (Toadsmoor Rd) to A417 Gloucester	NB	22.76	26:29	24:25	02:04	8%	✓
		SB	22.91	27:10	24:09	03:01	11%	✓
Route 107	Gloucester (Barnwood Rd) to Cheltenham (Andoversford)	EB	19.79	22:53	21:24	01:29	6%	✓
		WB	19.68	22:57	21:59	00:58	4%	✓
Route 108	A40 Gloucester (Highnam Rbt) to A4013 Cheltenham (Princess Elizabeth Way)	NB	16.07	17:35	16:14	01:21	8%	✓
		SB	16.21	16:53	15:32	01:21	8%	✓
Route 109_1	A417 Cirencester (Burford Rd) to A46 Crosshand Rbt	NB	22.02	19:32	17:37	01:55	10%	✓
		SB	21.71	19:19	17:27	01:52	10%	✓
Route 109_2	A46 Crosshand Rbt to M5 J11	NB	7.78	05:32	05:33	-00:01	0%	✓
		SB	6.86	05:04	05:06	-00:02	-1%	✓
Route 201	M5 J14 to A430 (Cole Avenue)	EB	27.27	24:55	23:40	01:15	5%	✓
		WB	27.43	25:45	23:56	01:49	7%	✓
Route 202	B4008 Bath Rd to B4008 (Cole Avenue)	NB	11.82	15:38	14:53	00:45	5%	✓
		SB	11.83	15:25	15:24	00:01	0%	✓
Route 203	A4173 (Pitchcombe) to A4173 (Southern Avenue)	NB	8.89	09:37	09:03	00:34	6%	✓
		SB	8.89	09:37	08:54	00:43	7%	✓
Route 204	M5 J13 to A419 (Cirencester)	EB	27.48	31:48	27:54	03:54	12%	✓
		WB	27.28	33:15	28:24	04:51	15%	✓

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Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 205	A46 Nailsworth to A46 Stroud	NB	6.25	08:29	08:12	00:17	3%	✓
		SB	6.25	08:35	07:55	00:40	8%	✓
Route 208	A419 (Kingsditch Rbt) to M5 J10	NB	11.22	09:00	09:20	-00:20	-4%	✓
		SB	10.53	08:37	09:20	-00:43	-8%	✓
Route 209	A38 (Jubilee Way) to A419 (Kingsditch Rbt)	EB	11.96	13:29	13:50	-00:21	-3%	✓
		WB	11.98	13:27	15:27	-02:00	-15%	✓
Route 210	A38 Gloucester (Longford Rbt) to A38 (Jubilee Way)	NB	15.18	15:43	15:14	00:29	3%	✓
		SB	15.36	16:06	15:21	00:45	5%	✓
Route 211	A4135 (A38 Bristol Rd) to B4066 Selsley Hill (A419)	EB	18.78	23:26	21:25	02:01	9%	✓
		WB	18.78	23:44	21:34	02:10	9%	✓

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Table E3 –Comparison of 2023 Forecast Model and Observed Journey Times With COVID-19 Adjustment - PM Peak

Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 1	A46 (M5J9) to A46 (M5J9)	EB	16.05	15:16	16:05	-00:49	-5%	✓
		WB	16.59	16:42	16:11	00:31	3%	✓
Route 2	M5 J9 to M5 J8	NB	5.77	03:25	03:37	-00:12	-6%	✓
		SB	6.33	04:02	03:51	00:11	5%	✓
Route 3	A438(B4211) to A438(M5J9)	EB	7.80	10:07	11:25	-01:18	-13%	✓
		WB	8.21	10:46	11:26	-00:40	-6%	✓
Route 4	A435(New Barn Lane) to B4079 (Main Road)	NB	14.29	15:50	17:59	-02:09	-14%	✓
		SB	14.10	15:36	17:27	-01:51	-12%	✓
Route 6	A46 (Evesham Bypass) to A46 (Salford Rd)	NB	13.62	10:16	09:54	00:22	4%	✓
		SB	13.31	09:26	09:44	-00:18	-3%	✓
Route 44	A40 (Brize Norton) to B4063 Gloucester	NB	54.09	55:18	52:06	03:12	6%	✓
		SB	54.27	57:26	54:28	02:58	5%	✓
Route 45	A419 Swindon (Merlin Way) to B4063 Gloucester	NB	53.29	42:24	40:15	02:09	5%	✓
		SB	53.38	39:09	35:40	03:29	9%	✓
Route 50	M5 J11 to M5 J10	NB	4.18	02:19	02:32	-00:13	-9%	✓
		SB	4.53	02:31	02:39	-00:08	-5%	✓
Route 101	A46 Stroud to A46 Cheltenham	NB	20.34	24:09	22:38	01:31	6%	✓
		SB	20.36	23:58	22:59	00:59	4%	✓
Route 102	B4070 Stroud to B4070 Cheltenham	EB	20.85	26:00	23:48	02:12	8%	✓
		WB	20.90	25:12	23:50	01:22	5%	✓
Route 103	A435 Cirencester to A46 Cheltenham	NB	30.79	32:20	29:07	03:13	10%	✓
		SB	30.45	28:04	27:03	01:01	4%	✓

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Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 104	A435 Cirencester to A417 Cheltenham	NB	22.38	19:32	19:53	-00:21	-2%	✓
		SB	22.26	19:35	18:44	00:51	4%	✓
Route 105_1	A46 Stroud to A46 Cranham Corner	NB	9.39	11:01	09:58	01:03	10%	✓
		SB	9.28	11:02	10:14	00:48	7%	✓
Route 105_2	B4070 (Birdlip Rd Crossroads) to A436 (A40 Crossroads)	EB	15.27	16:45	15:57	00:48	5%	✓
		WB	15.27	17:19	14:34	02:45	16%	✗
Route 106	Stroud (Toadsmoor Rd) to A417 Gloucester	NB	22.76	26:22	24:53	01:29	6%	✓
		SB	22.91	27:00	24:49	02:11	8%	✓
Route 107	Gloucester (Barnwood Rd) to Cheltenham (Andoversford)	EB	19.79	22:41	21:43	00:58	4%	✓
		WB	19.68	26:03	23:21	02:42	10%	✓
Route 108	A40 Gloucester (Highnam Rbt) to A4013 Cheltenham (Princess Elizabeth Way)	NB	16.07	18:11	17:14	00:57	5%	✓
		SB	16.21	17:37	16:59	00:38	4%	✓
Route 109_1	A417 Cirencester (Burford Rd) to A46 Crosshand Rbt	NB	22.02	20:00	17:58	02:02	10%	✓
		SB	21.71	25:58	17:35	08:23	32%	✗
Route 109_2	A46 Crosshand Rbt to M5 J11	NB	7.78	05:24	05:42	-00:18	-6%	✓
		SB	6.86	05:01	05:15	-00:14	-5%	✓
Route 201	M5 J14 to A430 (Cole Avenue)	EB	27.27	24:26	24:01	00:25	2%	✓
		WB	27.43	25:03	23:35	01:28	6%	✓
Route 202	B4008 Bath Rd to B4008 (Cole Avenue)	NB	11.82	15:44	15:18	00:26	3%	✓
		SB	11.83	15:34	15:30	00:04	0%	✓
Route 203	A4173 (Pitchcombe) to A4173 (Southern Avenue)	NB	8.89	13:54	09:33	04:21	31%	✗
		SB	8.89	14:04	09:07	04:57	35%	✗
Route 204	M5 J13 to A419 (Cirencester)	EB	27.48	32:12	28:28	03:44	12%	✓
		WB	27.28	31:40	29:46	01:54	6%	✓

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Route ID	Route Name	Direction	Distance (km)	Observed (mm:ss)	Modelled (mm:ss)	Difference (mm:ss)	Percentage Diff (%)	Meeting Validation Criteria
Route 205	A46 Nailsworth to A46 Stroud	NB	6.25	08:30	08:27	00:03	1%	✓
		SB	6.25	08:23	08:02	00:21	4%	✓
Route 208	A419 (Kingsditch Rbt) to M5 J10	NB	11.22	08:49	09:59	-01:10	-13%	✓
		SB	10.53	08:15	09:24	-01:09	-14%	✓
Route 209	A38 (Jubilee Way) to A419 (Kingsditch Rbt)	EB	11.96	13:02	13:47	-00:45	-6%	✓
		WB	11.98	12:57	16:08	-03:11	-25%	✗
Route 210	A38 Gloucester (Longford Rbt) to A38 (Jubilee Way)	NB	15.18	15:24	15:41	-00:17	-2%	✓
		SB	15.36	15:41	15:35	00:06	1%	✓
Route 211	A4135 (A38 Bristol Rd) to B4066 Selsley Hill (A419)	EB	18.78	22:55	21:39	01:16	6%	✓
		WB	18.78	22:56	21:37	01:19	6%	✓

Appendix F Link Flow Comparisons (With COVID-19 Adjustment)

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Table F1 – Comparison of Modelled Link Flows with Observed Counts With COVID-19 Adjustment - AM Peak

Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	Difference %	GEH	Meeting Link Flow Validation Criteria
1	B4063, Cheltenham Road East, Gloucester Airport	EB	401	626	224	56%	9.9	✗
		WB	370	365	-5	-1%	0.3	✓
2	A38 N Coombe Hill	NB	580	455	-125	-22%	5.5	✗
		SB	383	778	395	103%	16.4	✗
3	A419 Cirencester Road	EB	538	495	-43	-8%	1.9	✓
		WB	627	575	-52	-8%	2.1	✓
4	A435 Cheltenham Racecourse	NB	560	378	-182	-33%	8.4	✗
		SB	790	606	-184	-23%	7.0	✗
5	A435 Gloucester Road, Cirencester	NB	388	440	52	13%	2.5	✓
		SB	531	623	92	17%	3.8	✓
6	A435 Rendcomb	NB	122	169	47	39%	3.9	✓
		SB	161	225	64	40%	4.6	✓
7	Ashchurch Rd Tewkesbury	EB	600	743	143	24%	5.5	✗
		WB	704	685	-20	-3%	0.7	✓
8	B4073 Painswick Road, west of M5	NB	175	257	82	47%	5.6	✓
		SB	194	195	0	0%	0.0	✓
9	A417 Brockworth Bypass, Barnwood	NB	1,584	1,398	-186	-12%	4.8	✓
		SB	1,443	1,200	-243	-17%	6.7	✗
10	B4632 Broadway Road	NB	71	89	19	27%	2.1	✓
		SB	98	76	-22	-22%	2.3	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	Difference %	GEH	Meeting Link Flow Validation Criteria
11	A46 Shurdington Road, Chargrove	NB	438	566	128	29%	5.7	✗
		SB	492	449	-43	-9%	2.0	✓
12	A429 Strow Road	NB	333	327	-7	-2%	0.4	✓
		SB	297	307	10	3%	0.6	✓
13	A417 Whelford Turn	EB	225	276	51	22%	3.2	✓
		WB	197	138	-60	-30%	4.6	✓
14	A4135, East of Dursley	EB	370	317	-52	-14%	2.8	✓
		WB	244	229	-14	-6%	0.9	✓
15	A419 Ebley Bypass	EB	789	833	45	6%	1.6	✓
		WB	787	756	-31	-4%	1.1	✓
16	B4008 Ebley Road	EB	314	299	-15	-5%	0.8	✓
		WB	355	359	4	1%	0.2	✓
17	Frocester Hill	NB	192	194	2	1%	0.1	✓
		SB	215	193	-22	-10%	1.6	✓
18	A40, Walham Viaduct	NB	1,203	1,295	92	8%	2.6	✓
		SB	781	942	161	21%	5.5	✗
19	Golden Valley East of M5	SB	2,262	2,211	-51	-2%	1.1	✓
20	Golden Valley East of M5	NB	1,832	2,499	667	36%	14.3	✗
21	A40 Golden Valley, West of M5	NB	1,658	1,798	140	8%	3.4	✓
		SB	1,458	1,794	336	23%	8.3	✗
22	B4008 Gloucester Road, Haresfield	NB	235	274	39	17%	2.4	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	Difference %	GEH	Meeting Link Flow Validation Criteria
		SB	342	352	10	3%	0.5	✓
23	B4213, Haw Bridge Tirley	WB	183	278	95	52%	6.2	✓
		EB	117	100	-17	-14%	1.6	✓
24	High Street, Tewkesbury	NB	352	320	-32	-9%	1.7	✓
		SB	473	578	105	22%	4.6	✓
25	Hucclecote Road East of M5	EB	492	557	64	13%	2.8	✓
		WB	371	347	-24	-7%	1.3	✓
26	A436 Gloucester Road Andoversford	EB	420	435	15	4%	0.7	✓
		WB	355	350	-5	-1%	0.3	✓
27	Leckhampton Lane Cheltenham	NB	280	234	-46	-16%	2.9	✓
		SB	265	220	-45	-17%	2.9	✓
28	Lobleys Drive	EB	471	371	-100	-21%	4.9	✓
		WB	292	143	-149	-51%	10.1	✗
29	A27 within the A3(M) junction	EB	2,439	3,046	607	25%	11.6	✗
30	M275 between J2 and J12	NB	2,911	1,324	-1,587	-55%	34.5	✗
31	M4 Almondsbury Roundabout	EB	888	933	45	5%	1.5	✓
32	M5 Upton Warren	SB	3,745	3,882	136	4%	2.2	✓
33	M5 Oddingley	SB	3,683	3,780	97	3%	1.6	✓
34	M5 Oddingley	NB	3,256	3,432	176	5%	3.0	✓
35	South of M5 J6	NB	2,850	2,887	37	1%	0.7	✓
36	South of M5 J6	SB	3,346	3,522	176	5%	3.0	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	Difference %	GEH	Meeting Link Flow Validation Criteria
37	North of M5 J7	NB	2,839	2,887	48	2%	0.9	✓
38	South of M5 J7	SB	2,592	2,682	90	3%	1.7	✓
39	M5 between J10 and J11	NB	2,396	2,695	299	12%	5.9	✓
40	M5 between J11a and J12	SB	2,859	2,940	81	3%	1.5	✓
41	M5 between J11a and J12	NB	2,796	3,321	524	19%	9.5	✗
42	South of M5 J13	SB	2,576	2,692	116	5%	2.3	✓
43	South of M5 J13	NB	2,098	2,725	627	30%	12.8	✗
44	M4 Almondsbury Roundabout	EB	1,622	1,701	79	5%	1.9	✓
45	M5 between J17 and J16	NB	3,698	3,557	-141	-4%	2.3	✓
46	M50 South of Strensham Interchange	EB	1,352	1,460	109	8%	2.9	✓
47	M50 Longdon	WB	796	887	90	11%	3.1	✓
48	M50 Longdon	EB	992	1,026	35	4%	1.1	✓
49	Mythe Water Tower, Tewkesbury	NB	349	380	31	9%	1.6	✓
		SB	433	440	7	2%	0.3	✓
50	B4632 North of Prestbury	NB	290	431	141	49%	7.4	✗
		SB	378	382	4	1%	0.2	✓
51	A419 Stroud Road North of Coates	EB	484	549	65	14%	2.9	✓
		WB	288	277	-11	-4%	0.7	✓
52	A46 Painswick Road, Pitchcombe	NB	495	498	2	0%	0.1	✓
		SB	538	572	34	6%	1.4	✓
53	Sandywell Lodge, Cheltenham	EB	437	342	-95	-22%	4.8	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	Difference %	GEH	Meeting Link Flow Validation Criteria
		WB	341	319	-22	-6%	1.2	✓
54	B4632 Stanton	NB	126	136	10	8%	0.9	✓
		SB	127	174	47	37%	3.8	✓
55	Stoke Orchard Road, West of Bishops Cleeve	WB	346	274	-71	-21%	4.1	✓
		EB	341	385	44	13%	2.3	✓
56	Stroud Road, Gloucester	SB	371	200	-171	-46%	10.1	✗
57	M5 between J10 and J9	NB	2,745	2,995	250	9%	4.7	✓
58	A31 eastbound between A338 near Ringwood (east) and M27	EB	2,296	2,530	235	10%	4.8	✓
59	A46 between A44 near Evesham (east) and B4035	NB	889	1,004	115	13%	3.7	✓
60	A46 between A44 near Evesham (south) and A44 near Evesham (east)	NB	700	670	-31	-4%	1.2	✓
61	A46 between A44 near Evesham (east) and A44 near Evesham (south)	SB	693	622	-70	-10%	2.7	✓
62	A38 Jubilee Way	NB	252	106	-145	-58%	10.9	✗
		SB	334	243	-91	-27%	5.3	✓
63	A417 between A46 and M5	NB	1,993	1,823	-170	-9%	3.9	✓
64	M27 between J3 and J2	WB	3,229	2,776	-453	-14%	8.3	✗
65	A27 within the A3(M) junction	WB	2,221	2,362	141	6%	3.0	✓
66	A46 between B439 and A435 near Alcester	NB	874	760	-114	-13%	4.0	✓
67	A46 between A4184 and B4035	SB	1,009	1,069	60	6%	1.9	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	Difference %	GEH	Meeting Link Flow Validation Criteria
68	A46 between B4035 and A4184	NB	1,060	1,002	-58	-6%	1.8	✓
69	A46 between A435 near Bishop's Cleeve and A44 near Evesham (south)	NB	637	802	165	26%	6.2	✗
70	A46 between A44 near Evesham (south) and A435 near Bishop's Cleeve	SB	795	598	-198	-25%	7.5	✗
71	M5 between J9 and J10	SB	3,535	3,805	270	8%	4.5	✓
72	M5 J9 exit	NB	890	1,007	117	13%	3.8	✓
73	M5 within J9	NB	1,816	1,988	172	9%	3.9	✓
74	A46 between A435 near Alcester and A422	NB	783	416	-367	-47%	15.0	✗
75	A46 between A422 and A435 near Alcester	SB	552	633	80	15%	3.3	✓
76	A44 Five Mile Drive, Bourton on the Hill	NB	247	275	28	11%	1.7	✓
76	A44 Five Mile Drive, Bourton on the Hill	SB	458	519	61	13%	2.8	✓
77	A4019 Tewkesbury Road, Uckington	WB	536	384	-152	-28%	7.1	✗
77	A4019 Tewkesbury Road, Uckington	EB	886	1,036	150	17%	4.8	✓

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Table F2 – Comparison of Modelled Link Flows with Observed Counts With COVID-19 Adjustment – Inter-peak

Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	Difference %	GEH	Meeting Link Flow Validation Criteria
1	B4063, Cheltenham Road East, Gloucester Airport	EB	323	471	148	46%	7.4	✗
		WB	313	457	144	46%	7.3	✗
2	A38 N Coombe Hill	NB	408	460	52	13%	2.5	✓
		SB	418	512	94	23%	4.4	✓
3	A419 Cirencester Road	EB	582	418	-164	-28%	7.3	✗
		WB	529	420	-109	-21%	5.0	✗
4	A435 Cheltenham Racecourse	NB	573	423	-150	-26%	6.7	✗
		SB	577	526	-51	-9%	2.2	✓
5	A435 Gloucester Road, Cirencester	NB	418	443	25	6%	1.2	✓
		SB	376	399	24	6%	1.2	✓
6	A435 Rendcomb	NB	107	117	10	9%	1.0	✓
		SB	101	117	15	15%	1.5	✓
7	Ashchurch Rd Tewkesbury	EB	576	646	70	12%	2.8	✓
		WB	620	615	-5	-1%	0.2	✓
8	B4073 Painswick Road, west of M5	NB	161	201	40	25%	2.9	✓
		SB	153	166	13	9%	1.0	✓
9	A417 Brockworth Bypass, Barnwood	NB	1,146	1,042	-104	-9%	3.1	✓
		SB	1,138	925	-213	-19%	6.6	✗
10	B4632 Broadway Road	NB	90	68	-22	-24%	2.5	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	Difference %	GEH	Meeting Link Flow Validation Criteria
		SB	104	72	-32	-31%	3.4	✓
11	A46 Shurdington Road, Chargrove	NB	422	423	1	0%	0.0	✓
		SB	447	407	-40	-9%	1.9	✓
12	A429 Strow Road	NB	296	285	-12	-4%	0.7	✓
		SB	294	295	1	0%	0.1	✓
13	A417 Whelford Turn	EB	181	163	-18	-10%	1.4	✓
		WB	189	162	-27	-14%	2.1	✓
14	A4135, East of Dursley	EB	214	173	-42	-19%	3.0	✓
		WB	230	184	-46	-20%	3.2	✓
15	A419 Ebley Bypass	EB	696	699	3	0%	0.1	✓
		WB	764	728	-37	-5%	1.3	✓
16	B4008 Ebley Road	EB	313	275	-38	-12%	2.2	✓
		WB	275	246	-29	-10%	1.8	✓
17	Frocester Hill	NB	155	118	-36	-24%	3.1	✓
		SB	144	133	-10	-7%	0.9	✓
18	A40, Walham Viaduct	NB	899	1,020	121	13%	3.9	✓
		SB	808	976	168	21%	5.6	✗
19	Golden Valley East of M5	SB	1,280	1,591	310	24%	8.2	✗
20	Golden Valley East of M5	NB	1,538	1,475	-63	-4%	1.6	✓
21	A40 Golden Valley, West of M5	NB	1,161	1,207	45	4%	1.3	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	Difference %	GEH	Meeting Link Flow Validation Criteria
		SB	1,146	1,192	46	4%	1.3	✓
22	B4008 Gloucester Road, Haresfield	NB	268	258	-10	-4%	0.6	✓
		SB	290	288	-1	0%	0.1	✓
23	B4213, Haw Bridge Tirley	WB	101	108	7	7%	0.7	✓
		EB	112	102	-10	-9%	0.9	✓
24	High Street, Tewkesbury	NB	434	416	-18	-4%	0.9	✓
		SB	410	427	17	4%	0.8	✓
25	Hucclecote Road East of M5	EB	407	331	-76	-19%	4.0	✓
		WB	446	352	-94	-21%	4.7	✓
26	A436 Gloucester Road Andoversford	EB	314	321	7	2%	0.4	✓
		WB	374	356	-18	-5%	0.9	✓
27	Leckhampton Lane Cheltenham	NB	197	153	-44	-22%	3.3	✓
		SB	173	149	-24	-14%	1.9	✓
28	Lobleys Drive	EB	289	196	-92	-32%	5.9	✓
		WB	329	226	-103	-31%	6.2	✗
29	A27 within the A3(M) junction	EB	2,018	2,557	539	27%	11.3	✗
30	M275 between J2 and J12	NB	2,315	1,403	-912	-39%	21.1	✗
31	M4 Almondsbury Roundabout	EB	693	641	-52	-7%	2.0	✓
32	M5 Upton Warren	SB	3,358	3,263	-94	-3%	1.6	✓
33	M5 Oddingley	SB	3,252	3,072	-180	-6%	3.2	✓

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34	M5 Oddingley	NB	3,696	3,272	-424	-11%	7.2	✘
35	South of M5 J6	NB	3,312	2,896	-416	-13%	7.5	✘
36	South of M5 J6	SB	3,088	2,912	-176	-6%	3.2	✓
37	North of M5 J7	NB	3,237	2,896	-341	-11%	6.2	✓
38	South of M5 J7	SB	2,487	2,255	-232	-9%	4.8	✓
39	M5 between J10 and J11	NB	2,893	2,682	-211	-7%	4.0	✓
40	M5 between J11a and J12	SB	2,437	2,313	-124	-5%	2.5	✓
41	M5 between J11a and J12	NB	2,475	2,647	173	7%	3.4	✓
42	South of M5 J13	SB	2,453	2,083	-371	-15%	7.8	✘
43	South of M5 J13	NB	2,386	2,395	10	0%	0.2	✓
44	M4 Almondsbury Roundabout	EB	1,656	1,396	-260	-16%	6.6	✘
45	M5 between J17 and J16	NB	3,775	3,412	-363	-10%	6.1	✓
46	M50 South of Strensham Interchange	EB	1,015	961	-54	-5%	1.7	✓
47	M50 Longdon	WB	834	831	-3	0%	0.1	✓
48	M50 Longdon	EB	912	782	-130	-14%	4.5	✓
49	Mythe Water Tower, Tewkesbury	NB	366	329	-37	-10%	2.0	✓
		SB	360	339	-21	-6%	1.1	✓
50	B4632 North of Prestbury	NB	304	432	128	42%	6.7	✘
		SB	268	375	107	40%	6.0	✘
51	A419 Stroud Road North of Coates	EB	292	295	3	1%	0.2	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	Difference %	GEH	Meeting Link Flow Validation Criteria
		WB	319	326	7	2%	0.4	✓
52	A46 Painswick Road, Pitchcombe	NB	441	415	-26	-6%	1.3	✓
		SB	413	462	49	12%	2.3	✓
53	Sandywell Lodge, Cheltenham	EB	306	250	-56	-18%	3.4	✓
		WB	346	271	-75	-22%	4.3	✓
54	B4632 Stanton	NB	124	132	8	7%	0.7	✓
		SB	124	144	19	15%	1.7	✓
55	Stoke Orchard Road, West of Bishops Cleeve	WB	220	214	-6	-3%	0.4	✓
		EB	252	213	-39	-15%	2.5	✓
56	Stroud Road, Gloucester	SB	276	183	-93	-34%	6.2	✓
57	M5 between J10 and J9	NB	3,033	3,009	-24	-1%	0.4	✓
58	A31 eastbound between A338 near Ringwood (east) and M27	EB	1,927	1,728	-199	-10%	4.7	✓
59	A46 between A44 near Evesham (east) and B4035	NB	917	846	-70	-8%	2.4	✓
60	A46 between A44 near Evesham (south) and A44 near Evesham (east)	NB	583	548	-34	-6%	1.5	✓
61	A46 between A44 near Evesham (east) and A44 near Evesham (south)	SB	667	521	-146	-22%	6.0	✗
62	A38 Jubilee Way	NB	250	143	-108	-43%	7.7	✗
		SB	230	160	-71	-31%	5.1	✓
63	A417 between A46 and M5	NB	1,686	1,444	-241	-14%	6.1	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	Difference %	GEH	Meeting Link Flow Validation Criteria
64	M27 between J3 and J2	WB	2,818	2,576	-241	-9%	4.6	✓
65	A27 within the A3(M) junction	WB	1,970	1,804	-165	-8%	3.8	✓
66	A46 between B439 and A435 near Alcester	NB	693	567	-126	-18%	5.0	✗
67	A46 between A4184 and B4035	SB	1,038	872	-166	-16%	5.4	✗
68	A46 between B4035 and A4184	NB	950	903	-47	-5%	1.5	✓
69	A46 between A435 near Bishop's Cleeve and A44 near Evesham (south)	NB	582	546	-36	-6%	1.5	✓
70	A46 between A44 near Evesham (south) and A435 near Bishop's Cleeve	SB	594	521	-73	-12%	3.1	✓
71	M5 between J9 and J10	SB	2,972	2,805	-167	-6%	3.1	✓
72	M5 J9 exit	NB	676	685	10	1%	0.4	✓
73	M5 within J9	NB	2,481	2,323	-157	-6%	3.2	✓
74	A46 between A435 near Alcester and A422	NB	534	458	-76	-14%	3.4	✓
75	A46 between A422 and A435 near Alcester	SB	570	462	-108	-19%	4.8	✓
76	A44 Five Mile Drive, Bourton on the Hill	NB	343	359	16	5%	0.9	✓
76	A44 Five Mile Drive, Bourton on the Hill	SB	307	332	24	8%	1.4	✓
77	A4019 Tewkesbury Road, Uckington	WB	607	495	-112	-18%	4.8	✓
77	A4019 Tewkesbury Road, Uckington	EB	597	707	110	18%	4.3	✓

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Table F3 – Comparison of Modelled Link Flows with Observed Counts With COVID-19 Adjustment - PM Peak

Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
1	B4063, Cheltenham Road East, Gloucester Airport	EB	352	458	106	30%	5.3	✘
		WB	355	575	220	62%	10.2	✘
2	A38 N Coombe Hill	NB	415	635	220	53%	9.6	✘
		SB	525	540	15	3%	0.7	✔
3	A419 Cirencester Road	EB	682	563	-120	-18%	4.8	✔
		WB	566	501	-65	-11%	2.8	✔
4	A435 Cheltenham Racecourse	NB	778	572	-206	-27%	7.9	✘
		SB	658	565	-93	-14%	3.8	✔
5	A435 Gloucester Road, Cirencester	NB	570	657	87	15%	3.5	✔
		SB	415	453	38	9%	1.8	✔
6	A435 Rendcomb	NB	164	223	59	36%	4.2	✔
		SB	132	140	8	6%	0.7	✔
7	Ashchurch Rd Tewkesbury	EB	682	802	120	18%	4.4	✔
		WB	677	784	108	16%	4.0	✔
8	B4073 Painswick Road, west of M5	NB	195	255	61	31%	4.0	✔
		SB	167	221	54	32%	3.8	✔
9	A417 Brockworth Bypass, Barnwood	NB	1,459	1,299	-160	-11%	4.3	✔
		SB	1,494	1,333	-161	-11%	4.3	✔
10	B4632 Broadway Road	NB	92	71	-21	-23%	2.3	✔
		SB	90	83	-7	-7%	0.7	✔

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
11	A46 Shurdington Road, Chargrove	NB	483	554	71	15%	3.1	✓
		SB	513	528	15	3%	0.6	✓
12	A429 Strow Road	NB	286	275	-10	-4%	0.6	✓
		SB	324	329	4	1%	0.2	✓
13	A417 Whelford Turn	EB	182	171	-11	-6%	0.8	✓
		WB	218	217	-2	-1%	0.1	✓
14	A4135, East of Dursley	EB	235	211	-24	-10%	1.6	✓
		WB	342	249	-93	-27%	5.4	✓
15	A419 Ebley Bypass	EB	768	879	111	15%	3.9	✓
		WB	817	820	3	0%	0.1	✓
16	B4008 Ebley Road	EB	410	392	-19	-5%	0.9	✓
		WB	294	281	-13	-5%	0.8	✓
17	Frocester Hill	NB	220	166	-54	-24%	3.9	✓
		SB	195	187	-7	-4%	0.5	✓
18	A40, Walham Viaduct	NB	1,003	1,006	3	0%	0.1	✓
		SB	1,049	1,359	310	30%	8.9	✗
19	Golden Valley East of M5	SB	1,663	2,389	726	44%	16.1	✗
20	Golden Valley East of M5	NB	2,156	2,110	-46	-2%	1.0	✓
21	A40 Golden Valley, West of M5	NB	1,394	1,598	203	15%	5.3	✓
		SB	1,585	1,779	195	12%	4.7	✓
22	B4008 Gloucester Road, Haresfield	NB	223	278	56	25%	3.5	✓

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
23	B4213, Haw Bridge Tirley	SB	287	331	44	15%	2.5	✓
		WB	109	101	-8	-7%	0.8	✓
		EB	180	209	29	16%	2.1	✓
24	High Street, Tewkesbury	NB	499	535	36	7%	1.6	✓
		SB	417	447	30	7%	1.4	✓
25	Hucclecote Road East of M5	EB	420	403	-17	-4%	0.8	✓
		WB	548	584	36	7%	1.5	✓
26	A436 Gloucester Road Andoversford	EB	356	361	5	2%	0.3	✓
		WB	399	449	50	13%	2.4	✓
27	Leckhampton Lane Cheltenham	NB	273	189	-84	-31%	5.5	✓
		SB	217	313	96	44%	5.9	✓
28	Lobleys Drive	EB	371	206	-165	-44%	9.7	✗
		WB	529	400	-129	-24%	6.0	✗
29	A27 within the A3(M) junction	EB	2,547	3,719	1,172	46%	20.9	✗
30	M275 between J2 and J12	NB	3,660	2,174	-1,486	-41%	27.5	✗
31	M4 Almondsbury Roundabout	EB	1,017	828	-189	-19%	6.2	✗
32	M5 Upton Warren	SB	4,152	4,055	-97	-2%	1.5	✓
33	M5 Oddingley	SB	3,963	3,691	-271	-7%	4.4	✓
34	M5 Oddingley	NB	4,211	3,708	-503	-12%	8.0	✗
35	South of M5 J6	NB	4,002	3,305	-697	-17%	11.5	✗
36	South of M5 J6	SB	4,049	3,270	-778	-19%	12.9	✗

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
37	North of M5 J7	NB	3,847	3,305	-542	-14%	9.1	✗
38	South of M5 J7	SB	2,868	2,391	-477	-17%	9.3	✗
39	M5 between J10 and J11	NB	3,350	3,091	-259	-8%	4.6	✓
40	M5 between J11a and J12	SB	3,378	3,242	-136	-4%	2.4	✓
41	M5 between J11a and J12	NB	3,226	3,108	-118	-4%	2.1	✓
42	South of M5 J13	SB	2,917	2,668	-249	-9%	4.7	✓
43	South of M5 J13	NB	2,797	2,664	-133	-5%	2.5	✓
44	M4 Almondsbury Roundabout	EB	2,263	2,323	60	3%	1.3	✓
45	M5 between J17 and J16	NB	4,863	4,002	-861	-18%	12.9	✗
46	M50 South of Strensham Interchange	EB	1,009	942	-67	-7%	2.2	✓
47	M50 Longdon	WB	1,135	1,092	-43	-4%	1.3	✓
48	M50 Longdon	EB	936	716	-221	-24%	7.7	✗
49	Mythe Water Tower, Tewkesbury	NB	443	457	14	3%	0.7	✓
49	Mythe Water Tower, Tewkesbury	SB	372	439	67	18%	3.3	✓
50	B4632 North of Prestbury	NB	398	627	229	58%	10.1	✗
		SB	291	418	127	44%	6.7	✗
51	A419 Stroud Road North of Coates	EB	285	275	-10	-4%	0.6	✓
		WB	447	525	78	18%	3.6	✓
52	A46 Painswick Road, Pitchcombe	NB	539	536	-3	-1%	0.1	✓
		SB	479	554	75	16%	3.3	✓
53	Sandywell Lodge, Cheltenham	EB	325	343	17	5%	1.0	✓

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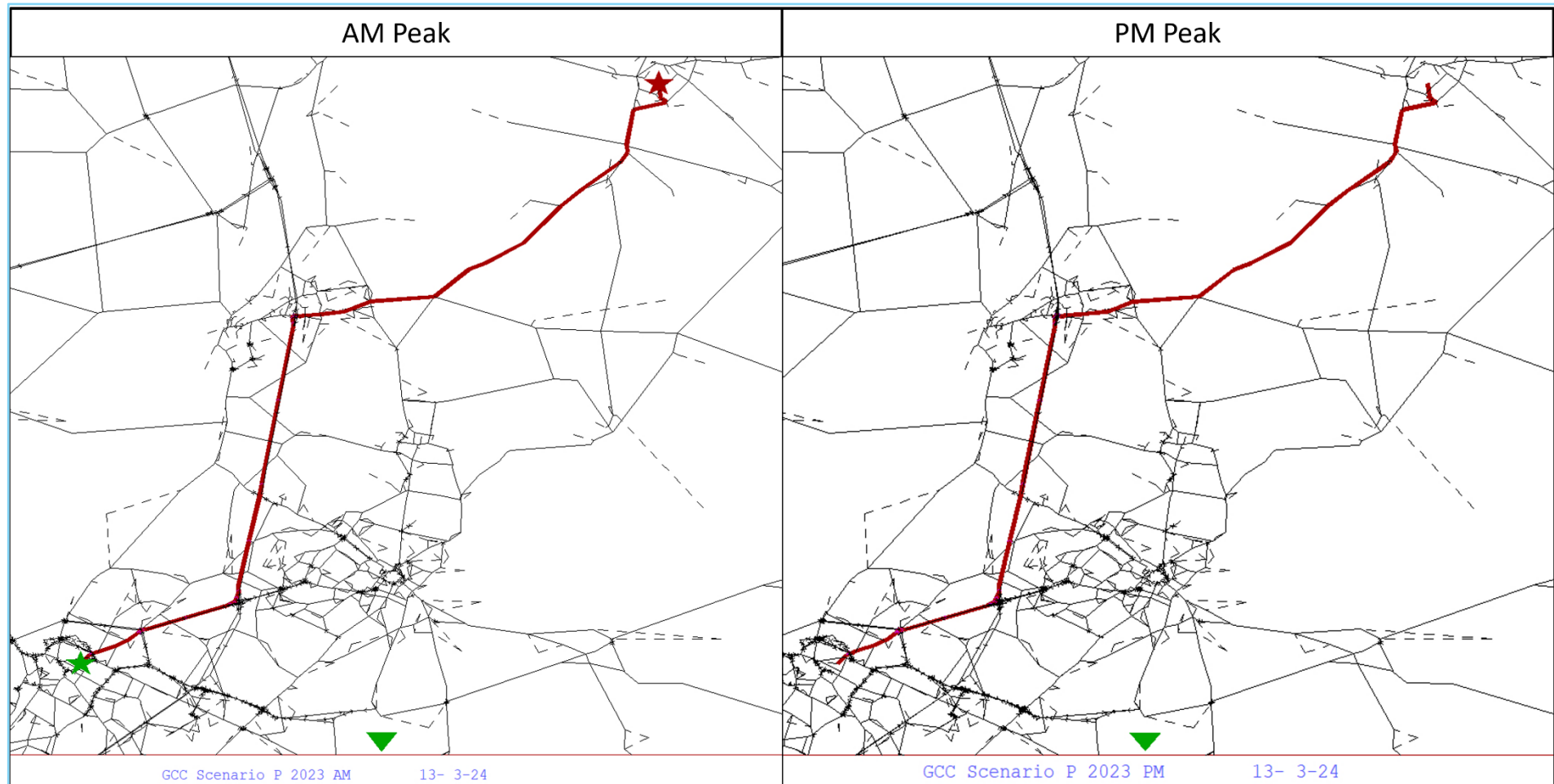Gloucestershire
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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
		WB	461	343	-117	-25%	5.9	✗
54	B4632 Stanton	NB	132	187	55	42%	4.4	✓
		SB	132	140	7	6%	0.6	✓
55	Stoke Orchard Road, West of Bishops Cleeve	WB	331	338	8	2%	0.4	✓
		EB	377	284	-93	-25%	5.1	✓
56	Stroud Road, Gloucester	SB	309	256	-53	-17%	3.1	✓
57	M5 between J10 and J9	NB	4,087	3,714	-373	-9%	6.0	✓
58	A31 eastbound between A338 near Ringwood (east) and M27	EB	2,305	1,896	-409	-18%	8.9	✗
59	A46 between A44 near Evesham (east) and B4035	NB	1,169	944	-225	-19%	6.9	✗
60	A46 between A44 near Evesham (south) and A44 near Evesham (east)	NB	719	674	-45	-6%	1.7	✓
61	A46 between A44 near Evesham (east) and A44 near Evesham (south)	SB	949	648	-302	-32%	10.7	✗
62	A38 Jubilee Way	NB	347	235	-111	-32%	6.5	✗
		SB	269	177	-92	-34%	6.2	✓
63	A417 between A46 and M5	NB	2,433	1,948	-486	-20%	10.4	✗
64	M27 between J3 and J2	WB	4,507	4,073	-434	-10%	6.6	✗
65	A27 within the A3(M) junction	WB	2,626	2,207	-419	-16%	8.5	✗
66	A46 between B439 and A435 near Alcester	NB	918	663	-255	-28%	9.1	✗
67	A46 between A4184 and B4035	SB	1,362	1,053	-309	-23%	8.9	✗

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Count Site No	Location	Direction	Observed Flow (vehicle)	Modelled Flow (vehicle)	Difference (vehicle)	% Difference	GEH	Meeting Link Flow Validation Criteria
68	A46 between B4035 and A4184	NB	1,167	1,133	-35	-3%	1.0	✓
69	A46 between A435 near Bishop's Cleeve and A44 near Evesham (south)	NB	902	616	-285	-32%	10.4	✗
70	A46 between A44 near Evesham (south) and A435 near Bishop's Cleeve	SB	824	829	6	1%	0.2	✓
71	M5 between J9 and J10	SB	3,431	3,357	-74	-2%	1.3	✓
72	M5 J9 exit	NB	949	960	10	1%	0.3	✓
73	M5 within J9	NB	3,108	2,754	-354	-11%	6.5	✓
74	A46 between A435 near Alcester and A422	NB	625	624	-1	0%	0.0	✓
75	A46 between A422 and A435 near Alcester	SB	903	546	-357	-40%	13.3	✗
76	A44 Five Mile Drive, Bourton on the Hill	NB	446	522	76	17%	3.5	✓
76		SB	260	280	21	8%	1.3	✓
77	A4019 Tewkesbury Road, Uckington	WB	839	815	-24	-3%	0.8	✓
77		EB	683	622	-61	-9%	2.4	✓

Appendix G   Route Choice Comparisons
(With COVID-19 Adjustment)

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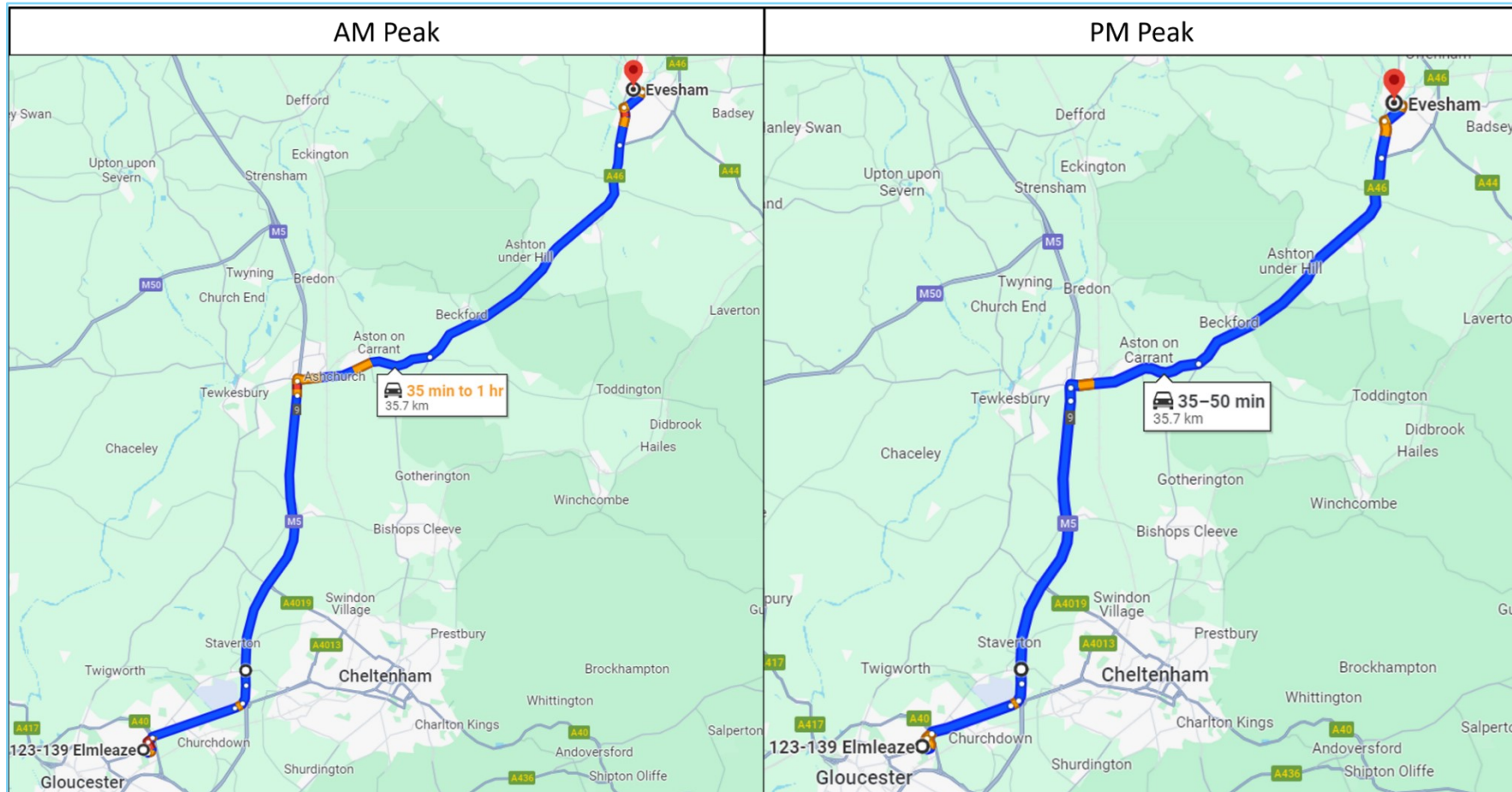
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Gloucester to Evesham

Figure G1 – Gloucester to Evesham OD Route Choice in the 2023 Forecast Model With COVID-19 Adjustment - AM Peak and PM Peak
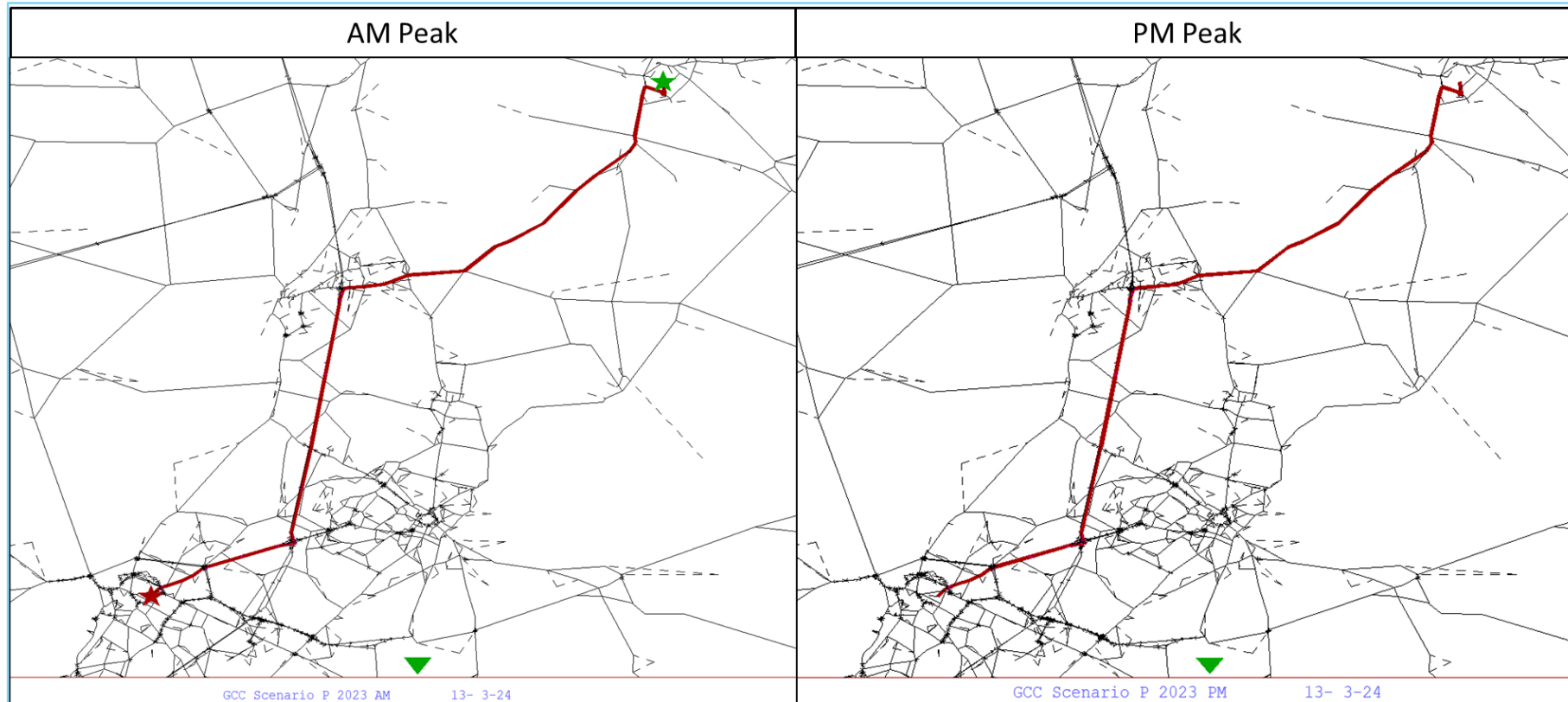
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Gloucester to Evesham

Figure G2 - Gloucester to Evesham Route Choice in Google Journey Time Planner AM Peak (8 am) and PM Peak (6 pm)

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Evesham to Gloucester
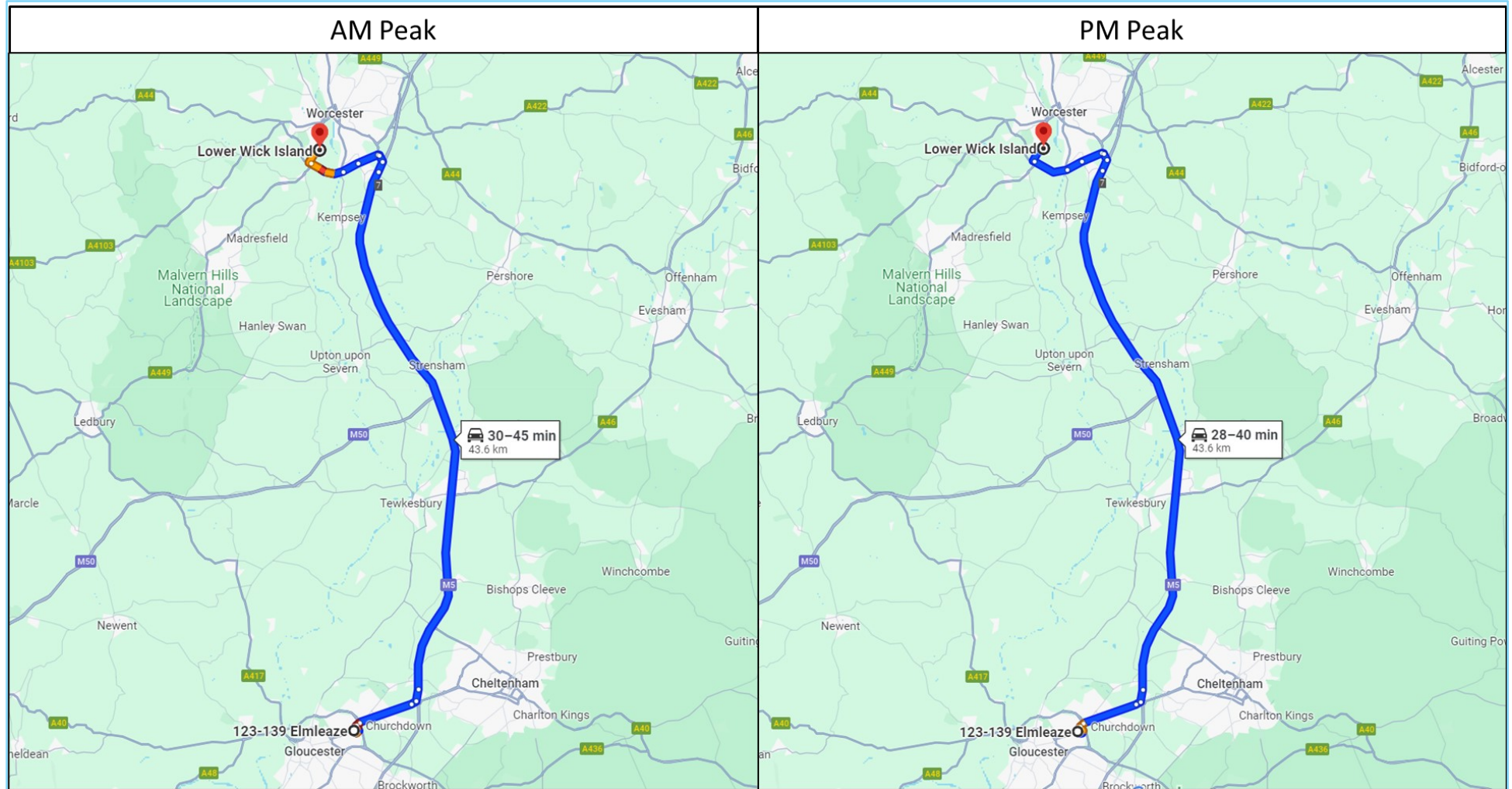
Figure G3 – Evesham to Gloucester OD Route Choice in in the 2023 Forecast Model With COVID-19 Adjustment - AM Peak and PM Peak

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Evesham to Gloucester

Figure G4 – Evesham to Gloucester Route Choice in Google Journey Time Planner AM Peak (8 am) and PM Peak (6 pm)

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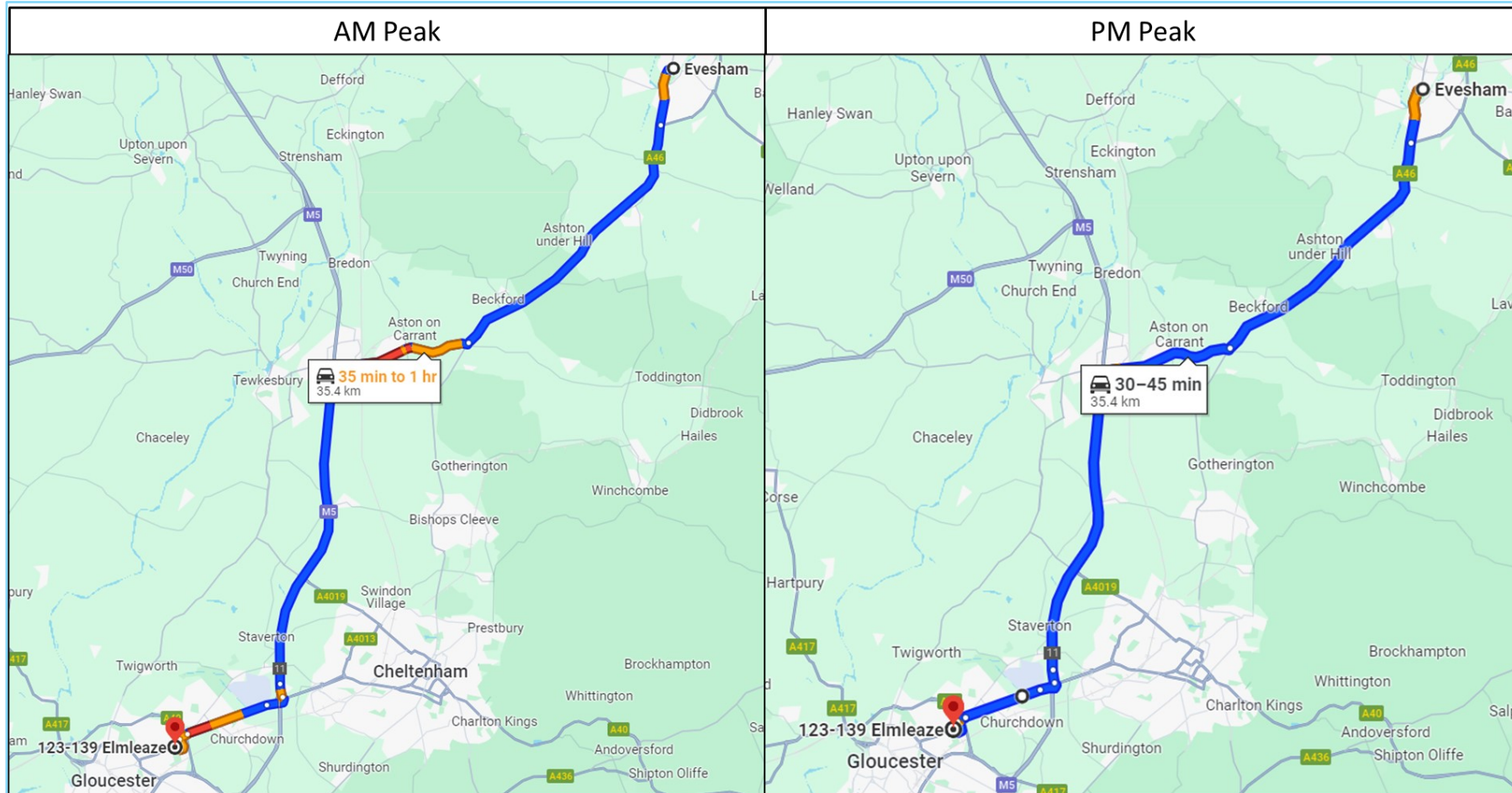
Gloucester to Worcester

Figure G5 – Gloucester to Worcester OD Route Choice in the 2023 Forecast Model Without COVID-19 Adjustment - AM Peak and PM Peak
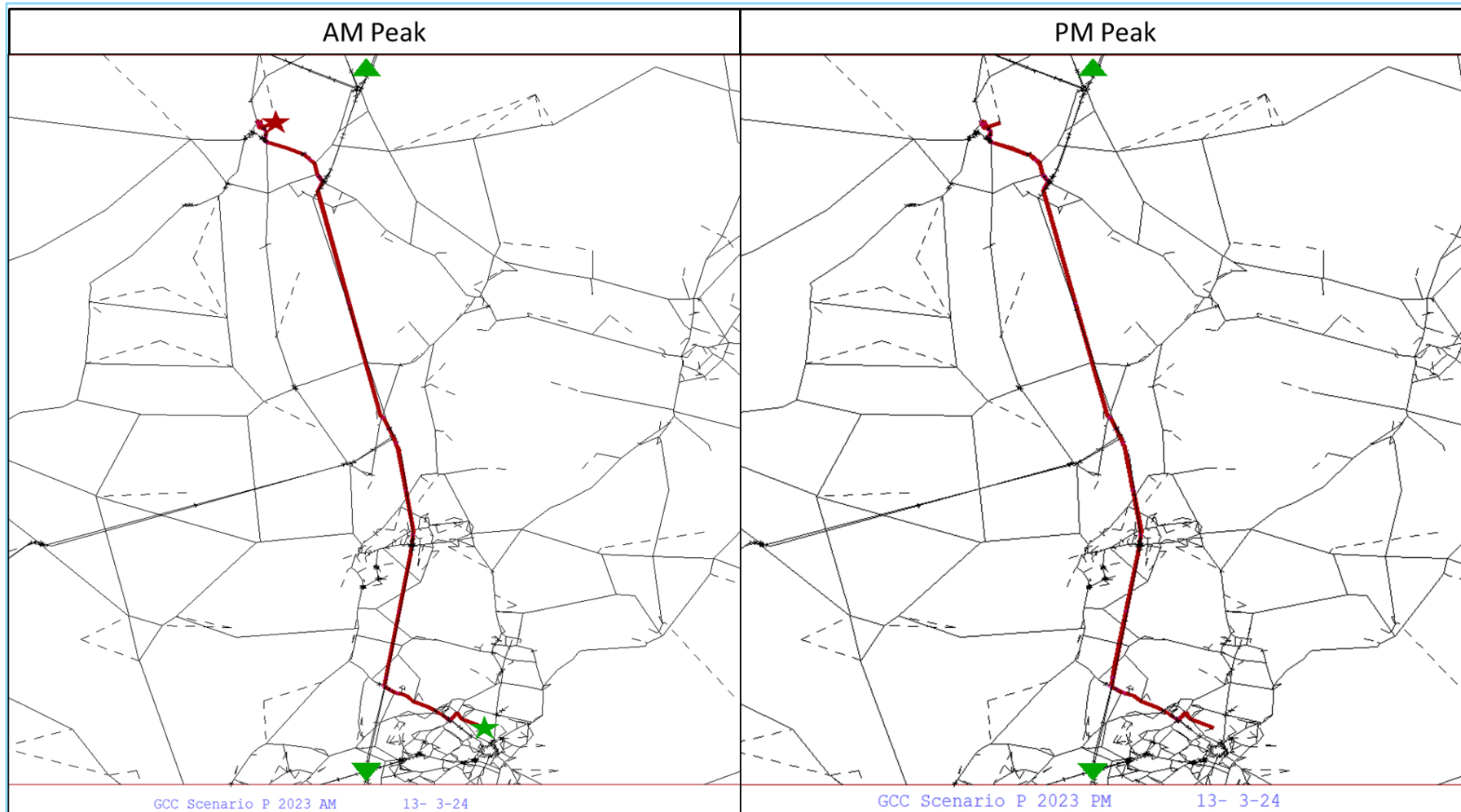
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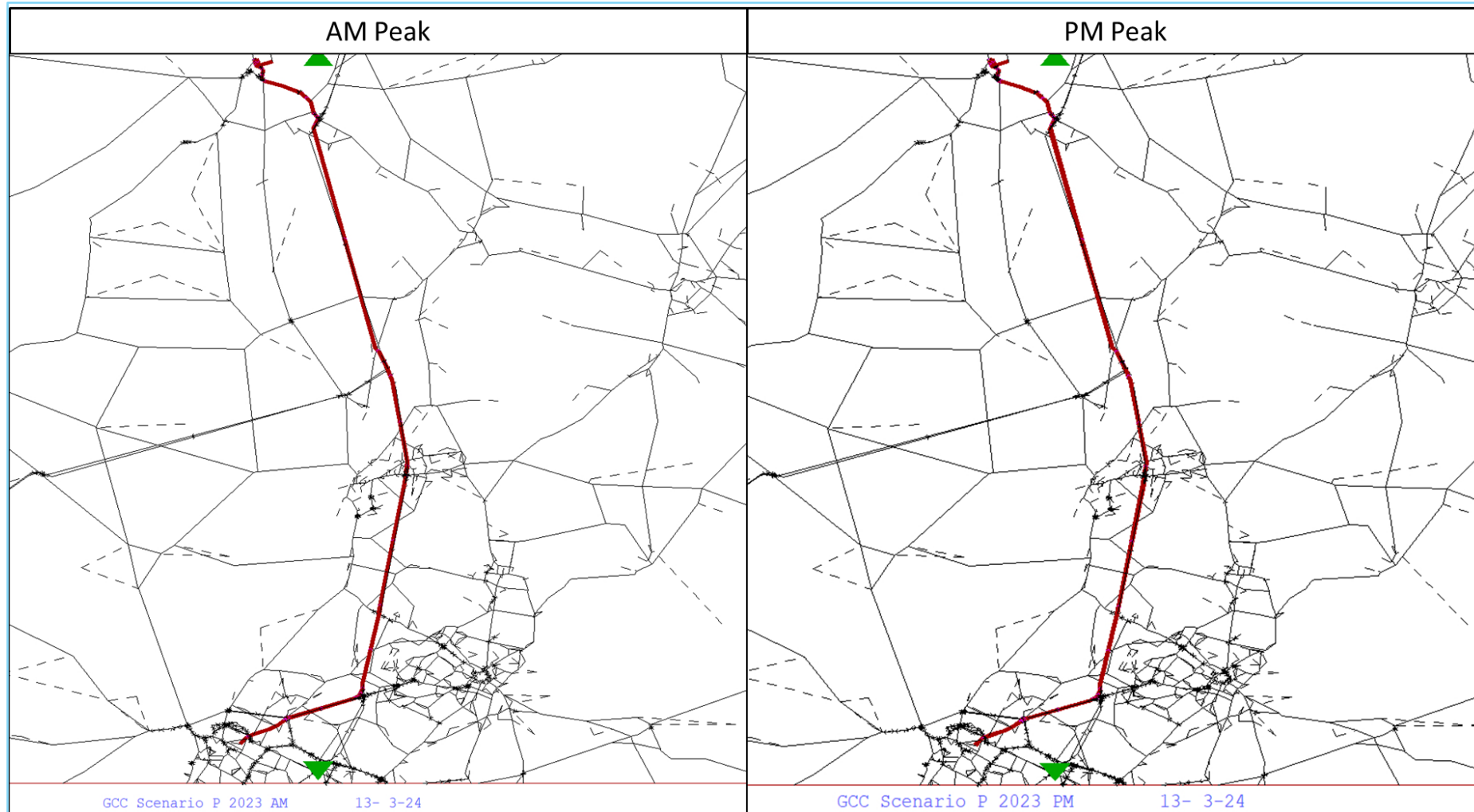
Gloucester to Worcester

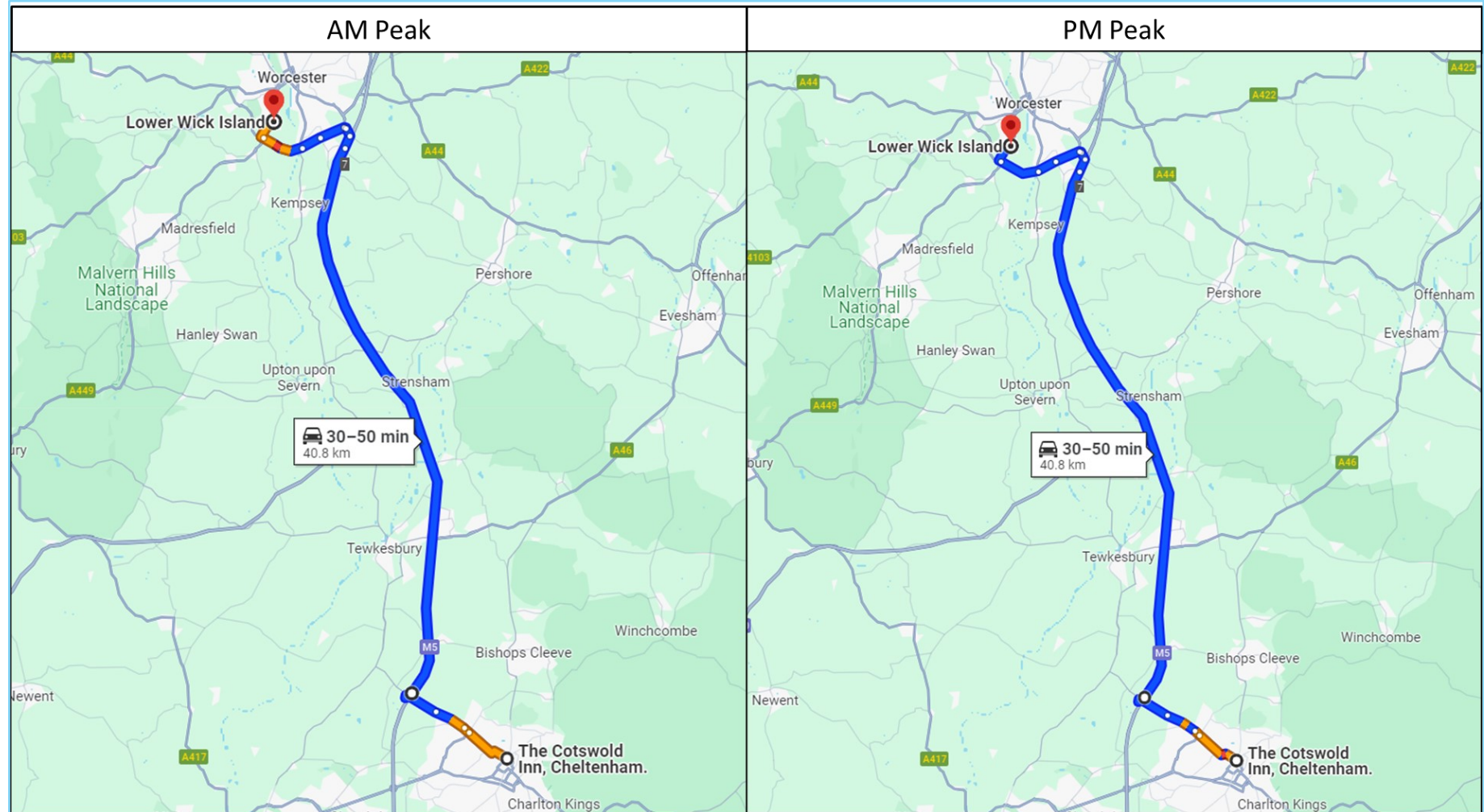Figure G6 – Gloucester to Worcester Route Choice in Google Journey Time Planner AM Peak (8 am) and PM Peak (6 pm)

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G.1.   Worcester to Gloucester

G.2.

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Worcester to Gloucester

Figure G7 – Worcester to Gloucester OD Route Choice in in the 2023 Forecast Model With COVID-19 Adjustment - AM Peak and PM Peak

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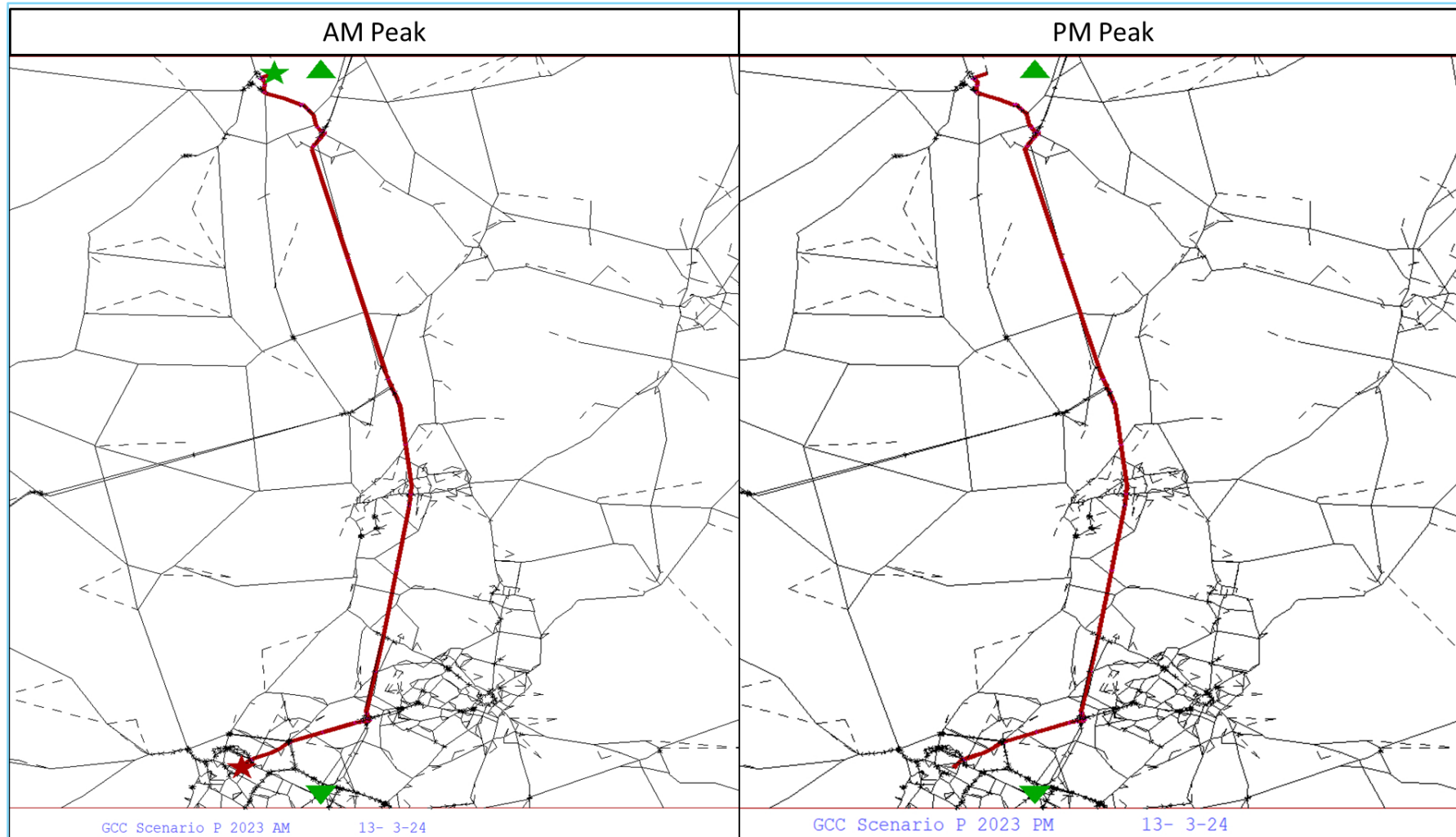
Worcester to Gloucester

Figure G8 – Worcester to Gloucester Route Choice in Google Journey Time Planner AM Peak (8 am) and PM Peak (6 pm)

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Cheltenham to Worcester

Figure G9 – Cheltenham to Worcester OD Route choice in the 2023 Forecast Model With COVID-19 Adjustment - AM Peak and PM Peak
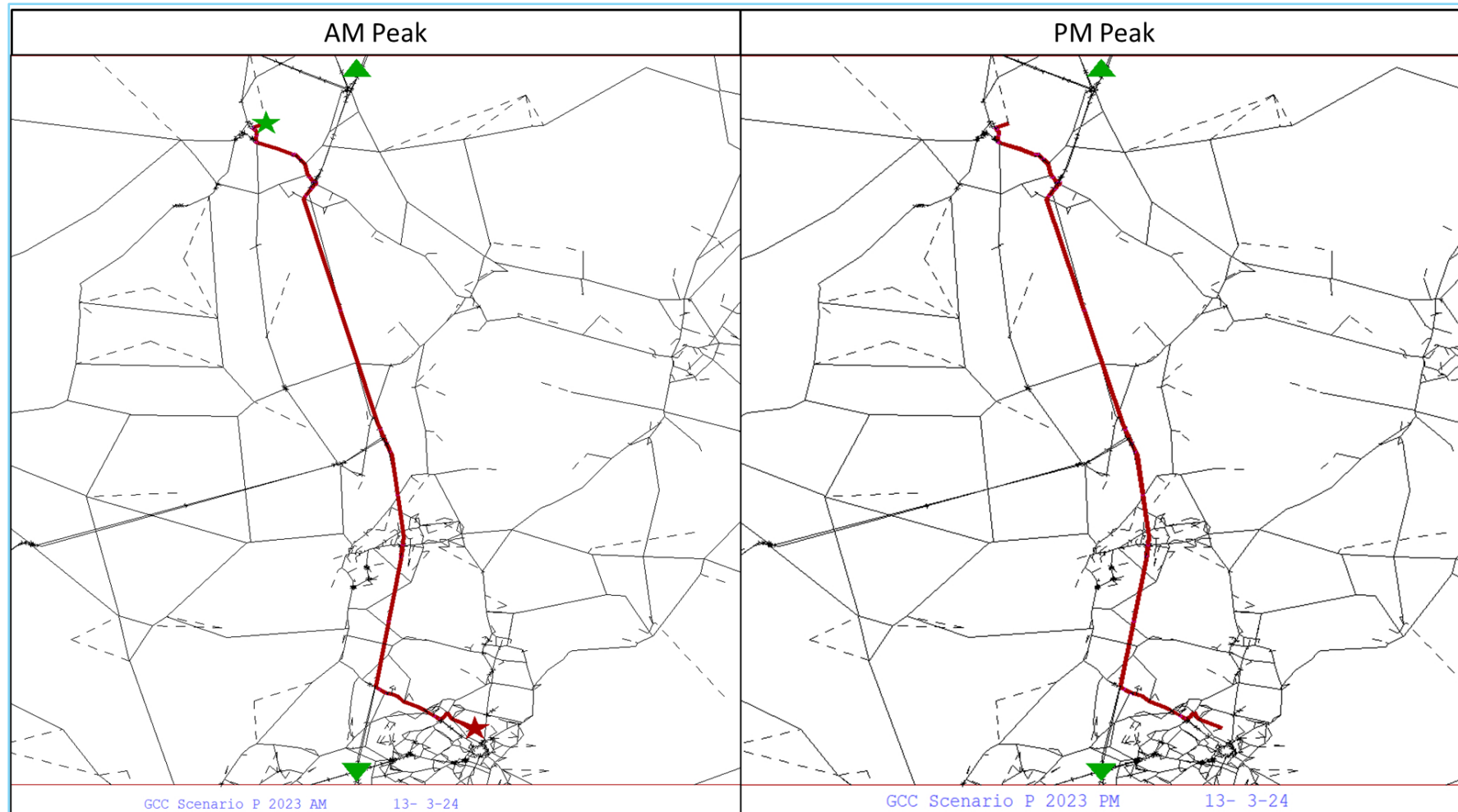
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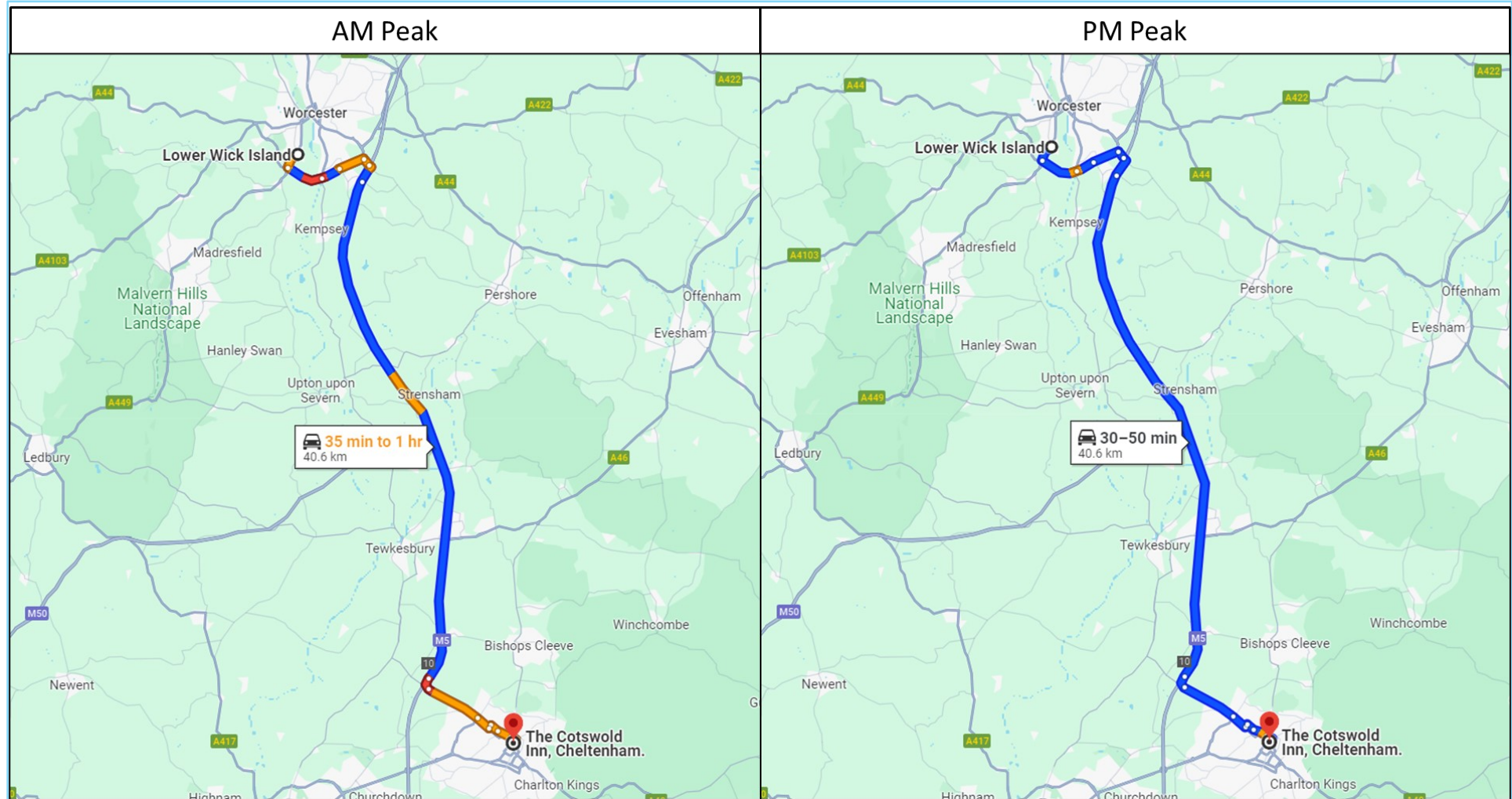Figure G10 – Cheltenham to Worcester Route Choice in Google Journey Time Planner AM Peak (8 am) and PM Peak (6 pm)

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Worcester to Cheltenham

Figure G11 – Worcester to Cheltenham OD Route choice in the 2023 Forecast Model With COVID-19 Adjustment – AM Peak and PM Peak
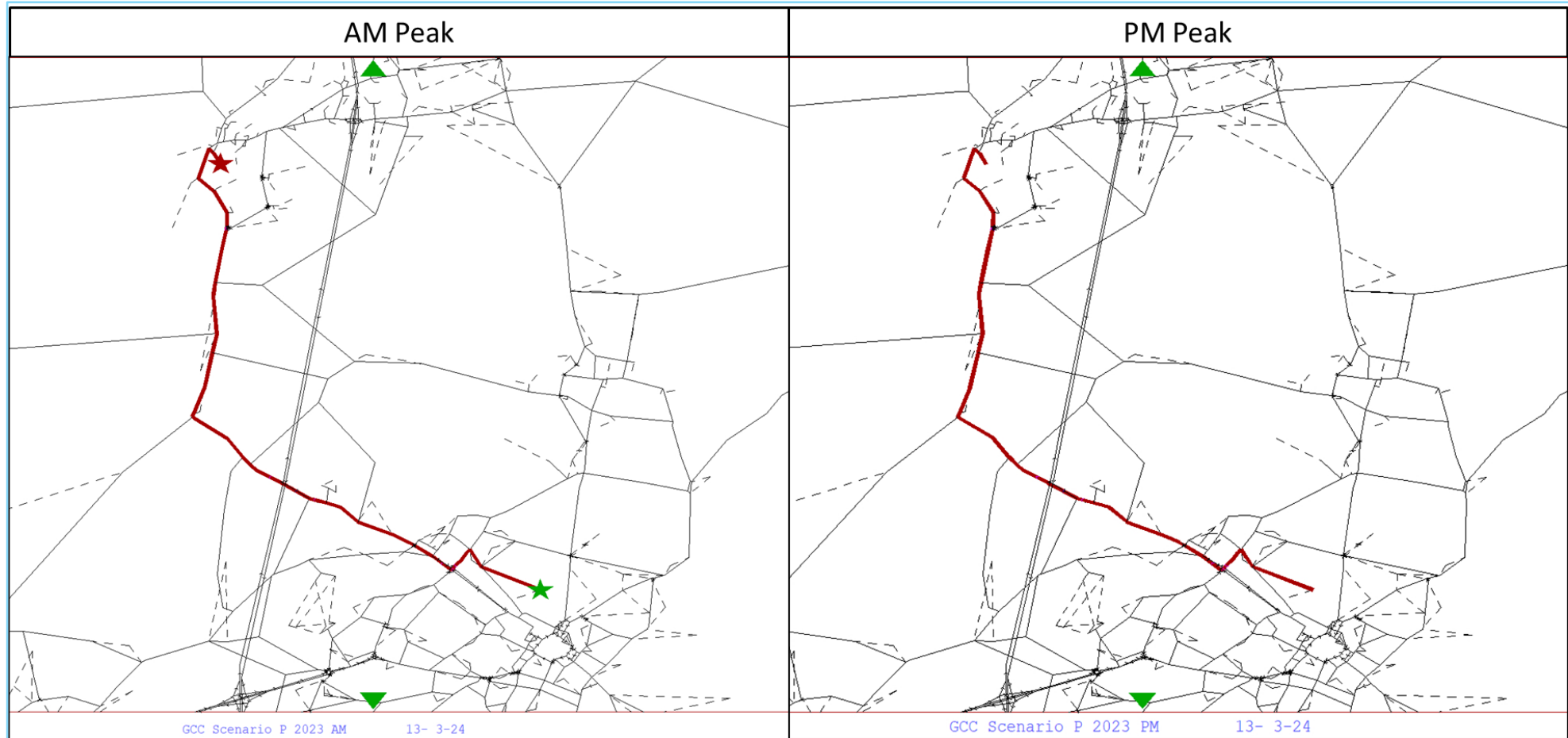
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Figure G12 – Worcester to Cheltenham Route Choice in Google Journey Time Planner AM Peak (8 am) and PM Peak (6 pm)

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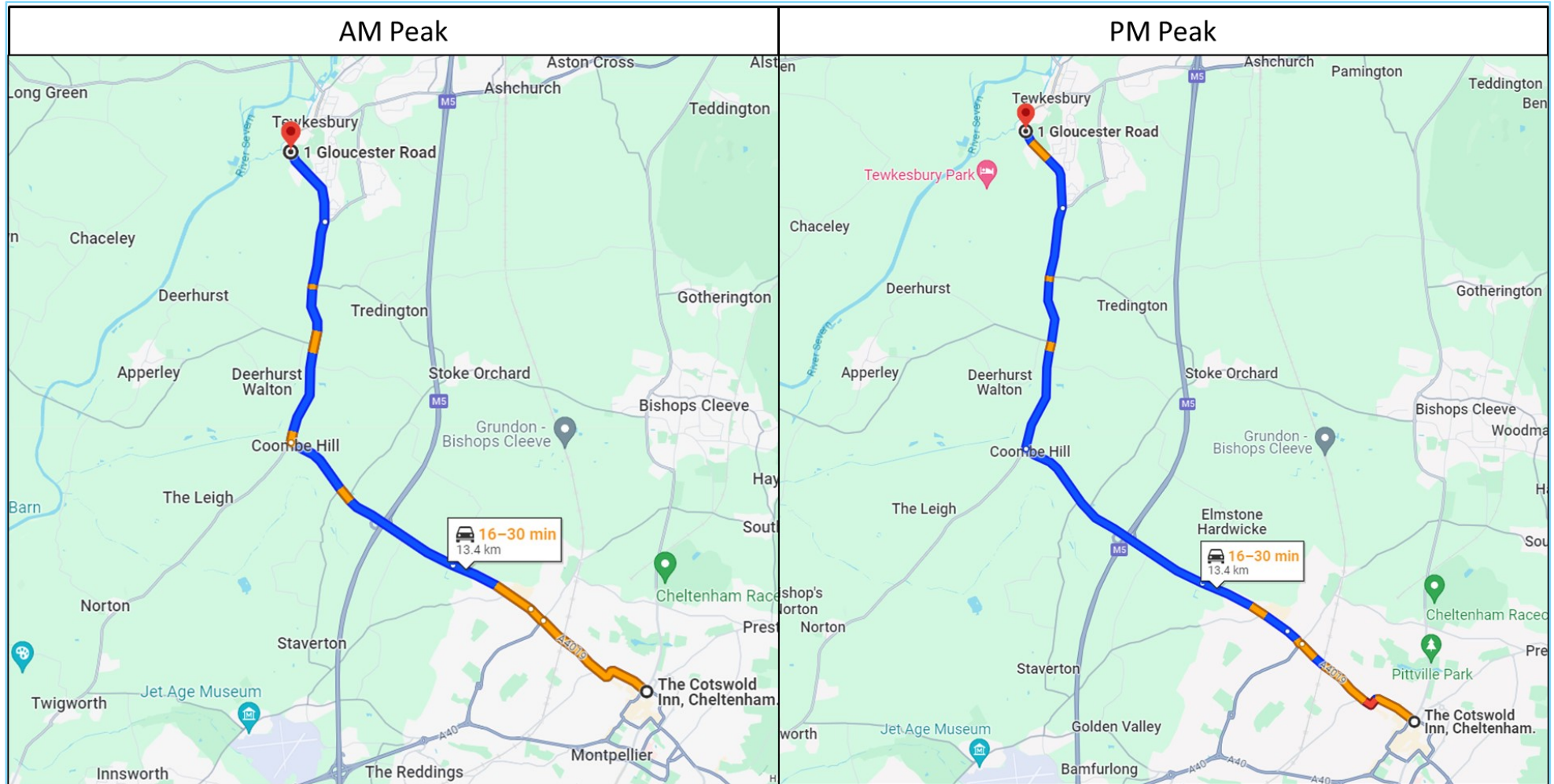
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Cheltenham to Tewkesbury

Figure G13 – Cheltenham to Tewkesbury OD Route Choice in the 2023 Forecast Model With COVID-19 Adjustment - AM Peak and PM Peak
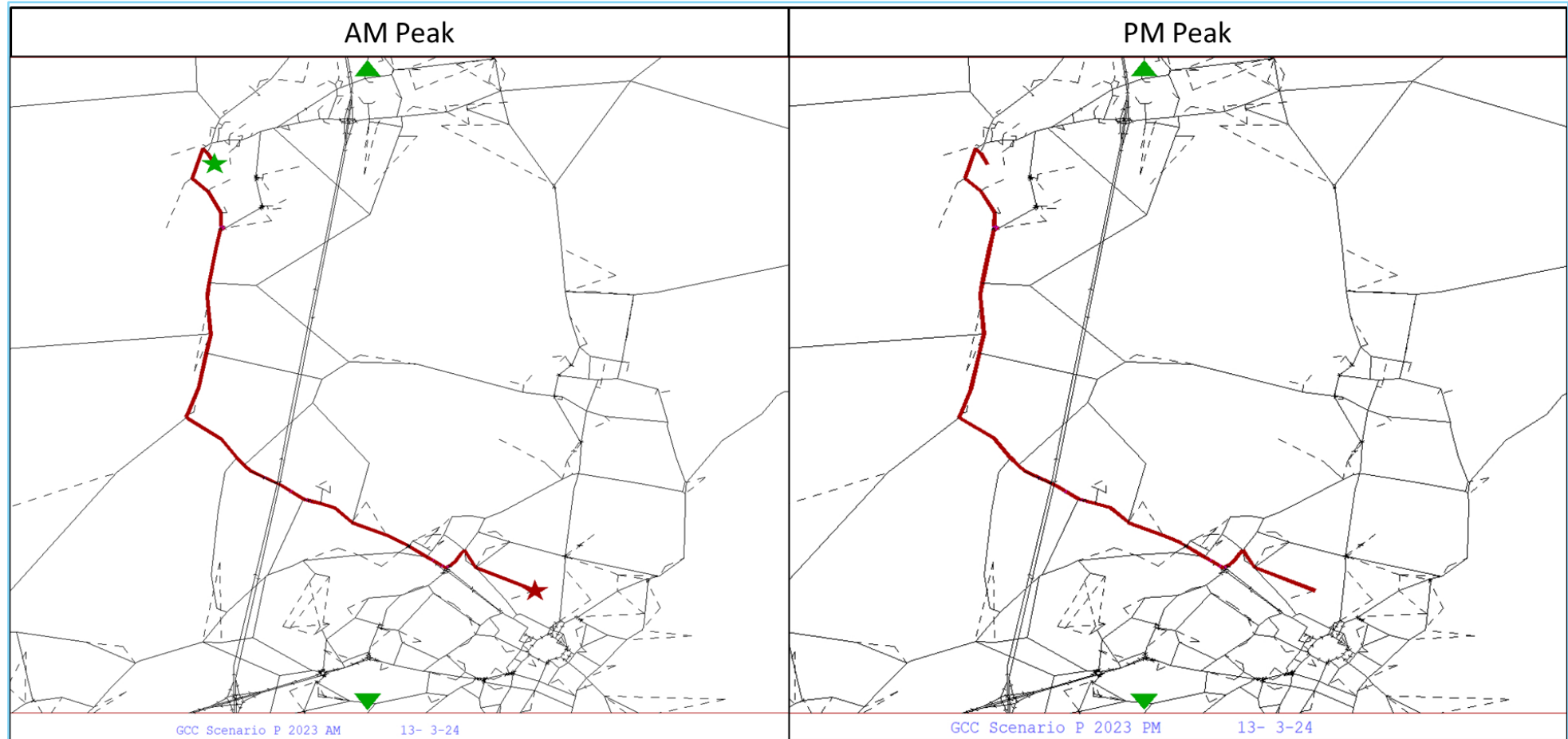
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Cheltenham to Tewkesbury

Figure G14 – Cheltenham to Tewkesbury Route Choice in Google Journey Time Planner AM Peak (8 am) and PM Peak (6pm)

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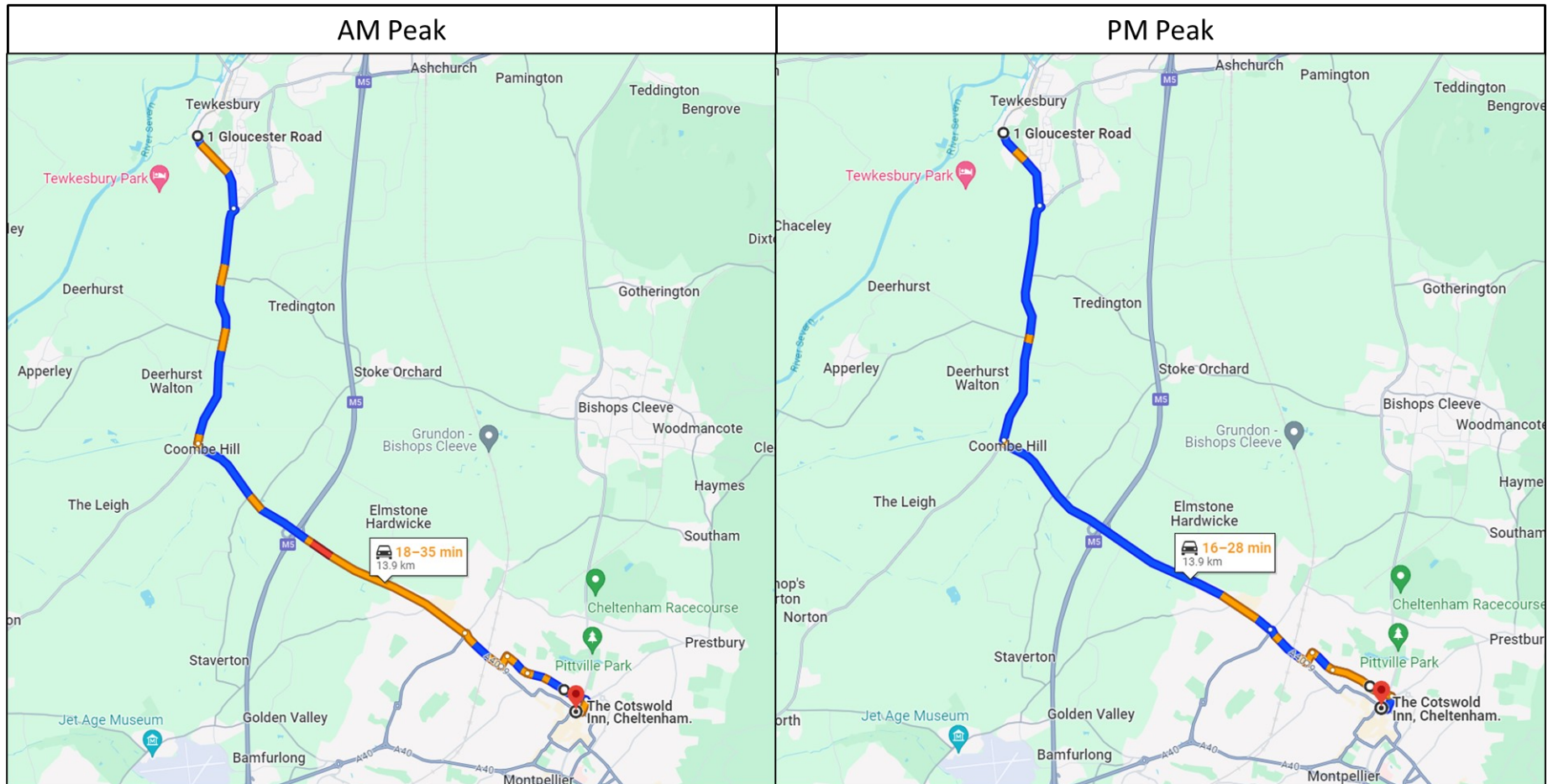
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Tewkesbury to Cheltenham

Figure G15 – Tewkesbury to Cheltenham OD Route Choice in the 2023 Forecast Model With COVID-19 Adjustment - AM Peak and PM Peak

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Tewkesbury to Cheltenham

Figure G16 - Tewkesbury to Cheltenham Route choice in Google Journey Time Planner AM Peak (8 am) and PM Peak (6pm)

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