

Bolton Local Plan Transport Model Model Development Report

Bolton Council

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1. Introduction

1.1 Background

AECOM was commissioned by Bolton Metropolitan Borough Council (BMBC) to develop a transport modelling platform capable of assessing the impacts of future growth scenarios associated with Bolton's Local Plan. An initial phase of work (Phase 1) was undertaken to review and evaluate available modelling options, with particular consideration given to the forthcoming 2025 Greater Manchester Strategic Model (GMSM).

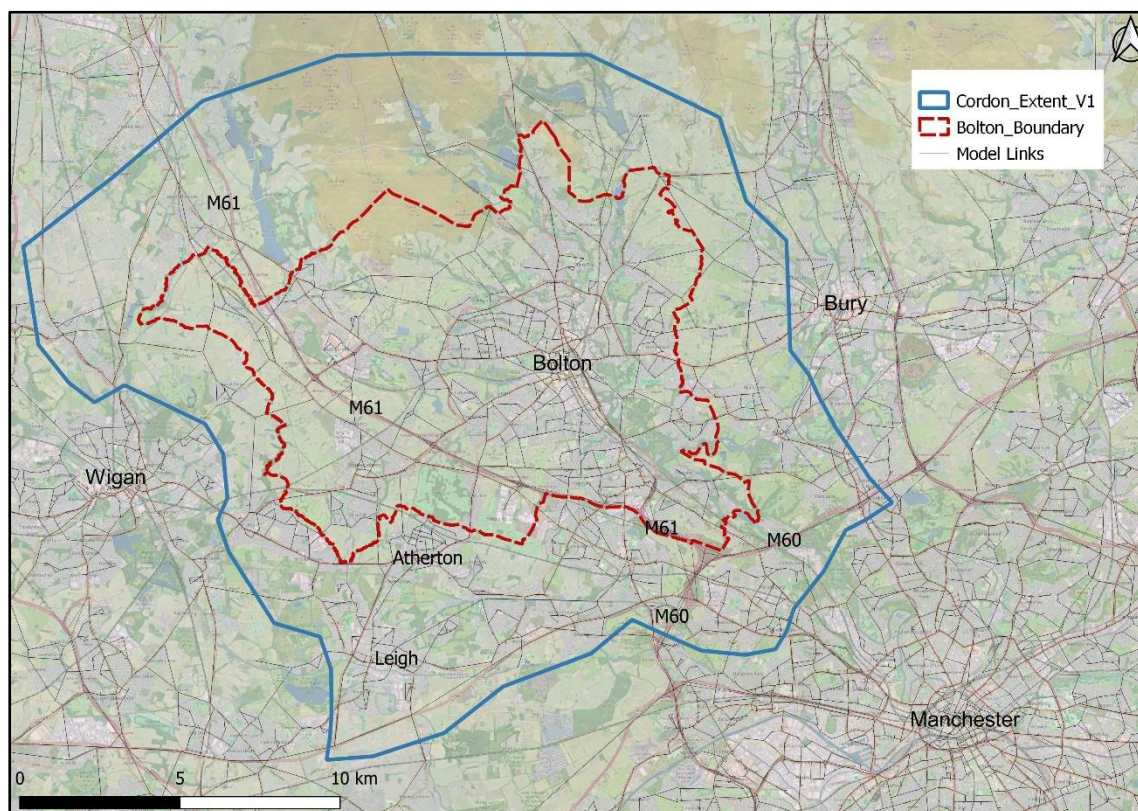
As part of Phase 1, traffic count data were collated from a range of sources, including Transport for Greater Manchester's (TfGM) C2 database, National Highways WebTRIS, and other planning-system traffic count datasets, supplemented where possible by additional Bolton Council and TfGM data. Journey time information was also obtained from Teletrac Navman for a number of key corridors across the borough for the corresponding 2025 period. The collected datasets were subsequently reviewed and analysed to establish a robust evidence base. In parallel, a detailed review of Version 28 of the GMSM 2025 Base Model was undertaken for the Bolton study area, informing the development of the proposed methodology and programme for subsequent phases of work.

The Phase 1 assessment concluded that, whilst the GMSM 2025 Base Model demonstrated a reasonable level of agreement with the traffic counts used in its original development, its performance against the additional traffic count datasets collected as part of Phase 1 was less satisfactory. Furthermore, the model exhibited a poor correlation with observed journey times across a number of corridors within Bolton. These findings identified the need for a proportionate Base Model Enhancement exercise (Phase 2) to improve model performance and ensure its suitability for Local Plan assessment work.

Following the completion of Phase 1, it was agreed that the GMSM 2025 model would be adopted as the foundation for the Bolton Local Plan modelling framework, with targeted enhancements undertaken to provide a fit-for-purpose tool for future growth testing and policy assessment.

1.2 Base Model Enhancement Overview

In consideration of the programme timescales and to minimise risks associated with model convergence, excessive run times and modelling noise, the implementation of a model cordon was agreed. The cordon encompasses the Bolton area of interest, as illustrated in Figure 1-1, and has been extended to include key external gateways and significant inter-authority movements. This approach has been adopted to reduce model run times whilst retaining the strategic routing characteristics required for robust assessment. The extent of the cordon was agreed with Bolton Council to ensure that all Local Plan strategic allocations, together with their potential wider network impacts, are appropriately represented within the modelled area.

Figure 1-1 Bolton Cordon Area

Following agreement of the model cordon and study area extents, a proportionate network review was undertaken to identify and rectify any fundamental coding issues that may affect model performance. This audit focused on the local highway network within the cordon and included a review of network coding elements such as missing or incorrectly coded links and turning movements, lane allocations and capacities, signal control data, speed limits, movement restrictions, and zone centroid connector coding.

Where identified, proportionate amendments were made to address coding deficiencies and to ensure that the network representation reflects present-day conditions, consistent with the wider GSM 2025 Base Model assumptions and coding standards.

Screenlines and cordons, where appropriate, were established based on the availability and spatial coverage of observed traffic count data. These were used to provide an adequate representation of travel movements across key corridors and geographic areas within the study area and supported the calibration and validation process.

A programme of incremental and targeted matrix estimation – starting from the GSM 2025 prior matrices - was undertaken using both the original GSM 2025 calibration count dataset and the additional traffic count data collected as part of Phase 1. Matrix estimation was applied in a controlled and staged manner, focusing initially on priority corridors and key zones. This approach minimised the risk of overfitting, facilitate stable model convergence, and maintain realistic trip distribution patterns. Whilst the overall demand structure was preserved wherever possible, constraints were applied to limit excessive changes to origin-destination movements. It is recognised, however, that in certain locations more substantial adjustments to the prior demand matrices were required to achieve an acceptable representation of observed traffic flows and journey times.

Model calibration and validation was undertaken in accordance with the principles of the Department for Transport's Transport Analysis Guidance (TAG), with a proportionate approach adopted to reflect the intended application of the model. Calibration and validation will focus on link flows, screenlines and cordons across the study area, while journey time validation was undertaken using the Teletrac Navman datasets collected during Phase 1. The calibration and validation results were reported against relevant TAG criteria and performance thresholds, together with a supporting narrative

describing the model's fitness for purpose and any residual discrepancies that may influence Local Plan assessments.

A comprehensive quality assurance process was embedded throughout the enhancement exercise. All network amendments, matrix estimation outputs, and model performance results were subjected to internal technical review by senior transport modelling specialists prior to issue. Compliance with relevant TAG principles and best-practice modelling standards were assessed throughout the process, with all evidence maintained in a transparent and reproducible manner through version-controlled model runs, clearly defined inputs and outputs, and archived model configurations.

Calibration and validation activities focussed on addressing material performance issues and demonstrating an appropriate level of model robustness through reasonableness testing, link flow comparisons, screenline and cordon validation, and journey time assessments. Recognising the available data constraints and programme requirements, the enhancement exercise remained proportionate in scope, avoiding any major redevelopment or wholesale restructuring of the underlying GMSM 2025 model framework.

The existing GMSM 2025 modelling platform, methodologies and coding conventions were retained wherever practicable to ensure consistency, continuity and comparability with the wider Greater Manchester modelling framework. In addition, a clear audit trail of all model changes were maintained through the use of dated model versions, documented assumptions, and concise change logs.

1.3 Report Purpose

This report documents the development of the Bolton cordon model, including the methodology adopted for its enhancement, calibration and validation. The report also presents the outcomes of the model validation exercise, including comparisons of modelled and observed link flows, screenline and cordon flows, and journey times.

Model performance has been assessed against the validation criteria set out within the Department for Transport's Transport Analysis Guidance (TAG) Unit M3.1: Highway Assignment Modelling (May 2026). The results are reported to demonstrate the extent to which the enhanced model provides a robust representation of existing travel conditions within the study area and satisfies the requirements of a proportionate TAG-compliant validation exercise.

The report further provides an assessment of the model's suitability for its intended application, namely the forecasting and appraisal of future-year scenarios associated with Bolton's Local Plan. In doing so, it demonstrates that the model is fit for purpose and capable of supporting the evaluation of strategic development allocations, transport interventions, and associated network impacts

1.4 Structure of the Report

The report is structured as follows:

- Chapter 2 - Modelling Standards;
- Chapter 3 - Model Description;
- Chapter 4 - Calibration and Validation Data;
- Chapter 5 - Trip Matrix Development;
- Chapter 6 - Network Calibration and Validation;
- Chapter 7 - Trip Matrix Calibration and Validation;
- Chapter 8 - Network Convergence and Link Flow Validation;
- Chapter 9 - Journey Time Validation; and
- Chapter 10 - Summary and Conclusions.

2. Modelling Standards

2.1 Introduction

The calibration and validation of the SATURN highway assignment model were undertaken in accordance with the guidance set out in the Department for Transport's (DfT) Transport Analysis Guidance (TAG) Unit M3.1: Highway Assignment Modelling (May 2026). TAG Unit M3.1 provides best-practice guidance for the development, calibration and validation of highway assignment models and establishes the principles and standards required to demonstrate that a model is fit for its intended purpose

The guidance covers all key aspects of the highway modelling process, including:

- Model design;
- Validation and calibration standards;
- Calibration and validation data;
- Network coding and checking;
- Network calibration and validation;
- Route choice validation and calibration;
- Trip matrix calibration and validation; and
- Assignment calibration and validation.

Further advice on trip matrix development is also given in TAG Unit M2, Variable Demand Modelling,

2.2 Link Flow Validation Acceptability Criteria

TAG guidance on link flow validation indicates that the measures that should be used are:

- The absolute and percentage differences between modelled flows and counts; and
- The GEH statistic, which is a form of the Chi-squared statistic that incorporates both relative and absolute errors, and is defined as follows:

Equation 2 1 - GEH Statistic

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

where, M is the modelled flow

C is the counted (observed) flow.

The validation criteria and acceptability guidelines for link flows (in vehicles per hour) are summarised below in Table 2-1.

The guidance also requires that for any cordons and screenlines, that the difference between the modelled flows and counts should be less than 5% of the counts in nearly all cases.

Table 2-1 Link Flow and Turning Movement Validation Criteria and Acceptability Guidelines

Criteria	Description of Criteria	Acceptability Guideline
1	Individual flows within 100 veh/h of counts for flows less than 700 vehicles/hour	> 85% of cases
	Individual flows within 15% of counts for flows from 700 to 2,700 vehicles/hour	> 85% of cases
	Individual flows within 400 veh/h of counts for flows more than 2,700 vehicles/hour	> 85% of cases
2	GEH < 5 for individual flows	> 85% of cases

2.3 Journey Time Validation Acceptability Criteria

The TAG requirement for journey time validation is that modelled times should be within 15% (or 1 minute if this is higher) of the observed time for more than 85% of routes.

2.4 Network Convergence Criteria and Standards

The TAG criteria for an acceptable level of network convergence are that:

- The Delta and %GAP statistics should be less than 0.1% on the final assignment iteration; and
- More than 98% of links should have a flow that changes by less than 1% on the final 4 iterations.

Details of the network convergence are presented in Chapter 8.

2.5 Summary of Approach to Calibration and Validation

A structured and iterative approach was adopted for the calibration and validation of the Bolton cordon model, with the objective of achieving an appropriate representation of observed traffic conditions whilst maintaining consistency with the underlying GSM 2025 model framework.

The calibration and validation process comprised the following key stages:

- An initial assignment validation exercise was undertaken using the cordoned highway network and the prior demand matrices extracted from the 2025 Greater Manchester Strategic Model (GSM). This provided a baseline assessment of model performance against observed traffic counts and journey time data.
- The highway network coding within the study area was subsequently reviewed to identify any deficiencies that may have contributed to discrepancies between observed and modelled conditions. Where appropriate, corrections and refinements were implemented to improve the representation of network operation prior to undertaking any matrix adjustments.
- Following completion of the network review, matrix estimation was undertaken using the available traffic count data. The process was applied in a controlled and proportionate manner to improve the alignment between modelled and observed traffic flows while maintaining realistic travel demand patterns and route choice behaviour.
- Upon completion of the matrix estimation process, the updated demand matrices were reassigned to the enhanced highway network, and a further round of calibration and validation was undertaken. Model performance was then reassessed against observed traffic flows,

screenline and cordon counts, and journey time data to determine whether the required validation standards had been achieved.

This iterative methodology ensured that network coding issues were addressed prior to demand matrix adjustment wherever possible, thereby reducing the risk of compensating for network deficiencies through artificial changes to travel demand. The resulting model was subsequently assessed against the relevant TAG validation criteria to confirm its suitability for future-year forecasting and Local Plan assessment purposes.

3. Model Description

3.1 Introduction

This section provides an overview of the key characteristics and components of the Bolton Local Plan Transport Model (BLPTM) model. The model has been developed from the 2025 Greater Manchester Strategic Model (GMSM) and has subsequently been refined and enhanced to provide a fit-for-purpose tool for the assessment of Local Plan growth scenarios and associated transport impacts within the Bolton study area.

The following subsections describe the principal elements of the model framework, including:

- The geographical extent of the modelled area;
- The zoning system adopted within the model;
- The structure and representation of the highway network;
- The coding and application of centroid connectors;
- The modelled time periods;
- The user class structure;
- The highway assignment methodology; and
- The generalised cost formulations and assignment parameters applied within the model.

Together, these elements define the operational characteristics of the model and provide the basis for the calibration, validation and forecasting procedures described in the subsequent sections of this report.

3.2 Geographical Coverage

The BLPTM was developed from the 2025 GMSM SATURN model through the implementation of a cordon surrounding the Bolton study area. This approach was adopted to create a proportionate modelling framework focused on the requirements of Local Plan assessment whilst retaining sufficient network coverage to represent wider strategic travel movements and interactions with neighbouring authorities.

The BLPTM comprises two principal components:

- The highway network, which represents the road infrastructure, junction layouts and operational characteristics utilised by private vehicles, freight traffic and bus services; and
- The demand matrices, which represent travel demand in the form of vehicle trip movements between model zones and define the distribution of traffic flows across the network.

Geographically, the BLPTM is centred on the Bolton study area, whilst retaining the surrounding highway network necessary to represent strategic travel patterns, cross-boundary movements and key external gateways. The model extent has been defined to ensure that movements entering, leaving and passing through the borough are appropriately captured, thereby maintaining realistic routing behaviour and network interactions.

The adopted cordon extent provides full coverage of the Local Plan area and all strategic development allocations under consideration. In addition, the surrounding network retained within the model allows the wider impacts of development-induced travel demand to be represented, ensuring that both local and strategic transport effects can be robustly assessed. This approach provides an appropriate

balance between model detail, computational efficiency and the need to accurately represent travel patterns affecting the Bolton highway network.

3.3 Zoning System

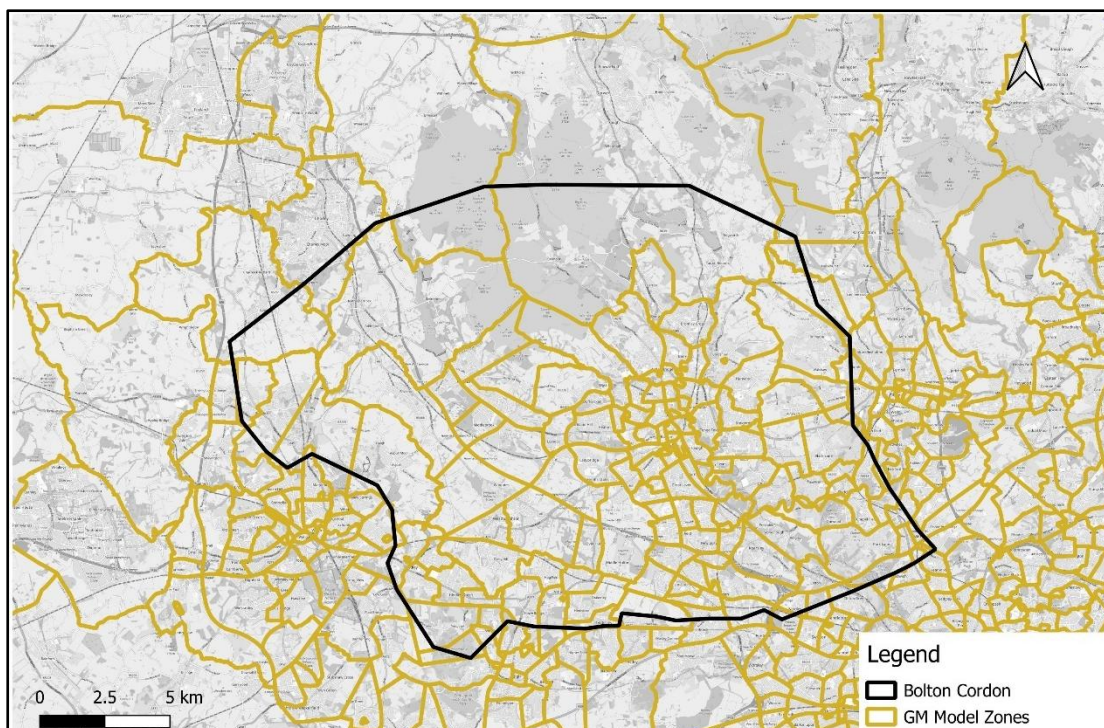
The BLPTM adopts the same zoning system as the GSM 2025 model, thereby maintaining consistency with the wider Greater Manchester modelling framework and ensuring compatibility with the inherited demand matrices and forecasting processes.

A total of 185 zones are located within the Bolton study area. The zoning structure provides an appropriate level of spatial detail to represent travel demand patterns across the borough and to assess the transport impacts associated with Local Plan development allocations. The model comprises both internal zones within the study area and external zones that enable the representation of longer-distance and cross-boundary travel movements.

The use of the established GSM zoning system allows the original origin-destination travel patterns and demand segmentation to be retained within the BLPTM, thereby ensuring consistency with the parent model and reducing the need for extensive restructuring of the demand data.

Figure 3-1 illustrates the GSM zoning system together with the BLPTM cordon boundary, highlighting the extent of the study area and the locations at which the model was extracted from the wider GSM framework.

Figure 3-1 Zoning System



3.4 Network Structure

The SATURN modelling software supports two levels of network representation:

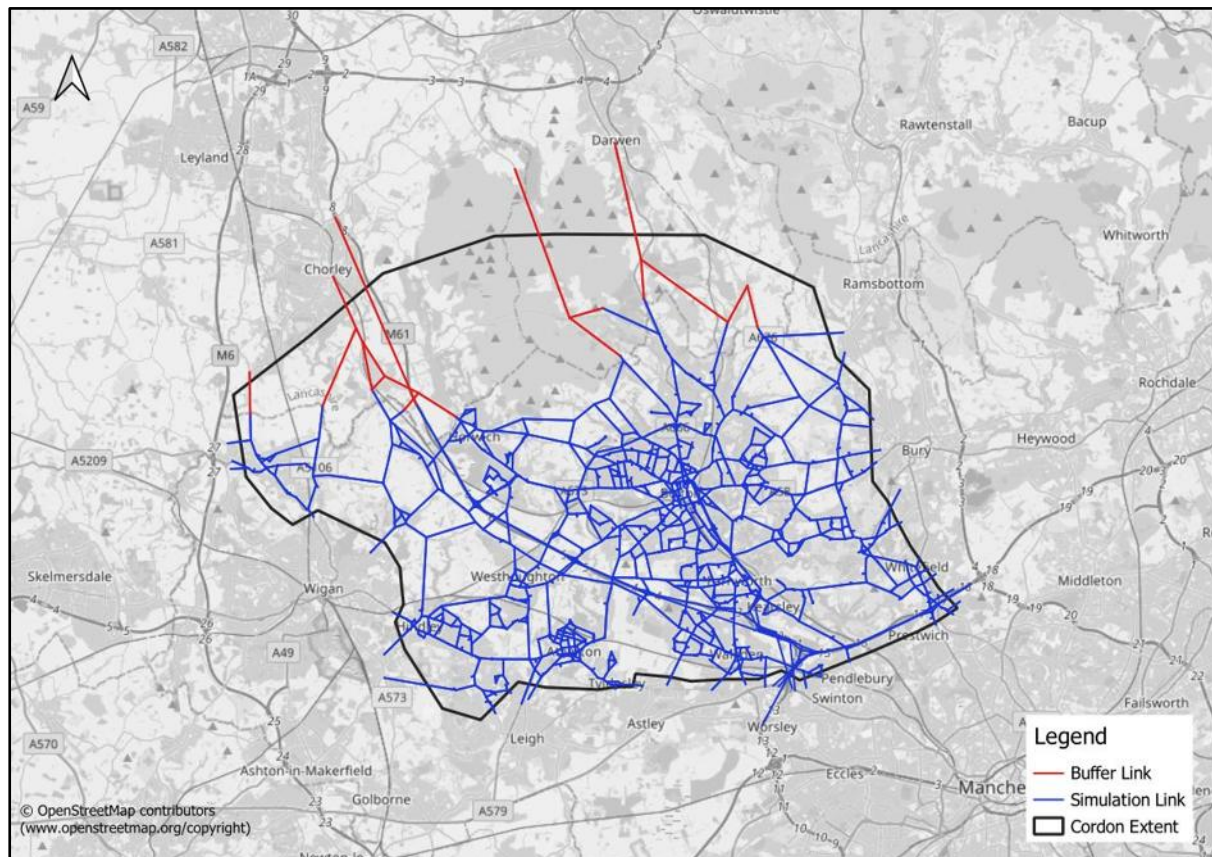
- Simulation network, in which roads and junctions are coded in detail to explicitly represent traffic operations and routing behaviour; and
- Buffer network, in which a simplified representation of the highway network is employed, requiring only link-based information to represent strategic movements without detailed junction modelling.

The BLPTM was developed through the extraction of a cordon from the GSM and has been designed to represent transport conditions within the Bolton study area and the surrounding strategic network. The highway network includes all roads of strategic and local traffic significance within the study area, including motorways, A roads and B roads, together with other key routes necessary to accurately represent travel demand and route choice behaviour.

The majority of the highway network within the study area is represented as a simulation network, providing a detailed representation of key corridors and junctions where network performance and traffic assignment are most sensitive. A limited proportion of the network is represented using buffer coding. The distribution of simulation and buffer network elements largely reflects the structure inherited from the GSM and has been retained within the BLPTM to maintain consistency with the parent model framework.

Figure 3-2 illustrates the extent of the simulation and buffer networks within the study area.

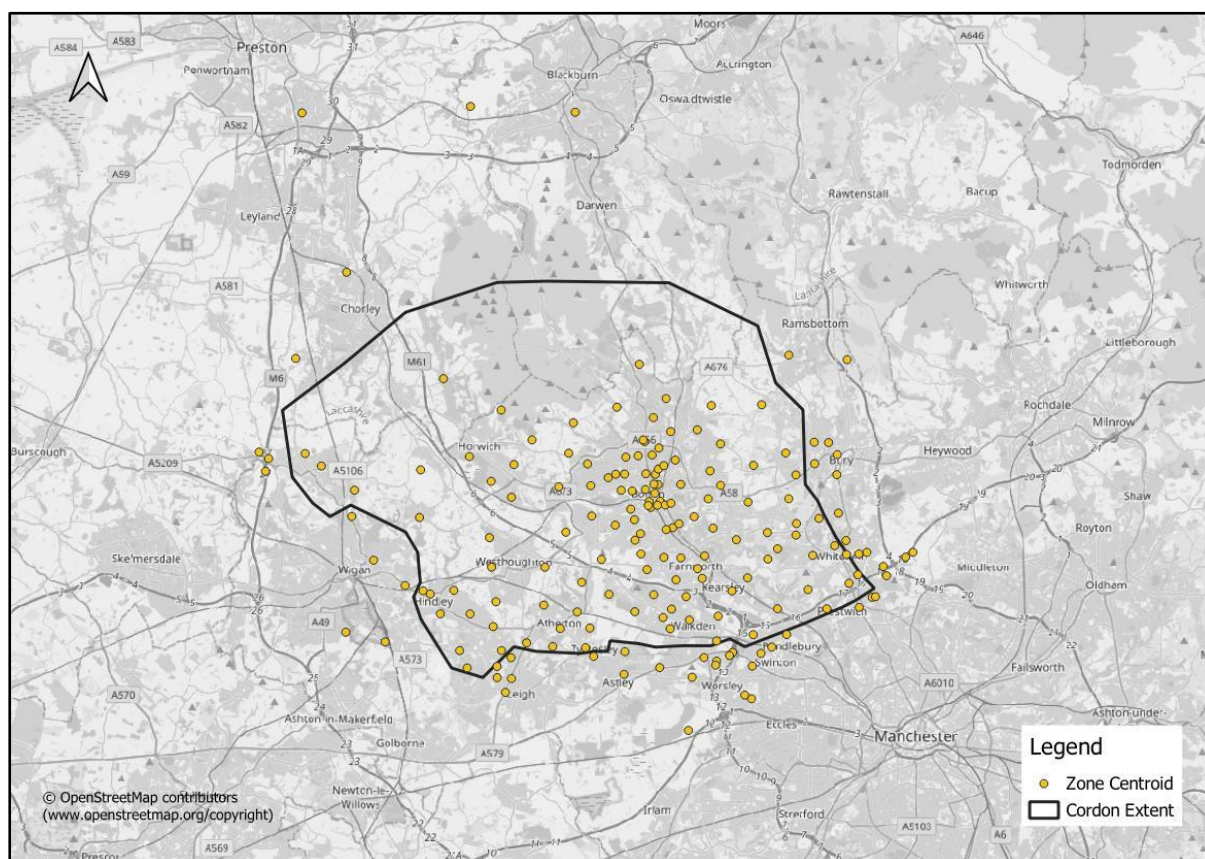
Figure 3-2 Bolton Network Cordon



3.5 Centroid Connectors

The centroid connectors within the BLPTM were retained from the GSM and provide the interface between model zones and the highway network. Their coding was reviewed as part of the network audit, with amendments made only where material issues affecting model performance were identified.

The location of the centroids is indicated on Figure 3-3.

Figure 3-3 Centroid Locations

3.6 Buses

Bus services are represented within the BLPTM as fixed link loads, with individual routes coded as predefined chains of nodes across both the simulation and buffer networks. This approach enables the impacts of bus movements on highway capacity and traffic assignment to be reflected within the model, whilst maintaining consistency with the GSM framework.

3.7 Modelled Time Periods

The BLPTM AM/PM average weekday model adopts the same modelled time periods as the GSM, maintaining consistency with the parent model framework and ensuring compatibility with the inherited demand matrices and forecasting methodology.

Separate highway assignment models were developed for the 2025 base year for the following periods:

- Average weekday AM peak hour: 08:00–09:00; and
- Average weekday PM peak hour: 17:00–18:00.

These peak-hour periods represent the highest levels of travel demand on the highway network and are consistent with the traffic count and journey time datasets available for calibration and validation. The use of the GSM peak periods ensures that the BLPTM remains aligned with the wider Greater Manchester modelling framework while providing an appropriate basis for the assessment of existing network conditions and future Local Plan development scenarios.

It should also be noted that an inter-peak model period was not developed as part of the BLPTM. This approach was adopted in recognition of the project programme constraints and the intended application of the model for Local Plan network stress test assessment. Given that the most significant transport

impacts associated with the proposed development allocations are expected to occur during the principal commuting periods, modelling efforts were focused on the AM and PM peak hours. These periods are considered to represent the most critical conditions on the highway network and therefore provide an appropriate basis for assessing the transport implications of future growth within the study area.

3.8 User Classes

The BLPTM adopts the same demand segmentation structure as the GSM, with assignment matrices expressed in Passenger Car Units (PCUs) and disaggregated into five user classes. This approach allows differences in travel purpose and vehicle type to be represented within the assignment process, thereby supporting a realistic representation of route choice and network performance.

The five user classes modelled are:

- Commuting car trips;
- Employers' business car trips;
- Other car trips;
- All-purpose Light Goods Vehicle (LGV) trips; and
- All-purpose Other Goods Vehicle (OGV) trips.

The use of these user classes ensures consistency with the GSM demand structure and enables the varying travel characteristics of different trip purposes and vehicle types to be reflected within the highway assignment process.

3.9 Assignment Methodology

The trip matrices are assigned to the highway network using SATURN's multi-user class equilibrium assignment procedure. Under this methodology, demand is distributed across the network such that, for each origin-destination (OD) pair and user class, all utilised routes have an equal minimum generalised cost, whilst any unused routes have an equal or greater generalised cost. This approach is consistent with the principles of user equilibrium, whereby no traveller can reduce their travel cost by unilaterally selecting an alternative route.

The assignment process is based on the calculation of generalised cost, which combines journey time and distance into a single measure of travel impedance. Generalised cost is calculated as follows:

$$Cost = (PPM \times Time) + (PPK \times Distance)$$

Where:

- PPM = value of time (pence per minute);
- Time = journey time (minutes);
- PPK = distance cost parameter (pence per kilometre); and
- Distance = journey length (kilometres).

The values applied within the assignment process are inherited from the GSM and reflect the relative importance of travel time and distance in route choice decisions. Through the iterative assignment process, network congestion and resulting travel costs are accounted for, enabling a realistic representation of route choice behaviour and traffic distribution across the highway network.

3.10 Generalised Cost Parameters

The generalised cost parameters applied within the assignment process were derived using the DfT's spreadsheet tool for the calculation of values of time and vehicle operating costs for transport modelling and appraisal purposes.

User-defined inputs to the spreadsheet comprise:

- The average network speed, which is used in the calculation of vehicle operating costs; and
- The model year and associated price base.

All other inputs, including values of time, fuel consumption parameters, fuel prices, and forecast fuel cost growth factors, were adopted directly from the TAG Databook (May 2026, Version 2.03). For commuting and other car user classes, only the fuel-related components of vehicle operating costs were incorporated within the distance-based cost calculation.

The resulting assignment parameters comprise:

- PPM (pence per minute), representing the value of travel time; and
- PPK (pence per kilometre), representing the distance-based operating cost component.

The values applied within the BLPTM correspond to the 2025 base year and are consistent with the assumptions and economic parameters contained within the TAG Databook. All values are expressed in 2023 prices.

The generalised cost parameters used within the highway assignment process are summarised in Table 3-1. (All items are expressed in 2023 prices).

Table 3-1 2025 Generalised Cost Parameters (2023 Prices)

Period	User Class	PPM	PPK
AM Peak Hour	Commuting Car	27.61	9.29
	Employers' Business Car	43.09	19.25
	Other Car	20.34	9.29
	LGV	41.17	19.58
	OGV	145.08	51.04
Inter-Peak Hour	Commuting Car	28.11	9.29
	Employers' Business Car	43.49	19.25
	Other Car	20.77	9.29
	LGV	41.17	19.58
	OGV	145.08	51.04
PM Peak Hour	Commuting Car	28.01	9.29
	Employers' Business Car	41.63	19.25
	Other Car	21.15	9.29
	LGV	41.17	19.58

Period	User Class	PPM	PPK
	OGV	145.08	51.04

3.11 Software Version Number

The model was developed using SATURN Version 11.6.03E X9 MC.

4. Calibration and Validation Data

4.1 Introduction

This section describes the datasets used in the calibration and validation of the BLPTM. These datasets were used to inform the matrix estimation process and to assess the model's ability to represent observed traffic conditions across the study area.

The calibration and validation datasets comprised:

- Traffic count data, used both within the matrix estimation process and for the validation of assigned traffic flows against observed network conditions; and
- Journey time data, used to assess the model's representation of route travel times and overall network performance.

The datasets were obtained from a range of sources, including TfGM traffic count databases, National Highways traffic monitoring data, and additional information collated as part of Phase 1 of the study. Together, these data provide the evidence base against which the BLPTM was calibrated and validated, enabling model performance to be assessed in accordance with the requirements of TAG Unit M3.1.

4.2 Traffic Count Data

Traffic count data used for the calibration and validation of the BLPTM were obtained from a range of sources, including TfGM C2 Automatic Traffic Count (ATC) sites, Classified Turning Counts (CTCs), National Highways WebTRIS sites and National Data Collection (NDC) sites commissioned by Wigan Metropolitan Borough Council. In addition, a limited number of counts were extracted from the GSM calibration dataset where suitable observed traffic count data were unavailable within the study area.

The count dataset was reviewed to ensure that the most appropriate and representative data were used for model calibration and validation purposes. Where the most recent available counts had been collected outside the model base period, appropriate growth factors were applied to adjust the observed traffic volumes to represent October 2025 conditions. This provided a consistent and robust dataset for comparison with modelled traffic flows during the calibration and validation process.

In total, approximately 274 traffic count locations were used within the model calibration and validation exercise. The dataset provided coverage of key routes, junctions, screenlines and gateway locations across the study area, thereby supporting a comprehensive assessment of model performance.

Classified traffic count data were available for the following vehicle classes, expressed in Passenger Car Units (PCUs):

- Cars;
- Light Goods Vehicles (LGVs); and
- Heavy Goods Vehicles (HGVs).

Observed traffic flows were obtained for the modelled peak-hour periods:

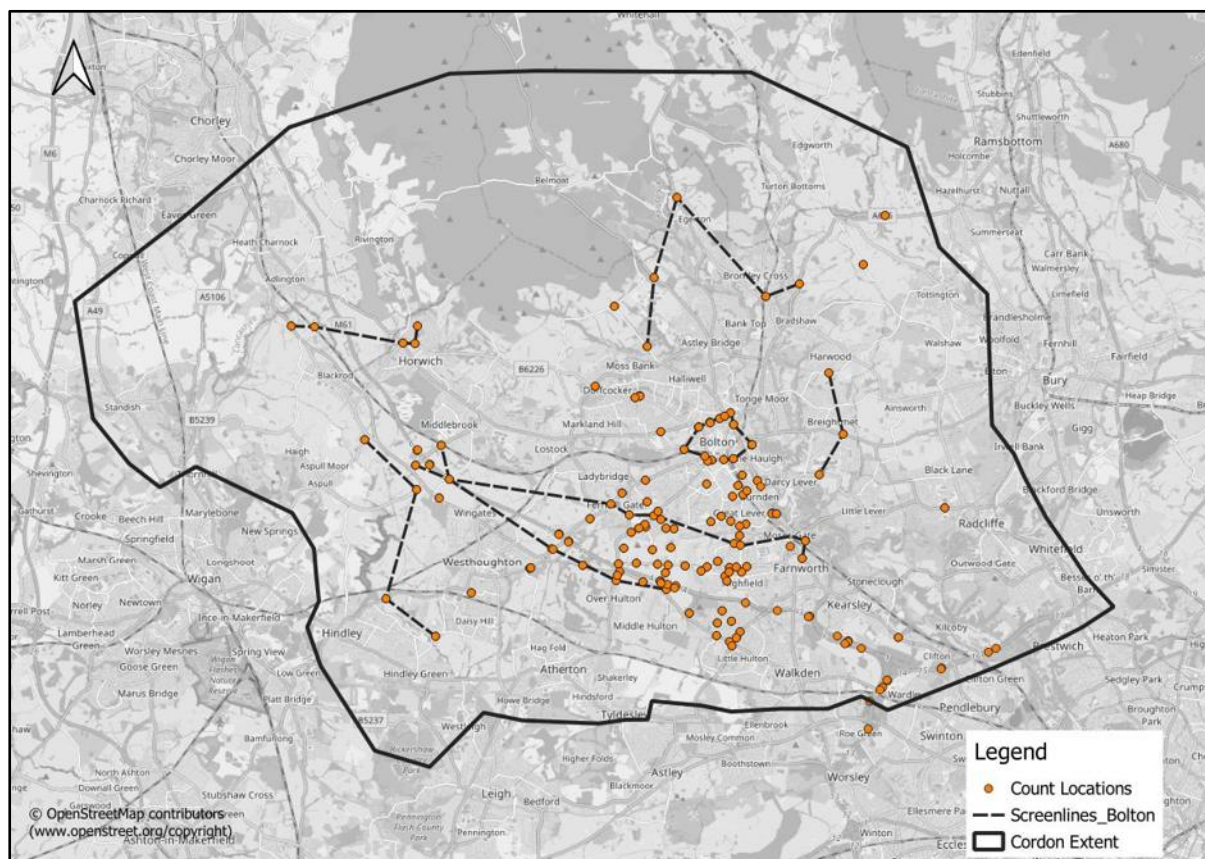
- AM Peak Hour: 08:00–09:00; and
- PM Peak Hour: 17:00–18:00.

The locations of the traffic count sites, together with the validation screenlines and cordons adopted within the study area, are shown in Figure 4-1.

It should be noted that, due to gaps in the available traffic count data and the inability to undertake additional surveys within the study programme, not all validation screenlines could be defined as fully watertight. Consequently, the adopted screenlines are intended to provide a broad indication of the

model's ability to represent traffic movements across key corridors and areas of the borough, rather than a complete accounting of all movements crossing each screenline. The screenline validation has therefore been used primarily as a diagnostic tool to identify any fundamental discrepancies in the distribution of traffic demand and assignment patterns across the study area.

Figure 4-1 Counts in Bolton area



4.3 Journey Time Data

Observed journey time data were derived from Teletrac Navman GPS data using a network-based processing methodology. Individual GPS traces were map-matched to the OpenStreetMap (OSM) highway network and stored within a local database, enabling journey times to be extracted for predefined routes without the need for repeated processing of the raw GPS records.

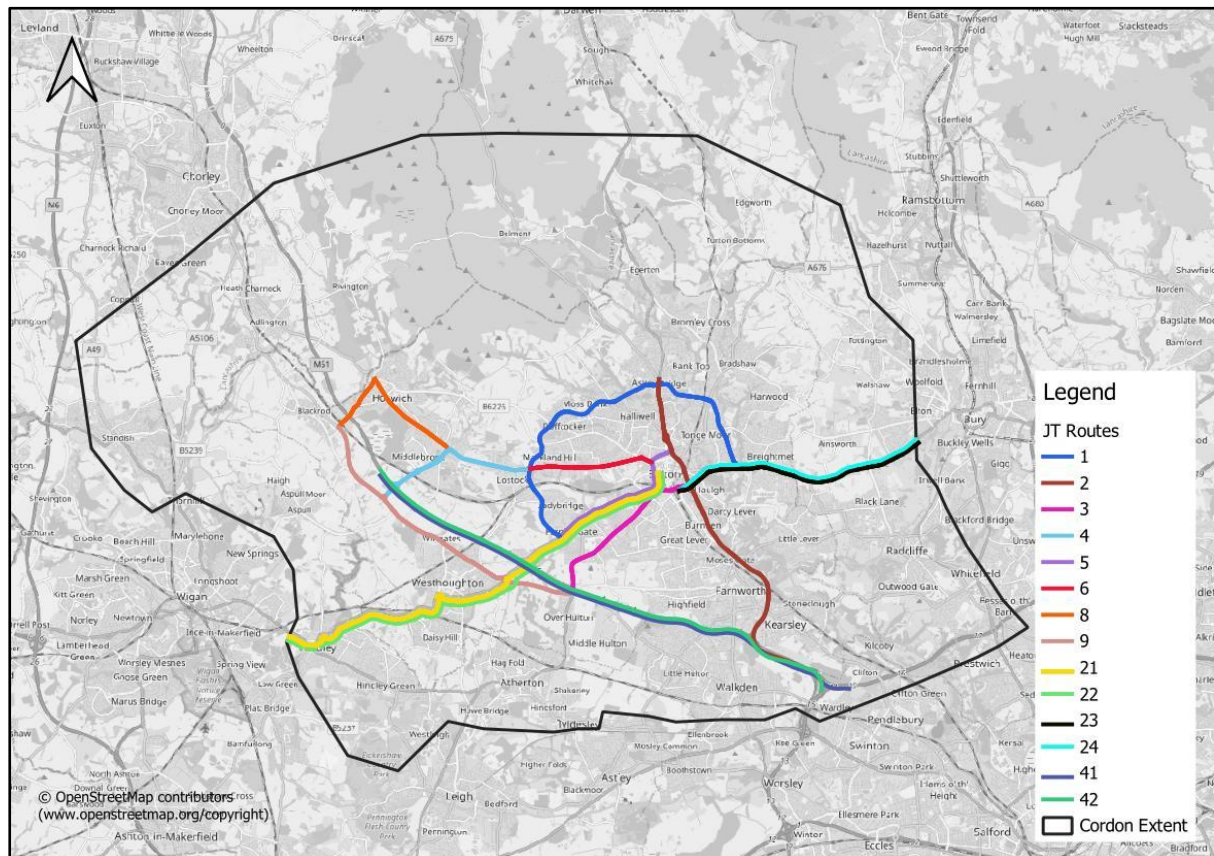
The dataset was processed to exclude observations collected during school holiday periods and national holidays, thereby ensuring that the resulting journey times were representative of typical weekday travel conditions. Average journey times were then calculated using observations from non-stopping vehicles only, with journeys undertaken by buses, taxis and other vehicles making frequent operational stops excluded from the analysis.

For the purposes of model validation, observed journey times were extracted for the modelled peak periods and compared directly against modelled journey times derived from the BLPTM. The validation was undertaken for the following periods:

- AM Peak Hour: 08:00–09:00; and
- PM Peak Hour: 17:00–18:00.

The use of GPS-derived journey time data provides a robust measure of observed network performance and supports the assessment of the model's ability to replicate route travel times and congestion levels across key corridors within the study area. The identified journey time routes are shown in Figure 4-2.

Figure 4-2 BLPTM Journey Time Routes



5. Trip Matrix Development

5.1 Introduction

The prior travel demand matrices for the BLPTM were derived from the 2025 GSM through the extraction of a cordoned model covering the Bolton study area, as described in Chapter 1 and illustrated in Figure 1-1. This approach retained the underlying demand structure, trip distribution patterns and user class segmentation developed for the parent model, whilst providing a proportionate modelling framework focused on the Local Plan study area.

As part of the cordoning process, all demand associated with the retained model area was extracted from the GSM (prior matrices) to create a set of prior matrices for use within the BLPTM. These matrices constituted the starting point for the calibration process and were subsequently refined through network review and matrix estimation to improve agreement with observed traffic conditions across the study area.

Table 5.1 presents the total prior matrix demand by user class for the BLPTM before the application of any matrix estimation or calibration adjustments

Table 5.1 Initial Prior Matrix totals - 2025

User class	AM Matrix	PM Matrix
UC 1 - Commuting car trips	20,993	28,124
UC 2 - Employers' business car trips	3,164	2,744
UC 3 - Other car trip	58,586	56,444
UC 4 - All-purpose LGV trips	13,186	9,985
UC 5 - All-purpose OGV trips	6,023	2,695
Total	101,952	99,992

5.2 Initial Prior Matrix Performance

The performance of the prior demand matrices extracted from the GSM was assessed against observed traffic counts, validation screenlines, cordons and journey time routes prior to the application of any matrix estimation.

The validation results indicated that the initial model performance was below the TAG acceptance criteria across a number of measures. At the individual link level, approximately 39% of validation sites met the TAG flow criteria in the AM peak hour, reducing to 34% in the PM peak hour. At the screenline and cordon level, compliance with the TAG criteria was achieved at 40% of locations in the AM peak and 26% in the PM peak. Journey time validation also demonstrated scope for improvement, with 36% of routes meeting the TAG criteria during the AM peak and 59% during the PM peak.

Overall, the results indicated that the prior matrices did not provide a sufficiently robust representation of observed traffic conditions within the study area and therefore required further refinement through matrix estimation. Given that the BLPTM was developed through the extraction of a cordoned sub-area model from the wider GSM, it was considered likely that some of the discrepancies observed in the validation results were associated with the representation of longer-distance movements interacting with the cordon boundary, particularly external-to-external trips passing through the study area.

Consequently, the subsequent matrix estimation process was undertaken with particular emphasis on improving the representation of strategic movements whilst maintaining realistic trip patterns and consistency with the underlying GSM demand structure.

5.3 Final Prior Matrices Development

As the BLPTM was developed through the extraction of a cordoned sub-area model from the wider GSM, the cordon boundary intersects a number of key strategic routes serving the study area. A review of the initial prior matrices identified that traffic volumes associated with several external gateways were not well aligned with observed counts, with some locations exhibiting materially higher or lower flows than those observed.

To improve the representation of strategic demand entering, leaving and passing through the study area, targeted adjustments were made to the prior matrices prior to the application of matrix estimation. These adjustments focused on movements associated with the external gateways located along the model cordon boundary. As these gateways represent cut links within the strategic highway network rather than discrete geographic zones, the observed discrepancies could not be robustly attributed to specific origin-destination pairs. Consequently, direct origin-destination matrix adjustments were not considered appropriate.

To inform the adjustment process, the prior demand matrices from the full GSM were reviewed alongside the assigned flows within the parent model. This review indicated that, at a number of external gateways, the prior matrices contained significantly higher levels of demand than those ultimately represented in the calibrated GSM assignment. This suggested that a proportion of the demand adjustments required to achieve acceptable model performance within the full GSM had been absorbed through the model calibration process and were therefore not fully reflected within the extracted BLPTM prior matrices.

In light of these findings, a trip-end adjustment approach was adopted whereby the total volume of demand associated with individual external gateways was adjusted to achieve closer agreement with observed traffic flows. The objective was to align the BLPTM prior matrices more closely with both observed traffic conditions and the demand patterns implicit within the calibrated GSM. This was considered a proportionate and robust approach given the strategic nature of the cordon crossings and the absence of sufficient evidence to support targeted origin-destination adjustments.

The implementation of these gateway adjustments resulted in an improved representation of observed traffic conditions within the prior matrices and provided a more robust starting point for the subsequent matrix estimation process. Importantly, by addressing significant discrepancies in strategic gateway flows at an early stage, the risk of matrix estimation applying excessive adjustments beyond its intended purpose was reduced. This ensured that the matrix estimation process could be focused on refining travel demand patterns whilst remaining within appropriate constraints and maintaining consistency with the underlying GSM demand structure.

Table 5.2 presents the total demand contained within the final prior matrices by user class following completion of the gateway adjustment process.

Table 5.2 Final Prior Matrix totals

User class	AM Matrix	PM Matrix
UC 1 - Commuting car trips	18,911	25,396
UC 2 - Employers' business car trips	2,815	2,452
UC 3 - Other car trip	52,913	51,053
UC 4 - All-purpose LGV trips	13,186	9,985

User class	AM Matrix	PM Matrix
UC 5 - All-purpose OGV trips	6,023	2,695
Total	93,847	91,582

6. Network Calibration and Validation

6.1 Introduction

This chapter describes the network calibration and validation process undertaken for the BLPTM. The purpose of the network calibration exercise was to ensure that the highway network provides an appropriate representation of existing conditions and that any material coding issues affecting route choice, traffic assignment or journey times were identified and addressed prior to undertaking matrix estimation.

TAG recognises that the extent of model calibration and validation should be proportionate to the intended application of the model. Consistent with this principle, the BLPTM has been calibrated and validated to a level considered appropriate for its primary purpose of supporting Local Plan forecasting and strategic transport assessment. Emphasis was placed on achieving a credible representation of observed traffic conditions and network performance on key routes, strategic corridors and areas influenced by proposed development allocations, rather than pursuing further model refinement solely to improve individual calibration and validation statistics.

Given the available data constraints, the programme requirements and the intended use of the model, a proportionate approach to network calibration was adopted. Calibration efforts were therefore focused on identifying and addressing material network coding issues affecting traffic flows, route choice behaviour and journey times. Professional judgement was applied throughout the process to ensure that the resulting model provides a robust and realistic representation of observed conditions and is fit for purpose for forecasting and Local Plan assessment.

The network calibration process included a review of key network attributes, routing characteristics and operational parameters to ensure consistency with observed conditions and to support realistic assignment outcomes. Where issues were identified, proportionate amendments were implemented, whilst retaining alignment with the underlying GSM framework.

This chapter presents:

- The methodology used to derive and review network cruise speeds; and
- The network coding review and associated quality assurance checks undertaken as part of the model enhancement process.

The outcomes of these activities informed the subsequent matrix estimation exercise and contributed to the overall calibration and validation of the BLPTM.

6.2 Link Cruise Speeds

Within SATURN, link cruise speeds are derived from the posted speed limits and adjusted to reflect the influence of local operating conditions on vehicle speeds. In urban areas, these adjustments account for the additional delays and friction effects experienced by drivers that are not explicitly represented within the network coding.

During the original model development, a series of test assignments was undertaken to derive appropriate adjustment factors for both the AM and PM peak periods. These factors were developed to improve the representation of observed journey times by accounting for the cumulative impact of localised delays associated with urban driving conditions, including bus stopping activity, pedestrian interactions, parking and loading activity, side-road turning movements, and other forms of network friction that can influence vehicle speeds, particularly during peak periods.

It should also be noted that the vast majority of links within the inherited GSM network do not utilise speed-flow relationships. Consequently, link speeds are not automatically adjusted in response to changes in traffic demand and congestion levels in the manner typically associated with speed-flow curve-based assignment models. As a result, the adopted cruise speed assumptions play an

important role in representing prevailing traffic conditions and ensuring that modelled journey times are broadly consistent with observed conditions.

As part of the BLPTM enhancement process, the inherited cruise speed assumptions were reviewed to determine whether improvements to journey time performance could be achieved through further refinement. A series of sensitivity tests and trial assignments was undertaken to examine the effect of varying the cruise speed adjustment factors on modelled journey times and overall network performance.

6.3 Network Checks

A series of network coding and quality assurance checks was undertaken following extraction of the BLPTM from the GSM and the assignment of the preliminary demand matrices. The objective was to identify any coding issues that could adversely affect traffic assignment, route choice or journey time performance within the study area.

The network review focused on locations where modelled conditions differed materially from observed conditions. This included investigating links and junctions where observed flows exceeded coded capacities, where excessive modelled delays were present, or where routing patterns appeared unrealistic. Particular attention was given to key corridors, strategic routes and journey time validation routes within the study area.

The coding of the journey time routes was reviewed to ensure that the network appropriately represented observed travel times and delays. Where material coding issues were identified, proportionate amendments were implemented to improve the representation of prevailing traffic conditions.

In addition, a range of standard network consistency checks was undertaken, including verification of link connectivity, link lengths, capacities and coding consistency across both directions of travel and modelled time periods.

All traffic signal control data were inherited from the GSM. Given the proportionate nature of the model enhancement exercise and the availability of signal data, no comprehensive review of signal timings was undertaken. Instead, efforts were focused on addressing material coding issues and improving the overall representation of observed traffic flows and journey times.

7. Trip Matrix Calibration and Validation

7.1 Introduction

This chapter describes the trip matrix calibration and validation process undertaken for the BLPTM. Following completion of the network review and the development of the final prior matrices, matrix estimation was undertaken to improve the representation of observed traffic conditions across the study area whilst maintaining realistic travel demand patterns and consistency with the underlying GSM demand structure.

The matrix estimation process was applied in a controlled and proportionate manner, with adjustments guided by observed traffic count data and informed by professional judgement. Particular emphasis was placed on improving the representation of strategic movements and key corridors within the study area whilst avoiding excessive changes to underlying travel demand patterns.

The results of the matrix estimation process are presented in the remainder of this chapter. The chapter is structured as follows:

- The first section describes the traffic count data used within the matrix estimation process; and
- The second section presents the matrix estimation results, including comparisons of matrix totals, trip-end totals and trip length distributions between the prior and updated matrices.

The calibration outcomes are subsequently assessed to determine the extent to which the updated matrices provide an improved representation of observed traffic

7.2 Traffic Count Data

The traffic count data used for matrix estimation are described in Chapter 4. These data formed the primary inputs to the calibration process and were used to refine the prior demand matrices and improve agreement between modelled and observed traffic flows.

The locations of the calibration and validation count sites, together with the adopted screenlines and cordons, are shown in Figure 4-1.

7.2.1 Count Checks

Successful application of matrix estimation requires traffic count data that are both accurate and internally consistent. Accordingly, the count dataset was reviewed throughout the calibration process to identify and resolve any anomalies that could adversely affect the matrix estimation results.

Potential inconsistencies may arise from a range of sources, including:

- Day-to-day variations in traffic flows;
- Enumeration errors;
- Count transcription errors, such as counts being assigned to incorrect links or directions of travel; and
- Contradictory observations between adjacent count locations, where traffic flow patterns are inconsistent with expected routing behaviour and network continuity.

The count data were reviewed through a combination of visual inspection and automated consistency checks within SATURN. This included the identification of counts that violated Kirchhoff's Law, whereby the total flow entering a junction should equal the total flow leaving it, subject to the available count coverage. Similar checks were undertaken where count locations were expected to exhibit consistent flow relationships based on the modelled routing patterns.

Where inconsistencies were attributed to transcription or coding errors, the counts were corrected and retained within the dataset. Where discrepancies could not be satisfactorily explained, or where there was reason to believe that counts had been influenced by survey errors or atypical operating conditions, the affected counts were excluded from the matrix estimation process. This ensured that the calibration was informed by a robust and reliable set of observed traffic counts.

7.3 Matrix Estimation Process

The traffic count data described in Chapter 4.2 were used within the matrix estimation process. Separate matrix estimation runs were undertaken for the AM and PM peak-hour models, with independent estimation applied to the car, LGV and HGV demand matrices for each modelled period.

The matrix estimation process was undertaken iteratively, with the objective of improving agreement between modelled and observed traffic flows whilst maintaining realistic travel demand patterns and consistency with the prior matrices. In line with the proportionate calibration approach adopted for the BLPTM, matrix estimation was applied in a controlled manner to refine travel demand where required without introducing excessive changes to the underlying demand structure.

A total of twenty-six (26) matrix estimation runs were undertaken for each modelled period. The matrix estimation procedure was configured with an internal loop of six iterations per run. This approach was considered sufficient to achieve a stable solution whilst ensuring that adjustments to the demand matrices reduced progressively between successive iterations. The matrix estimation process comprised the following stages:

- Assignment of the prior demand matrices to the highway network to establish initial route choice patterns;
- Application of matrix estimation using the observed traffic count data to produce revised demand matrices;
- Reassignment of the revised demand matrices to generate updated route choice patterns;
- Reapplication of matrix estimation using the revised assignment results as inputs; and
- Repetition of the process until matrix stability was achieved.

The matrix estimation process was monitored throughout the calibration exercise, with successive runs undertaken until an acceptable balance was achieved between improvements in validation performance and the preservation of realistic travel demand patterns. The final matrices were adopted when further iterations resulted in only marginal improvements to model performance and the matrix changes had stabilised at an acceptable level.

7.4 Matrix Estimation Results

This section summarises the changes resulting from the matrix estimation process and assesses the extent to which the calibrated matrices differ from the final prior matrices.

The review focuses on three key aspects of matrix change:

- Changes to overall matrix totals;
- Changes to zonal trip-end totals; and
- Changes to trip length distributions.

Together, these measures provide an indication of the scale and nature of the adjustments made through matrix estimation and allow the resulting demand patterns to be assessed against the prior matrices. This helps to confirm that the calibration process has improved agreement with observed traffic conditions whilst maintaining realistic travel demand patterns and consistency with the intended application of the BLPTM.

7.4.1 Changes to Matrix Totals

Table 7-1 presents the estimated matrix totals and the percentage change relative to the final prior matrices by user class and modelled period.

Table 7-1 Comparison of prior and post matrices totals by user class

User Class	AM Peak		PM Peak	
	Trips	% Change	Trips	% Change
Commuting Car	18,689	-1.17%	25,290	-0.42%
EB Car	2,780	-1.25%	2,458	0.24%
Other Car	52,310	-1.14%	50,888	-0.32%
All Car	73,779	-1.15%	78,636	-0.34%
LGV	11,892	-9.81%	10,277	2.92%
HGV	10,690	77.49%	6,085	125.77%
Total (PCUS)	96,360	2.68%	94,997	3.73%

The matrix estimation process resulted in relatively modest changes to overall demand levels for most user classes. Total car demand decreased slightly in both peak periods, with reductions of approximately 1.1% in the AM peak hour and 0.4% in the PM peak hour. Similar changes were observed across the commuting and other car user classes, whilst Employers' Business (EB) trips decreased by 1.2% in the AM peak hour and increased marginally by 0.2% in the PM peak hour.

More noticeable adjustments were observed within the goods vehicle matrices. LGV demand decreased by approximately 9.8% in the AM peak hour but increased by 2.9% in the PM peak hour. The largest changes were recorded within the HGV matrices, where demand increased by approximately 77.5% in the AM peak hour and 125.8% in the PM peak hour. Whilst these changes appear substantial in percentage terms, they relate to a comparatively small proportion of total matrix demand and largely reflect the refinement of strategic freight movements required to improve agreement with observed traffic flows at key locations across the network.

Overall, the impact of matrix estimation on total demand was relatively limited, with total assigned demand increasing by approximately 2.7% in the AM peak hour and 3.7% in the PM peak hour. This indicates that the calibration process primarily redistributed demand to achieve improved agreement with observed traffic conditions, rather than introducing significant changes to the overall scale of travel demand represented within the BLPTM.

7.4.2 Changes to Zonal Trip Ends

Table 7-2 presents the regression statistics obtained by comparing zonal trip-end totals from the estimated matrices against the final prior matrices. The statistics include the slope, intercept and coefficient of determination (R^2) for the best-fit regression line. Separate results are presented for the car, LGV and HGV matrices for each modelled time period.

TAG indicates that, as a guideline, the slope of the regression line should fall within the range of 0.99 to 1.01, the intercept should be close to zero, and the R^2 value should exceed 0.98. However, it is also recognised that achieving these benchmarks can be challenging for strategic models, particularly where matrix estimation adjustments are concentrated within a relatively small number of zones or movements. The resulting statistics are influenced by factors such as zone size, demand levels and the extent of matrix adjustments applied during calibration.

The regression results indicate that the car matrices exhibit the highest degree of consistency with the final prior matrices, with slopes generally close to unity and strong correlations between estimated and prior trip-end totals. The corresponding R^2 values, ranging from approximately 0.90 to 0.96, demonstrate that the spatial distribution of car demand has been largely preserved through the matrix estimation process.

The LGV matrices also show a good level of agreement with the prior matrices. Whilst the AM peak results exhibit slopes below unity, indicating a greater degree of adjustment than observed for the car matrices, the overall relationship between estimated and prior trip ends remains strong, suggesting that the underlying demand structure has been retained.

The HGV matrices display consistently high correlation coefficients, with R^2 values ranging between approximately 0.91 and 0.98. However, the corresponding slopes are notably greater than unity, reflecting the larger proportional adjustments made to freight demand during calibration. This is considered unsurprising given the comparatively low base level of HGV demand and the sensitivity of regression statistics to relatively small absolute changes in freight trip volumes.

Overall, the regression results demonstrate that the matrix estimation process has maintained a strong relationship between the estimated and final prior matrices, particularly for the car and LGV user classes. The results indicate that the calibration process has improved agreement with observed traffic conditions whilst broadly preserving the underlying demand patterns within the BLPTM.

Table 7-2 Summary of Matrix Estimation Zonal Changes

Time Period	Matrix	Cell Level			Trip Ends Origin			Trip Ends Destination		
		Slope	Intercept	R-Squared	Slope	Intercept	R-Squared	Slope	Intercept	R-Squared
Weekday AM Peak	Car	0.94	0.10	0.93	0.95	14.34	0.96	0.95	15.06	0.94
	LGV	0.85	0.03	0.96	0.66	18.03	0.92	0.72	13.19	0.94
	HGV	2.23	-0.05	0.95	2.61	-14.02	0.96	2.65	-14.17	0.91
Weekday PM Peak	Car	0.88	0.24	0.90	0.95	21.65	0.96	0.97	10.00	0.96
	LGV	1.07	0.01	0.93	0.88	8.26	0.92	0.96	3.87	0.95
	HGV	2.54	-0.01	0.98	2.58	-2.38	0.98	2.89	-4.61	0.96

7.4.3 Changes to Trip Length Distributions

Table 7-3 and Table 7-4 compares the mean trip lengths of the final prior matrices and estimated matrices by vehicle type and modelled periods. Trip length distributions were reviewed to ensure that the matrix estimation process had not introduced unrealistic changes to travel patterns and that the overall structure of the demand matrices remained reasonable.

Table 7-3 Comparison of mean trips lengths and standard deviation between prior and post matrices for AM peak

Matrix	Prior		Post		% Change	
	Mean(km)	Std Dev	Mean	Standard Dev	Mean	Std Dev
Car	6.64	5.28	6.62	5.55	0%	5%

Matrix	Prior		Post		% Change	
	Mean(km)	Std Dev	Mean	Standard Dev	Mean	Std Dev
LGV	6.45	5.72	6.17	5.34	-4%	-7%
HGV	9.06	6.70	10.58	7.58	17%	13%

Table 7-4 Comparison of mean trips lengths and standard deviation between prior and post matrices for PM peak

Matrix	Prior		Post		% Change	
	Mean(km)	Std Dev	Mean	Standard Dev	Mean	Std Dev
Car	7.23	5.39	7.09	5.71	-2%	6%
LGV	6.51	5.80	6.45	5.17	-1%	-11%
HGV	9.95	6.71	10.44	6.07	5%	-10%

The results indicate that the car matrices remained largely unchanged following matrix estimation, with average trip lengths showing no change in the AM peak and a marginal reduction of approximately 2% in the PM peak. This suggests that the calibration process achieved improvements in traffic flow validation whilst maintaining the underlying distribution of car trips.

The LGV matrices show a modest reduction in average trip length, decreasing by approximately 4% reduction in the AM peak and 1% in the PM peak. These changes are considered relatively minor and indicate that the overall pattern of LGV travel was broadly retained.

The largest changes were observed within the HGV matrices, where average trip lengths increased by approximately 17% in the AM peak and 5% in the PM peak. These increases are consistent with the adjustments made to freight demand during the calibration process and reflect the sensitivity of the HGV matrices to relatively small changes in trip numbers and distribution patterns.

Overall, the trip length analysis indicates that matrix estimation did not fundamentally alter the structure of the demand matrices. Whilst some changes to freight travel patterns were observed, the average trip lengths remain broadly consistent with the final prior matrices, providing confidence that the calibration process improved model performance whilst maintaining realistic travel demand characteristics.

8. Network Convergence and Link Flow Validation

8.1 Introduction

This chapter presents the network convergence statistics and link flow validation results for the BLPTM. The validation has been undertaken using the traffic count dataset described in Chapter 4 and reflects the performance of the final calibrated matrices and highway network.

Network convergence statistics are reported for each modelled period and assessed against the guidance and criteria described in Chapter 2. These measures provide confidence that stable assignment solutions have been achieved and that the model results are suitable for validation and subsequent forecasting applications.

Link flow validation is presented at two levels:

- Comparison of modelled and observed flows across the adopted screenlines and cordons within the study area; and
- Comparison of modelled and observed flows at the individual count sites used within the calibration and validation process.

Validation results are presented for the screenlines and cordons adopted within the study area, together with summary statistics for the overall count dataset. These comparisons provide an indication of the model's ability to replicate both local traffic conditions and broader traffic movement patterns across the network.

The descriptions of the adopted screenlines and cordons are provided in Table 7-5 (and shown in Figure 4-1).

It should be noted that the screenlines and cordons were used primarily as validation and diagnostic tools and were not applied as constraints during the matrix estimation process. Due to limitations in the available count data, the majority of screenlines and cordons contain gaps and therefore do not represent fully watertight counting boundaries. Consequently, they are considered more appropriate for assessing the overall reasonableness of traffic patterns across key corridors and strategic movements within the study area, rather than as formal calibration constraints. The results presented at the screenline and cordon level should therefore be interpreted in this context.

Table 7-5 Matrix Estimation Cordons and Screenlines Description

Cordon / Screenline Number	Direction	Number of Sites
SL01	Inbound	12
SL01	Outbound	12
SL02	East - West	3
SL02	West -East	3
SL03	North - South	5
SL03	South - North	5
SL04	West - East	4

Cordon / Screenline Number	Direction	Number of Sites
SL04	East - West	4
SL05	West - East	4
SL05	East - West	4
SL06	West - East	5
SL06	East - West	5
SL06	South - North	3
SL06	North - South	3
SL07	North - South	5
SL07	South - North	5

8.2 Network Convergence

The assignment of the calibrated demand matrices to the highway network is undertaken through an iterative process in which travel demand is loaded onto the network, travel costs are recalculated, and route choice patterns are updated until a stable equilibrium solution is achieved. During this process, traffic flows, journey times and route choices are progressively refined through successive assignment iterations until changes between iterations become sufficiently small.

Achieving an acceptable level of convergence is important to ensure that the model produces stable and reliable results and that subsequent calibration and validation outputs are robust. Particular attention was therefore given to achieving a high level of assignment convergence for both modelled time periods.

In accordance with TAG guidance, network convergence was assessed using the following criteria:

- Delta and %GAP statistics should be less than 0.1% on the final assignment iteration; and
- More than 98% of links should exhibit flow changes of less than 1% over the final four assignment iterations.

Table 7-6 summarises the convergence statistics for each modelled period.

The results indicate that the BLPTM achieved a satisfactory level of convergence for both peak-hour models. In all cases, the reported Delta and %GAP values were considerably below the TAG threshold of 0.1%, while the proportion of links exhibiting less than a 1% flow change over the final four iterations exceeded the recommended criterion. The assignment results can therefore be considered stable and suitable for calibration, validation and forecasting applications.

Table 7-6 Network Convergence Statistics

Criterion	Target	Weekday	
		AM Peak	PM Peak
%GAP	< 0.1%	0.022	0.017

Criterion	Target	Weekday	
		AM Peak	PM Peak
% of links with < 1% flow change on final iteration	> 98%	98.2	98.1
Final iteration-1		98.4	98.7
Final iteration-2		98.1	98.0
Final iteration-3		98.5	98.4

8.3 Cordon and Screenline performance

The post-calibration performance of the BLPTM at the screenline and cordon level is summarised in Table 7-7. Separate results are presented for the AM and PM peak periods, with traffic flows reported as total PCUs across all vehicle classes.

For each screenline and cordon, the table presents the number of count locations, the total observed flow, the total modelled flow, the absolute difference between modelled and observed flows, and the corresponding percentage difference.

Table 7-7 Modelled and Observed Cordon and Screenline Crossing Flows (PCUs)

Cordon/ Screenline	Direction	Observed	Modelled Flow	Diff	% Diff
AM Peak Hour					
SL01	Inbound	7,775	7,078	697	-9%
SL01	Outbound	6,165	5,846	319	-5%
SL02	East - West	448	454	6	1%
SL02	West -East	422	299	123	-29%
SL03	North - South	1,390	1,352	38	-3%
SL03	South - North	1,343	1,341	2	0%
SL04	West - East	2,079	2,079	0	0%
SL04	East - West	1,575	1,599	24	2%
SL05	West - East	4,665	4,821	156	3%
SL05	East - West	3,832	4,151	319	8%
SL06	West -East	3,382	3,381	1	0%
SL06	East - West	2,413	2,620	207	9%
SL06	South - North	3,250	3,298	48	1%

Cordon/ Screenline	Direction	Observed	Modelled Flow	Diff	% Diff
SL06	North - South	3,297	3,220	77	-2%
SL07	North - South	1,193	1,125	68	-6%
SL07	South - North	1,217	1,207	10	-1%

PM Peak Hour

SL01	Inbound	6,865	6,502	363	-5%
SL01	Outbound	7,249	6,858	391	-5%
SL02	East - West	401	323	78	-19%
SL02	West -East	391	401	10	3%
SL03	North - South	1,308	1,218	90	-7%
SL03	South - North	1,615	1,503	112	-7%
SL04	West - East	1,604	1,637	33	2%
SL04	East - West	2,274	2,295	21	1%
SL05	West - East	4,010	3,967	43	-1%
SL05	East - West	4,880	5,231	351	7%
SL06	West -East	2,807	2,767	40	-1%
SL06	East - West	3,491	3,571	80	2%
SL06	South - North	3,299	3,124	175	-5%
SL06	North - South	3,660	3,720	60	2%
SL07	North - South	1,430	1,171	259	-18%
SL07	South - North	1,040	832	208	-20%

The results indicate that 63% of screenlines and cordons satisfy the TAG validation criteria in the AM peak period, reducing to 44% in the PM peak period. Whilst these results are below the levels typically expected for fully defined screenlines and cordons, they should be interpreted in the context of the available dataset and the purpose for which these validation measures were used within the BLPTM.

As discussed in Chapter 4, the majority of the adopted screenlines and cordons are not fully watertight due to gaps in the available traffic count coverage and the inability to collect additional data within the project programme. Consequently, the reported screenline and cordon statistics do not represent a complete accounting of all movements crossing each screenline or cordon. The results are also influenced by local inconsistencies within the count dataset, which can have a disproportionate impact on aggregate screenline performance where count coverage is incomplete.

For these reasons, the screenlines and cordons were not used as constraints within the matrix estimation process. Instead, they were adopted as strategic validation and diagnostic tools to provide an indication of whether traffic movements across key corridors and areas of the borough were being represented reasonably within the model. Their primary function was to assist in identifying any fundamental issues in traffic demand distribution or route assignment patterns, rather than to provide a definitive measure of validation performance.

Accordingly, whilst the screenline and cordon results have been reviewed as part of the overall model validation exercise, greater emphasis has been placed on individual link flow validation, journey time validation and the overall reasonableness of network performance when assessing the fitness-for-purpose of the BLPTM.

8.4 Individual Counts Performance

All 274 available traffic count locations were used within the calibration and validation of the BLPTM. The performance of the model against these counts was assessed before and after the application of matrix estimation, with the results summarised in Table 7.8.

The matrix estimation process delivered a significant improvement in model performance across the study area. Following calibration, approximately 88% of count locations satisfied the TAG validation criteria during the AM peak period, with 86% meeting the criteria during the PM peak period. This represents a substantial improvement over the performance of the prior matrices and demonstrates the effectiveness of the calibration process in improving agreement between modelled and observed traffic flows.

The high proportion of count sites meeting the validation criteria provides confidence that the BLPTM is able to replicate observed traffic conditions across the majority of the highway network. The remaining locations that do not satisfy the TAG criteria are generally isolated and are not considered to indicate any systematic issues with the overall representation of traffic demand or route assignment within the model.

The geographical distribution of count site performance is illustrated in Figure 7-1 for the AM peak period and Figure 7-2 for the PM peak period. These figures demonstrate that the model achieves a good spatial spread of validation performance across the study area and key strategic corridors.

A detailed comparison of modelled and observed flows at each count location, including the performance of both the prior and calibrated matrices, is provided in Appendix A.

Table 7.8 Individual Counts performance

Peak	Car	LGV	HGV	Total
Prior Matrix				
AM	47% (129 out of 272)	93% (254 out of 272)	88% (240 out of 272)	39% (107 out of 272)
PM	49% (132 out of 272)	94% (256 out of 272)	90% (245 out of 272)	45% (121 out of 272)
Post Matrix				
AM	91% (247 out of 272)	97% (264 out of 272)	94% (257 out of 272)	88% (239 out of 272)
PM	90% (244 out of 272)	97% (263 out of 272)	95% (259 out of 272)	86% (235 out of 272)

Figure 7-1 Individual counts performance in AM peak

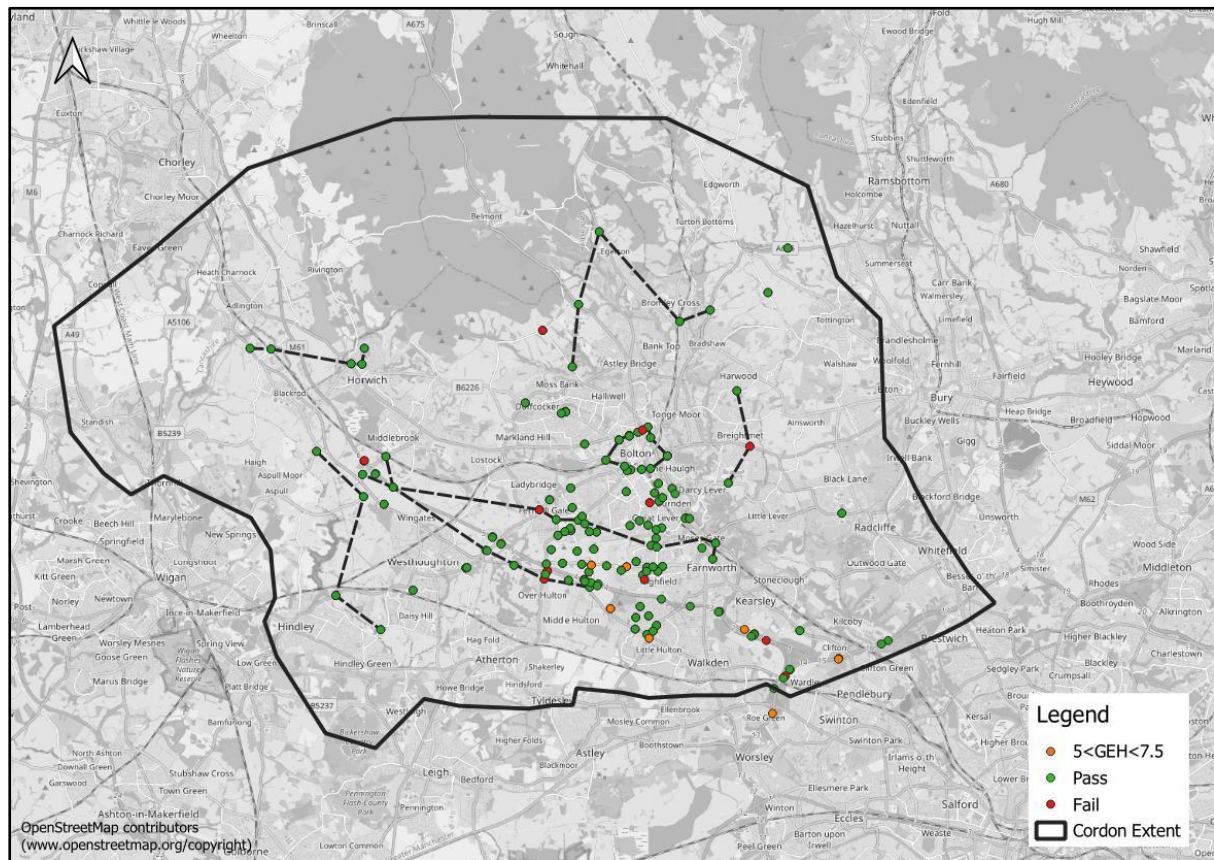
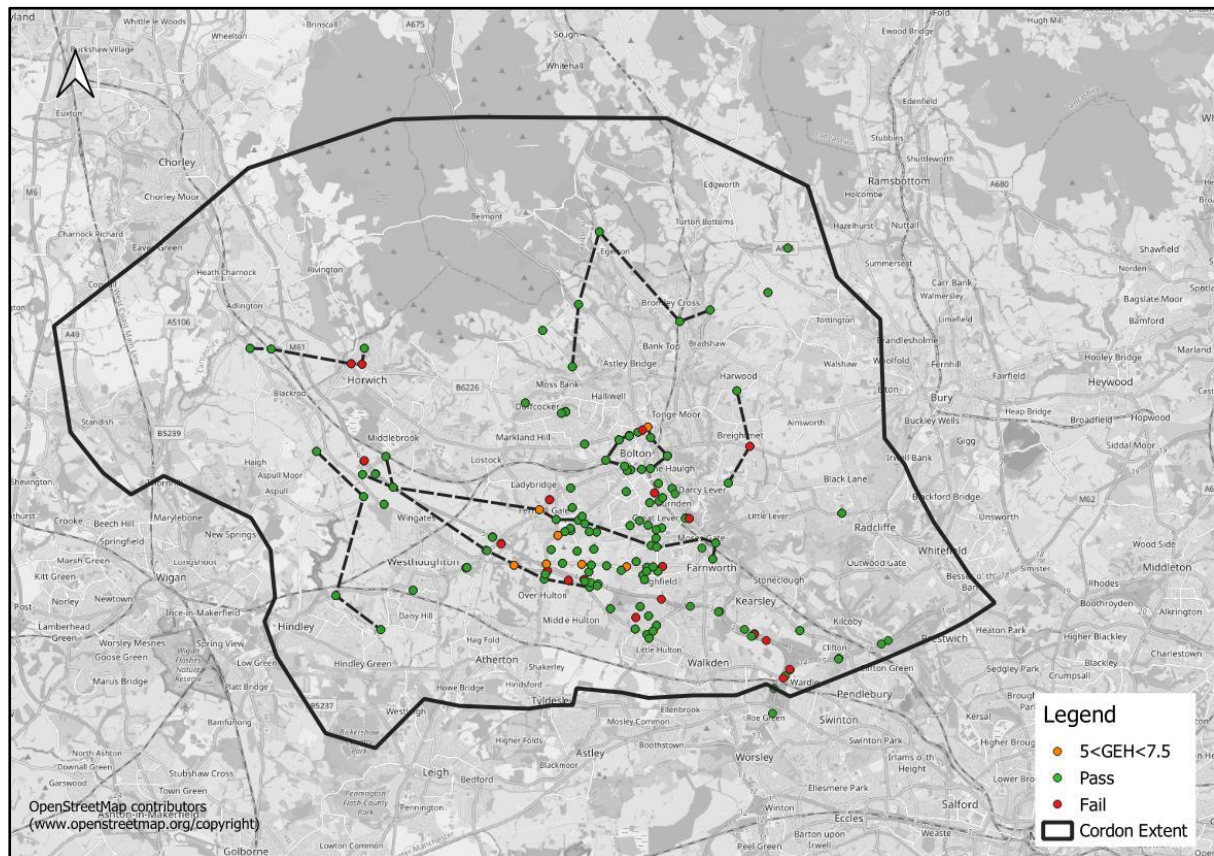


Figure 7-2 Individual counts performance in PM peak

9. Journey Time Validation

9.1 Introduction

Journey time validation provides an important assessment of the model's ability to replicate observed route choice, congestion patterns and overall network performance. As such, modelled journey times were compared against observed journey times on a series of key radial and orbital routes across the study area.

The journey time validation routes adopted for the BLPTM are listed in Table 9-1 and illustrated in Figure 9-1. The selected routes provide coverage of the principal corridors within the study area and were chosen to assess model performance across a range of operating conditions and levels of congestion. Thus selected routes provide a representative cross-section of travel patterns across the borough, ensuring broad geographic coverage.

Observed journey times were derived from Teletrac Navman GPS data using the network-based processing methodology described in Chapter 4. The processed dataset provides representative weekday journey times based on non-stopping vehicle movements and enables observed travel times to be extracted for predefined validation routes.

Modelled journey times were compared against the observed GPS-derived journey times for the following modelled periods:

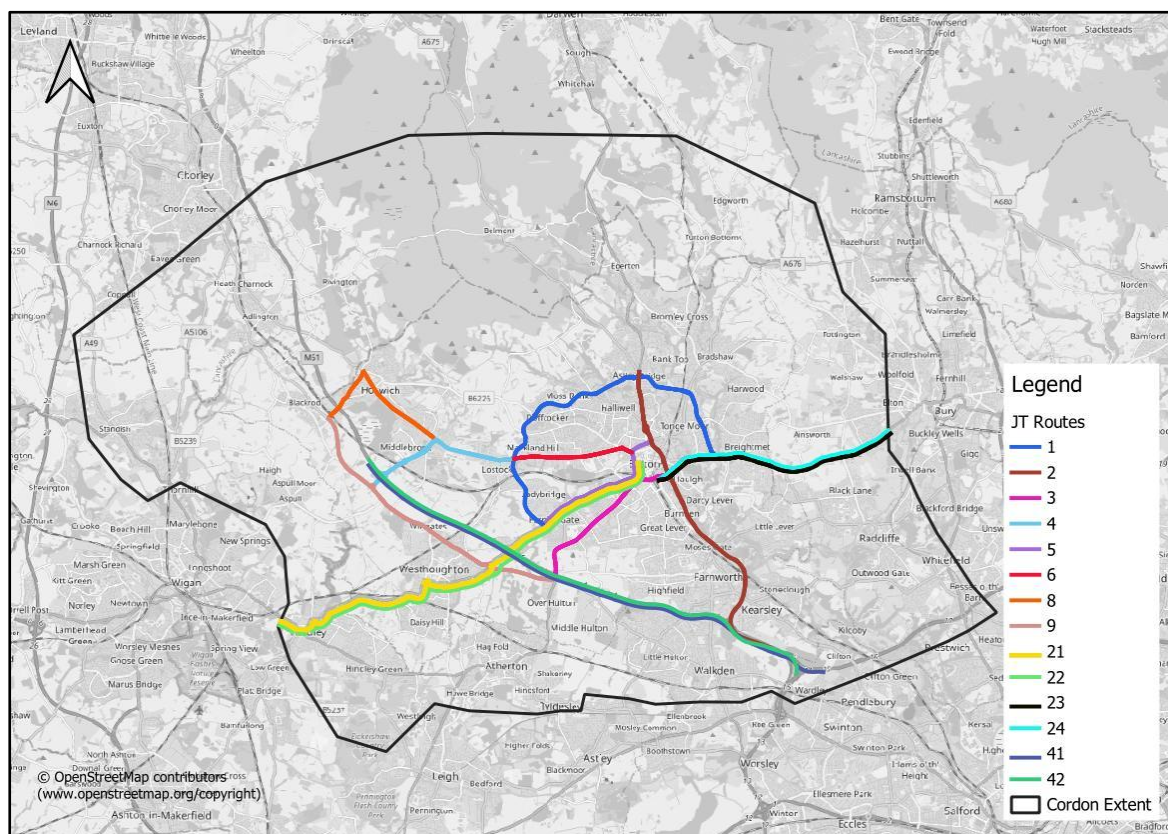
- AM Peak Hour: 08:00–09:00; and
- PM Peak Hour: 17:00–18:00.

The validation results presented in this chapter provide an indication of the extent to which the BLPTM replicates observed travel conditions across the study area and complement the link flow validation presented in Chapter 8. Together, the journey time and traffic flow validation results provide a comprehensive assessment of the model's fitness for purpose for future forecasting and Local Plan assessment.

Table 9-1 Journey Time Routes

ID	Route Number	Route Name	Direction	Route Length
1	1	A58/A676 to A579/ Crompton way (A58)	EB	10.9
2	1	A579/ Crompton way (A58) to A58 / A676	WB	11.0
3	2	M61 J2 to A666 / A675	NB	9.1
4	2	A666 / A675 to M61 J2	SB	9.2
5	3	A579 Northbound	NB	5.4
6	3	A579 Southbound	SB	5.5
7	4	Chorley Road / DeHavilland Road Roundabout to A58 / A673	EB	4.8
8	4	A58 / A673 to Chorley Road / DeHavilland Road Roundabout	WB	4.7
9	5	A58/A676 to A666 / A673	EB	4.5

ID	Route Number	Route Name	Direction	Route Length
10	5	A666 / A673 to A58/A676	WB	4.4
11	6	A673 (Chorley New Road / Beaumont Road to St George Road / Topp Way)	EB	3.5
12	6	A673 (St George Road / Topp Way to Chorley New Road / Beaumont Road)	WB	3.5
13	8	Station Road / Blackrod Bypass Road to Beehive Roundabout	EB	4.6
14	8	Beehive Roundabout to Station Road / Blackrod Bypass Road	WB	4.6
15	9	Station Road / Blackrod Bypass Road to St Helen's Road/ Manchester Road	EB	8.8
16	9	St Helen's Road/ Manchester Road to Station Road / Blackrod Bypass Road	WB	8.8
17	21	Wigan Road / Seaman Way to Moor Lane / Spa Road	EB	12.8
18	22	Moor Lane / Spa Road to Wigan Road / Seaman Way	WB	12.9
19	23	Trinity Street bridge to Bolton Road / Colville Drive	EB	7.5
20	24	Bolton Road / Colville Drive to Trinity Street bridge	WB	7.5
21	41	M61 J6 to M60 J15	EB	13.9
22	42	M60 J1 to M61 J6	WB	14.0

Figure 9-1 Journey Time Routes

9.2 Weekday AM Peak Hour

Table 9-2 compares the modelled and observed journey times for the 22 validation routes during the weekday AM peak hour (08:00–09:00).

Overall, the journey time validation performance for the AM peak period is considered good. Of the 22 validation routes assessed, 17 routes satisfy the TAG validation criterion, whereby modelled journey times are within $\pm 15\%$ of the observed journey time, or ± 1 minute, whichever is greater. This indicates that the BLPTM provides a generally robust representation of observed travel conditions and congestion levels across the principal corridors within the study area.

Table 9-2 Modelled Versus Observed Journey Times for the Weekday AM-Peak Hour (Seconds)

ID	Route Number	Direction	Route Length (km)	Observed Time	Modelled Time	Modelled-Observed	% Diff	TAG Compliance
1	1	EB	10.9	1,087	1,206	119	11%	YES
2	1	WB	11.0	999	1,111	112	11%	YES
3	2	NB	9.1	588	733	145	25%	NO
4	2	SB	9.2	667	957	290	43%	NO
5	3	NB	5.4	714	762	48	7%	YES
6	3	SB	5.5	781	843	62	8%	YES

ID	Route Number	Direction	Route Length (km)	Observed Time	Modelled Time	Modelled-Observed	% Diff	TAG Compliant
7	4	EB	4.8	446	507	60	14%	YES
8	4	WB	4.7	374	416	42	11%	YES
9	5	EB	4.5	601	686	85	14%	YES
10	5	WB	4.4	602	697	96	16%	NO
11	6	EB	3.5	431	474	44	10%	YES
12	6	WB	3.5	348	397	49	14%	YES
13	8	EB	4.6	471	473	2	0%	YES
14	8	WB	4.6	467	494	27	6%	YES
15	9	EB	8.8	819	887	68	8%	YES
16	9	WB	8.8	781	855	74	9%	YES
17	21	EB	12.8	1,387	1,693	306	22%	NO
18	22	WB	12.9	1,365	1,546	180	13%	YES
19	23	EB	7.5	727	825	97	13%	YES
20	24	WB	7.5	797	842	44	6%	YES
21	41	EB	13.9	1,073	539	-534	-50%	NO
22	42	WB	14.0	497	556	59	12%	YES
Number of routes satisfying TAG Criteria = 17 out of 22 (77.0%)								

9.3 Weekday PM Peak Hour

Table 9-3 compares the modelled and observed journey times for the 22 validation routes during the weekday PM peak hour (17:00–18:00).

Overall, the journey time validation performance for the PM peak period is considered good. Of the 22 validation routes assessed, 17 routes satisfy the TAG validation criterion, whereby modelled journey times are within $\pm 15\%$ of the observed journey time, or ± 1 minute, whichever is greater. This indicates that the BLPTM provides a robust representation of prevailing traffic conditions and congestion levels across the principal corridors within the study area during the evening peak period.

Table 9-3 Modelled Versus Observed Journey Times for the Weekday PM-Peak Hour (Seconds)

ID	Route Number	Direction	Route Length (km)	Observed Time	Modelled Time	Modelled-Observed	% Diff	TAG Compliant
1	1	EB	10.9	1,101	1,201	100	9%	YES
2	1	WB	11.0	1,119	1,080	-39	-3%	YES
3	2	NB	9.1	734	800	66	9%	YES
4	2	SB	9.2	616	793	177	29%	NO
5	3	NB	5.4	938	840	-98	-10%	YES
6	3	SB	5.5	1,087	935	-153	-14%	YES
7	4	EB	4.8	436	494	58	13%	YES
8	4	WB	4.7	505	541	36	7%	YES
9	5	EB	4.5	744	694	-51	-7%	YES
10	5	WB	4.4	959	654	-305	-32%	NO
11	6	EB	3.5	451	463	12	3%	YES
12	6	WB	3.5	537	478	-60	-11%	YES
13	8	EB	4.6	576	631	55	10%	YES
14	8	WB	4.6	497	789	293	59%	NO
15	9	EB	8.8	794	862	67	8%	YES
16	9	WB	8.8	925	855	-70	-8%	YES
17	21	EB	12.8	1,439	1,742	304	21%	NO
18	22	WB	12.9	2,101	1,524	-577	-27%	NO
19	23	EB	7.5	935	875	-60	-6%	YES
20	24	WB	7.5	808	831	22	3%	YES
21	41	EB	13.9	595	550	-44	-7%	YES
22	42	WB	14.0	493	561	68	14%	YES
Number of routes satisfying TAG Criteria = 17 out of 22 (77.0%)								

Overall, the BLPTM demonstrates a good level of journey time validation across both peak periods. Of the 22 validation routes assessed, 17 routes (77%) satisfy the TAG validation criterion in both the AM and PM peak periods. This represents a strong level of performance, particularly given the

relatively compact geographical extent of the model and the comparatively high number of validation routes assessed within the study area.

The routes that do not satisfy the TAG criterion are limited in number and are not concentrated within any particular corridor or area of the network. As such, they do not indicate any systematic issues with the representation of route choice, congestion or overall network performance within the model.

Given the proportionate calibration and validation approach adopted for the BLPTM, and its intended application as a Local Plan forecasting and assessment tool, the overall journey time validation performance is considered appropriate and consistent with the model's purpose. The results demonstrate that the BLPTM is able to replicate observed travel conditions across the majority of the study area and provide confidence that the model is fit for use in future-year forecasting and the assessment of Local Plan development scenarios.

10. Summary and Conclusions

10.1 Overview

This report has documented the development of the Bolton Local Plan Transport Model (BLPTM), a SATURN-based highway assignment model developed to support the assessment of future development scenarios associated with the Bolton Local Plan.

The BLPTM has been developed for a 2025 base year and represents the following modelled periods:

- Weekday AM Peak Hour: 08:00–09:00; and
- Weekday PM Peak Hour: 17:00–18:00.

In accordance with the intended application of the model and the anticipated transport impacts associated with Local Plan growth, model development was focused on the principal commuting periods. An inter-peak model period was not developed as part of this study, reflecting both programme considerations and the expectation that the most significant development-related impacts would occur during the AM and PM peak periods.

The BLPTM was developed through the extraction of a cordoned study area from the 2025 GSM. The highway network, zoning system, user class structure and key modelling assumptions were inherited from the parent model to maintain consistency with the wider Greater Manchester modelling framework. The adopted model extent was designed to provide comprehensive coverage of the Bolton Local Plan area whilst retaining the strategic gateways and external movements necessary to represent wider travel patterns and cross-boundary interactions.

Following extraction of the cordoned model, a programme of model enhancement was undertaken. This included reviews of the highway network coding, refinement of demand associated with key external gateways, and the application of matrix estimation using the available traffic count data. These activities were undertaken to improve the representation of observed travel conditions within the study area whilst retaining consistency with the underlying GSM demand structure and modelling framework.

The model development process was undertaken in accordance with the principles of proportionality set out in TAG. Recognising the intended use of the BLPTM as a Local Plan forecasting tool, efforts were focused on delivering a robust representation of observed traffic conditions on key corridors and locations relevant to future growth assessment, whilst making efficient use of the available data and programme resources.

The following sections summarise the model calibration and validation outcomes and assess the suitability of the BLPTM for future forecasting and Local Plan assessment purposes

10.2 Model Calibration

10.2.1 At Screenline / Cordon Level

TAG guidance recommends that differences between modelled and observed flows at screenline and cordon locations should generally be within $\pm 5\%$ to achieve an acceptable level of validation.

As discussed previously, the screenlines and cordons adopted within the BLPTM were not fully watertight due to gaps in the available traffic count coverage. Consequently, screenline and cordon totals were not used as constraints within the matrix estimation process. Instead, they were utilised as a diagnostic measure to assess the overall reasonableness of traffic movement patterns across key corridors and areas of the study area.

The validation results indicate that approximately 63% of screenlines and cordons satisfy the TAG criterion during the weekday AM peak period, with approximately 44% satisfying the criterion during the weekday PM peak period. Whilst this level of compliance is lower than would typically be

expected for fully defined screenlines and cordons, the results should be interpreted in the context of the incomplete count coverage and the intended purpose of these validation measures within the BLPTM.

Given that the adopted screenlines and cordons do not capture all movements crossing the validation boundaries, the resulting statistics are considered indicative rather than definitive. As such, greater emphasis has been placed on individual link flow validation, journey time validation and the overall reasonableness of network performance when assessing model calibration and fitness for purpose. The screenline and cordon results were primarily used to confirm that no fundamental issues existed in the distribution of traffic demand across the study area and that strategic traffic movements were being represented appropriately within the model.

10.2.2 At Individual Counts Level

Individual link flow validation was undertaken by comparing modelled and observed traffic flows at the count locations across the study area. The assessment was carried out in accordance with the validation guidance set out in TAG Unit M3.1: Highway Assignment Modelling, as described in section 2.2.

The calibration results demonstrate a strong level of agreement between modelled and observed traffic flows following completion of the calibration process. Approximately 88% of count locations satisfied the TAG validation criteria during the weekday AM peak hour, whilst approximately 86% satisfied the criteria during the weekday PM peak hour.

These results represent a substantial improvement on the performance of the prior matrices and indicate that the matrix estimation and network calibration processes were successful in improving the representation of observed traffic conditions within the study area. The high proportion of count sites meeting the TAG criteria demonstrates that the BLPTM provides a robust representation of traffic flows across the majority of the network and that traffic demand is being assigned in a realistic manner.

Whilst a limited number of count locations remain outside the TAG thresholds, these are generally isolated instances and do not indicate any systematic issues with the overall calibration of the model. The individual count validation results therefore provide confidence that the BLPTM is capable of reproducing observed traffic flow patterns to a level appropriate for its intended application as a Local Plan forecasting and assessment tool.

10.3 Model Validation

The validation of the BLPTM included a comparison of modelled and observed journey times across the study area. Journey time validation provides an important measure of the model's ability to replicate observed route choice behaviour, congestion levels and overall network performance. The assessment was undertaken in accordance with the guidance set out in TAG Unit M3.1: Highway Assignment Modelling, as described in section 2.3.

10.3.1 Journey Time Validation

Journey time validation was undertaken using a set of 22 one-way validation routes covering the principal radial and orbital corridors within the study area. Modelled journey times were compared against observed journey times derived from Teletrac Navman GPS data for both the AM and PM peak periods.

The validation results indicate a good level of agreement between modelled and observed journey times. Across all routes, approximately 77% satisfied the TAG validation criteria in both the weekday AM and PM peak periods. This level of performance is considered robust, particularly given the relatively compact geographical extent of the BLPTM and the comparatively high number of validation routes assessed within the study area.

The routes that did not satisfy the TAG criterion were limited in number and were not concentrated within any particular corridor or geographic area. Consequently, no systematic issues were identified in the representation of route choice, congestion or network operation.

Overall, the journey time validation results provide confidence that the BLPTM is able to replicate observed travel conditions across the majority of the study area and supports the conclusion that the model provides a realistic representation of existing highway network performance.

10.4 Model Fitness for Purpose Statement

The development, calibration and validation of the BLPTM have been undertaken in accordance with the principles set out in TAG Unit M3.1: Highway Assignment Modelling, adopting a level of effort proportionate to the intended application of the model.

The BLPTM was developed from the 2025 GSM through the extraction and enhancement of a cordoned study area covering Bolton and its key strategic connections. The model has subsequently been subject to a programme of network review, demand refinement, matrix estimation, calibration and validation using the best available traffic count and journey time data.

The calibration results demonstrate that the model provides a robust representation of observed traffic conditions across the study area. Following calibration, approximately 88% of count locations in the AM peak and 86% in the PM peak satisfy the TAG link flow validation criteria. In addition, approximately 77% of journey time routes satisfy the TAG journey time validation criteria in both peak periods, indicating a good representation of route choice behaviour, congestion levels and overall network performance.

Whilst not all screenlines, cordons and journey time routes satisfy the relevant TAG criteria, the remaining validation differences are generally localised and do not indicate any systematic deficiencies in the model structure, network coding or demand patterns. Furthermore, it is recognised that the available count data contain gaps and that the adopted screenlines and cordons are not fully watertight. Consequently, these measures were used primarily as diagnostic tools to assess the reasonableness of traffic movement patterns rather than as formal calibration constraints.

Consistent with TAG guidance, model performance has been assessed with regard to its intended purpose rather than solely against individual calibration and validation statistics. The model has been developed as a strategic forecasting tool and has been calibrated and validated proportionately to support the assessment of future travel demand, development growth and associated transport impacts across the borough.

The validation results demonstrate that the BLPTM is capable of reproducing observed highway network conditions to a level appropriate for its intended application. Whilst some localised discrepancies remain, these are not considered to materially affect the model's ability to support forecasting and transport assessment. The overall model performance, together with the level of convergence achieved and the consistency of the calibration and validation results across both peak periods, provides confidence in the robustness of the model.

It is therefore concluded that the BLPTM is fit for purpose for the development and assessment of future-year forecasting scenarios, including the evaluation of Bolton Local Plan growth options, strategic development allocations, transport interventions and the cumulative impacts of development on the highway network. In addition, the model is considered suitable for the assessment of individual development sites and planning applications, supporting Bolton Council's development management and development control functions where an understanding of the transport implications of proposed developments is required. The model may also be used to inform the identification and testing mitigation measures necessary to accommodate future development and manage highway network impacts.

It should be recognised that the BLPTM has been developed as a strategic highway assignment model and has therefore been calibrated and validated to support network-wide transport assessment rather than detailed operational analysis. The model is considered appropriate for assessing overall traffic flows, route choice patterns, corridor performance and the strategic impacts of development across the highway network. Whilst it can be used to identify locations where operational issues may arise and where mitigation may be required, it has not been developed to provide detailed operational assessments at individual junctions. Consequently, the model should not be relied upon in isolation for junction capacity assessments, signal optimisation studies, queue length estimation, reserve capacity

calculations, or other forms of detailed operational analysis. Where such assessments are required, the findings of the BLPTM should be supplemented by appropriately scoped local junction and or micro-simulation models.

Accordingly, the BLPTM is considered to provide a robust and proportionate evidence base for strategic transport planning, Local Plan examination, development-related transport assessment and development management activities within Bolton.

10.5 Potential Future Enhancements

Whilst the BLPTM is considered fit for purpose for its intended application, a number of potential enhancements could be considered as part of future model development should additional data, resources or assessment requirements arise.

These enhancements include:

- Collection of additional traffic count data to improve coverage across key corridors and gateways and to support the development of more comprehensive and watertight screenlines and cordons.
- Collection of supplementary journey time data for corridors where validation performance is weaker or where future development pressures are expected to be significant.
- Review and update of traffic signal control data where more recent and comprehensive signal timing information becomes available.
- Development of an inter-peak model period to support assessments where travel impacts are expected to extend beyond the principal commuting periods.
- Further refinement of freight demand patterns, particularly at strategic gateways, where additional data sources become available.
- Review of cruise speed assumptions and network operating parameters should more detailed corridor-level assessments be required in the future.
- Ongoing maintenance and updating of the model to incorporate future revisions to the GMSM and emerging transport and development data.

It should be noted that these potential enhancements are intended to further strengthen the model and broaden its potential applications, rather than address any fundamental shortcomings. The calibration and validation results presented in this report demonstrate that the BLPTM already provides a robust representation of existing traffic conditions and is suitable for its intended purpose as a strategic transport forecasting and assessment tool.

Accordingly, no further model development is considered necessary to support the assessment of Bolton Local Plan growth scenarios, strategic transport interventions, individual development sites, or development management activities at the present time. Future enhancements should therefore be considered only where they are required to support a specific study objective or a more detailed level of transport assessment.

Appendix A Detailed Calibration / Validation Results

Table A1. Individual count performance in AM peak - Post ME

Source	Count ID	Car					Total Vehicles				
		Modelle d Flow	Observed Flow	Diff	% Diff	TAG Criteria	Modelle d Flow	Observed Flow	Diff	% Diff	TAG Criteria
GM	60	448	453	-5	-1%	Pass	513	524	-11	-2%	Pass
GM	61	647	652	-5	-1%	Pass	742	749	-7	-1%	Pass
GM	62	248	255	-7	-3%	Pass	295	301	-6	-2%	Pass
GM	63	613	604	9	1%	Pass	758	748	10	1%	Pass
GM	64	235	251	-16	-6%	Pass	256	281	-25	-9%	Pass
GM	65	2,001	1,832	169	9%	Pass	2,542	2,375	167	7%	Pass
GM	66	284	303	-19	-6%	Pass	353	374	-21	-6%	Pass
GM	67	364	396	-32	-8%	Pass	429	466	-37	-8%	Pass
GM	68	543	518	25	5%	Pass	632	602	30	5%	Pass
GM	69	555	563	-8	-1%	Pass	638	641	-3	-1%	Pass
GM	70	308	306	2	1%	Pass	346	346	0	0%	Pass
GM	71	948	953	-5	0%	Pass	1,052	1,058	-6	-1%	Pass
GM	72	110	130	-20	-15%	Pass	116	139	-23	-16%	Pass
GM	73	528	535	-7	-1%	Pass	597	604	-7	-1%	Pass
GM	74	750	1,212	-462	-38%	Fail	860	1,463	-603	-41%	Fail
GM	75	443	483	-40	-8%	Pass	530	575	-45	-8%	Pass
GM	76	330	326	4	1%	Pass	386	381	5	1%	Pass
GM	77	184	188	-4	-2%	Pass	225	229	-4	-2%	Pass
GM	78	508	514	-6	-1%	Pass	661	667	-6	-1%	Pass
GM	79	100	94	6	6%	Pass	119	112	7	6%	Pass
GM	81	476	503	-27	-5%	Pass	543	564	-21	-4%	Pass
GM	82	300	302	-2	-1%	Pass	356	357	-1	0%	Pass
GM	83	628	614	14	2%	Pass	751	723	28	4%	Pass
GM	84	432	439	-7	-2%	Pass	496	513	-17	-3%	Pass
GM	85	192	202	-10	-5%	Pass	225	238	-13	-6%	Pass
GM	86	831	817	14	2%	Pass	968	955	13	1%	Pass
GM	87	153	150	3	2%	Pass	175	171	4	2%	Pass
GM	88	372	376	-4	-1%	Pass	434	450	-16	-3%	Pass
GM	89	664	894	-230	-26%	Fail	865	1126	-261	-23%	Fail
GM	276	2,332	2,456	-124	-5%	Pass	2,894	3,019	-125	-4%	Pass
GM	277	1,492	1,343	149	11%	Pass	1,863	1,713	150	9%	Pass
GM	477	218	218	0	0%	Pass	246	254	-8	-3%	Pass
GM	479	332	332	0	0%	Pass	400	400	0	0%	Pass
GM	543	324	324	0	0%	Pass	421	421	0	0%	Pass
GM	544	77	77	0	0%	Pass	104	96	8	8%	Pass
GM	547	339	338	1	0%	Pass	368	363	5	1%	Pass
GM	548	253	254	-1	-1%	Pass	297	315	-18	-6%	Pass
GM	549	255	258	-3	-1%	Pass	317	320	-3	-1%	Pass
GM	551	218	218	0	0%	Pass	268	271	-3	-1%	Pass
GM	614	280	280	0	0%	Pass	354	354	0	0%	Pass
GM	615	108	108	0	0%	Pass	125	125	0	0%	Pass
GM	618	165	79	86	109%	Pass	203	84	119	142%	Fail

Source	Count ID	Car					Total Vehicles				
		Modelle d Flow	Observed Flow	Diff	% Diff	TAG Criteria	Modelle d Flow	Observed Flow	Diff	% Diff	TAG Criteria
GM	619	251	240	11	4%	Pass	318	304	14	5%	Pass
WebTRIS	9036/2	1,151	1,147	4	0%	Pass	1,951	1,943	8	0%	Pass
WebTRIS	9036/1	628	1,096	-468	-43%	Fail	703	1,296	-593	-46%	Fail
WebTRIS	9037/2	1,795	1,789	6	0%	Pass	2,772	2,766	6	0%	Pass
WebTRIS	9037/1	1,272	1,378	-106	-8%	Pass	1,634	1,755	-121	-7%	Pass
WebTRIS	8539/2	1,843	1,863	-20	-1%	Pass	2,853	2,794	59	2%	Pass
WebTRIS	8539/1	503	500	3	1%	Pass	583	660	-77	-12%	Pass
WebTRIS	8541/1	1,735	1,702	33	2%	Pass	2,984	3,148	-164	-5%	Pass
WebTRIS	M61/2061A	2,348	2,385	-37	-2%	Pass	3,677	3,772	-95	-3%	Pass
WebTRIS	M61/2052B	2,015	1,620	395	24%	Fail	3,346	3,243	103	3%	Pass
WebTRIS	M61/2044B	1,725	1,720	5	0%	Pass	2,852	2,714	138	5%	Pass
WebTRIS	M61/2030K	2,123	2,147	-24	-1%	Pass	3,219	3,157	62	2%	Pass
WebTRIS	M60/9228A	3,724	4,519	-796	-18%	Fail	6,975	6,542	432	7%	Fail
WebTRIS	M60/9239B	1,298	1,298	0	0%	Pass	4,068	4,159	-91	-2%	Pass
WebTRIS	M60/9242A	1,756	1,473	283	19%	Fail	3,873	3,935	-62	-2%	Pass
WebTRIS	M60/9257A	3,500	3,499	1	0%	Pass	6,711	6,742	-31	0%	Pass
WebTRIS	M60/9257B	2,655	2,633	23	1%	Pass	5,995	6,424	-429	-7%	Fail
WebTRIS	M60/9270B	3,658	3,657	1	0%	Pass	7,245	7,133	112	2%	Pass
WebTRIS	M60/9272A	4,117	41,21	-4	0%	Pass	7,606	7,331	276	4%	Pass
WebTRIS	M61/2010A	617	618	-1	0%	Pass	876	874	2	0%	Pass
WebTRIS	M61/5202B	877	877	-1	0%	Pass	1,832	2,371	-539	-23%	Fail
WebTRIS	M61/5205A	1,967	1,594	374	23%	Fail	3,102	3,164	-63	-2%	Pass
WIGAN_WebTRIS	M61/5218A	3,150	3,131	20	1%	Pass	4,782	5,685	-903	-16%	Fail
WIGAN_WebTRIS	M61/2031M	375	374	0	0%	Pass	544	680	-136	-20%	Fail
WIGAN_WebTRIS	M61/5222B	1,131	1,134	-4	0%	Pass	2,054	2,060	-6	0%	Pass
WIGAN_WebTRIS	M61/2031L	1,245	1,285	-40	-3%	Pass	2,128	2,333	-205	-9%	Pass
WIGAN_WebTRIS	M61/2035B	481	481	0	0%	Pass	724	873	-149	-17%	Fail
WIGAN_WebTRIS	M61/2044L	290	256	34	13%	Pass	494	464	30	6%	Pass
WIGAN_WebTRIS	8540/2	2,167	21,29	39	2%	Pass	3,462	3,866	-403	-10%	Fail
WIGAN_WebTRIS	8540/1	381	290	92	32%	Pass	498	526	-28	-5%	Pass
WIGAN_WebTRIS	M61 SBbound within J4	1,699	1,794	-95	-5%	Pass	2,956	3,257	-301	-9%	Pass
WIGAN_WebTRIS	M61 J4 SBbound exit	682	654	28	4%	Pass	826	1,188	-362	-30%	Fail
WIGAN_ND C	Site 43 Watergate Lane _NB	773	832	-60	-7%	Pass	918	948	-30	-3%	Pass
WIGAN_ND C	Site 45A Snyderdale Way _NB	1,185	1,172	13	1%	Pass	1,492	1,371	121	9%	Pass
WIGAN_ND C	Site 45B Snyderdale Way _SB	896	880	16	2%	Pass	1,072	1,057	15	1%	Pass
WIGAN_ND C	Site 46 Park Road _EB	924	900	24	3%	Pass	1026	978	48	5%	Pass

Source	Count ID	Car					Total Vehicles				
		Modelle d Flow	Observed Flow	Diff	% Diff	TAG Criteria	Modelle d Flow	Observed Flow	Diff	% Diff	TAG Criteria
WIGAN_ND C	Site 47 A579 Newbrook Road _NB	913	909	5	1%	Pass	1,091	1,014	77	8%	Pass
WIGAN_ND C	Site 48 B5239 Dicconson Lane _EB	829	857	-28	-3%	Pass	889	922	-33	-4%	Pass
WIGAN_ND C	Site 49 A6027 De Havilland Way _NB	1,094	1,109	-15	-1%	Pass	1,320	1,333	-13	-1%	Pass
WIGAN_ND C	Site 50 B5238 Scot Lane _NB	379	365	13	4%	Pass	429	408	21	5%	Pass
WIGAN_ND C	Site 10 Hindley Road _WB	233	235	-1	-1%	Pass	268	271	-4	-1%	Pass
WIGAN_ND C	Site 11 A58 Wigan Road _WB	276	275	0	0%	Pass	329	328	1	0%	Pass
WIGAN_ND C	Site 10 Hindley Road _EB	336	334	2	1%	Pass	365	364	2	0%	Pass
WIGAN_ND C	Site 11 A58 Wigan Road _EB	340	331	9	3%	Pass	396	385	11	3%	Pass
WIGAN_ND C	Site 43 Watergate Lane _SB	901	836	65	8%	Pass	1028	968	60	6%	Pass
WIGAN_ND C	Site 46 Park Road _WB	840	839	1	0%	Pass	947	945	2	0%	Pass
WIGAN_ND C	Site 47 A579 Newbrook Road _SB	588	427	161	38%	Fail	708	501	207	41%	Fail
WIGAN_ND C	Site 48 B5239 Dicconson Lane _WB	506	502	4	1%	Pass	585	564	21	4%	Pass
WIGAN_ND C	Site 49 A6027 De Havilland Way _SB	1,030	1,025	5	0%	Pass	1,343	1,305	37	3%	Pass
WIGAN_ND C	Site 50 B5238 Scot Lane _SB	365	364	1	0%	Pass	418	412	5	1%	Pass
C2	1068_SW	883	887	-4	0%	Pass	1,073	1,067	6	1%	Pass
C2	1471_N	889	874	16	2%	Pass	1,067	1,051	15	1%	Pass
C2	1454_N	2,103	2,068	35	2%	Pass	2,663	2,490	174	7%	Pass
C2	1071_NE	739	689	50	7%	Pass	878	829	49	6%	Pass
C2	1072_W	723	701	22	3%	Pass	862	844	19	2%	Pass
C2	1470_W	959	959	-1	0%	Pass	1,155	1,155	1	0%	Pass
C2	1259_NW	1,917	1,910	7	0%	Pass	2,341	2,340	2	0%	Pass
C2	1068_NE	1,139	1,148	-8	-1%	Pass	1,353	1,382	-28	-2%	Pass
C2	1471_S	803	766	37	5%	Pass	927	922	5	1%	Pass
C2	1454_S	1,955	1,932	22	1%	Pass	2,350	2,326	24	1%	Pass
C2	1071_SW	1,006	1,015	-9	-1%	Pass	1,203	1,222	-19	-2%	Pass
C2	1072_E	635	644	-9	-1%	Pass	759	775	-16	-2%	Pass
C2	1470_E	1,117	1,018	99	10%	Pass	1331	1,225	106	9%	Pass
C2	1259_SE	1,771	1,782	-11	-1%	Pass	2,174	2,183	-9	0%	Pass
C2	1121_N	0	43	-43	-100%	Pass	0	51	-51	-100%	Pass
C2	2333_E	145	141	5	3%	Pass	189	169	20	12%	Pass
C2	2050_E	350	346	4	1%	Pass	410	416	-6	-1%	Pass
C2	255_N	344	352	-8	-2%	Pass	418	429	-11	-3%	Pass
C2	2536_N	273	280	-6	-2%	Pass	331	337	-6	-2%	Pass
C2	2325_E	73	62	10	17%	Pass	85	75	11	14%	Pass
C2	2324_N	255	255	-1	0%	Pass	303	307	-4	-1%	Pass
C2	2326_N	498	442	55	13%	Pass	593	532	61	11%	Pass
C2	2665_N	614	243	370	152%	Fail	709	293	416	142%	Fail

Source	Count ID	Car					Total Vehicles				
		Modelle d Flow	Observed Flow	Diff	% Diff	TAG Criteria	Modelle d Flow	Observed Flow	Diff	% Diff	TAG Criteria
C2	2572_N	602	608	-5	-1%	Pass	682	732	-49	-7%	Pass
C2	2537_E	564	573	-9	-2%	Pass	678	690	-13	-2%	Pass
C2	2002_N	57	57	0	1%	Pass	68	68	0	0%	Pass
C2	2018_N	434	431	3	1%	Pass	520	519	1	0%	Pass
C2	2004_N	26	80	-55	-68%	Pass	39	97	-58	-60%	Pass
C2	2049_N	356	346	10	3%	Pass	426	416	10	2%	Pass
C2	2329_N	143	154	-11	-7%	Pass	171	186	-15	-8%	Pass
C2	2761_E	182	183	-1	0%	Pass	218	220	-2	-1%	Pass
C2	1254_E	274	274	0	0%	Pass	319	334	-15	-4%	Pass
C2	203_N	0	14	-14	-100%	Pass	0	18	-18	-100%	Pass
C2	2578_E	139	137	2	2%	Pass	159	164	-5	-3%	Pass
C2	2660_N	284	274	10	4%	Pass	340	330	10	3%	Pass
C2	1124_E	105	215	-110	-51%	Fail	140	258	-118	-46%	Fail
C2	519_N	375	398	-22	-6%	Pass	459	485	-26	-5%	Pass
C2	2576_E	305	308	-3	-1%	Pass	364	371	-7	-2%	Pass
C2	521_S	588	608	-19	-3%	Pass	721	741	-20	-3%	Pass
C2	520_N	523	528	-5	-1%	Pass	637	644	-6	-1%	Pass
C2	545_W	194	211	-18	-8%	Pass	227	258	-31	-12%	Pass
C2	2581_E	393	413	-20	-5%	Pass	470	497	-27	-6%	Pass
C2	524_N	221	244	-23	-9%	Pass	267	299	-32	-11%	Pass
C2	1121_S	0	75	-75	-100%	Pass	0	90	-90	-100%	Pass
C2	2333_W	255	253	2	1%	Pass	345	305	40	13%	Pass
C2	2050_W	317	317	0	0%	Pass	382	381	1	0%	Pass
C2	255_S	90	90	0	0%	Pass	110	110	0	0%	Pass
C2	2536_S	202	200	2	1%	Pass	244	241	2	1%	Pass
C2	2325_W	53	53	0	0%	Pass	64	64	0	0%	Pass
C2	2324_S	204	226	-22	-10%	Pass	247	272	-25	-9%	Pass
C2	2326_S	557	393	164	42%	Fail	690	474	217	46%	Fail
C2	2665_S	371	360	12	3%	Pass	446	433	13	3%	Pass
C2	2572_S	398	377	21	6%	Pass	473	453	20	4%	Pass
C2	2537_W	246	246	0	0%	Pass	296	296	0	0%	Pass
C2	2002_S	60	58	3	5%	Pass	72	69	3	4%	Pass
C2	2018_S	222	221	1	1%	Pass	269	266	3	1%	Pass
C2	2004_S	157	152	5	3%	Pass	187	183	4	2%	Pass
C2	2049_S	319	317	2	1%	Pass	385	381	4	1%	Pass
C2	2329_S	168	167	2	1%	Pass	191	201	-10	-5%	Pass
C2	2761_W	223	218	5	2%	Pass	267	262	5	2%	Pass
C2	1254_W	306	306	0	0%	Pass	373	373	0	0%	Pass
C2	203_S	22	22	0	-1%	Pass	27	27	0	-1%	Pass
C2	2578_W	190	190	0	0%	Pass	229	229	0	0%	Pass
C2	2660_S	367	358	9	3%	Pass	442	431	11	3%	Pass
C2	1124_W	197	183	13	7%	Pass	225	219	5	2%	Pass
C2	519_S	341	347	-6	-2%	Pass	421	423	-2	-1%	Pass

Source	Count ID	Car					Total Vehicles				
		Modelle d Flow	Observed Flow	Diff	% Diff	TAG Criteria	Modelle d Flow	Observed Flow	Diff	% Diff	TAG Criteria
C2	2576_W	165	164	1	0%	Pass	196	197	-1	-1%	Pass
C2	2581_W	368	361	7	2%	Pass	458	435	23	5%	Pass
C2	524_S	842	841	1	0%	Pass	1,030	1,029	0	0%	Pass
CTC	1	414	553	-139	-25%	Fail	525	665	-140	-21%	Fail
CTC	1	913	913	0	0%	Pass	1,091	1,099	-8	-1%	Pass
CTC	1	322	328	-6	-2%	Pass	375	395	-20	-5%	Pass
CTC	1	405	419	-14	-3%	Pass	477	504	-27	-5%	Pass
CTC	1	588	592	-4	-1%	Pass	708	713	-4	-1%	Pass
CTC	1	269	465	-196	-42%	Fail	346	560	-214	-38%	Fail
CTC	2	269	460	-191	-42%	Fail	346	554	-208	-38%	Fail
CTC	2	717	663	54	8%	Pass	865	798	67	8%	Pass
CTC	2	322	321	1	0%	Pass	375	386	-12	-3%	Pass
CTC	3	613	557	56	10%	Pass	694	670	23	3%	Pass
CTC	3	814	813	1	0%	Pass	977	978	-2	0%	Pass
CTC	3	317	290	27	9%	Pass	390	349	41	12%	Pass
CTC	4	353	393	-40	-10%	Pass	435	473	-39	-8%	Pass
CTC	4	878	837	41	5%	Pass	1,061	1,008	53	5%	Pass
CTC	4	141	199	-58	-29%	Pass	169	239	-70	-29%	Pass
CTC	4	492	508	-16	-3%	Pass	601	611	-10	-2%	Pass
CTC	5	229	218	11	5%	Pass	275	262	12	5%	Pass
CTC	5	383	387	-4	-1%	Pass	466	466	0	0%	Pass
CTC	5	324	351	-28	-8%	Pass	386	423	-37	-9%	Pass
CTC	5	243	252	-9	-3%	Pass	298	303	-5	-2%	Pass
CTC	6	484	591	-107	-18%	Pass	583	712	-128	-18%	Fail
CTC	6	551	498	53	11%	Pass	660	600	60	10%	Pass
CTC	6	568	694	-127	-18%	Fail	683	835	-153	-18%	Fail
CTC	6	447	458	-11	-2%	Pass	540	551	-11	-2%	Pass
CTC	7	120	48	73	153%	Pass	140	57	83	144%	Pass
CTC	7	808	916	-109	-12%	Pass	970	1,103	-133	-12%	Pass
CTC	7	651	608	43	7%	Pass	787	731	55	8%	Pass
CTC	8	427	423	5	1%	Pass	512	509	3	1%	Pass
CTC	8	838	944	-107	-11%	Pass	1004	1,137	-133	-12%	Pass
CTC	8	223	201	22	11%	Pass	275	242	34	14%	Pass
CTC	8	236	284	-48	-17%	Pass	286	342	-56	-16%	Pass
CTC	9	244	193	51	26%	Pass	278	232	46	20%	Pass
CTC	9	588	721	-133	-18%	Fail	702	868	-166	-19%	Fail
CTC	9	615	675	-59	-9%	Pass	730	812	-82	-10%	Pass
CTC	10	46	46	0	-1%	Pass	56	56	0	0%	Pass
CTC	10	493	485	8	2%	Pass	591	584	8	1%	Pass
CTC	10	242	171	71	42%	Pass	282	206	76	37%	Pass
CTC	10	389	375	14	4%	Pass	467	451	16	4%	Pass
CTC	10	226	94	132	141%	Fail	268	113	156	138%	Fail
CTC	11	330	317	13	4%	Pass	395	382	13	3%	Pass

Source	Count ID	Car					Total Vehicles				
		Modelle d Flow	Observed Flow	Diff	% Diff	TAG Criteria	Modelle d Flow	Observed Flow	Diff	% Diff	TAG Criteria
CTC	11	103	60	42	70%	Pass	120	73	48	65%	Pass
CTC	11	485	468	17	4%	Pass	584	563	21	4%	Pass
CTC	11	439	456	-17	-4%	Pass	528	549	-21	-4%	Pass
CTC	12	433	380	53	14%	Pass	515	457	58	13%	Pass
CTC	12	192	190	3	1%	Pass	222	228	-6	-3%	Pass
CTC	12	409	418	-9	-2%	Pass	491	503	-13	-2%	Pass
CTC	12	181	197	-16	-8%	Pass	202	237	-35	-15%	Pass
CTC	12	383	401	-18	-5%	Pass	437	483	-46	-9%	Pass
CTC	13	497	604	-107	-18%	Pass	597	728	-130	-18%	Fail
CTC	13	440	412	27	7%	Pass	528	496	32	6%	Pass
CTC	13	594	595	-1	0%	Pass	714	716	-2	0%	Pass
CTC	14	414	424	-9	-2%	Pass	498	510	-12	-2%	Pass
CTC	14	594	650	-56	-9%	Pass	714	782	-69	-9%	Pass
CTC	14	290	157	133	85%	Fail	362	189	173	92%	Fail
CTC	14	589	574	15	3%	Pass	713	691	22	3%	Pass
CTC	14	440	448	-8	-2%	Pass	528	539	-11	-2%	Pass
CTC	14	270	198	71	36%	Pass	334	239	95	40%	Pass
CTC	15	546	533	13	2%	Pass	657	641	15	2%	Pass
CTC	15	159	238	-79	-33%	Pass	191	287	-96	-33%	Pass
CTC	15	589	607	-18	-3%	Pass	713	731	-18	-2%	Pass
CTC	15	226	260	-34	-13%	Pass	276	313	-37	-12%	Pass
CTC	15	686	744	-58	-8%	Pass	836	896	-59	-7%	Pass
CTC	15	129	206	-77	-37%	Pass	153	248	-95	-38%	Pass
CTC	15	414	407	7	2%	Pass	498	490	8	2%	Pass
CTC	15	290	282	9	3%	Pass	349	339	10	3%	Pass
CTC	16	413	414	0	0%	Pass	498	498	0	0%	Pass
CTC	16	174	152	21	14%	Pass	210	183	27	15%	Pass
CTC	16	263	269	-6	-2%	Pass	320	324	-4	-1%	Pass
CTC	16	328	280	47	17%	Pass	404	337	67	20%	Pass
CTC	16	402	391	10	3%	Pass	484	471	14	3%	Pass
CTC	17	290	339	-49	-14%	Pass	348	408	-60	-15%	Pass
CTC	17	507	512	-4	-1%	Pass	611	616	-5	-1%	Pass
CTC	17	340	432	-93	-21%	Pass	415	520	-105	-20%	Pass
CTC	17	324	324	0	0%	Pass	389	390	-1	0%	Pass
CTC	17	443	459	-16	-4%	Pass	536	552	-16	-3%	Pass
CTC	18	370	509	-139	-27%	Fail	449	613	-164	-27%	Fail
CTC	18	466	488	-22	-5%	Pass	565	588	-22	-4%	Pass
CTC	18	266	257	9	3%	Pass	319	310	10	3%	Pass
CTC	18	593	608	-15	-2%	Pass	720	732	-12	-2%	Pass
CTC	18	282	241	41	17%	Pass	335	290	45	16%	Pass
CTC	19	821	837	-16	-2%	Pass	984	1,007	-24	-2%	Pass
CTC	19	237	288	-51	-18%	Pass	276	347	-71	-20%	Pass
CTC	19	403	394	8	2%	Pass	499	475	24	5%	Pass

Source	Count ID	Car					Total Vehicles				
		Modelle d Flow	Observed Flow	Diff	% Diff	TAG Criteria	Modelle d Flow	Observed Flow	Diff	% Diff	TAG Criteria
CTC	19	564	606	-42	-7%	Pass	685	729	-44	-6%	Pass
CTC	19	398	402	-4	-1%	Pass	469	484	-15	-3%	Pass
CTC	19	476	512	-36	-7%	Pass	577	616	-40	-6%	Pass
CTC	20	308	315	-8	-2%	Pass	373	379	-6	-2%	Pass
CTC	20	173	238	-65	-27%	Pass	209	287	-78	-27%	Pass
CTC	20	65	232	-167	-72%	Fail	77	279	-202	-72%	Fail
CTC	20	388	415	-27	-7%	Pass	469	499	-30	-6%	Pass
CTC	20	306	272	35	13%	Pass	374	327	46	14%	Pass
CTC	20	201	378	-177	-47%	Fail	239	455	-217	-48%	Fail
CTC	20	29	211	-182	-86%	Fail	47	254	-207	-82%	Fail
CTC	20	397	339	58	17%	Pass	469	408	61	15%	Pass
CTC	21	231	47	184	389%	Fail	268	57	211	371%	Fail
CTC	21	119	105	14	13%	Pass	150	127	23	18%	Pass
CTC	21	151	129	21	17%	Pass	184	156	29	18%	Pass
CTC	22	147	167	-20	-12%	Pass	180	201	-22	-11%	Pass
CTC	22	793	652	140	22%	Fail	946	785	161	20%	Fail
CTC	22	710	714	-4	-1%	Pass	854	860	-6	-1%	Pass
CTC	22	229	166	63	38%	Pass	265	200	65	33%	Pass
CTC	22	703	672	31	5%	Pass	850	809	41	5%	Pass
CTC	23	588	579	9	2%	Pass	707	697	10	1%	Pass
CTC	23	144	224	-80	-36%	Pass	170	270	-100	-37%	Fail
CTC	23	608	637	-29	-5%	Pass	745	767	-22	-3%	Pass
CTC	23	712	717	-5	-1%	Pass	865	863	2	0%	Pass
CTC	24	509	540	-31	-6%	Pass	607	650	-43	-7%	Pass
CTC	24	597	567	30	5%	Pass	729	682	46	7%	Pass
CTC	24	484	503	-19	-4%	Pass	583	605	-23	-4%	Pass
CTC	24	486	492	-6	-1%	Pass	580	592	-12	-2%	Pass
CTC	24	543	420	123	29%	Fail	646	506	140	28%	Fail

Table A2. Individual count performance in PM peak - Post ME

Source	Count ID	Car					Total Vehicles				
		Modelled Flow	Observed Flow	Diff	% Diff	TAG Criteria	Modelled Flow	Observed Flow	Diff	% Diff	TAG Criteria
GM	60	464	463	1	0%	Pass	514	509	5	1%	Pass
GM	61	483	490	-7	-1%	Pass	520	522	-2	0%	Pass
GM	62	191	194	-3	-2%	Pass	207	216	-9	-4%	Pass
GM	63	536	549	-13	-2%	Pass	596	610	-14	-2%	Pass
GM	64	68	137	-69	-50%	Pass	76	155	-79	-51%	Pass
GM	65	1,939	1,805	134	7%	Pass	2,302	2,065	237	11%	Pass
GM	66	482	487	-5	-1%	Pass	531	528	3	1%	Pass
GM	67	483	484	-1	0%	Pass	514	514	0	0%	Pass
GM	68	605	610	-5	-1%	Pass	659	656	3	1%	Pass
GM	69	537	540	-3	-1%	Pass	579	574	5	1%	Pass
GM	70	248	248	0	0%	Pass	264	261	3	1%	Pass

Source	Count ID	Car					Total Vehicles				
		Modelled Flow	Observed Flow	Diff	% Diff	TAG Criteria	Modelled Flow	Observed Flow	Diff	% Diff	TAG Criteria
GM	71	738	735	3	0%	Pass	834	803	31	4%	Pass
GM	72	118	120	-2	-2%	Pass	127	126	1	1%	Pass
GM	73	358	414	-56	-14%	Pass	397	444	-47	-11%	Pass
GM	74	699	1,059	-360	-34%	Fail	810	1,163	-353	-30%	Fail
GM	75	388	549	-161	-29%	Fail	434	595	-161	-27%	Fail
GM	76	630	665	-35	-5%	Pass	681	717	-36	-5%	Pass
GM	77	302	310	-8	-3%	Pass	326	341	-15	-4%	Pass
GM	78	709	658	51	8%	Pass	804	736	68	9%	Pass
GM	79	219	193	26	13%	Pass	238	205	33	16%	Pass
GM	81	462	491	-29	-6%	Pass	502	529	-27	-5%	Pass
GM	82	311	309	2	1%	Pass	352	346	6	2%	Pass
GM	83	690	707	-17	-2%	Pass	795	751	44	6%	Pass
GM	84	417	409	8	2%	Pass	449	440	9	2%	Pass
GM	85	327	326	1	0%	Pass	344	342	2	1%	Pass
GM	86	991	971	20	2%	Pass	1,110	1,057	53	5%	Pass
GM	87	202	202	0	0%	Pass	222	218	4	2%	Pass
GM	88	606	632	-26	-4%	Pass	645	676	-31	-5%	Pass
GM	89	950	1,232	-282	-23%	Fail	1,087	1,373	-286	-21%	Fail
GM	276	2,276	2,515	-239	-10%	Pass	2,703	2,909	-206	-7%	Pass
GM	277	1,788	1,555	233	15%	Pass	2,088	1,740	348	20%	Fail
GM	477	225	225	0	0%	Pass	254	254	0	0%	Pass
GM	479	315	315	0	0%	Pass	366	368	-2	-1%	Pass
GM	543	427	427	0	0%	Pass	465	472	-7	-1%	Pass
GM	544	113	107	6	6%	Pass	135	130	5	4%	Pass
GM	547	148	148	0	0%	Pass	172	165	7	4%	Pass
GM	548	203	205	-2	-1%	Pass	233	235	-2	-1%	Pass
GM	549	323	323	0	0%	Pass	362	362	0	0%	Pass
GM	551	282	280	2	1%	Pass	318	316	2	1%	Pass
GM	614	522	509	13	2%	Pass	581	569	12	2%	Pass
GM	615	86	85	1	1%	Pass	104	102	2	2%	Pass
GM	618	220	161	59	36%	Pass	252	170	82	48%	Pass
GM	619	270	337	-67	-20%	Pass	311	388	-77	-20%	Pass
WebTRIS	9036/2	1,623	1,622	1	0%	Pass	2,131	2,111	20	1%	Pass
WebTRIS	9036/1	813	1,420	-607	-43%	Fail	870	1,524	-654	-43%	Fail
WebTRIS	9037/2	2,219	2,223	-4	0%	Pass	2,710	2,694	16	1%	Pass
WebTRIS	9037/1	1,494	1,527	-33	-2%	Pass	1,802	1,747	55	3%	Pass
WebTRIS	8539/2	2,661	2,838	-177	-6%	Pass	3,396	3,446	-50	-1%	Pass
WebTRIS	8539/1	608	618	-10	-2%	Pass	680	689	-9	-1%	Pass
WebTRIS	8541/1	2,535	2,534	1	0%	Pass	3,319	3,672	-353	-10%	Pass
WebTRIS	M61/2061A	3,106	3,615	-509	-14%	Fail	4,011	4,510	-499	-11%	Fail
WebTRIS	M61/2052B	2,599	2,582	17	1%	Pass	3,723	3,803	-80	-2%	Pass
WebTRIS	M61/2044B	2,410	2,786	-376	-14%	Pass	3,416	3,425	-9	0%	Pass
WebTRIS	M61/2030K	2,532	2,836	-304	-11%	Pass	3,205	3,389	-184	-5%	Pass

Source	Count ID	Car					Total Vehicles				
		Modelled Flow	Observed Flow	Diff	% Diff	TAG Criteria	Modelled Flow	Observed Flow	Diff	% Diff	TAG Criteria
WebTRIS	M60/9228A	4,050	4,995	-945	-19%	Fail	6,206	6,045	161	3%	Pass
WebTRIS	M60/9239B	2,247	2,250	-4	0%	Pass	4,030	4,797	-766	-16%	Fail
WebTRIS	M60/9242A	2,247	1,536	711	46%	Fail	3,791	3,838	-46	-1%	Pass
WebTRIS	M60/9257A	4,277	4,270	7	0%	Pass	6,429	6,514	-85	-1%	Pass
WebTRIS	M60/9257B	4,303	4,303	0	0%	Pass	6,721	6,866	-145	-2%	Pass
WebTRIS	M60/9270B	4,990	4,986	4	0%	Pass	7,512	7,330	183	2%	Pass
WebTRIS	M60/9272A	4,873	4,875	-1	0%	Pass	7,149	7,488	-339	-5%	Pass
WebTRIS	M61/2010A	1249	1,249	0	0%	Pass	1,528	1,527	1	0%	Pass
WebTRIS	M61/5202B	1,384	1,382	2	0%	Pass	2,330	2,599	-269	-10%	Pass
WebTRIS	M61/5205A	1,803	1,800	3	0%	Pass	2,415	2,892	-477	-17%	Fail
WIGAN_WebTRIS	M61/5218A	3,314	3,317	-2	0%	Pass	4,495	6,023	-1528	-25%	Fail
WIGAN_WebTRIS	M61/2031M	286	286	1	0%	Pass	487	519	-31	-6%	Pass
WIGAN_WebTRIS	M61/5222B	1,261	1,261	0	0%	Pass	1,850	2,291	-441	-19%	Fail
WIGAN_WebTRIS	M61/2031L	1,894	1,883	11	1%	Pass	2,759	3,419	-660	-19%	Fail
WIGAN_WebTRIS	M61/2035B	516	422	93	22%	Pass	657	767	-110	-14%	Pass
WIGAN_WebTRIS	M61/2044L	189	186	3	1%	Pass	307	339	-32	-9%	Pass
WIGAN_WebTRIS	8540/2	2,938	2,448	490	20%	Fail	3,714	4,444	-730	-16%	Fail
WIGAN_WebTRIS	8540/1	565	562	3	1%	Pass	710	1,020	-310	-30%	Fail
WIGAN_WebTRIS	M61 SBbound within J4	2,182	2,176	6	0%	Pass	3,209	3,951	-742	-19%	Fail
WIGAN_WebTRIS	M61 J4 SBbound exit	697	496	201	41%	Fail	835	900	-65	-7%	Pass
WIGAN_NDC	Site 43 Watergate Lane _NB	872	1,114	-242	-22%	Fail	1,004	1,206	-202	-17%	Fail
WIGAN_NDC	Site 45A Snydale Way _NB	896	956	-60	-6%	Pass	1125	1,087	38	3%	Pass
WIGAN_NDC	Site 45B Snydale Way _SB	1,046	1,012	34	3%	Pass	1167	1,140	27	2%	Pass
WIGAN_NDC	Site 46 Park Road _EB	726	774	-48	-6%	Pass	789	827	-38	-5%	Pass
WIGAN_NDC	Site 47 A579 Newbrook Road _NB	501	447	53	12%	Pass	597	489	108	22%	Pass
WIGAN_NDC	Site 48 B5239 Dicconson Lane _EB	520	519	1	0%	Pass	564	562	2	0%	Pass
WIGAN_NDC	Site 49 A6027 De Havilland Way _NB	1,053	1,039	14	1%	Pass	1,241	1,228	14	1%	Pass
WIGAN_NDC	Site 50 B5238 Scot Lane _NB	342	340	2	1%	Pass	393	375	18	5%	Pass
WIGAN_NDC	Site 10 Hindley Road _WB	324	317	7	2%	Pass	359	354	5	1%	Pass
WIGAN_NDC	Site 11 A58 Wigan Road _WB	413	413	0	0%	Pass	467	467	0	0%	Pass
WIGAN_NDC	Site 10 Hindley Road _EB	295	298	-3	-1%	Pass	320	323	-3	-1%	Pass
WIGAN_NDC	Site 11 A58 Wigan Road _EB	312	309	2	1%	Pass	360	343	17	5%	Pass
WIGAN_NDC	Site 43 Watergate Lane _SB	892	795	97	12%	Pass	1048	894	154	17%	Pass

Source	Count ID	Car					Total Vehicles				
		Modelled Flow	Observed Flow	Diff	% Diff	TAG Criteria	Modelled Flow	Observed Flow	Diff	% Diff	TAG Criteria
WIGAN_ND C	Site 46 Park Road _WB	1,015	1,024	-9	-1%	Pass	1,114	1,123	-10	-1%	Pass
WIGAN_ND C	Site 47 A579 Newbrook Road _SB	882	857	25	3%	Pass	1054	941	113	12%	Pass
WIGAN_ND C	Site 48 B5239 Dicconson Lane _WB	771	752	19	3%	Pass	855	826	29	3%	Pass
WIGAN_ND C	Site 49 A6027 De Havilland Way _SB	1,695	1,648	47	3%	Pass	1,961	1,905	56	3%	Pass
WIGAN_ND C	Site 50 B5238 Scot Lane _SB	565	578	-13	-2%	Pass	614	627	-13	-2%	Pass
C2	1068_SW	1,306	1,310	-4	0%	Pass	1,560	1,577	-17	-1%	Pass
C2	1471_N	716	648	68	10%	Pass	858	780	78	10%	Pass
C2	1454_N	2,139	2,005	134	7%	Pass	2,549	2,413	135	6%	Pass
C2	1071_NE	705	680	25	4%	Pass	845	818	27	3%	Pass
C2	1072_W	671	668	3	0%	Pass	773	804	-31	-4%	Pass
C2	1470_W	939	945	-7	-1%	Pass	1125	1138	-13	-1%	Pass
C2	1259_NW	1,851	2,050	-199	-10%	Pass	2,212	2,428	-216	-9%	Pass
C2	1068_NE	861	887	-26	-3%	Pass	1,047	1,067	-21	-2%	Pass
C2	1471_S	782	896	-114	-13%	Pass	908	1079	-170	-16%	Fail
C2	1454_S	2,100	2,076	24	1%	Pass	2,448	2,499	-52	-2%	Pass
C2	1071_SW	899	888	11	1%	Pass	1,074	1,069	6	1%	Pass
C2	1072_E	656	666	-10	-1%	Pass	730	801	-71	-9%	Pass
C2	1470_E	845	778	67	9%	Pass	999	937	62	7%	Pass
C2	1259_SE	2,055	2,014	40	2%	Pass	2,434	2,386	48	2%	Pass
C2	1121_N	0	73	-73	-100%	Pass	0	88	-88	-100%	Pass
C2	2333_E	208	233	-24	-10%	Pass	250	280	-31	-11%	Pass
C2	2050_E	284	412	-127	-31%	Fail	321	495	-174	-35%	Fail
C2	255_N	141	138	3	2%	Pass	169	165	4	2%	Pass
C2	2536_N	381	368	13	3%	Pass	456	443	13	3%	Pass
C2	2325_E	66	70	-4	-6%	Pass	76	84	-9	-10%	Pass
C2	2324_N	247	242	5	2%	Pass	285	291	-6	-2%	Pass
C2	2326_N	609	581	29	5%	Pass	728	699	29	4%	Pass
C2	2665_N	537	511	26	5%	Pass	641	615	26	4%	Pass
C2	2572_N	378	381	-3	-1%	Pass	446	458	-12	-3%	Pass
C2	2537_E	417	411	7	2%	Pass	488	494	-6	-1%	Pass
C2	2002_N	127	129	-2	-1%	Pass	147	155	-8	-5%	Pass
C2	2018_N	213	223	-11	-5%	Pass	257	269	-12	-5%	Pass
C2	2004_N	124	132	-8	-6%	Pass	145	159	-14	-9%	Pass
C2	2049_N	406	412	-6	-1%	Pass	489	495	-6	-1%	Pass
C2	2329_N	197	198	-1	0%	Pass	227	238	-11	-5%	Pass
C2	2761_E	217	219	-3	-1%	Pass	250	264	-14	-5%	Pass
C2	1254_E	304	304	0	0%	Pass	349	367	-18	-5%	Pass
C2	203_N	0	24	-24	-100%	Pass	0	28	-28	-100%	Pass
C2	2578_E	160	159	1	1%	Pass	183	191	-8	-4%	Pass
C2	2660_N	499	507	-8	-2%	Pass	591	611	-19	-3%	Pass
C2	1124_E	191	167	23	14%	Pass	218	201	17	9%	Pass

Source	Count ID	Car					Total Vehicles				
		Modelled Flow	Observed Flow	Diff	% Diff	TAG Criteria	Modelled Flow	Observed Flow	Diff	% Diff	TAG Criteria
C2	519_N	497	514	-18	-3%	Pass	539	614	-75	-12%	Pass
C2	2576_E	237	230	7	3%	Pass	270	277	-7	-2%	Pass
C2	521_S	1,027	1,025	2	0%	Pass	1,226	1,224	2	0%	Pass
C2	520_N	381	381	1	0%	Pass	467	455	13	3%	Pass
C2	545_W	156	154	2	1%	Pass	184	184	0	0%	Pass
C2	2581_E	400	398	2	0%	Pass	500	480	21	4%	Pass
C2	524_N	729	716	13	2%	Pass	859	848	11	1%	Pass
C2	1121_S	0	44	-44	-100%	Pass	0	52	-52	-100%	Pass
C2	2333_W	439	273	166	61%	Fail	518	329	189	58%	Fail
C2	2050_W	179	433	-255	-59%	Fail	210	522	-311	-60%	Fail
C2	255_S	242	217	25	11%	Pass	290	259	31	12%	Pass
C2	2536_S	183	165	17	11%	Pass	218	199	19	10%	Pass
C2	2325_W	144	74	70	94%	Pass	158	89	69	77%	Pass
C2	2324_S	266	290	-24	-8%	Pass	316	349	-33	-10%	Pass
C2	2326_S	533	413	120	29%	Fail	630	497	133	27%	Fail
C2	2665_S	620	423	197	46%	Fail	718	509	209	41%	Fail
C2	2572_S	707	653	54	8%	Pass	833	786	47	6%	Pass
C2	2537_W	456	448	8	2%	Pass	533	539	-6	-1%	Pass
C2	2002_S	65	65	-1	-1%	Pass	75	79	-4	-5%	Pass
C2	2018_S	473	469	5	1%	Pass	570	564	7	1%	Pass
C2	2004_S	83	87	-4	-4%	Pass	96	105	-9	-8%	Pass
C2	2049_S	425	433	-8	-2%	Pass	512	522	-9	-2%	Pass
C2	2329_S	101	155	-54	-35%	Pass	114	187	-72	-39%	Pass
C2	2761_W	247	259	-12	-5%	Pass	285	311	-26	-9%	Pass
C2	1254_W	279	279	0	0%	Pass	336	336	0	0%	Pass
C2	203_S	16	16	0	2%	Pass	18	19	-1	-4%	Pass
C2	2578_W	129	127	2	2%	Pass	149	152	-4	-2%	Pass
C2	2660_S	385	364	21	6%	Pass	463	438	25	6%	Pass
C2	1124_W	155	207	-52	-25%	Pass	174	248	-74	-30%	Pass
C2	519_S	410	454	-44	-10%	Pass	489	543	-54	-10%	Pass
C2	2576_W	362	363	-1	0%	Pass	395	437	-42	-10%	Pass
C2	2581_W	318	285	33	12%	Pass	400	343	57	17%	Pass
C2	524_S	416	416	0	0%	Pass	493	493	0	0%	Pass
CTC	1	425	395	30	8%	Pass	500	475	25	5%	Pass
CTC	1	501	416	85	20%	Pass	597	514	83	16%	Pass
CTC	1	248	441	-192	-44%	Fail	325	531	-206	-39%	Fail
CTC	1	296	427	-131	-31%	Fail	402	528	-127	-24%	Fail
CTC	1	882	878	4	0%	Pass	1,054	1,057	-2	0%	Pass
CTC	1	224	377	-153	-41%	Fail	274	454	-180	-40%	Fail
CTC	2	224	412	-188	-46%	Fail	274	496	-221	-45%	Fail
CTC	2	767	733	33	5%	Pass	912	883	29	3%	Pass
CTC	2	248	483	-234	-49%	Fail	325	581	-256	-44%	Fail
CTC	3	571	573	-1	0%	Pass	692	689	2	0%	Pass

Source	Count ID	Car					Total Vehicles				
		Modelled Flow	Observed Flow	Diff	% Diff	TAG Criteria	Modelled Flow	Observed Flow	Diff	% Diff	TAG Criteria
CTC	3	967	974	-8	-1%	Pass	1,105	1,173	-68	-6%	Pass
CTC	3	416	421	-4	-1%	Pass	514	506	7	1%	Pass
CTC	4	657	765	-108	-14%	Pass	788	920	-133	-14%	Pass
CTC	4	649	532	117	22%	Pass	764	640	125	19%	Pass
CTC	4	306	296	10	3%	Pass	381	356	25	7%	Pass
CTC	4	901	963	-62	-6%	Pass	1,102	1,159	-57	-5%	Pass
CTC	5	355	289	66	23%	Pass	442	348	94	27%	Pass
CTC	5	279	285	-7	-2%	Pass	323	343	-21	-6%	Pass
CTC	5	384	514	-130	-25%	Fail	486	618	-132	-21%	Fail
CTC	5	292	323	-31	-10%	Pass	358	388	-31	-8%	Pass
CTC	6	471	555	-84	-15%	Pass	581	668	-87	-13%	Pass
CTC	6	420	494	-74	-15%	Pass	512	595	-82	-14%	Pass
CTC	6	675	654	21	3%	Pass	807	787	20	3%	Pass
CTC	6	606	597	9	1%	Pass	718	719	-1	0%	Pass
CTC	7	145	50	94	188%	Pass	174	60	114	189%	Fail
CTC	7	542	606	-64	-11%	Pass	655	730	-75	-10%	Pass
CTC	7	675	545	131	24%	Fail	806	656	150	23%	Fail
CTC	8	421	343	78	23%	Pass	504	413	91	22%	Pass
CTC	8	587	632	-45	-7%	Pass	709	760	-52	-7%	Pass
CTC	8	254	225	30	13%	Pass	302	270	31	12%	Pass
CTC	8	279	247	32	13%	Pass	330	297	33	11%	Pass
CTC	9	440	445	-5	-1%	Pass	510	536	-26	-5%	Pass
CTC	9	308	400	-92	-23%	Pass	379	482	-103	-21%	Pass
CTC	9	266	147	120	82%	Fail	319	176	143	81%	Fail
CTC	10	66	58	8	14%	Pass	77	70	7	10%	Pass
CTC	10	479	443	35	8%	Pass	558	533	25	5%	Pass
CTC	10	135	130	5	4%	Pass	159	156	3	2%	Pass
CTC	10	377	378	0	0%	Pass	449	454	-6	-1%	Pass
CTC	10	243	207	37	18%	Pass	288	249	39	16%	Pass
CTC	11	416	468	-52	-11%	Pass	500	563	-63	-11%	Pass
CTC	11	37	28	9	32%	Pass	43	33	9	28%	Pass
CTC	11	380	318	62	19%	Pass	456	383	72	19%	Pass
CTC	11	314	296	18	6%	Pass	379	357	22	6%	Pass
CTC	12	452	480	-28	-6%	Pass	543	578	-35	-6%	Pass
CTC	12	158	183	-25	-13%	Pass	176	220	-45	-20%	Pass
CTC	12	324	286	38	13%	Pass	391	345	46	13%	Pass
CTC	12	223	258	-36	-14%	Pass	247	311	-64	-20%	Pass
CTC	12	323	504	-181	-36%	Fail	393	607	-214	-35%	Fail
CTC	13	432	375	57	15%	Pass	509	451	58	13%	Pass
CTC	13	650	637	14	2%	Pass	781	766	15	2%	Pass
CTC	13	443	362	81	22%	Pass	520	436	84	19%	Pass
CTC	14	645	682	-37	-5%	Pass	775	820	-45	-5%	Pass
CTC	14	443	402	41	10%	Pass	520	484	35	7%	Pass

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CTC	14	215	238	-23	-10%	Pass	287	286	0	0%	Pass
CTC	14	445	419	26	6%	Pass	539	504	35	7%	Pass
CTC	14	650	691	-41	-6%	Pass	781	832	-51	-6%	Pass
CTC	14	207	191	16	9%	Pass	261	230	32	14%	Pass
CTC	15	690	701	-11	-2%	Pass	824	843	-20	-2%	Pass
CTC	15	167	238	-71	-30%	Pass	199	286	-87	-31%	Pass
CTC	15	445	486	-40	-8%	Pass	539	585	-45	-8%	Pass
CTC	15	302	313	-11	-4%	Pass	367	377	-10	-3%	Pass
CTC	15	515	592	-77	-13%	Pass	630	712	-82	-12%	Pass
CTC	15	165	247	-82	-33%	Pass	196	298	-102	-34%	Fail
CTC	15	645	672	-27	-4%	Pass	775	809	-33	-4%	Pass
CTC	15	279	227	52	23%	Pass	327	273	54	20%	Pass
CTC	16	361	268	93	35%	Pass	424	323	101	31%	Fail
CTC	16	100	89	11	13%	Pass	119	107	12	11%	Pass
CTC	16	376	406	-30	-7%	Pass	458	489	-31	-6%	Pass
CTC	16	408	433	-25	-6%	Pass	497	521	-24	-5%	Pass
CTC	16	285	248	37	15%	Pass	329	298	31	10%	Pass
CTC	17	390	432	-42	-10%	Pass	475	520	-45	-9%	Pass
CTC	17	413	386	27	7%	Pass	494	465	29	6%	Pass
CTC	17	430	491	-61	-12%	Pass	513	591	-79	-13%	Pass
CTC	17	259	266	-7	-3%	Pass	307	320	-13	-4%	Pass
CTC	17	557	598	-40	-7%	Pass	668	719	-51	-7%	Pass
CTC	18	417	466	-49	-10%	Pass	506	560	-54	-10%	Pass
CTC	18	519	508	12	2%	Pass	628	611	17	3%	Pass
CTC	18	247	247	0	0%	Pass	300	298	3	1%	Pass
CTC	18	621	589	32	6%	Pass	762	709	53	7%	Pass
CTC	18	322	240	82	34%	Pass	379	289	91	31%	Pass
CTC	19	792	768	23	3%	Pass	946	925	21	2%	Pass
CTC	19	320	321	-1	0%	Pass	383	386	-3	-1%	Pass
CTC	19	424	439	-15	-3%	Pass	512	529	-17	-3%	Pass
CTC	19	678	694	-16	-2%	Pass	817	836	-19	-2%	Pass
CTC	19	202	174	27	16%	Pass	239	210	29	14%	Pass
CTC	19	656	660	-4	-1%	Pass	785	794	-9	-1%	Pass
CTC	20	392	377	15	4%	Pass	471	453	17	4%	Pass
CTC	20	254	423	-169	-40%	Fail	303	509	-206	-41%	Fail
CTC	20	132	169	-37	-22%	Pass	151	204	-53	-26%	Pass
CTC	20	412	411	1	0%	Pass	492	495	-3	-1%	Pass
CTC	20	227	228	-1	0%	Pass	268	274	-5	-2%	Pass
CTC	20	317	324	-6	-2%	Pass	374	390	-15	-4%	Pass
CTC	20	25	225	-200	-89%	Fail	28	270	-242	-90%	Fail
CTC	20	621	604	17	3%	Pass	746	727	19	3%	Pass
CTC	21	53	44	8	18%	Pass	59	54	5	10%	Pass
CTC	21	202	92	111	121%	Fail	224	110	114	103%	Fail

Source	Count ID	Car					Total Vehicles				
		Modelled Flow	Observed Flow	Diff	% Diff	TAG Criteria	Modelled Flow	Observed Flow	Diff	% Diff	TAG Criteria
CTC	21	153	134	18	14%	Pass	166	161	5	3%	Pass
CTC	22	146	189	-43	-23%	Pass	158	227	-70	-31%	Pass
CTC	22	762	750	11	2%	Pass	907	903	3	0%	Pass
CTC	22	662	687	-25	-4%	Pass	808	827	-19	-2%	Pass
CTC	22	45	158	-113	-71%	Fail	50	190	-140	-74%	Fail
CTC	22	758	757	1	0%	Pass	910	911	-1	0%	Pass
CTC	23	720	736	-16	-2%	Pass	842	886	-44	-5%	Pass
CTC	23	195	199	-4	-2%	Pass	229	239	-10	-4%	Pass
CTC	23	475	526	-51	-10%	Pass	581	633	-53	-8%	Pass
CTC	23	550	574	-25	-4%	Pass	669	691	-22	-3%	Pass
CTC	24	639	668	-28	-4%	Pass	760	804	-44	-5%	Pass
CTC	24	577	575	3	0%	Pass	696	692	4	1%	Pass
CTC	24	420	422	-2	0%	Pass	510	508	2	0%	Pass
CTC	24	530	555	-25	-5%	Pass	648	668	-20	-3%	Pass
CTC	24	610	610	1	0%	Pass	735	734	2	0%	Pass

