South Tyneside Local Plan Strategic Road Network
Reference number GB01T23B76 (AB.23.10)

17/11/2023

SOUTH TYNESIDE LOCAL PLAN STRATEGIC ROAD NETWORK MODEL

Model Development Report

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STRATEGIC ROAD NETWORK MODEL

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1	Author	Rebecca Windsor / Ajay Saxena	Consultant	22/09/2023	
	Checked by	Noema Azcona	Principal Consultant	22/09/2023	
	Approved by	Sandra Hill-Smith	Associate	17/11/2023	

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1. INTRODUCTION

1.1 Background

1.1.1 SYSTRA has previously undertaken network testing of regulation 18 Local Plan allocations provided by South Tyneside Council [STC] in 2021.

1.1.2 The A19 South Tyneside Aimsun Next model [A19ST18hy], calibrated to 2018 traffic flows, was used in that study. Potential infrastructure schemes at Jarrow and White Mare Pool were identified, tested and shown to address the majority of congestion up to 2032. By 2037 the identified schemes were no longer sufficient but the key constraint was identified as the capacity of the Tyne Tunnel so no further schemes were tested.

1.1.3 That study noted that adjusting modelled flows to take account of COVID impacts might extend the period for which the network continues to operate effectively with the current capacity for traffic crossing the Tyne. Since then, further evidence is available regarding the impacts: a drop in traffic flows in some locations, reduced traffic growth from original forecasts, and increased working from home over the long term which could reduce the amount of traffic generated by new development.

1.1.4 Since the previous studies, a number of highway improvements have been implemented across the network and their real world operation has been reviewed and utilised within the model. This includes the Arches gyratory, Testos and Downhill Lane major schemes, Mill Lane signals and widening of the A194 southbound to White Mare Pool.

1.1.5 Some of the developments which were considered as Local Plan have now gained consent and would be considered as committed, and some of the developments which were considered as committed have now been built.

1.1.6 STC has also identified a new set of Local Plan allocations which will be subject to regulation 19 consultation in 2024.

1.2 Model purpose

1.2.1 An updated A19 South Tyneside Aimsun Next model, referred to in this document as A19ST22hy, has been created using 2022 traffic data, and will be used to assess Local Plan impacts on the Strategic Road Network (SRN). This report documents the data and methodology used to update the base model for A19ST22hy.

1.3 Model area

1.3.1 The network area of the 2018 Aimsun base model remains unchanged, providing a focus on the area considered of most relevance to South Tyneside and National Highways. This cordoned model network is presented in Figure 1.1 below and broadly covers:

- A19 from south of the Downhill Lane junction to north of the Tyne Tunnel;
- A194 from the A185 in the north to south of Follingsby Lane junction in the south;
- A185 east of the A19;
- A184 between the White Mare Pool and Testos junctions; and
- Follingsby Lane between Downhill Lane and the Follingsby Lane junction of the A194(M).

Figure 1.1 Model extent

1.4 Software

1.4.1 Version 22.0.3 of Aimsun Next was used in the update, calibration and validation of the model.

1.5 Relevant guidance documents

1.5.1 The model update, calibration and validation for A19ST22hy was undertaken using guidance from Transport Analysis Guidance TAG, Unit M3.1, Highway Assignment Modelling (Department for Transport, May 2020).

1.6 Report structure

1.6.1 Following this introduction this report documents:

- Traffic survey data
- Network development
- Traffic demand
- Model calibration
- Model validation

1.7 Model reference table

1.7.1 Outline parameters of the model are provided in Table 1.1 for easy reference.

Table 1.1 A19ST22hy model reference table

ELEMENT	SPECIFICATION
Calibrated time periods	Average weekday AM (06:00-10:00) Average weekday PM (15:00-19:00)
Warm up/Cool down	Model includes an additional warm up (30 min) and cool down (30 min)
Simulation area	See Figure 1.1
Public transport	Bus services and stops from the parent model
Assignment	Stochastic Route Choice – average of 10 runs. 85% of vehicles following a path assignment generated by macro scenario, 15% following dynamic routing.
Model calibration	Junction Turning Count data (2022) TRIS counts (2022)
Model validation	TRIS journey times (2022)
Model level and type	Meso
Model name & parent	South Tyneside subnetwork (STsHy22) Parents: A19 Tyne & Wear model/2019 South Tyneside Infrastructure Study

2. TRAFFIC SURVEY DATA

2.1 Overview

2.1.1 This section describes the data used to update the model and traffic demand for A19ST22hy. The chapter also describes how the data was processed and verified for use in this model.

2.2 Commissioned data

Junction Turning Count 2022 surveys

2.2.1 Junction turning count surveys at the A19/A184 (Testos) and A19/A1290 (Downhill Lane) roundabouts were commissioned by IAMP LLP for development planning purposes. IAMP LLP has provided the data for use in this study. The counts were undertaken on the 7th December 2022.

2.2.2 The surveys covered the time period 06:00 to 19:00, with classifications of cars, light goods vehicles, heavy goods vehicles, buses, motorcycles and cyclists. Counts were recorded in 15-minute intervals and the locations are shown in Figure 2.1 below.

Junction Turning Count 2021 surveys

2.2.3 Junction turning count surveys at the A19/A194 (Lindisfarne) and A194/A184 (White Mare Pool) roundabouts were commissioned by National Highways for other studies and made available for the model update. The counts were undertaken on the 30th November 2021.

2.2.4 The surveys covered the time period 07:00 to 19:00, with classifications of cars, light goods vehicles, heavy goods vehicles, buses, motorcycles and cyclists.

2.2.5 However, the 2021 data was not used for the base model calibration as discussed further in section 2.4.

2.3 Non-commissioned data

2.3.1 Additional data was sourced to provide more information where no surveyed results were available. This additional data is described below.

Traffic Road Information System (TRIS) Link Counts

2.3.2 TRIS is a free-to-use database of Automatic Traffic Counter (ATC) data maintained by National Highways.

2.3.3 TRIS link count data was obtained where available for the SRN network in the A19ST22hy model scope. TRIS data was available at three locations along the A19 and one location along the A184. The location of the link counts is given below on Figure 2.1.

2.3.4 The data is presented in disaggregated vehicle counts of lengths 0-520cm (car), 521-660cm (light goods vehicles), 661-1160cm and 1160+cm (heavy goods vehicles), every 15 minutes.

2.3.5 Counts from the 7th December 2022 were selected to maintain consistency with the commissioned data.

Figure 2.1 Survey data locations

Signal data

2.3.6 Traffic signal information used in the A19ST22hy was adopted from the parent model. The locations of signalised junctions are shown in Figure 2.2.

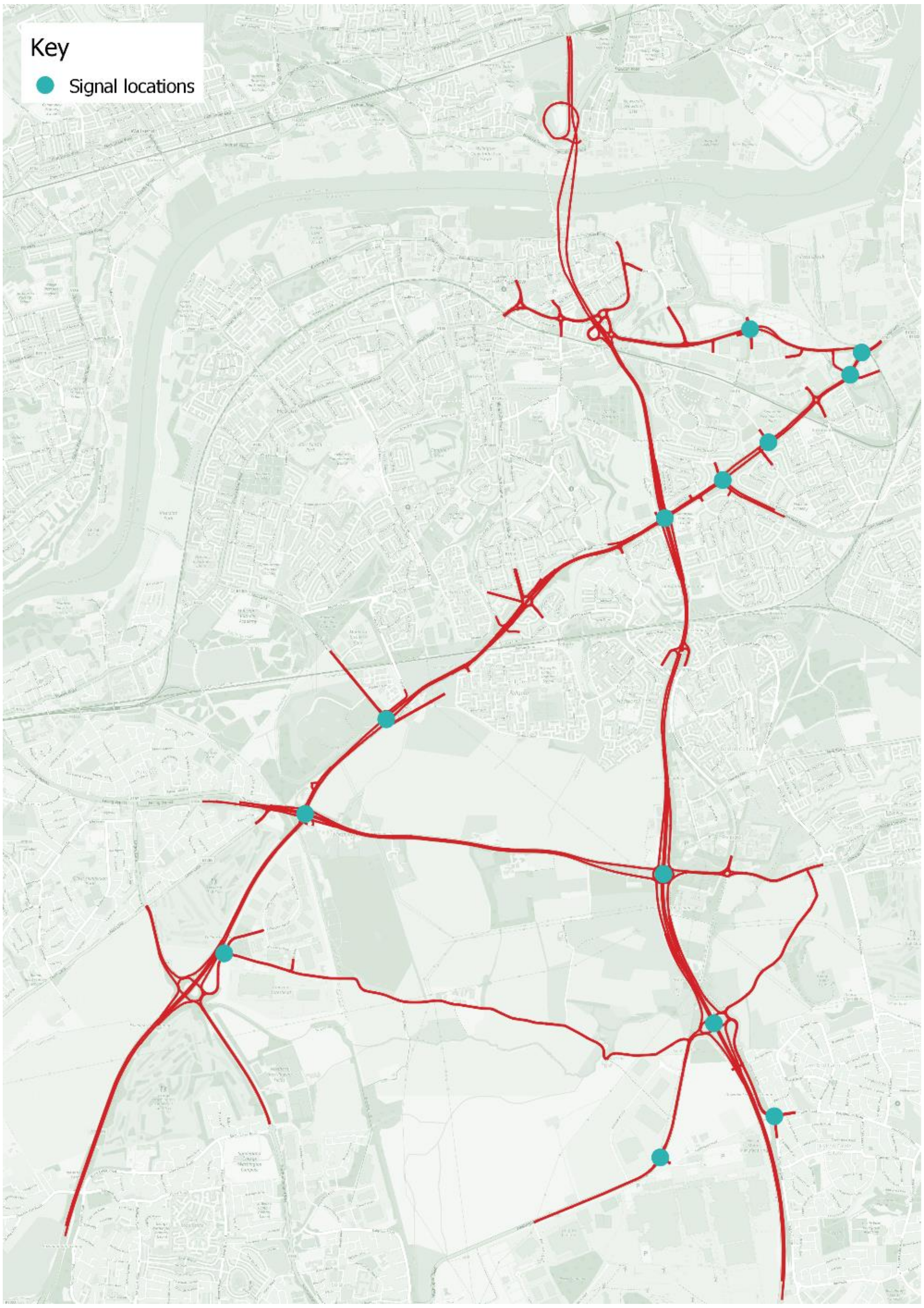

Figure 2.2 Signal locations

Public Transport

2.3.7 Public transport stops, routes, and timetables in the A19ST22hy were adopted from the parent model.

TRIS Journey times

2.3.8 Journey times were obtained from the National Highways TRIS database. Details of the data which was extracted are noted in Table 2.1. below, while the start and end points of the routes are shown in Figure 2.3.

Table 2.1 TRIS journey time details

ITEM	DETAILS
Dates	Non-holiday November 2022 Tuesday to Thursdays
Time Periods	Matching model simulation periods: 06:00-10:00 15:00-19:00
Vehicle classes	The journey times are an average of all the available data thus ‘all vehicles’ average.

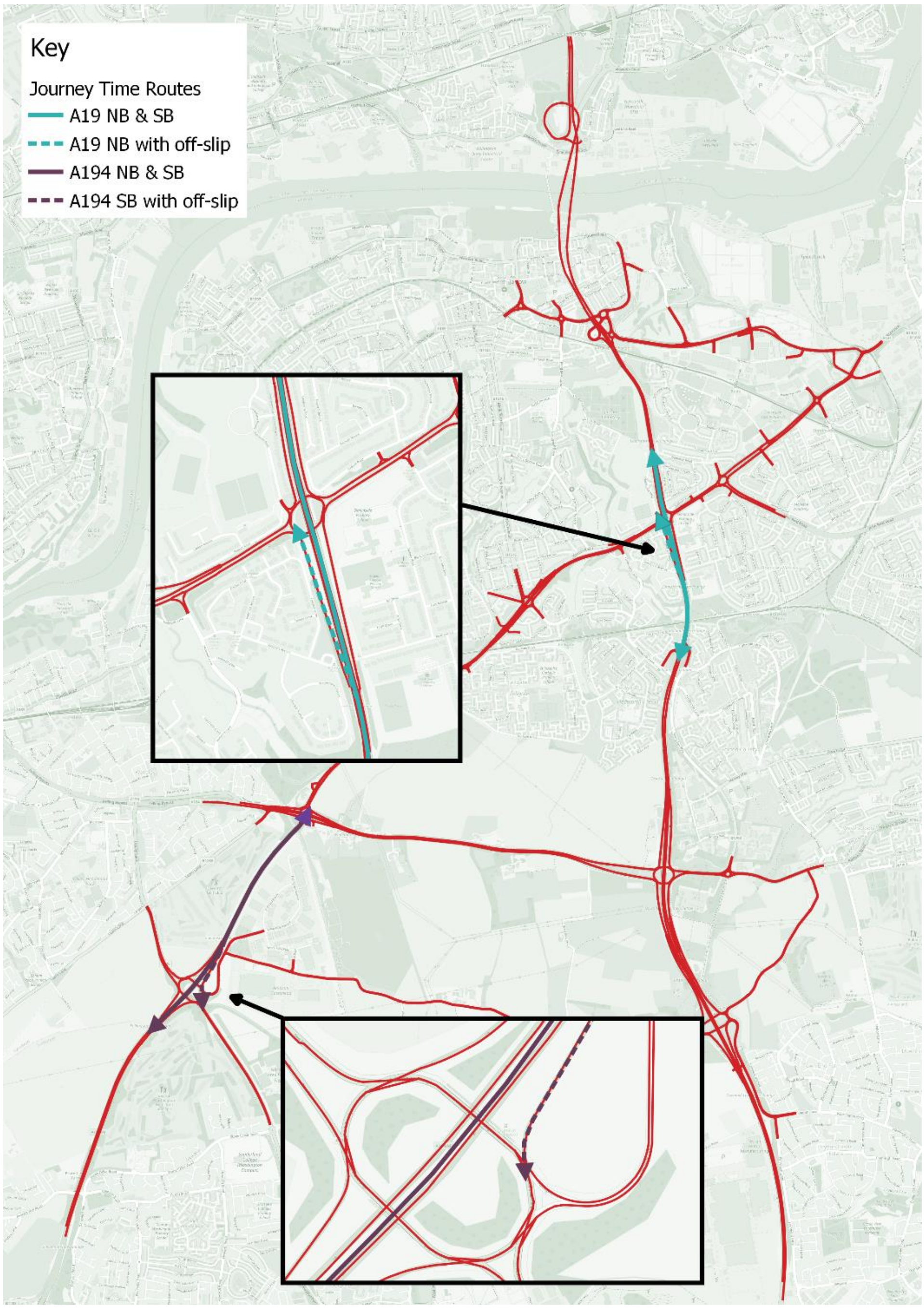

Figure 2.3 Journey time routes

2.4 Data checks and processing

2.4.1 The data accumulated for A19ST22hy was from different sources and for different years. Moreover, the commissioned data from 2022 was from November and December (considered non-neutral by TAG). The 2021 data was from a period when traffic patterns may still be disrupted due to COVID-19 related behavioural change. Hence, a comparison was conducted to check the representativeness of survey data and identification of the most appropriate base year.

2.4.2 A filter was applied to include only non-holiday Tuesday to Thursday data for all the analysis discussed in this section.

2.4.3 Historic TRIS data was analysed to identify the annual growth trend for the morning and evening model periods (06:00-10:00 and 15:00-19:00).

2.4.4 Sites 9346/1 (A19 southbound direction to the south of Downhill Lane junction) and 9770/1 (A19 northbound direction to the north of Testos roundabout) had TRIS data available for the years 2018, 2021, and 2022. Figure 2.4 shows flow for the morning and evening periods averaged for both sites by week and year.

2.4.5 Figure 2.4 demonstrates that 2021 flows are substantially lower than 2022, indicating the continued presence of COVID related disruptions in traffic patterns for that period. Hence commissioned data from 2021 is not used for A19ST22hy.

2.4.6 The 2022 surveys were conducted on 7th December, the 50th week of the year. Figure 2.5 shows the average flow for morning and evening periods by week in 2022 for the four TRIS sites available for this period. TAG prescribes neutral months, and suggests that flows from the months of November and December (included in the model) may not be representative. The chart demonstrates that the flows in the 50th week are reasonably representative of the peak flows from neutral months. Hence the 2022 commissioned data from December is considered to reflect typical 2022 traffic for the base model A19ST22hy.

2.5 Summary

2.5.1 Commissioned and non-commissioned data was used for the A19ST22hy model development. The data was checked to ensure consistency. Where discrepancies were identified, these were addressed such as with 2021 survey data. The TRIS analysis undertaken shows a drop in traffic for 2021, therefore 2021 survey data located at the A19/A194 (Lindisfarne) and A194/A184 (White Mare Pool) roundabouts was not used for the model calibration.

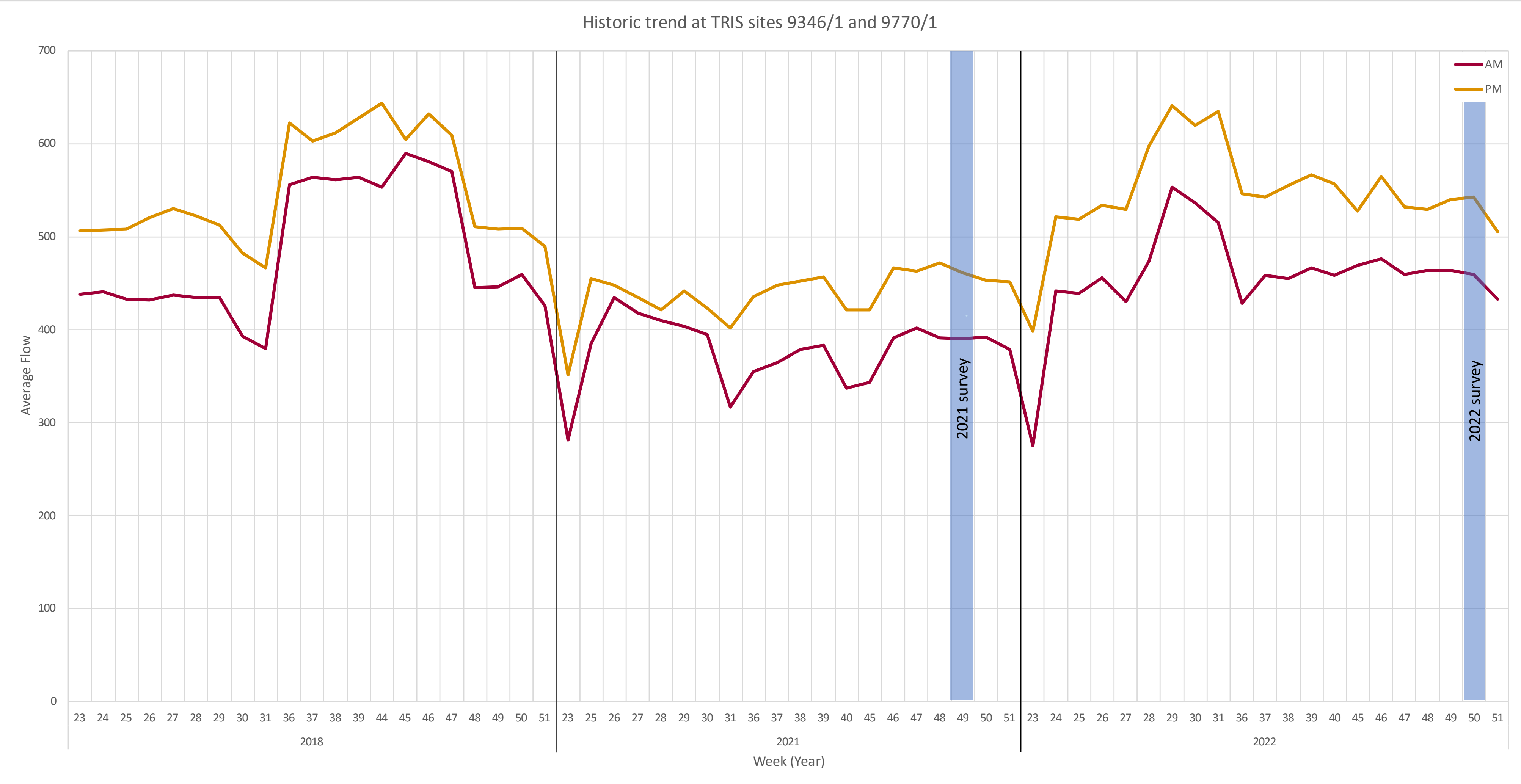

Figure 2.4 Historic traffic trend at TRIS sites 9346/1 and 9770/1– morning and evening periods

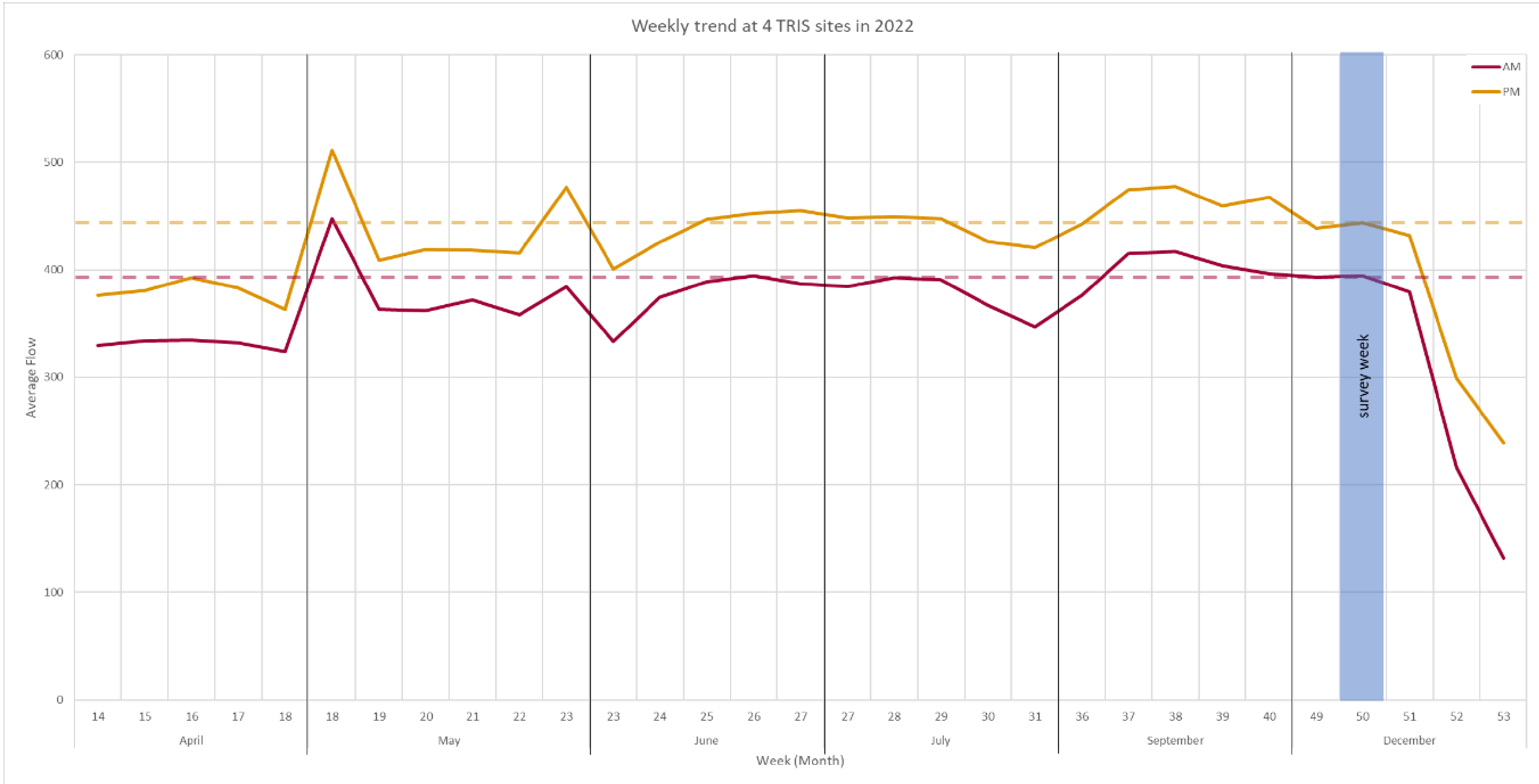

Figure 2.5 Average weekly flow at TRIS sites in 2022 – morning and evening periods

3. NETWORK DEVELOPMENT

3.1 Overview

3.1.1 This section details the process of coding the skeleton road network, including centroid (zone) system, network and road types, traffic signals and vehicle parameters.

3.2 Centroid system

3.2.1 Centroids within a traffic model provide loading points where traffic can enter or exit the model. In A19ST22hy, centroids were defined by the cordon taken from the wider model. A total of 53 centroids were used. These are presented in Figure 3.1.

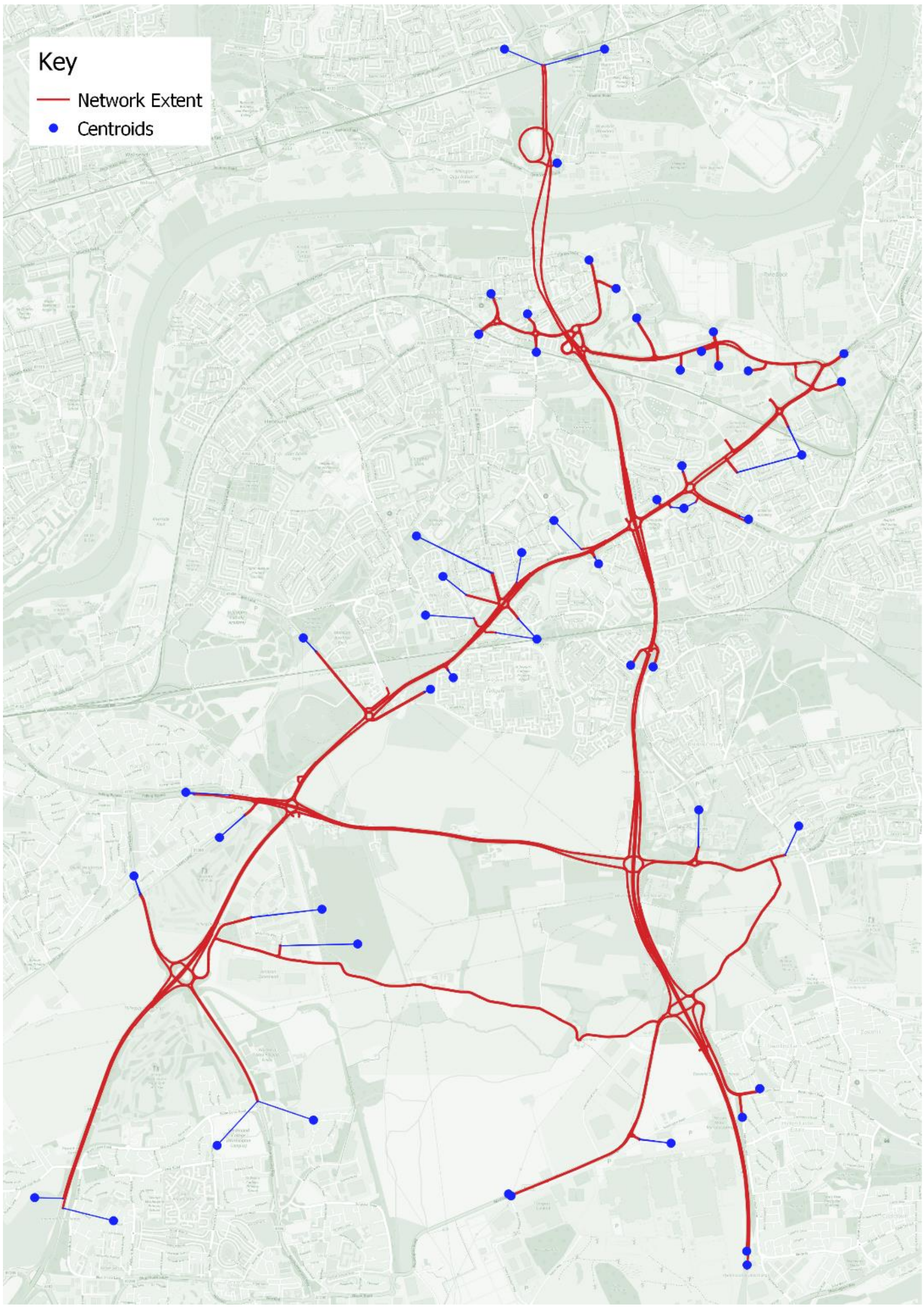

Figure 3.1 Centroid locations

3.3 Network and road types

3.3.1 A19ST22hy was developed using a methodology consistent with SYSTRA and industry best practice. Speed limits and road geometry were taken from the parent model and checked with online "site visits" and Open Street Map, supported by local knowledge. The model was reviewed in detail to ensure it operated appropriately at a mesoscopic level. While the A19ST22hy road network was inherited from the 2018 base model, any updates to the network between 2018 to 2022 have been captured in the base model, particularly grade separated junctions at Testos and Downhill Lane, signalisation at Mill Lane roundabout and traffic reorganisation at the Arches.

3.3.2 In Aimsun Next, the model is set up with road types which determine speed limit and cost (representing attractiveness of the road to drivers).

3.3.3 Additional road types were coded for merge and diverge, replicating those defined in DMRB document CD 122 – Geometric design of grade separated junctions.

3.4 Traffic signals

3.4.1 All signals within the model were coded as traffic lights with fixed or vehicle actuated timings for both periods.

3.4.2 Signal timings were obtained from the parent model which was built in 2018. Therefore, at certain locations, these were adjusted to give appropriate levels of queueing.

3.5 Road and vehicle parameters

3.5.1 Calibration parameters were kept at the default values except where guidance, research or experience suggested alternative values were more appropriate.

3.5.2 The key changes were:

- Roundabout and junction give way parameters were adjusted in certain locations where required, to reflect observed conditions and throughput.
- Look ahead distances, which affect when a vehicle considers changing lane before making a turn, were adjusted for relevant turns to reflect signage, lane markings and known driver behaviour.
- "Penalise shared lanes" was turned on in some locations to better reflect lane choice.
- "Penalise slow lanes" was turned on for dual carriageway links to improve lane usage.

3.6 Summary

3.6.1 The road network was coded to match the physical network as closely as possible. Each turn within a junction was coded separately, ensuring all priorities were correctly represented. Average time signal timings were developed to represent on site conditions.

4. TRAFFIC DEMAND

4.1 Overview

4.1.1 This section details development of the traffic demand. The vehicle types included in the model are described, along with their behaviour.

4.1.2 General traffic (cars, vans and heavy goods vehicles) was applied as a matrix, with a number of trips assigned to each origin-destination pair of centroids. The route each trip takes through the network was identified using Aimsun Next's routing models.

4.2 Vehicle parameters

4.2.1 Four vehicle types were used in the model: car, van, HGV and bus. A van was defined as a goods vehicle weighing less than 3.5 tons and an HGV was defined as a goods vehicle that weighs more than 3.5 tons.

4.2.2 Consistent with best practice, a distribution of maximum desired speeds was assigned using minimum, maximum, mean and standard deviation for each vehicle type. The length, width, speed limit acceptance, acceleration, headway and maximum give way time were specified in a similar manner. Values were taken from SYSTRA's internal guidance, based on published fleet data.

4.2.3 Since almost all heavy goods vehicles in the UK have a speed limiter fitted, the maximum speed for heavy goods vehicles was set to 56mph.

4.3 Routing parameters

4.3.1 Running an Aimsun micro or meso model dynamically (using Dynamic User Equilibrium) allows vehicles to reroute around congestion. While this is a powerful tool, it can lead to routing being too variable and similar scenarios having wildly different results due to rerouting. One way to "damp down" this rerouting is to use macroscopic or 'static' routes.

4.3.2 A macroscopic scenario was run to generate a path file. Then in the mesoscopic scenario, 85% of vehicles in the simulation were set to follow the paths from the 'static' macro scenario. The remaining 15% calculate the cost of routes available and update their route depending on congestion along the way. The 85/15 proportion is common practice and produced modelled flows with a good match to observed patterns.

4.4 Matrix development

4.4.1 The previous model's 2018 base year matrices were used as prior matrices and provided a 4-hour matrix for each period and each of the three vehicle types (cars, vans and HGVs). No matrix was required for buses as these are coded to fixed routes.

4.4.2 The 2018 matrix was adjusted within Aimsun Next to reflect 2022 traffic flows. Two data sources were used for the adjustment of traffic demand matrices:

- 2022 JTC data
- 2022 TRIS count data

4.4.3 Three independent stages were used to develop the demand. The process was undertaken for each of the matrices for the 3 vehicle types (cars, vans and HGVs) and each peak period (morning and evening). The stages are described below Figure 4.1.

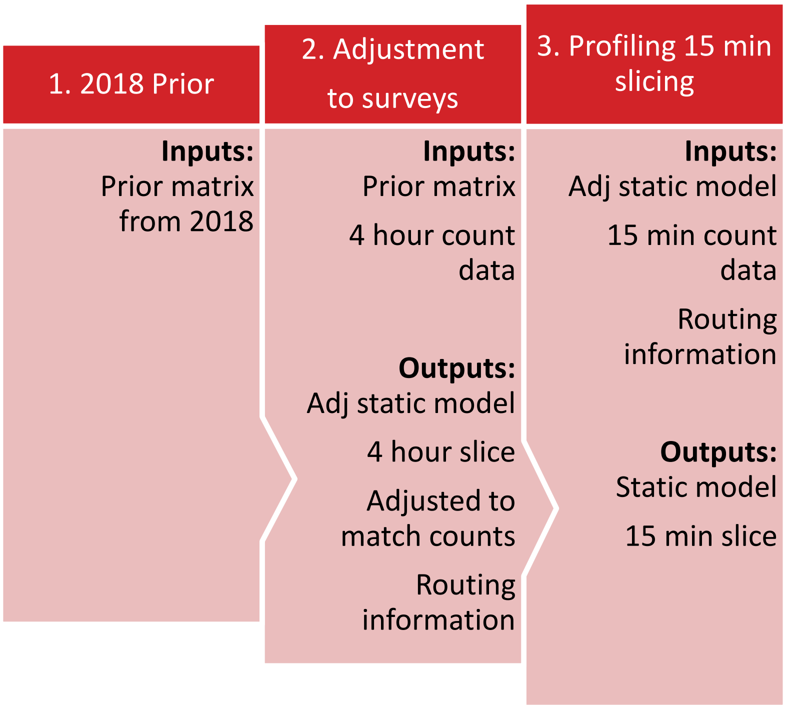

Figure 4.1 Demand development process summary

Stage 1. 2018 prior matrix

4.4.4 From the previous 2018 model, a prior matrix was obtained and used as a starting point for 2022 base matrix development.

Stage 2. Adjustment

4.4.5 A static OD adjustment (or estimation) was undertaken to take the 2018 matrices and uplift them to 2022 data. Outputs at this stage were a static model with a closer fit to the observed data. The routing information was also stored at this stage for later use.

Stage 3. Profiling and dynamic meso simulation scenario

4.4.6 The next stage was to convert the temporally flat demand into dynamic 15-minute slicing. To do this the adjusted static 1- hour demand from stage 3, the routing information and 15-minute counts were used with the Aimsun Next Departure Time Adjustment tool. This allows for the demand to be adjusted according to the travel time to the survey location so that traffic arrives at the survey site (by each movement) at the correct time interval.

4.4.7 Finally, the recorded route choice information and the 15-minute matrices were used to create a dynamic mesoscopic scenario which was run using Stochastic Route Choice (SRC) which allows traffic to divert around congestion.

4.4.8 For statistical robustness a total of 10 SRC runs were averaged and used to report any results. For link lengths over 50m in the model, the model output is considered stable in both the morning and evening periods.

4.5 A19ST22hy matrix summary

4.5.1 A summary of the A19ST22hy matrix totals is provided in Table 4.1 and Table 4.2 below.

Table 4.1 A19ST22hy matrix totals – morning peak period

Car	Van	HGV	Total
59,304	8,362	3,784	71,450

Table 4.2 A19ST22hy matrix totals – evening peak period

Car	Van	HGV	Total
69,520	6,922	2,345	78,786

4.5.2 As the mesoscopic model uses a profiled demand to incrementally build traffic to a peak, a warm-up period of 30 minutes was included before the model simulation period. This was calculated by using the Aimsun Next in-built warm-up generator.

4.5.3 A cool-down of 30 minutes was also applied to the demand matrices after the peak hours to ensure that trips which start within the peak hour can complete their trips allowing the model to report journey times. The warm-up and cool-down demands are not included in the above totals.

4.6 Summary

4.6.1 This section details the development of the base traffic demand for the A19 South Tyneside mesoscopic model, A19ST22hy.

4.6.2 For A19ST22hy, a 4-hour morning and evening demand covering cars, vans and heavy goods vehicles was developed with a 53-centroid configuration. Public transport was included in the form of fixed route buses.

5. MODEL CALIBRATION

5.1 Overview

5.1.1 Any adjustments to the model intended to reduce the differences between the modelled and observed data should be regarded as calibration. This section presents the results of the model calibration.

5.2 Calibration guidance

5.2.1 TAG is considered the industry standard for calibration and validation of most traffic models in the UK. There is currently no national guidance relating specifically to the development of micro or mesoscopic traffic models.

5.2.2 The calibration process was therefore undertaken using Transport Analysis Guidance (TAG, Unit M3.1), Highway Assignment Modelling (Department for Transport, May 2020) and supplementary advice from Traffic Appraisal in Urban Areas (DMRB Volume 12, Section 2, Part 1). Although the latter is now withdrawn, the checks it recommended provide additional confidence in the model.

5.2.3 To check the validity of a traffic model, TAG recommends the following comparisons should be made:

- Assigned flows and counts totalled for each screenline or cordon, as a check on the quality of the trip matrices.
- Assigned flows and counts on individual links and turning movements at junctions as a check on the quality of the assignment.
- Modelled and observed journey times along routes, as a check on the quality of the network and the assignment.

5.3 Trip matrix comparison

5.3.1 The first recommended check in TAG relates to the trip matrices. The measure which should be used is the percentage differences between modelled and observed flows at screenline level. The validation criterion and acceptability guideline for screenline flows are defined in Table 5.1.

Table 5.1 TAG M3.1 table

CRITERIA	ACCEPTABILITY GUIDELINE
Differences between modelled flows and counts should be less than 5% of the counts	All or nearly all screenlines

5.3.2 A19ST22hy contains limited route choice and is not complex enough to create any screenlines with more than 5 links, which is the recommended screenline criteria. The screenline checks were therefore considered irrelevant for A19ST22hy.

5.4 Assigned flow and count comparison

5.4.1 TAG recommends that assigned flows are compared to recorded observed counts using two different analytical methods:

- Flow criteria (absolute and percentage difference relative to flow per hour).
- The GEH statistic (a form of the chi-squared statistic that incorporates both relative and absolute difference).

5.4.2 TAG unit M3.1, section 3.3.12 recommends each time period (morning and evening peak) is compared independently. These comparisons are described in Table 5.2 below.

Table 5.2 TAG M3.1 table 2

CRITERIA	DESCRIPTION	ACCEPTABILITY GUIDELINE
1	Individual flows within 100 veh/h of counts for flows less 700veh/h	> 85% of all cases
	Individual flows within 15% of counts for flows from 700 to 2,700 veh/h	
	Individual flows within 400 veh/h of counts for flows more than 2,700 veh/h	
2	GEH < 5 for individual flows	> 85% of all cases

5.4.3 TAG states that if either flow criteria in Table 5.2 is met at a particular location, the match is regarded satisfactory.

5.4.4 The absolute or percentage difference can present the impact of the gap disproportionately. For example, a 10% gap between modelled and observed at a flow of 100 vehicles is likely to be irrelevant, while 10% difference with a flow of 10,000 vehicles may be a problem. The GEH statistic considers both the volume of flows and the proportional difference between them and is defined as:

$$GEH = \sqrt{\frac{2(Modelled - Observed)^2}{(Modelled + Observed)}}$$

5.5 Calibration results

Turn flow calibration

5.5.1 TAG recommends that modelled vs. observed comparisons should be undertaken for at least an average hour in each period. TAG also recommends that, in 85% of locations, criteria 1 or 2 meet the targets in the average hour for each model period.

5.5.2 Table 5.3 and Table 5.4 show that both turn flow and GEH targets are met for all vehicle types, for both the morning (06:00 to 10:00) and the evening (15:00 to 19:00). All TAG targets for turn flow calibration are also exceeded.

5.5.3 Table 5.5 and Table 5.6 show that both link flow and GEH targets are met for all vehicle types, for both the morning (06:00 to 10:00) and the evening (15:00 to 19:00). All TAG targets for link flow calibration are also exceeded.

Table 5.3 A19ST22hy turn flow calibration – morning peak period

Target (no sites)	Car				Light				Heavy				Total			
	06:00 - 07:00	07:00 - 08:00	08:00 - 09:00	09:00 - 10:00	06:00 - 07:00	07:00 - 08:00	08:00 - 09:00	09:00 - 10:00	06:00 - 07:00	07:00 - 08:00	08:00 - 09:00	09:00 - 10:00	06:00 - 07:00	07:00 - 08:00	08:00 - 09:00	09:00 - 10:00
1.1 < 700 vph ± 100 veh	100% (47)	100% (45)	100% (46)	100% (47)	100% (47)	100% (47)	100% (47)	100% (47)	100% (47)	100% (47)	100% (47)	100% (47)	100% (47)	98% (43)	100% (45)	100% (47)
1.2 700 - 2,700 vph ± 15%	- (0)	100% (2)	100% (1)	- (0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	100% (3)	100% (2)	(0)
1.3 > 2,700 vph ± 400 veh	- (0)	- (0)	- (0)	- (0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Summary Criteria 1	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	98%	100%	100%
2. GEH flows <5	94%	96%	94%	94%	98%	96%	96%	98%	100%	98%	100%	98%	87%	94%	91%	94%
Summary Either Criteria 1 or 2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	98%	100%	100%

Table 5.4 A19ST22hy turn flow calibration – evening peak period

Target (no sites)	Car				Light				Heavy				Total			
	15:00 - 16:00	16:00 - 17:00	17:00 - 18:00	18:00 - 19:00	15:00 - 16:00	16:00 - 17:00	17:00 - 18:00	18:00 - 19:00	15:00 - 16:00	16:00 - 17:00	17:00 - 18:00	18:00 - 19:00	15:00 - 16:00	16:00 - 17:00	17:00 - 18:00	18:00 - 19:00
1.1 < 700 vph ± 100 veh	100% (47)	98% (45)	98% (45)	100% (47)	100% (47)	100% (47)	100% (47)	100% (47)	100% (47)	100% (47)	100% (47)	100% (47)	98% (45)	98% (45)	98% (44)	100% (47)
1.2 700 - 2,700 vph ± 15%	- (0)	100% (1)	100% (1)	- (0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	100% (1)	100% (1)	100% (2)	(0)
1.3 > 2,700 vph ± 400 veh	- (0)	- (0)	- (0)	- (0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Summary Criteria 1	100%	98%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	98%	98%	98%	100%
2. GEH flows <5	87%	89%	89%	85%	91%	91%	98%	98%	89%	94%	100%	100%	87%	87%	87%	85%
Summary Either Criteria 1 or 2	100%	98%	98%	100%	100%	100%	100%	100%	100%	100%	100%	100%	98%	98%	98%	100%

Table 5.5 A19ST22hy link flow calibration – morning peak period

Target (no sites)	Car				Light				Heavy				Total			
	06:00 - 07:00	07:00 - 08:00	08:00 - 09:00	09:00 - 10:00	06:00 - 07:00	07:00 - 08:00	08:00 - 09:00	09:00 - 10:00	06:00 - 07:00	07:00 - 08:00	08:00 - 09:00	09:00 - 10:00	06:00 - 07:00	07:00 - 08:00	08:00 - 09:00	09:00 - 10:00
1.1 < 700 vph ± 100 veh	94% (17)	100% (14)	93% (14)	100% (20)	100% (24)	100% (24)	100% (24)	100% (24)	100% (24)	100% (24)	100% (24)	100% (24)	94% (17)	100% (13)	93% (13)	100% (15)
1.2 700 - 2,700 vph ± 15%	100% (6)	100% (9)	100% (9)	100% (4)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	83% (5)	89% (8)	100% (8)	100% (9)
1.3 > 2,700 vph ± 400 veh	- (0)	100% (1)	- (0)	- (0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	100% (2)	100% (2)	(0)
Summary Criteria 1	96%	100%	96%	100%	100%	100%	100%	100%	100%	100%	100%	100%	92%	96%	96%	100%
2. GEH flows <5	83%	92%	88%	79%	96%	88%	83%	100%	100%	96%	96%	88%	79%	83%	92%	96%
Summary Either Criteria 1 or 2	96%	100%	96%	100%	100%	100%	100%	100%	100%	100%	100%	100%	92%	96%	96%	100%

Table 5.6 A19ST22hy link flow calibration – evening peak period

Target (no sites)	Car				Light				Heavy				Total			
	15:00 - 16:00	16:00 - 17:00	17:00 - 18:00	18:00 - 19:00	15:00 - 16:00	16:00 - 17:00	17:00 - 18:00	18:00 - 19:00	15:00 - 16:00	16:00 - 17:00	17:00 - 18:00	18:00 - 19:00	15:00 - 16:00	16:00 - 17:00	17:00 - 18:00	18:00 - 19:00
1.1 < 700 vph ± 100 veh	81% (13)	92% (11)	86% (12)	93% (14)	96% (23)	100% (24)	100% (24)	100% (24)	100% (24)	100% (24)	100% (24)	100% (24)	85% (11)	82% (9)	86% (12)	93% (14)
1.2 700 - 2,700 vph ± 15%	88% (7)	100% (12)	100% (10)	100% (9)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	100% (11)	100% (11)	100% (8)	100% (9)
1.3 > 2,700 vph ± 400 veh	- (0)	- (0)	- (0)	- (0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	100% (2)	100% (2)	(0)
Summary Criteria 1	83%	96%	92%	96%	96%	100%	100%	100%	100%	100%	100%	100%	92%	92%	92%	96%
2. GEH flows <5	79%	83%	88%	88%	75%	75%	92%	100%	63%	83%	100%	100%	79%	71%	79%	83%
Summary Either Criteria 1 or 2	92%	96%	96%	96%	96%	100%	100%	100%	100%	100%	100%	100%	92%	92%	92%	96%

5.6 Summary

5.6.1 Calibration of A19ST22hy was undertaken on turns and links across the network, providing an excellent match by exceeding the required TAG criteria in all cases.

5.6.2 A19ST22hy is considered calibrated to the available data for the purposes of testing the impact of the proposed developments and supporting infrastructure schemes.

6. MODEL VALIDATION

6.1 Overview

6.1.1 Validation is an independent check of the calibrated model and is based on data not used in the model development and calibration processes.

6.1.2 A19ST22hy was validated against journey times obtained from the National Highways TRIS database as described in the data chapter.

6.1.3 Modelled journey times were extracted from A19ST22hy using subpaths. A subpath journey time is the average journey time for all vehicles that have travelled along the full length of the subpath. If a vehicle did not complete the full subpath, it will not be included in the calculation.

6.1.4 Additionally, on the 18th September SYSTRA attended a meeting with South Tyneside Council and National Highways to show the model and obtain their local knowledge on the network delays. SYSTRA has followed South Tyneside Council and National Highways advice to confirm the modelled delays on the network match the on-street operation.

6.2 Journey time validation

6.2.1 The TAG validation target is for the modelled journey time to be within 15% of the observed average (or one minute if higher than 15%) in 85% of cases. Usually, routes must be between 3km and 15km. However due to availability of data the routes selected are between 1-2km.

6.2.2 Table 6.1 and Table 6.2 below compare the average of the modelled and observed times for the morning and evening periods for six routes as shown in Figure 2.3:

- A194 northbound (1.8km)
- A194 southbound (1.8km)
- A194 southbound to off-slip (1.5km)
- A19 northbound (1.5km)
- A19 southbound (1.5km)
- A19 northbound to off-slip (1.0km)

Table 6.1 Morning journey time validation (seconds)

Route	Observed	Modelled	Difference
	Morning Period		
A194 northbound	118	309	191
A194 southbound	70	82	12
A194 southbound to off-slip	61	74	12
A19 northbound	142	90	-52
A19 southbound	56	64	9
A19 northbound to off-slip	72	89	18

Table 6.2 Evening journey time validation (seconds)

Route	Observed	Modelled	Difference
	Evening Period		
A194 northbound	132	281	149
A194 southbound	69	82	13
A194 southbound to off-slip	63	72	9

A19 northbound	58	90	32
A19 southbound	57	64	7
A19 northbound to off-slip	55	99	44

6.2.3 Analysing A19ST22hy outputs, five out of six routes (83%) meet the TAG validation criteria for journey times in the morning and evening period. This falls short of the TAG prescribed pass rate (85%), however due to availability of data for only 6 routes, even one route not meeting the criteria brings down the pass rate below 85%. Hence five of the six routes meeting the journey time validation criteria is considered acceptable for A19ST22hy.

6.3 Summary

6.3.1 By undertaking validation against TRIS journey times, the model is considered to replicate delays and traffic conditions as expected in 2022.

7. SUMMARY

7.1.1 National Highways & South Tyneside Council commissioned SYSTRA to update an Aimsun Next model of the A19 and surrounding local area. The A19 South Tyneside Aimsun Next model, referred to in this document as A19ST22hy, has a base year of 2022 and will be used to assess Local Plan impacts.

7.1.2 This report documents the data and methodology used to update the base model for A19ST22hy.

7.1.3 The model network covers the A19 from south of the Downhill Lane junction to north of the Tyne Tunnel, the A194 from the A185 in the north to south of Follingsby Lane junction, the A185 east of the A19, the A184 between White Mare Pool and Testos junctions, and Follingsby Lane between Downhill Lane and the Follingsby Lane junction of the A194(M).

7.1.4 Two sources of data were used to build the 2022 base traffic demand:

- 2022 Junction Turning Count (JTC) data
- 2022 National Highways TRIS data

7.1.5 The model was successfully calibrated in accordance with TAG guidance, with 98% and 92% of the turns and links meeting either criteria 1 or 2 for both peak periods, which is well above the 85% target.

7.1.6 The model was successfully validated in accordance with TAG guidance, with 83% of the routes meeting validation criteria for morning and evening periods. While the pass target is 85%, journey times are considered validated due to limited number of routes (six) and only one of the routes not meeting the criteria.

7.1.7 The A19ST22hy model is considered suitable for use in testing Local Plan impacts.

SYSTRA provides advice on transport, to central, regional and local government, agencies, developers, operators and financiers.

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For more information visit www.systra.co.uk

Birmingham
Alpha Tower, Crowne Plaza, Suffolk Street
Birmingham, B1 1TT
T: +44 (0)121 393 4841

Bristol
33 Colston Avenue, Bristol, BS1 4UA

Cork
City Quarter, Lapps Quay, Cork City
Cork, T12 WY42, Republic of Ireland

Dublin
2nd Floor, Riverview House, 21-23 City Quay
Dublin D02 AY91, Republic of Ireland
T: +353 (0) 1 566 2028

Edinburgh
83 Princes Street, Edinburgh, United Kingdom, EH2 2ER
T: +44 (0)131 460 1847

Glasgow
The Centrum Business Centre Limited, 38 Queen Street, Glasgow, G1 3DX
T: +44 (0)141 468 4205

Leeds
100 Wellington Street, Leeds, LS1 1BA
T: +44 (0)113 360 4842

London
One Carey Lane, London, England EC2V 8AE
T: +44 (0)20 3855 0079

Manchester
5th Floor, Four Hardman Street, Spinningfields
Manchester, M3 3HF
Tel: +44 (0)161 504 5026

Newcastle
Floor E, South Corridor, Milburn House, Dean Street,
Newcastle, NE1 1LE
T: +44 (0)191 249 3816

Reading
Davidson House, Forbury Square,
Reading, RG1 3EU
T: +44 118 208 0111

Woking
Dukes Court, Duke Street
Woking, Surrey GU21 5BH
T: +44 (0)1483 357705

York
Meridian House, The Crescent
York, YO24 1AW
Tel: +44 1904 454 600

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