Springfield Road North Planning Proposal

Modelling Methodology Report

Springfield Road Pty Ltd

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1. INTRODUCTION

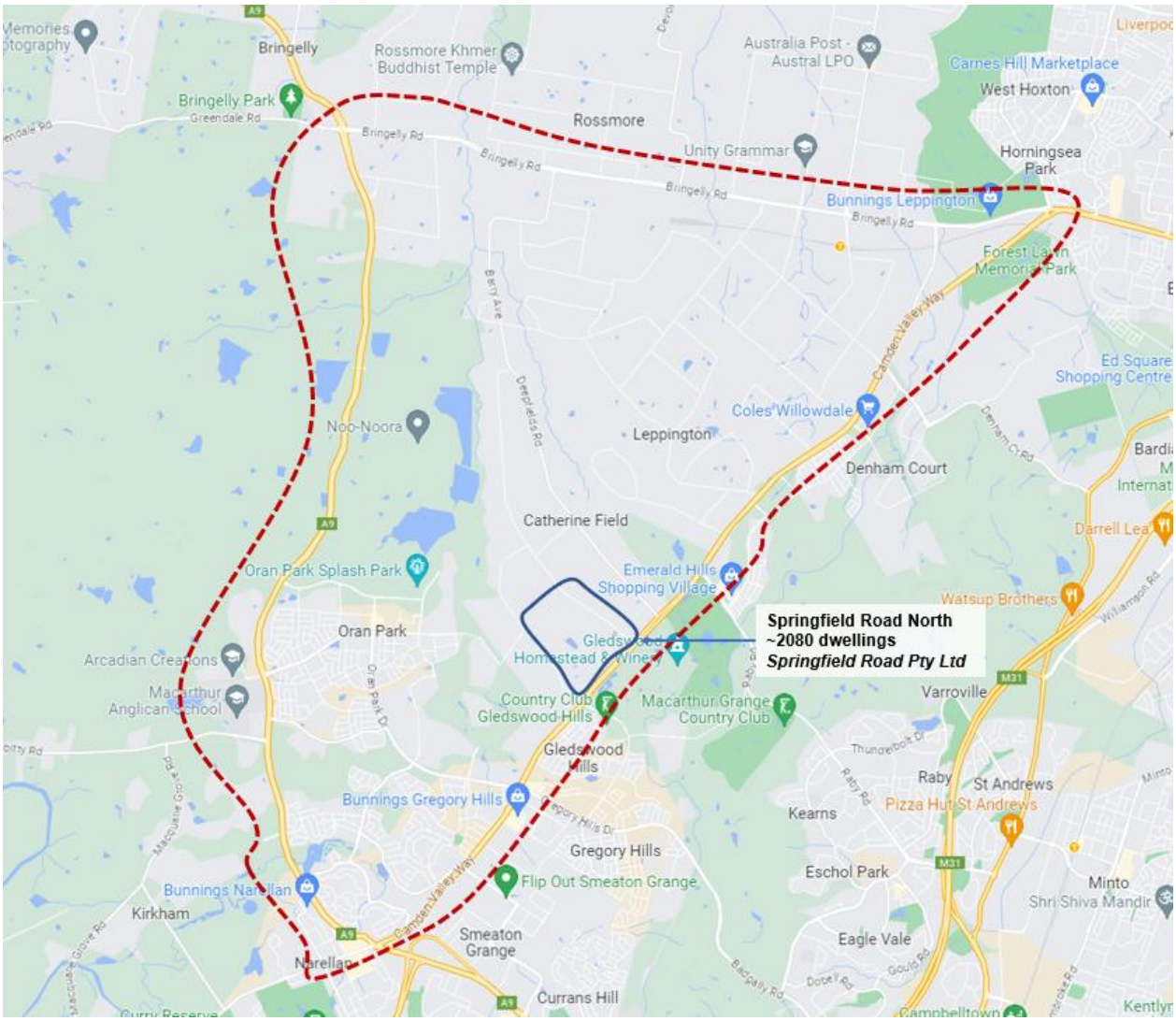
1.1 Background

Springfield Road North is a development area located within the Catherine Fields precinct which is part of Sydney's South West Growth Area.

The Planning Proposal has been prepared and submitted to the NSW Department of Planning (DoP) for this area with details as follows:

- **Springfield Road North**: approximately 54 hectares comprising 2080 dwellings submitted by Harrington Estates Pty Ltd

The site is to be zoned under State Environmental Planning Policy (Precincts – Western Parkland City) 2021 (the *WPC SEPP*), which will be the principal Environmental Planning Instrument applicable to the land after rezoning. The site fronts Camden Valley Way, north of Oran Park Drive as shown in Figure 1.1.



Base Map Source: Google Maps

Figure 1.1: Springfield Road North Planning Proposal Location

In reviewing the Planning Proposal, TfNSW provided advice to Camden Council in letters dated 15 November 2022 and 14 December 2022. TfNSW requested:

- A '*comprehensive traffic and transport impact assessment'*
- A '*three-tier modelling process*' comprising of strategic transport modelling, mesoscopic modelling and intersection modelling and that the applicant(s) meet with TfNSW to further discuss the modelling methodology.

Bitzios Consulting was then commissioned by Springfield Road Pty Ltd to prepare a **Modelling Methodology Report** (this report). A meeting was the held with the applicant and TfNSW on 26 April 2023. TfNSW provided further advice in response to this meeting in its letter of 22 May 2023, including:

- '*TfNSW advises that following a review of the documentation provided to date, the agency has no objection to the above Proposals proceeding to Gateway and is of the view that Council as the relevant Planning Authority is best placed to determine the strategic planning merits on whether the proposals should proceed to gateway'*
- '*TfNSW is also of the view that mesoscopic modelling is no longer required for the agency's transport assessment purposes as select link analysis and traffic forecasting utilising the TfNSW Strategic Traffic Forecasting Model combined with SIDRA intersection modelling is considered sufficient to determine the traffic impacts of the proposed land release'*
- '*TfNSW wishes to rescind the previous submission of 14 December 2022 and supersede this earlier submission with this letter*'

1.2 Purpose of the Modelling Methodology Report

This report outlines the proposed process for the traffic modelling of the impacts of the proposed development and for testing potential traffic impact mitigation measures, within the framework of a multi-modal transport impact assessment process. It nominates proposed assessment years, assessment time periods and key network assumptions to be used.

This report also provides a preliminary assessment of outputs from the Strategic Traffic Forecasting Model (STFM) to provide the evidence-base to inform the selection of the reasonable extent of road network to assess for determining the traffic impacts of the development.

1.3 Key Stakeholders

Key stakeholders involved in this project and with an interest in the traffic and transport modelling are Camden Council, DoP, Springfield Road Pty Ltd and Transport for NSW (TfNSW).

1.4 Reference Documents

The following documents will be referred to throughout the model development process:

- A Metropolis of Three Cities: Greater Sydney Region Plan (Greater Sydney Commission, 2018)
- A Guide to the South West Growth Area (Department of Planning and Environment)
- Catherine Park North Planning Proposal (Urbanco)
- Camden Local Environmental Plan 2010
- Camden Local Housing Strategy
- Camden Local Strategic Planning Statement
- Camden Growth Centres Development Control Plan 2011
- Catherine Field Precinct Planning Proposal (Urbanco)

2. MODELLING PROCESS AND HIERARCHY

2.1 Modelling Process

The traffic modelling process proposed for this project is illustrated in Figure 2.1 and described below.

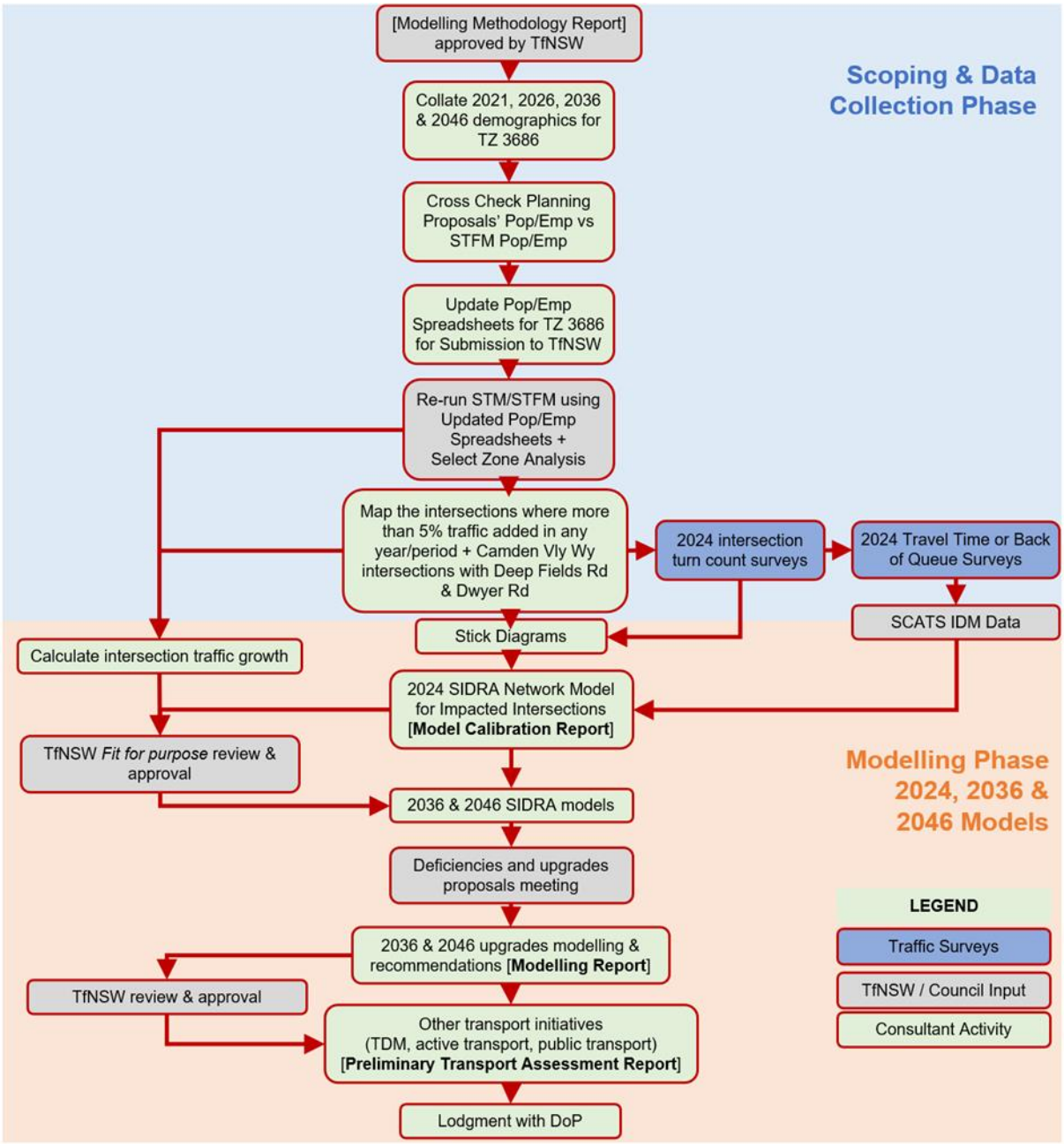


Figure 2.1: Modelling Process

Once the modelling methodology in this report is approved by TfNSW, The traffic modelling process/tasks will include:

- Extracting from OpenData the latest 2021, 2026, 2036 and 2046 demographic data
- Updating the demographics for the TZ that the development is located in (2036, 2046) and requesting TfNSW run its models and produce:
  - 2-hour (AM/PM) traffic volume plots (by vehicle class)
  - 2-hour (AM/PM) select zone analyses plots for TZ3686
- Calculating the Planning Proposal's traffic generation from first principles and accounting for any TDM, active transport or public transport initiatives proposed that would result in a justified and

reduced traffic generation rate compared to the default rates in the Guide to Traffic Generating Developments (GTGD)

- Using the TfNSW STFM select zone analyses output and the adjusted traffic generation rate (from first principles), confirm the area of influence for assessment of the development based on the 5% increase in volume impact threshold nominated. An intersection is included for assessment if it exceeds this threshold in either 2036 or in 2046 in either peak. As per TfNSW recommendation, two intersections of Deepfields Road/ Camden Valley Way and Dwyer Road/Camden Valley Way should be included in the SIDRA modelling regardless of projected growth.
- Collecting (year 2024) traffic data for the intersections identified to be potentially impacted, such as:
  - Intersection counts
  - Historical SCATS IDM data
  - Travel time surveys along the modelling corridor (depending on proximity of intersections and if SIDRA network is to be used) or back of queue surveys at isolated intersections
- Calibrating the SIDRA models (2024 base) and producing the Model Calibration Report for TfNSW review
- Applying the traffic growth rates inferred from the STFM plots to the turning movements at each intersection being assessed to create 2036 and 2046 intersection models without and with development
- Modelling year 2036 and 2046 'with development' and 'without development' traffic demands in the SIDRA models to:
  - Identify which intersection operate with longer delays in the with development case and by how much
  - Identify network upgrade (concept layouts) requirements to mitigate the additional delays generated by the development where intersections are at LoS E or LoS F
- Make recommendations for traffic upgrade works specifically related to each development and whether the works are needed by 2036 or by 2046 and include the findings in a Modelling Report, as usually required by TfNSW
- Develop Travel Demand Management (TDM), active transport and public transport strategies to support the development at a level of detail commensurate with the level of planning certainty in surrounding areas. Along with the findings in the Modelling Report (one report), include these strategies in a Transport Assessment Report for each development.

2.2 Modelling Hierarchy

2.2.1 Overview

In accordance with the modelling process detailed above, two 'levels' of modelling will be undertaken, as follows:

- Strategic Modelling (by TfNSW) with inputs and outputs processing by the consultant
- Micro-Analytical Modelling (by the consultant) using SIDRA Network and/or SIDRA Intersection depending on the proximity of intersections being assessed and discussions with TfNSW.

2.2.2 Strategic Modelling (STFM)

The STFM will be used as follows:

- To update demographics for TZ3686 based on development yield proposal
- To be run for 2036 and 2046 and to produce AM and PM peak:
  - Select Zone Analysis plots for TZ3686
  - Traffic volume plots by vehicle class
- To calculate the year 2023 to year 2036 and year 2046 traffic growth by period
- To produce traffic assignment patterns for TZ3686 for 2036 and 2046 AM and PM peak periods.
- To determine the 'area of influence' of the Planning Proposal, defined as the intersections which show an increase of greater than 5% of their total traffic volume in the future years of 2036 and 2046.

2.2.3 Micro Analytical Modelling (SIDRA)

The intersections identified from the strategic modelling as triggering more than a 5% increase in volumes due to the Planning Proposal (plus two intersections of Deepfields Road/ Camden Valley Way and Dwyer Road/Camden Valley Way) will be modelled using SIDRA Intersection software.

SIDRA will be the primary modelling tool used for this project and the subsequent sections of this report focus on the modelling methodologies associated with the SIDRA model.

2.3 Modelling-Related Reports

Future modelling-related reports (i.e. beyond this report) to be prepared as part of this study include:

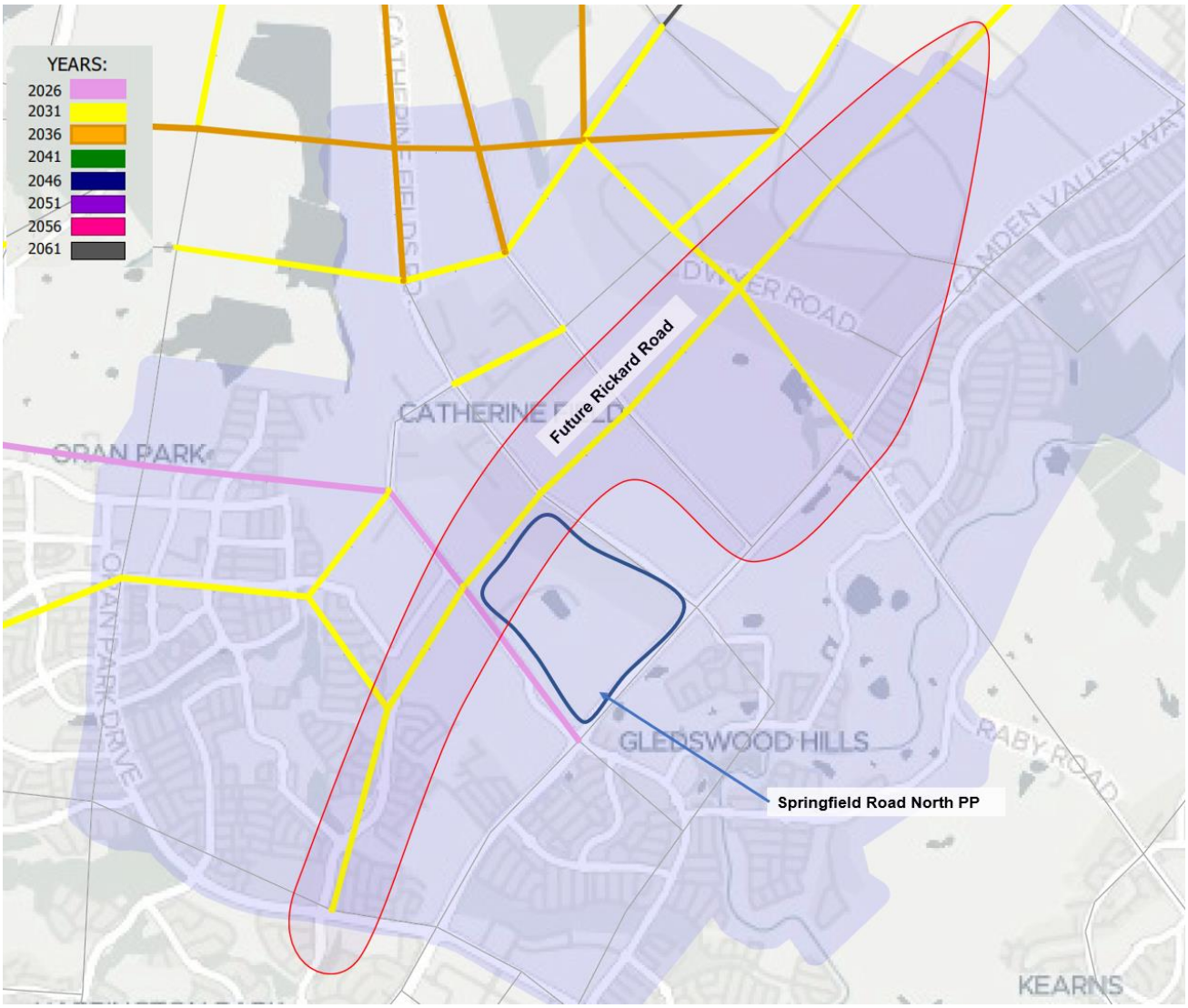
- **Base Models Calibration Report:** Detailing the development of the SIDRA base year models, including the model calibration results for the SIDRA model(s).
- **Future 2036 and 2046 Years Modelling Report:** Incorporating the study process, adding new links, intersections and forecast traffic volumes and specifying future intersection layouts and evaluating the future SIDRA network performance, implementation schedule and recommendations.

3. PRELIMINARY ASSESSMENT FINDINGS

3.1 Determining the Development 'Area of Influence'

For the purposes of the establishing the modelling methodology, a preliminary 'area of influence' of the development was determined using the STFM. The 'area of influence' has been defined as the locations (intersections) which show an increase in total traffic volumes of five percent (5%) or more due to the Planning Proposal plus two intersections of Deepfields Road/ Camden Valley Way and Dwyer Road/Camden Valley Way in the assessment years of 2036 or 2046.

As shown in Figure 3.1, there are a number of new links that are expected to be added to the network between 2023 and 2046, especially the yellow links that are expected (by TfNSW) to be added in 2031.



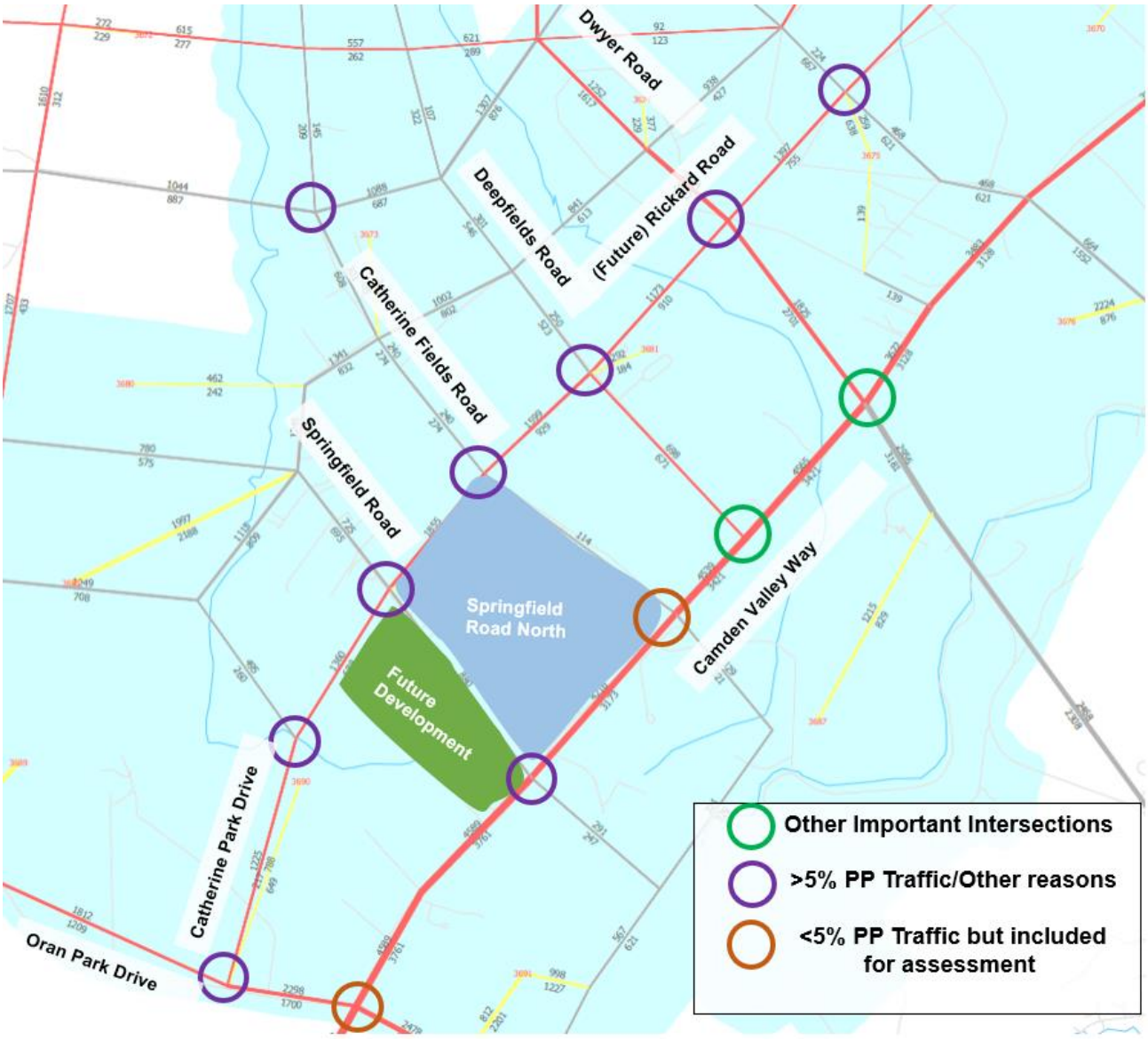
Source: STFM

Figure 3.1: STFM Links and Year Added to the Network

3.2 Future Year Intersections for Assessment

The future year 2036 and 2046 STFM volume plots and Select Zone Analysis plots were compared, and this process identified 11 intersections that met the nominated 'area of influence' trigger for the Planning Proposal or requested by TfNSW to be included in the analysis, as shown in Figure 3.2. Most of these intersections are located along Rickard Road which is expected to be the primary route for most of the development's traffic in the future.

Before the Rickard Road connection is completed, two intersections located along Camden Valley Way (at Catherine Fields Road and at Oron Park Road) would be expected to be impacted by the development traffic. These intersections have been identified for assessment as shown in Figure 3.2.



Adapted from: STFM Volume Plots

Figure 3.2: Year 2036 & 2046 Intersections for Assessment

The STFM Volume Plots and Select Zone Analysis plots used to identify the intersections where more than 5% of traffic would include the development traffic, are provided in **Appendix A**.

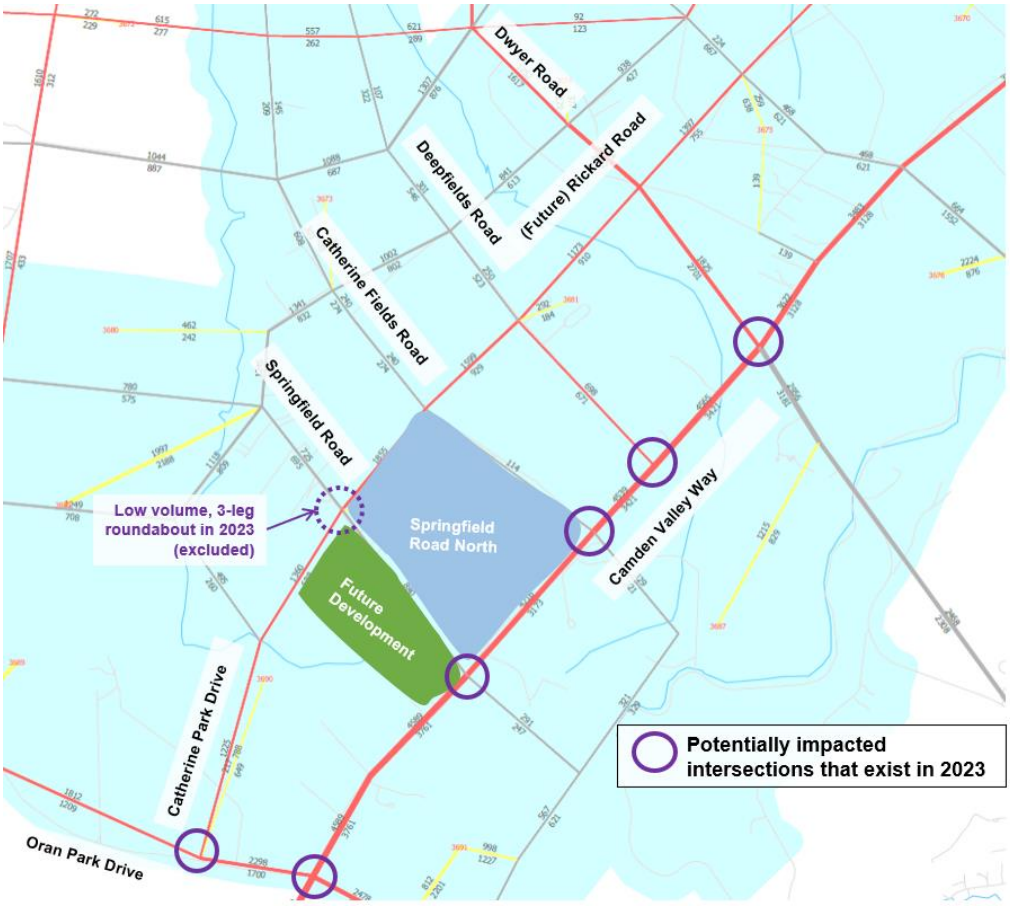
3.3 Base Year Model Intersections

Not all of the intersections shown in Figure 3.2 currently exist. SIDRA base year models can only be calibrated for those intersections which do exist in 2023. For the other (future) intersections, SIDRA modelling will need to be undertaken based on turning volumes derived from the strategic modelling. As shown in Figure 3.3, only seven (7) out of the 13 intersections identified for assessment in 2036 and 2041 exist in 2023. One of those intersections, the intersection of Catherine Park Road and Springfield Road is a single lane, three leg roundabout with very low traffic volumes. This intersection is substantially different to what the 4-leg intersection will be in 2036. There is no merit in calibrating a year 2024 base model at this intersection because of this.

Based on the above, the following six (6) intersections have been nominated for base year SIDRA model development and calibration:

- Camden Valley Way / Deepfields Road
- Camden Valley Way / Dwyer Road
- Camden Valley Way / Catherine Fields Road
- Camden Valley Way / Springfield Road
- Camden Valley Way / Oran Park Drive
- Oran Park Drive / Catherine Park Drive.

Given the proximity of these intersections to each other, the base year SIDRA model is recommended to be created as a 'network model'. The model would be calibrated to surveyed intersection counts and signal operations for the 2024 AM and PM peak hours (1 hour each). The network model would be validated to travel times collected for Camden Valley Way. Travel Time validation would be supplemented by back of queue length validation at all six intersections.



Adapted from: STFM Volume Plots

Figure 3.3: Base Year SIDRA Model Intersections

4. MODEL INPUT DATA

4.1 Intersection Turn Count Surveys

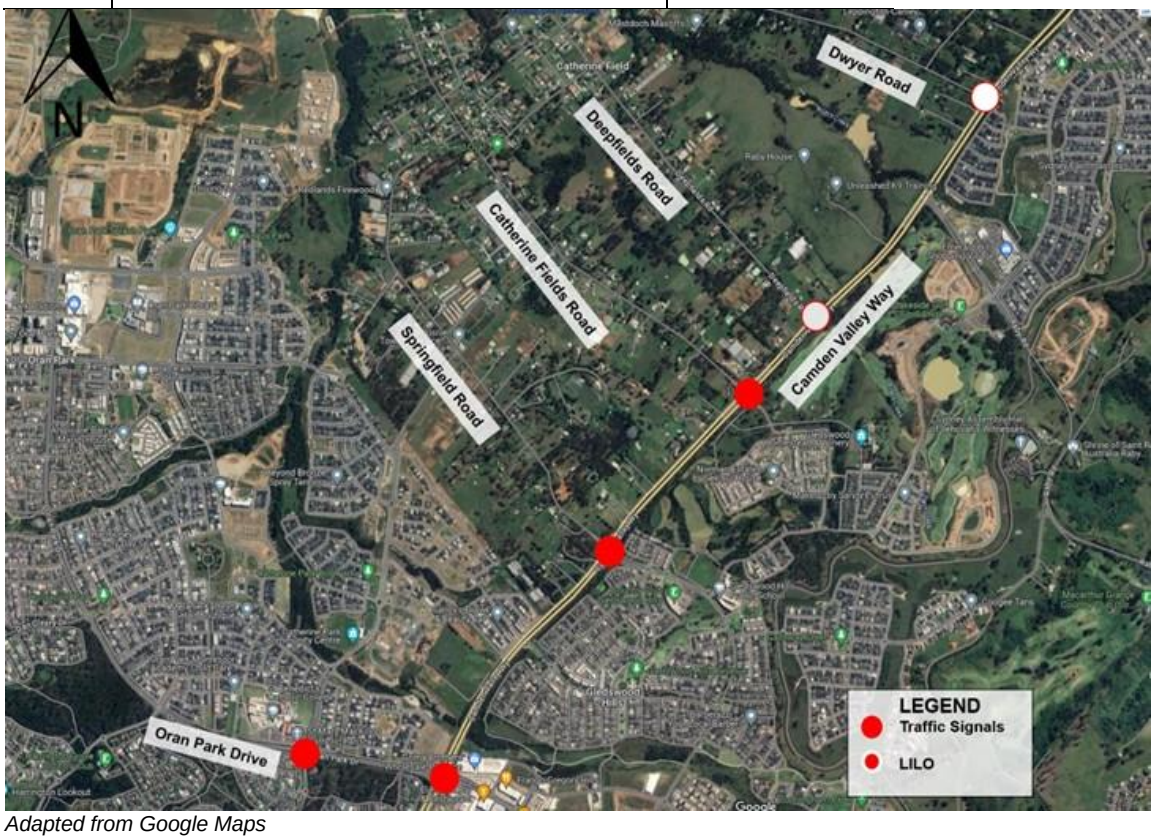
A traffic survey sub-consultant will be engaged to undertake turn count surveys at the six (6) intersections depicted in Figure 4.1. The traffic counts are to be collected on weekdays (outside of school holidays) during the AM peak (7:00am-9:00am) and PM peak (4:00pm-6:00pm) to align with the modelled hours in the STFM. The traffic counts are to be classified into light vehicles, heavy vehicles, buses, bicycles and pedestrians, and recorded in 15-minute intervals.

Pedestrian and cyclist volumes will be very low in the base 2023 year but could be substantially higher in 2036 and 2046. This will be given further consideration align with land use plans in the area to establish appropriate future year volumes for walking and cycling movements at intersections.

The intersection count data will be used for building network traffic flow diagrams for direct input into the SIDRA network models. A list of the intersections along with their control type is provided in Table 4.1 and their locations are shown in Figure 4.1.

Table 4.1: Intersection Count Locations

No.	Intersection	Control Type
1	Catherine Fields Road / Camden Valley Way	Signals
2	Springfield Road / Camden Valley Way	Signals
3	Camden Valley Way / Oran Park Drive	Signals
4	Catherine Park Drive / Oran Park Drive	Signals
5	Camden Valley Way / Deepfields Road	LILO
6	Camden Valley Way / Dwyer Road	LILO



Adapted from Google Maps

Figure 4.1: Intersection Count Locations

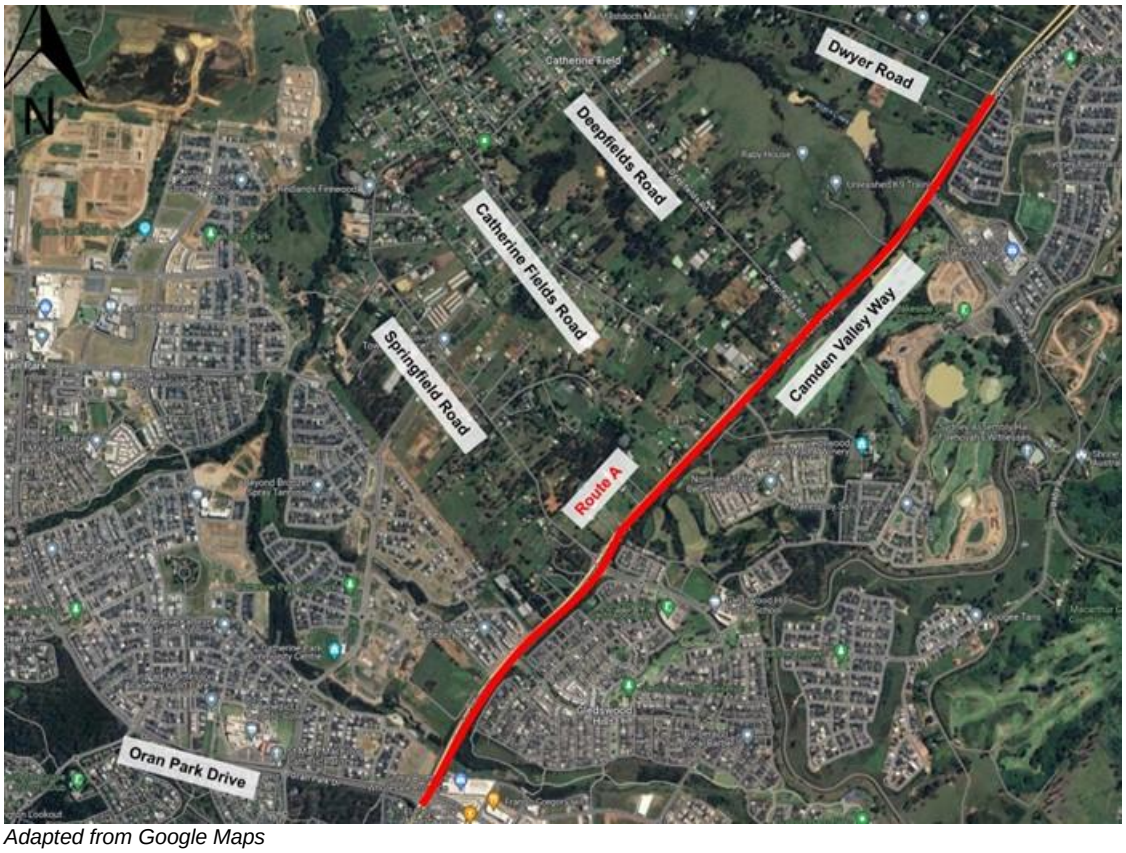
4.2 Travel Time Surveys for Model Calibration

The traffic survey sub-consultant will be engaged to undertake travel time surveys along the following Route at the same times as the intersection counts:

- **Camden Valley Way:** Dwyer Road to Oran Park Drive

The route is shown in Figure 4.2. The travel time survey will aim for five return-runs per peak hour (i.e. 20 return-runs in total).

The calculated average time taken for vehicles in the SIDRA model to travel along the Camden Valley Way route will be compared to the average travel times from the survey model validation purposes. The travel time route will also be split into sub-sections by intersection based on average back of queue location.



Adapted from Google Maps

Figure 4.2: Travel Time Survey Route

4.3 Queue Length Surveys for Model Validation

The travel time surveys described above will provide data to calibrate movements along Camden Valley Way. For other approaches, queue length survey data will be used. These locations include:

- **Camden Valley Way / Catherine Fields Road:** Catherine Fields Road and Lady Josephine Road approaches
- **Camden Valley Way / Springfield Road**: Springfield Road and The Hermitage Way approaches
- **Camden Valley Way / Oran Park Drive**: Oran Park Drive approaches
- **Oran Park Drive / Catherine Park Drive**: All four approaches
- **Camden Valley Way/ Deepfields Road:** Deepfields Road approach
- **Camden Valley Way / Dwyer Road :** Dwyer Road approach

Maximum queue lengths at the start of each green phase will be collected at each location continuously for the two peak periods to allow for estimation of average and 95th percentile queue lengths for calibration purposes.

4.4 SCATS Data

The SCATS history data will be sourced from TfNSW for the four (4) signalised intersections for input into the SIDRA models. The corresponding LX files will also be obtained to calculate offset times between signalised intersections for validation of the model. A list of these intersections is provided in Table 4.2.

Table 4.2: TCS Sites

TCS No.	Location
4465	Catherine Fields Road/ Camden Valley Way
4464	Springfield Road/ Camden Valley Way
4219	Camden Valley Way/Oran Park Drive
4647	Catherine Park Drive/Oran Park Drive

4.5 Site Observations

Site visits will be undertaken to capture any specific traffic influences observed in peak periods to enable the modeller to ground-truth the models based on observations of queueing behaviour across the road network.

Video footage will also be collected using a GPS-enabled dash cam and will be referred to while validating the SIDRA models to verify the performance of the model, particularly for any unusual traffic behaviours or patterns.

Site visits will be undertaken on the same day as the traffic survey data collection.

5. SIDRA MODELLING DETAILS

5.1 Base Year SIDRA Models

The primary purpose of the SIDRA modelling is to assess the impact of the Planning Proposal on the surrounding intersections.

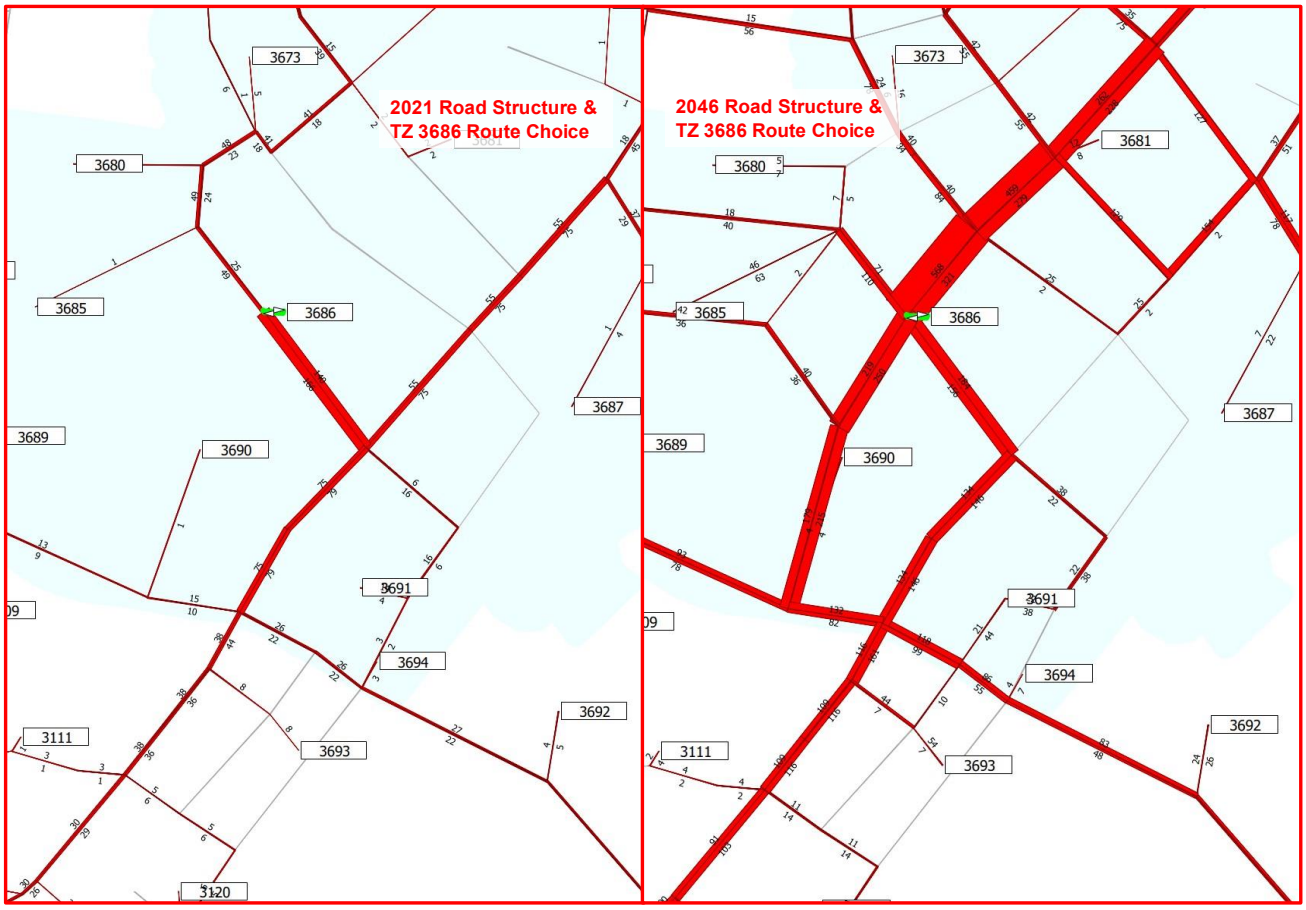
Year 2024 base year weekday AM and PM peak hour SIDRA network models will be developed for four (4) nominated intersections using SIDRA Version 9.1. The SIDRA models will be calibrated and validated to TfNSW modelling guidelines using a combination of travel time data and back-of-queue data, supplemented with intersection survey video footage.

The development of the SIDRA base models will be prepared as part of the Base Models Calibration Report, describing the intersections, networks, inputs, processes, outputs and key adjustments made to the models as part of the calibration. TfNSW's default SIDRA setting will be applied for the models.

5.2 Future Year SIDRA Models

5.2.1 Rickard Road Influences

The modelling results suggest that the opening of Rickard Road as per the Structure Plan (assumed by TfNSW as by 2031) will have a significant influence on route choice for the Structure Plan area generally and for Catherine Park North and Springfield Road North specifically. Figure 5.1 compares route choice for TZ3686 (the zone containing the development) in 2021 before Rickard Road and when Rickard Road is connected.



Adapted from STFM TZ 3686 SLA Plots

Figure 5.1: TZ 3686 Route Choice before and after Rickard Road Connection

Figure 5.1 highlights that until Rickard Road is connected, the development will primarily use Camden Valley Way to access the broader network. However, when Rickard Road is connected, the majority of traffic to/from the development will use it, relieving capacity on Camden Valley Way for other traffic. That is, whilst from a long term Planning Proposal perspective, year 2036 and 2046 impact assessment with Rickard Road in place is relevant, any future stage-based development applications that occur before Rickard Road is established should separately assess that stage's impact onto Camden Valley Way for the intervening period.

5.2.2 STFM TZ3686 versus Development Yields

STFM TZ3686 includes the Catherine Park North and Springfield Road North development areas and these areas make up about half of the spatial area of the TZ. When accounting for 50% of the entire zone, assuming that the balance of the TZ would have a similar density to the development under assessment and assuming the zone would be fully developed by 2046, first principles traffic calculations suggest that the sum of the traffic generated by TZ3686 in the STFM is less than what would be expected.

In 2041, TZ 3686 shows a total of 1881 movements to and from the zone in AM 2-hour peak period. This figure is well below what would be expected to be generated by this travel zone at full development. However, a number of factors could be contributing to this, including:

- Demographic projections used in the STM/STFM for this region may be based on full development occurring much later than 2046
- The balance of TZ3686 being of a much lesser yield than the subject development
- The NSW demographics for TZ3686 not being sensitive to the yields planned under the Structure Plan, and need to be updated.

Early consultation will be undertaken with TfNSW to determine which of the above factors are contributing to the lower than expected traffic demands to/from TZ3686 and whether the STFM needs to be re-run with updated demographics and the Select Zone analysis re-done, or if the subject development needs to be assessed as not being fully completed by 2046.

5.2.3 Future Year Turning Movements at Intersections

Future year turning movements at intersections will be calculated as follows:

- **Where 2024 counts have been undertaken**: Use the STFM approach to departure (average) percentage growth and applied to the 2024 base volumes by movement
- **Where 2024 counts do not exist**: Use the STFM approach and departure link flows to furness an intersection turning movement matrix by period and then profile it to the peak one hour by dividing it by two.

5.2.4 Use of the SIDRA Models

The future year SIDRA modelling will be used to:

- Compare intersection performance for the 13 intersections identified without and with the development in 2036 and in 2046
- Test and refine preferred intersection configurations including mitigation measures relevant to the development based on year 2036 and year 2046 traffic demands

Typical SIDRA movement outputs will be extracted for upgrade performance reporting, including DoS, average delay (in seconds), LoS and 95th percentile queue lengths.

6. NEXT STEPS

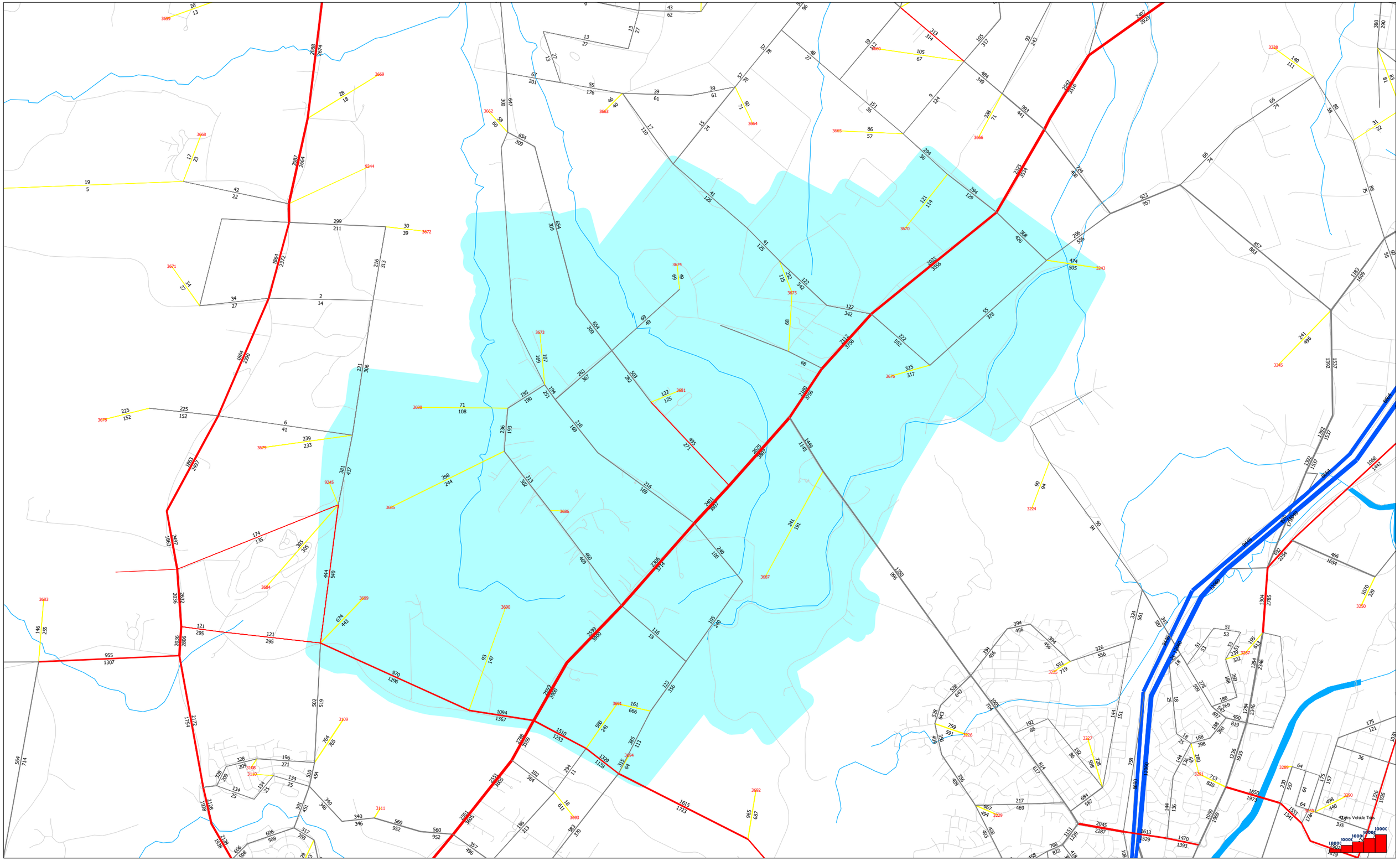
Once this *Modelling Methodology Report* is approved by Council and TfNSW, the *Base Models Calibration and Validation Report* for the SIDRA models will be prepared and submitted.

While this is being undertaken, discussions will be held with TfNSW regarding appropriate demographics to assume for the development in the STFM and the STFM re-run request made if needed.

Appendix A:

STFM Volume Plots and Select Zone Analysis Plots

TRAFFIC VOLUMES_STFM



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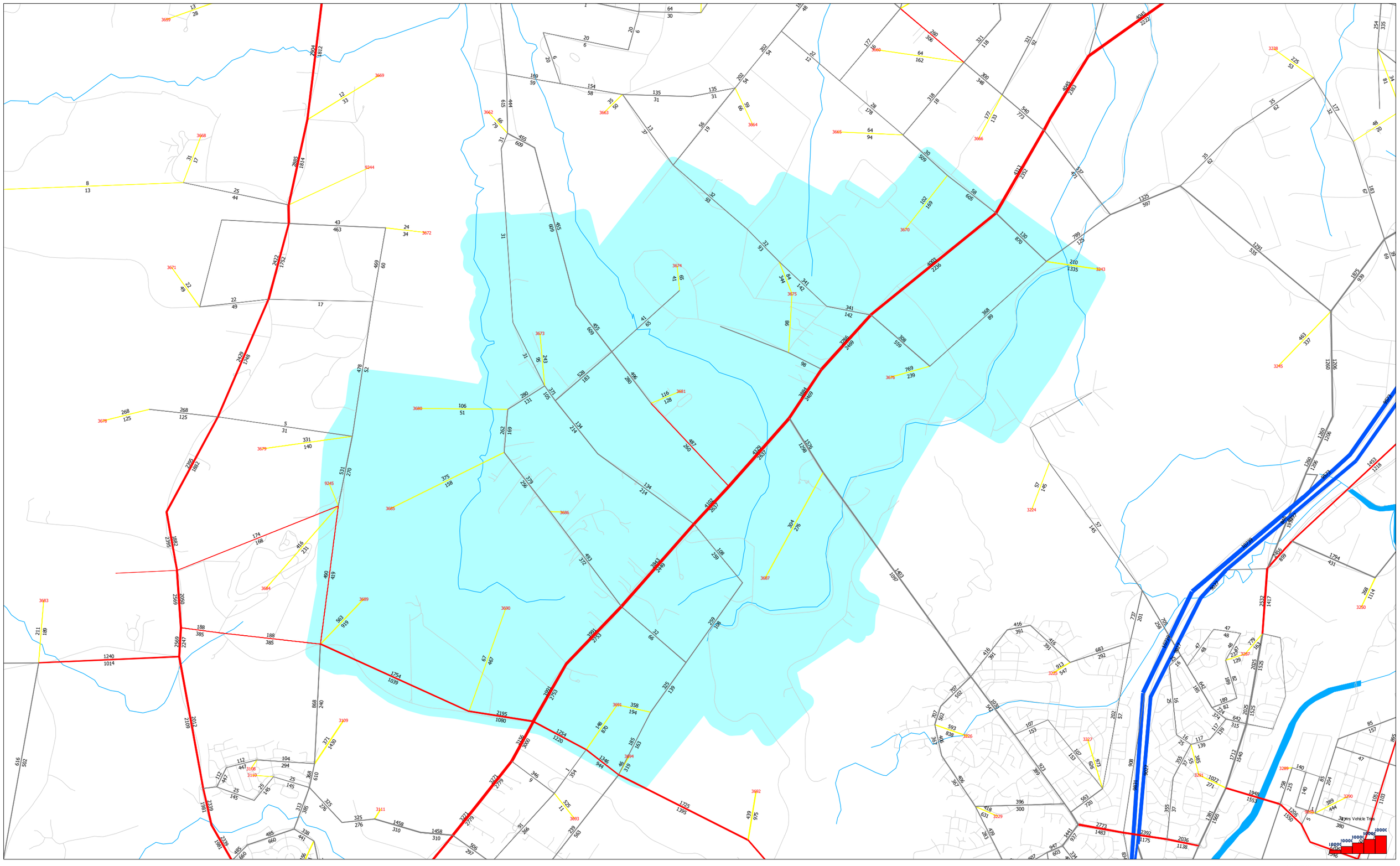

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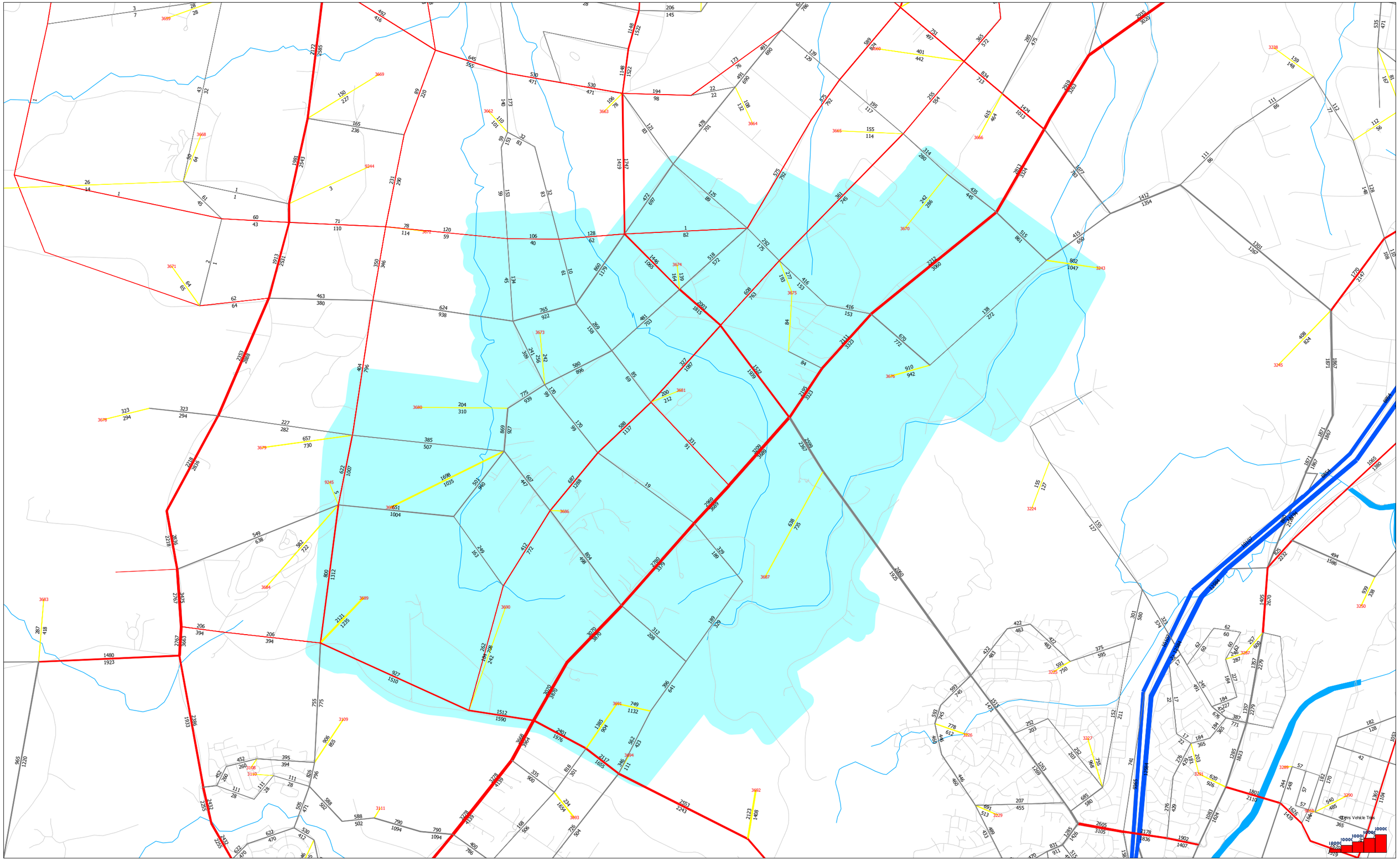

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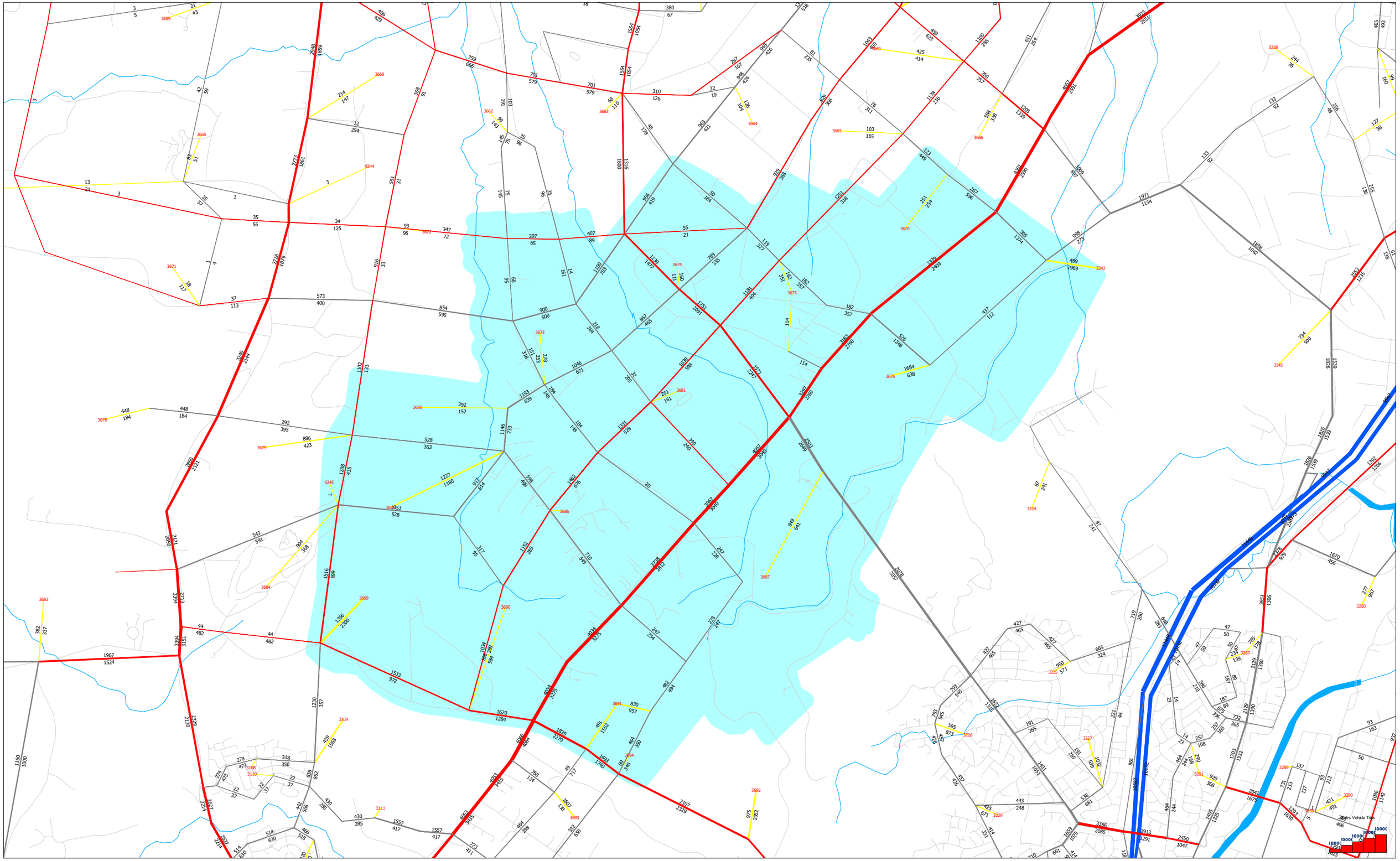

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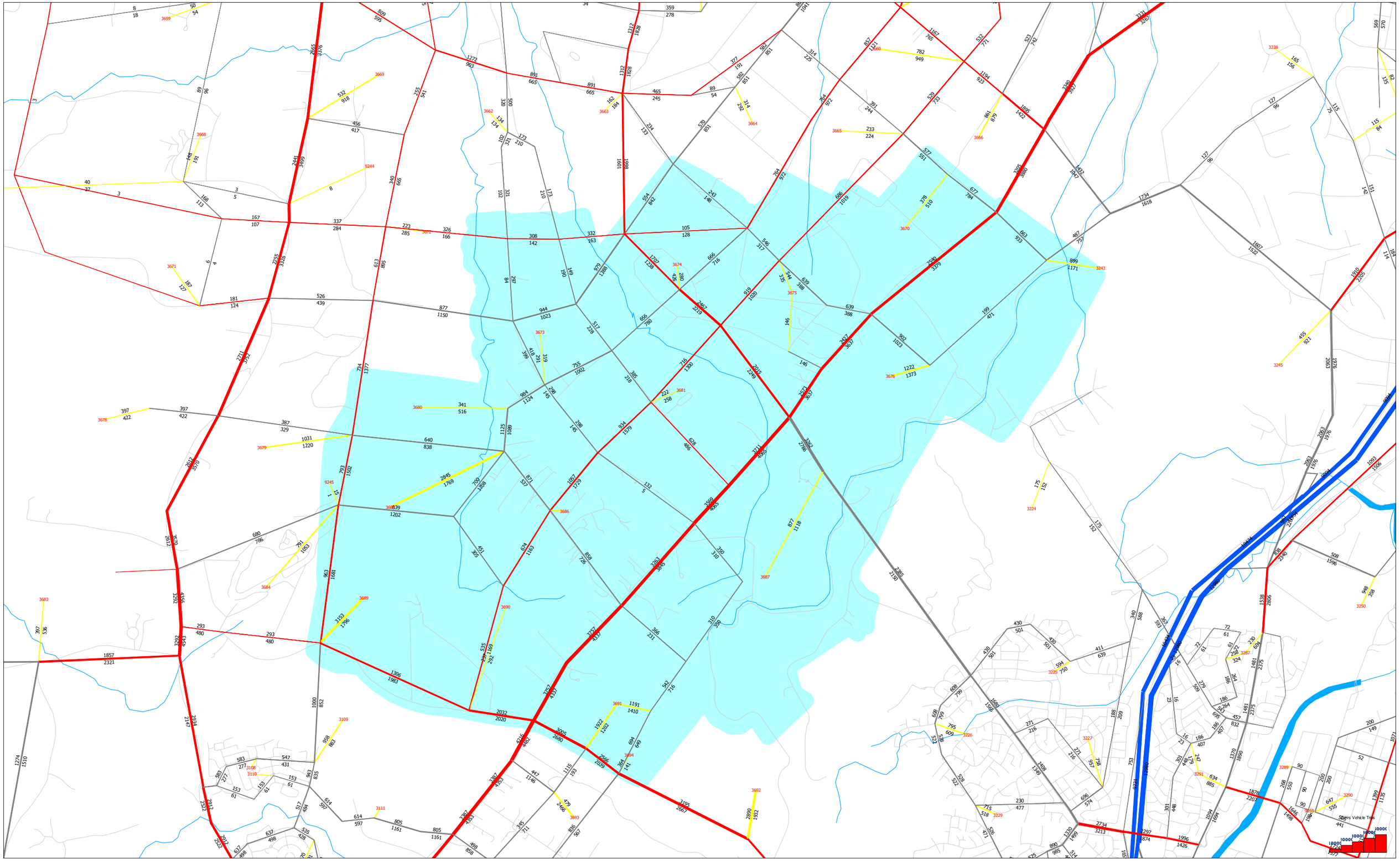

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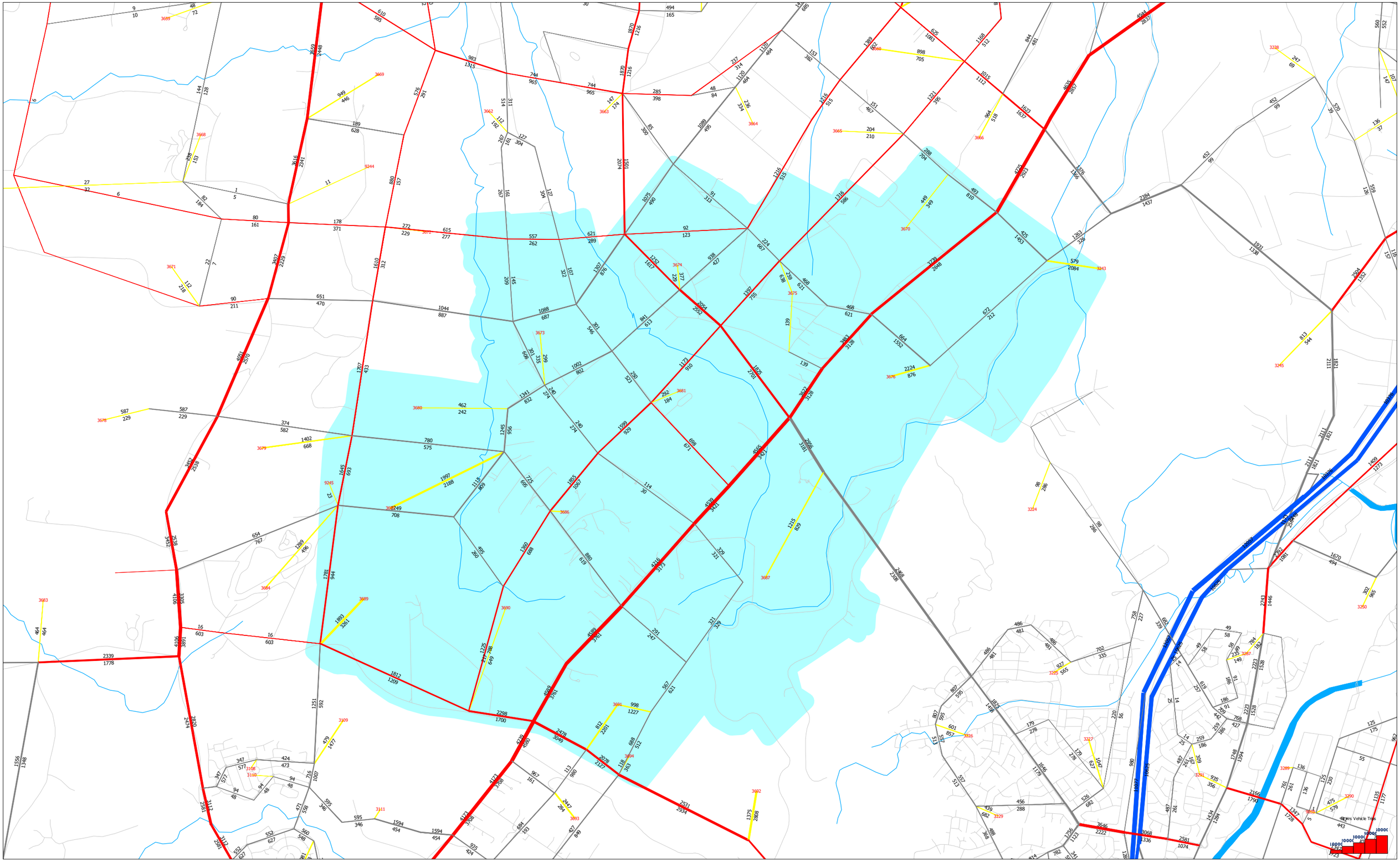

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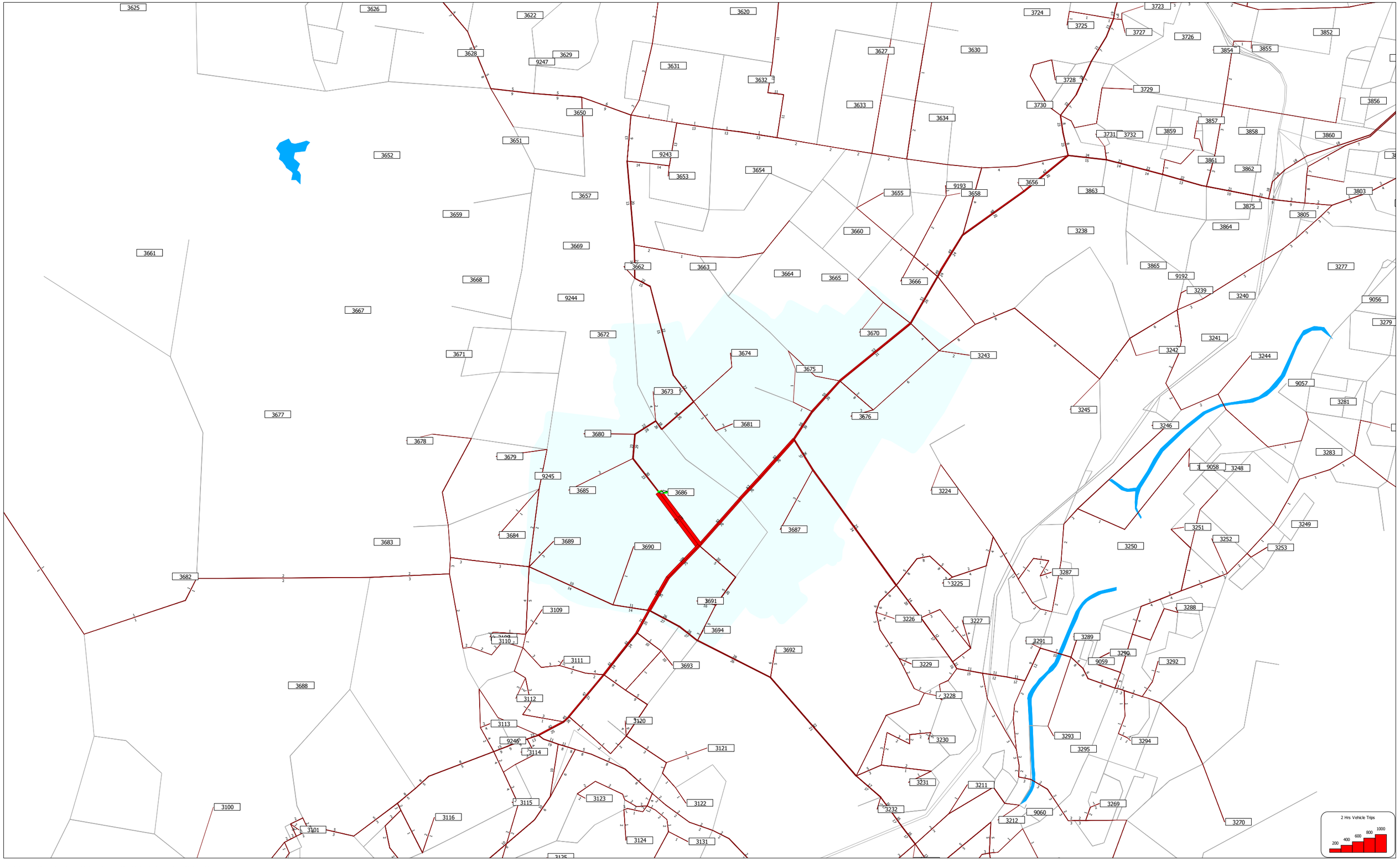

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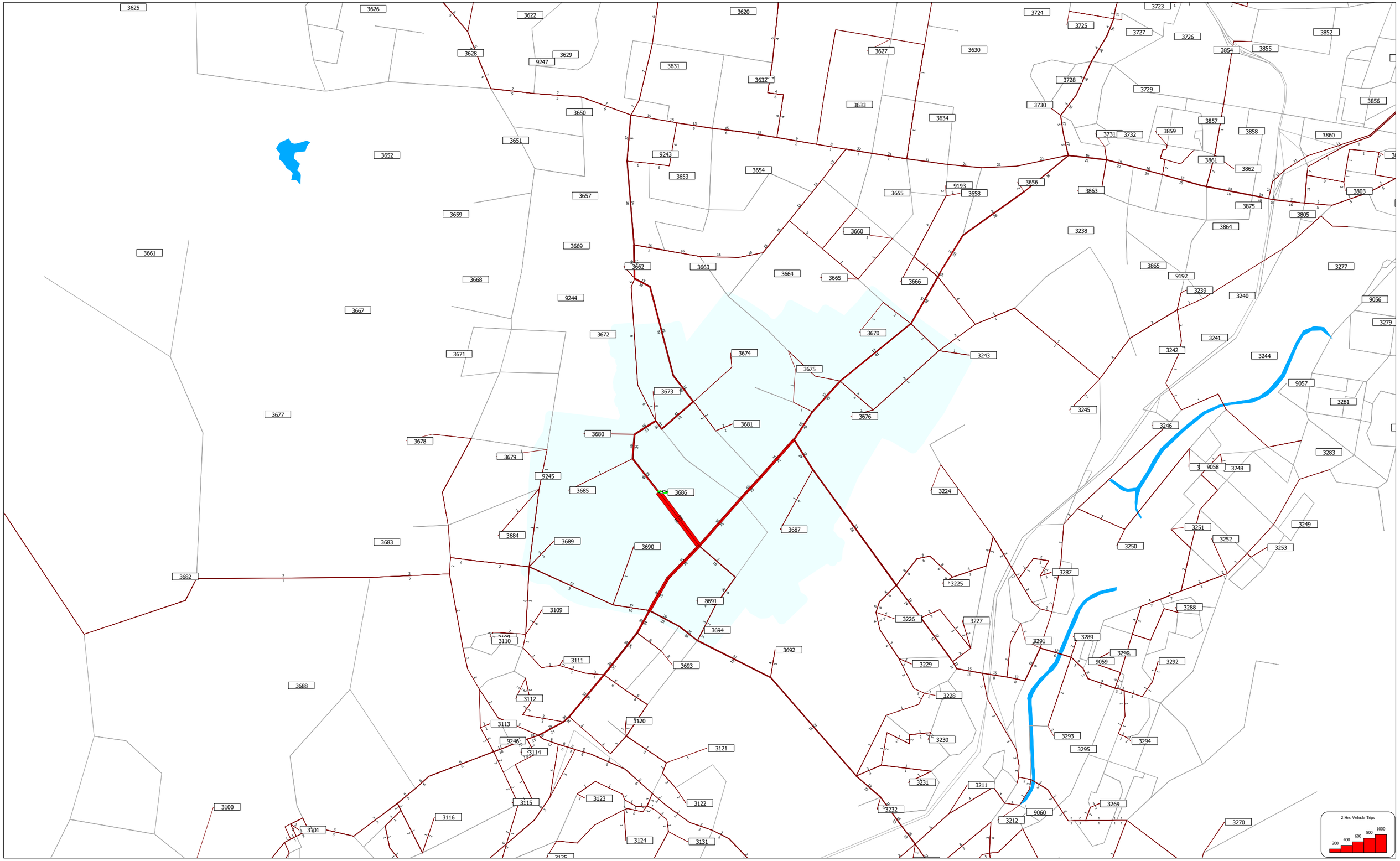

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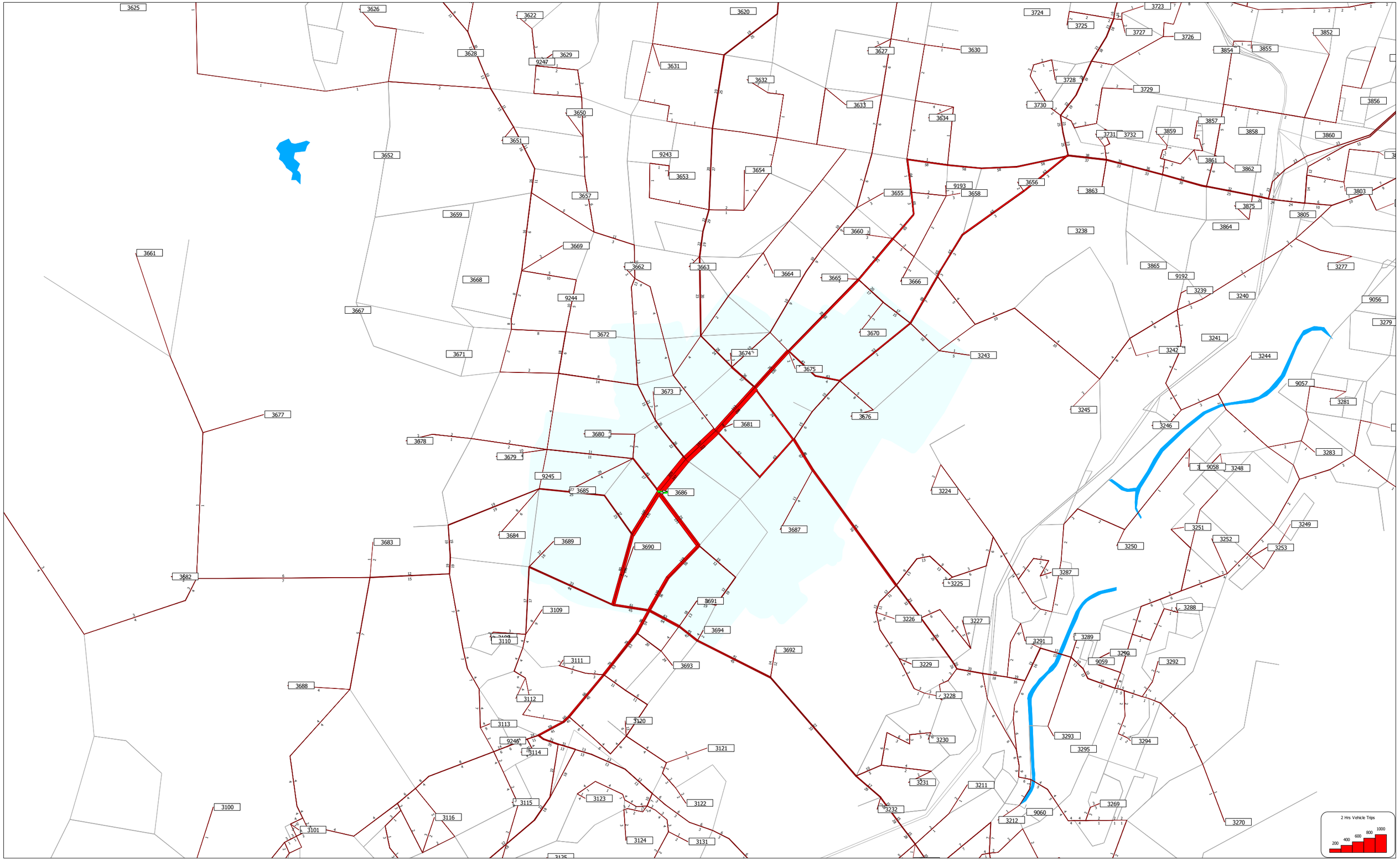
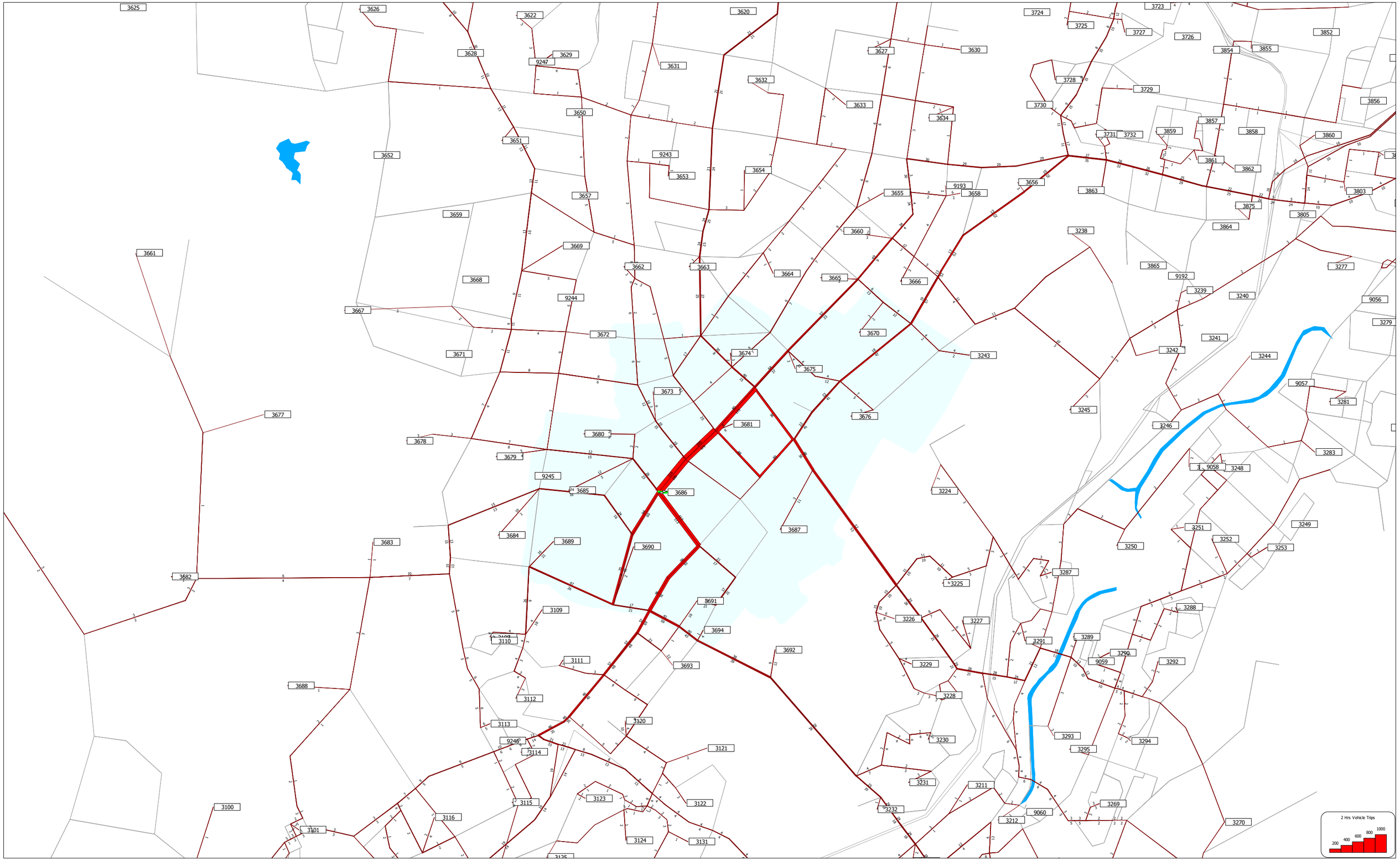
2023-09-12 12:26

SELECT TRAFFIC VOLUMES_1



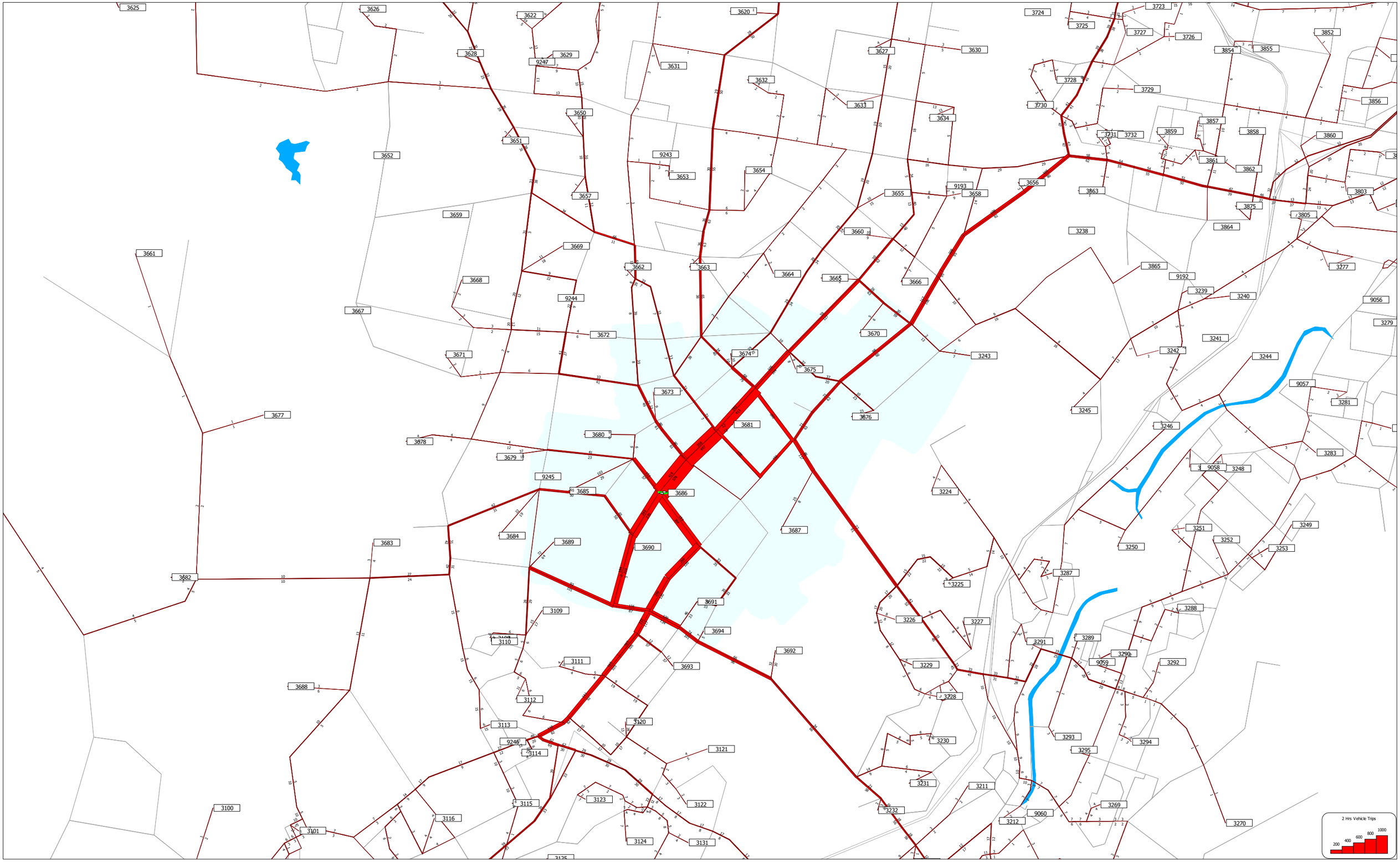
SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL(STFM)
Scenario 5: SA_2036_STFM(TZP22STM3.91)-4-6PM(mf56)
2023-09-12 12:27

SELECT TRAFFIC VOLUMES_1



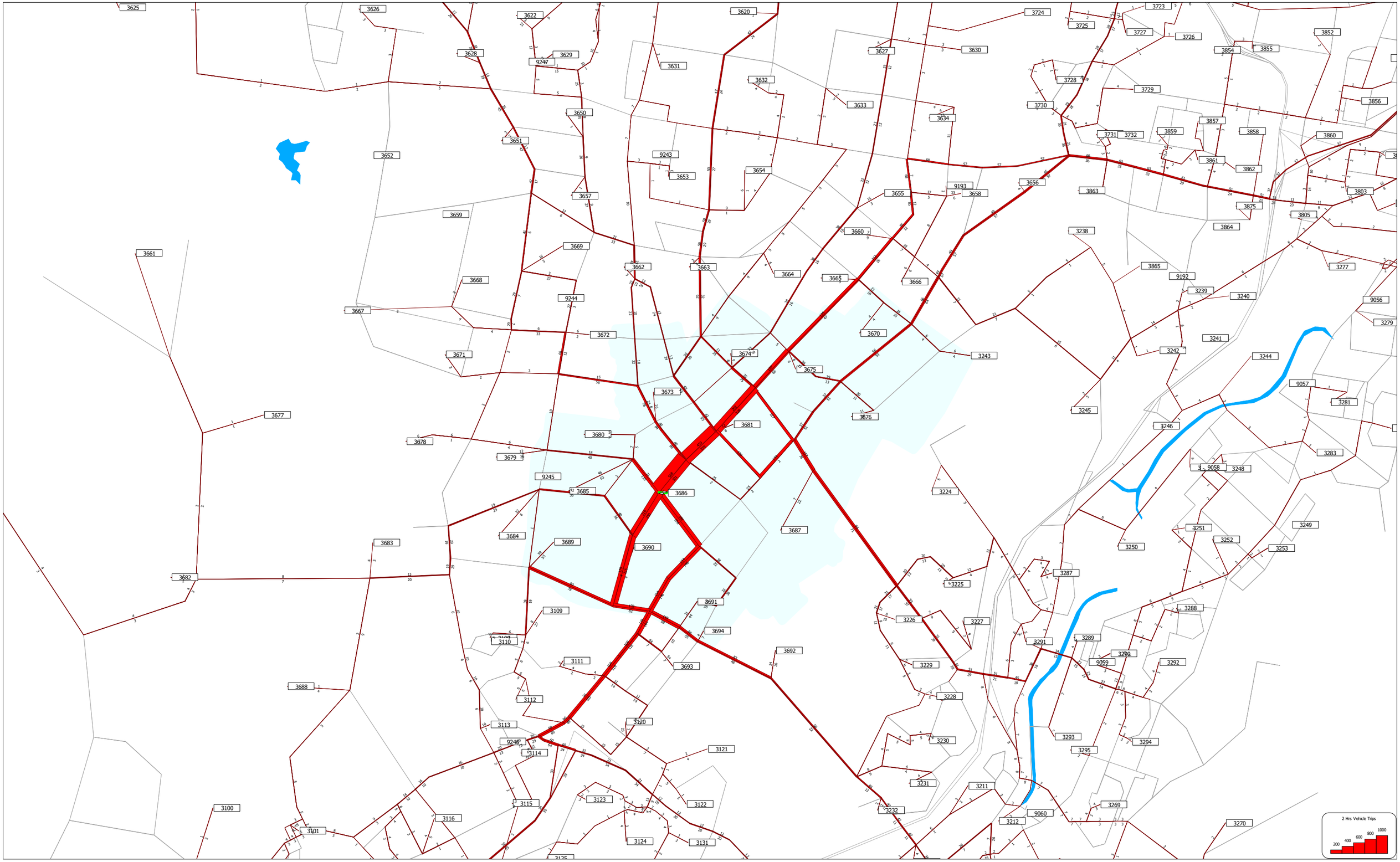
SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL(STFM)
Scenario 2: SA_2036_STFM(TZP22STMV3.91)-7-9AM(mf36)
2023-09-12 12:26

SELECT TRAFFIC VOLUMES_1



SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL(STFM)
Scenario 6: SA_2046_STFM(TZP22STM3.91)-4-6PM(mf58)
2023-09-12 12:27

SELECT TRAFFIC VOLUMES_1



SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL(STFM)
Scenario 3: SA_2046_STFM(TZP22STMV3.91)-7-9AM(mf38)
2023-09-12 12:27