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22 July 2021

Copy via email: **renee@tollemache.co**

Dear Renee,

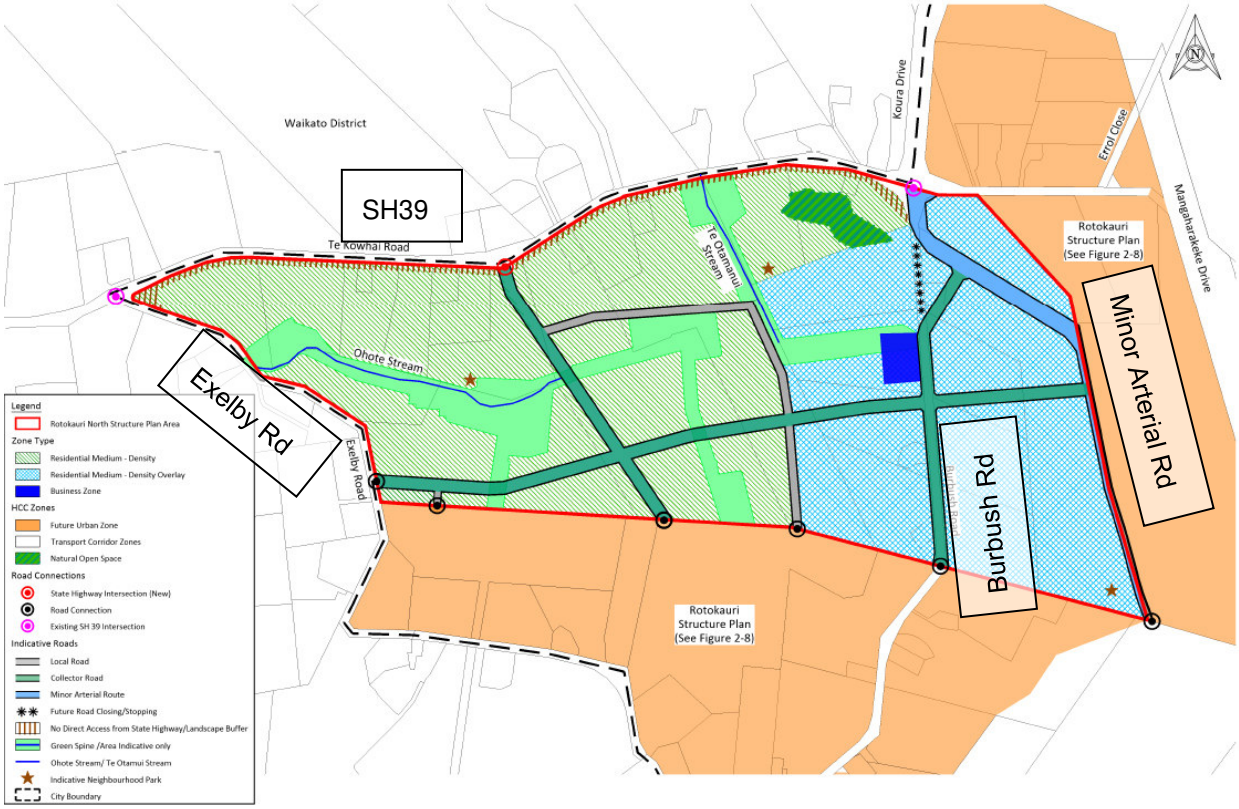
ROTOKAURI NORTH – REVISED STRUCTURE PLAN / TRAFFIC MODELLING

The following outlines an assessment of the revised Structure Plan for Rotokauri North, the traffic volumes predicted along Burbush Road and Exelby Road for the year 2021 and 2041 (with and without a potential residential development) and the associated upgrades / staging requirements necessary to cater for these volumes.

1 STRUCTURE PLAN CHANGES

Following comments received by both Hamilton City Council and NZTA Waka Kotahi the Precinct Plan has been altered. The revised Structure Plan is shown in Figure 1 below.

Figure 1: Revised Structure Plan (indicative)



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In particular, the key changes as relevant to Transport include:

- the number of new intersections on SH39 has been reduced from two to one as anticipated by the existing Rotokauri Structure Plan;
- the intersection proposed on SH39 will be roundabout controlled;
- Alteration of internal zones to reflect the changes to road and also the stormwater network areas; and
- a small number of inconsistencies / points of clarification added to the plan.

As a Notice of Requirement for the minor arterial road has not yet lodged, the alignment shown is as per the notified Structure Plan.

2 MODELLING BACKGROUND

2.1 WAIKATO REGIONAL TRANSPORT MODEL (WRTM)

Traffic modelling has been undertaken using the current version of the Tracks model for Hamilton, to determine the level of traffic volumes predicted on the roads and intersections located near the vicinity of a Proposed Plan change (PPC) located within Rotokauri North.

Six scenarios have previously been tested including a 2021 and 2041 scenario, with and without the potential residential development (referred to as the "Base" and "Potential" scenario respectively). The 2041 potential scenario has further been tested with and without the provision of a minor arterial road, planned as part of the existing Rotokauri Structure Plan. The 2021 potential scenario previously included an initial development of 150 dwellings with access provided via a connection onto State Highway 39 (SH39) only (however, this is not intended as any determination that the PPC should be limited to a first stage of 150 dwellings in this location – it has been run as a test model only). The 2041 potential scenario includes the remainder of the development (up to 2000 dwellings and a school) to be provided in stages.

Subsequent to above, a rerun of the model has recently been undertaken for the future year 2041 and takes into account the revised Structure Plan layout. As part of the re-run, the scenario excluding the minor arterial road has also been tested in order to assess the effect this will have on the surrounding road network (i.e. Burbush Road and Exelby Road respectively) should the construction of the minor arterial road be delayed and not yet operational by 2041. It is however noted that the designation process for the minor arterial road is currently underway and therefore any additional movements along these roads as a result of this delay is expected to be temporarily only until the minor arterial road is complete.

Attachment A shows the revised volumes predicted near the site for the future year 2021 and 2041, with and without the potential development.

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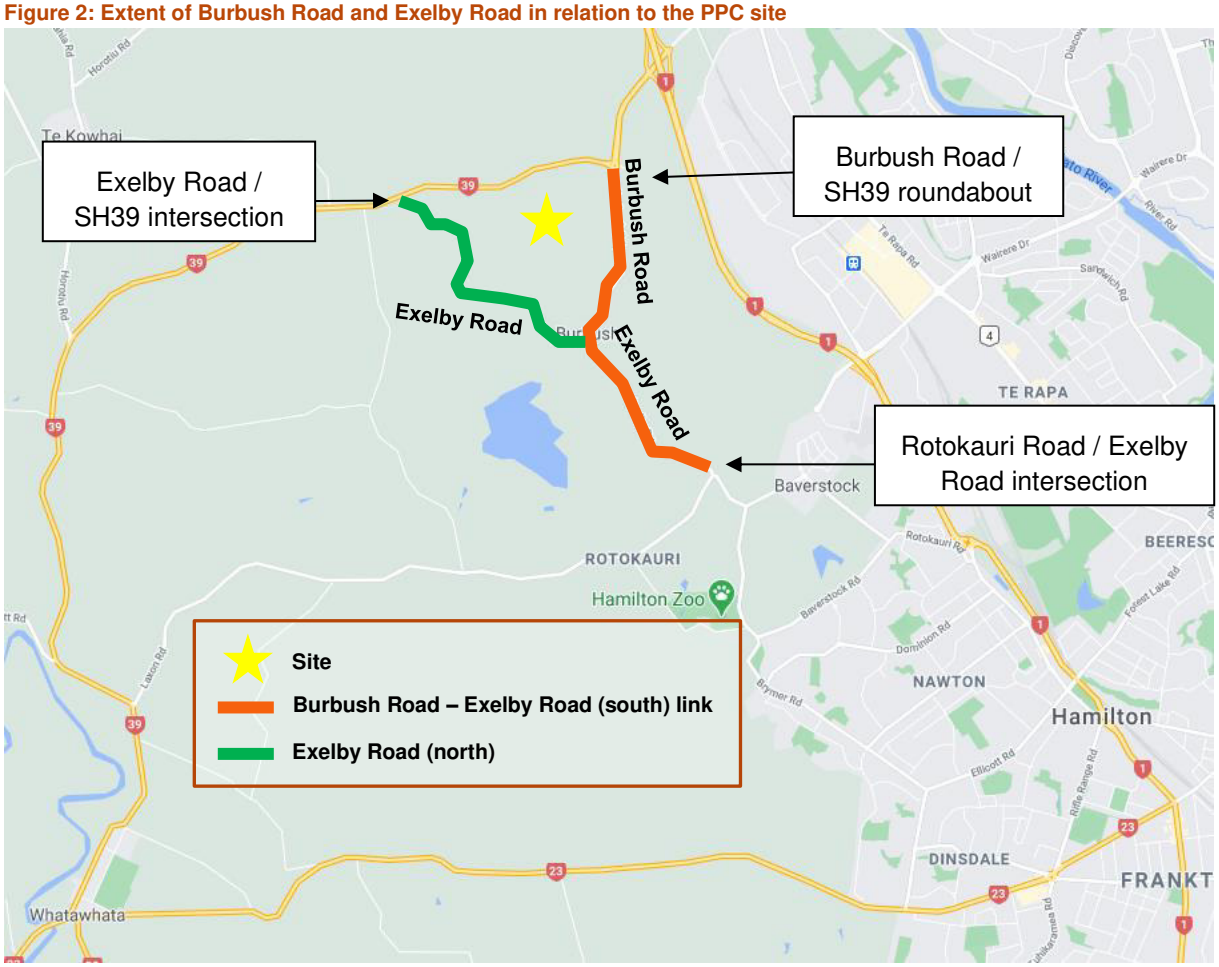
3 TRAFFIC MODELLING OUTPUTS

3.1 GENERAL

A high-level assessment of the WRTM outputs has been made to specifically understand the change in volumes along Burbush Road and Exelby Road (rural roads) as a result of the PPC development for the future year 2021 and 2041. A number of submissions made to the PPC development have specifically identified these roads as requiring some form of mitigation should the development occur.

Figure 2 shows the extent of Burbush Road and Exelby Road in relation to the PPC site.

Figure 2: Extent of Burbush Road and Exelby Road in relation to the PPC site



3.2 SH39 / COLLECTOR ROAD ROUNDABOUT PERFORMANCE

Traffic modelling has been undertaken using SIDRA analysis at the PPC internal Collector / SH39 intersection. The scenario modelled considers providing one intersection on SH39 as part of the proposed development (i.e. a single lane roundabout). It is noted that, the traffic volumes expected at the Collector / SH39 intersection has been based on 2041 volumes (worst case).

Figure 3 and Figure 4 below outlines the movement summary during the morning and afternoon peak hour respectively.

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Figure 3: Collector 1 / SH39 intersection (morning peak hour)

MOVEMENT SUMMARY

Site: 101 [Collector Road / SH39 roundabout 2041 AM_incl minor arterial (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Collector Road 1														
1	L2	28	5.0	29	5.0	0.129	4.0	LOS A	0.7	4.8	0.40	0.60	0.40	45.2
3	R2	110	5.0	116	5.0	0.129	8.5	LOS A	0.7	4.8	0.40	0.60	0.40	46.3
Approach		138	5.0	145	5.0	0.129	7.6	LOS A	0.7	4.8	0.40	0.60	0.40	46.1
East: SH39 (east)														
4	L2	94	5.0	99	5.0	0.213	3.0	LOS A	1.3	9.3	0.12	0.34	0.12	47.7
5	T1	214	5.0	225	5.0	0.213	2.9	LOS A	1.3	9.3	0.12	0.34	0.12	48.9
Approach		308	5.0	324	5.0	0.213	2.9	LOS A	1.3	9.3	0.12	0.34	0.12	48.5
West: SH39 (west)														
11	T1	276	5.0	291	5.0	0.245	3.4	LOS A	1.5	11.0	0.33	0.41	0.33	47.9
12	R2	22	5.0	23	5.0	0.245	8.0	LOS A	1.5	11.0	0.33	0.41	0.33	48.1
Approach		298	5.0	314	5.0	0.245	3.8	LOS A	1.5	11.0	0.33	0.41	0.33	47.9
All Vehicles		744	5.0	783	5.0	0.245	4.1	LOS A	1.5	11.0	0.26	0.41	0.26	47.8

Figure 4: Collector 1 / SH39 intersection (evening peak hour)

MOVEMENT SUMMARY

Site: 101 [Collector Road / SH39 roundabout 2041 PM_incl minor arterial (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Collector Road 1														
1	L2	10	5.0	11	5.0	0.072	4.4	LOS A	0.4	2.6	0.45	0.62	0.45	44.9
3	R2	62	5.0	65	5.0	0.072	8.9	LOS A	0.4	2.6	0.45	0.62	0.45	46.0
Approach		72	5.0	76	5.0	0.072	8.3	LOS A	0.4	2.6	0.45	0.62	0.45	45.8
East: SH39 (east)														
4	L2	122	5.0	128	5.0	0.288	3.0	LOS A	1.8	13.3	0.12	0.33	0.12	47.7
5	T1	305	5.0	321	5.0	0.288	2.9	LOS A	1.8	13.3	0.12	0.33	0.12	48.9
Approach		427	5.0	449	5.0	0.288	2.9	LOS A	1.8	13.3	0.12	0.33	0.12	48.6
West: SH39 (west)														
11	T1	294	5.0	309	5.0	0.239	3.1	LOS A	1.5	11.0	0.24	0.36	0.24	48.3
12	R2	20	5.0	21	5.0	0.239	7.7	LOS A	1.5	11.0	0.24	0.36	0.24	48.4
Approach		314	5.0	331	5.0	0.239	3.4	LOS A	1.5	11.0	0.24	0.36	0.24	48.3
All Vehicles		813	5.0	856	5.0	0.288	3.6	LOS A	1.8	13.3	0.20	0.37	0.20	48.2

Based on the above, a single lane roundabout could cater for the volumes and could be expected to perform at a LOS A. The maximum 95%ile queue length is 13.3 m and is expected to occur at the eastern approach (evening peak hour). Overall, the single / single lane approach roundabout with SH39 is considered to be appropriate.

3.3 BURBUSH ROAD – EXELBY ROAD LINK

3.3.1 2021 SCENARIO

Figure 55 and Figure 66 below show the volumes predicted at the Burbush Road / SH39 intersection within the Base and Potential scenario respectively (during the AM&PM peak two-hour period). The modelling outputs indicate the majority of vehicles associated with the development would in this scenario utilise the SH1 / SH39 interchange when travelling to and from the site. In this regard, it is

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important to note that the site's proximity to the SH1 interchange enables a viable connection for residents travelling between the site and the wider road network / key destinations within Hamilton without reliance on the existing rural roads (being Exelby Road and Burbush Road).

Figure 5: Burbush Road / SH39 roundabout (Base scenario) – 2021 AM & PM (two-hourly)

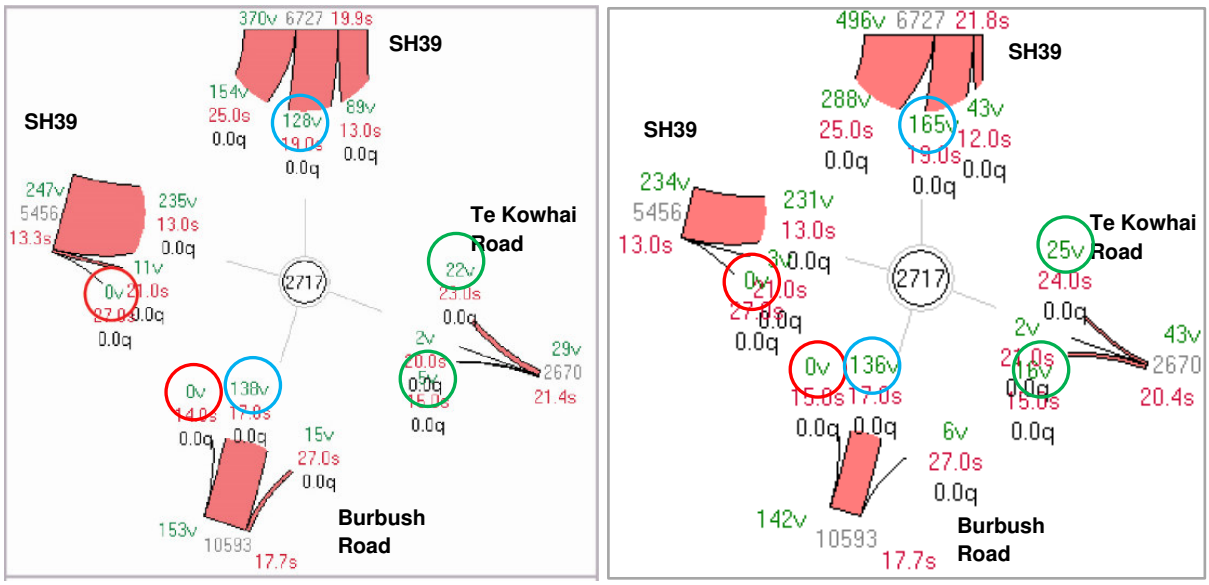
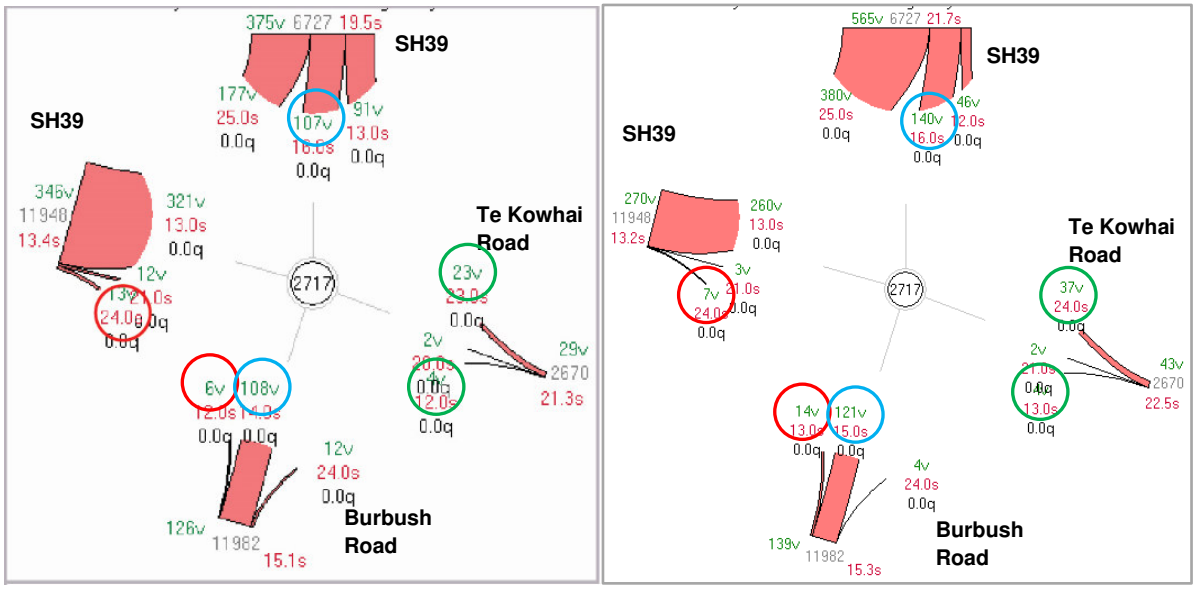


Figure 6: Burbush Road / SH39 roundabout (Potential scenario) - 2021 AM&PM (two-hourly)



As circled in red in Figure 2 above, the Base scenario indicates that there are no existing vehicles turning between Burbush Road and SH39 (western approach) during the peak hours[1]. In comparison, the Potential scenario indicates some 19-21 vehicles turning to/ from this approach in the peak two-hour period (as shown in Figure 3 above). It is therefore considered that a small portion of the trips predicted along Burbush Road, within the 2021 Potential scenario, are associated with the PPC site.

[1] Two hourly period

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When comparing the Potential scenario against the Base scenario volumes, the following is identified in relation to vehicle movements to / from Burbush Road:

- the Potential scenario shows a decrease in northbound and southbound through volumes at the Burbush Road / SH39 roundabout (circled in blue in Figure 2 and Figure 3 above).
- the potential scenario shows a reduction in volumes turning right onto Burbush Road from Te Kowhai Road (eastern approach) i.e., there is a shift in turning volumes such that a slightly greater portion of volumes travel northbound towards the SH1 interchange as opposed to utilising Burbush Road (circled in green in Figure 55 and Figure 66 above).
- At the southern end of the Burbush Road – Exelby Road link, the Potential scenario shows a reduction in volumes turning to and from Exelby Road via the Rotokauri Road / Exelby Road intersection.

As such, notwithstanding the PPC site potentially adding some 19-21 vehicles onto Burbush Road and Exelby Road further south, the Potential scenario indicates that the overall volumes along this link decreases slightly when compared to the Base scenario; this is shown in Figure 7 and Figure 8 below.

Figure 7: Base scenario volumes along Burbush Road – Exelby Road (south) link in relation – 2021 AM (two-hourly)

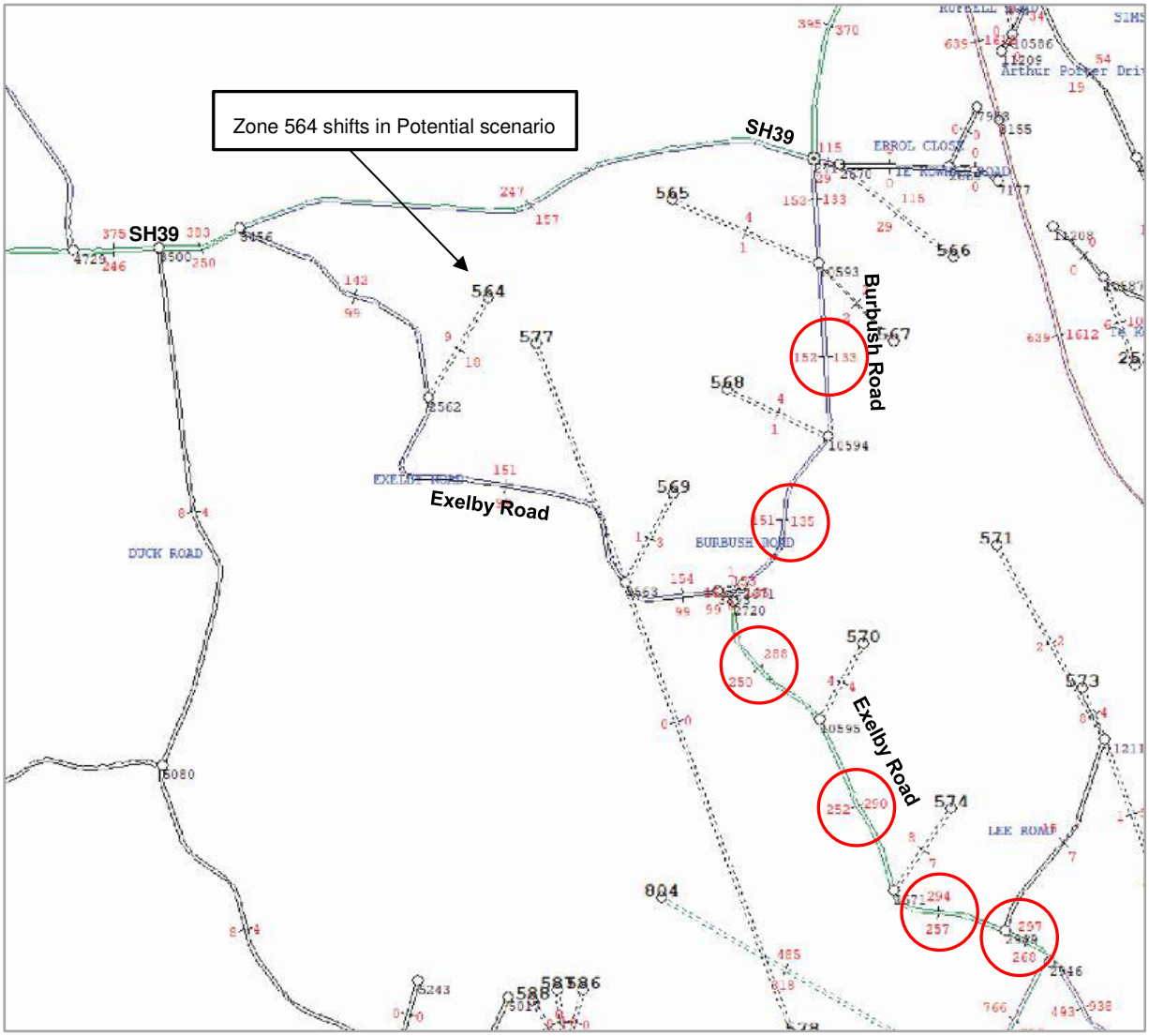

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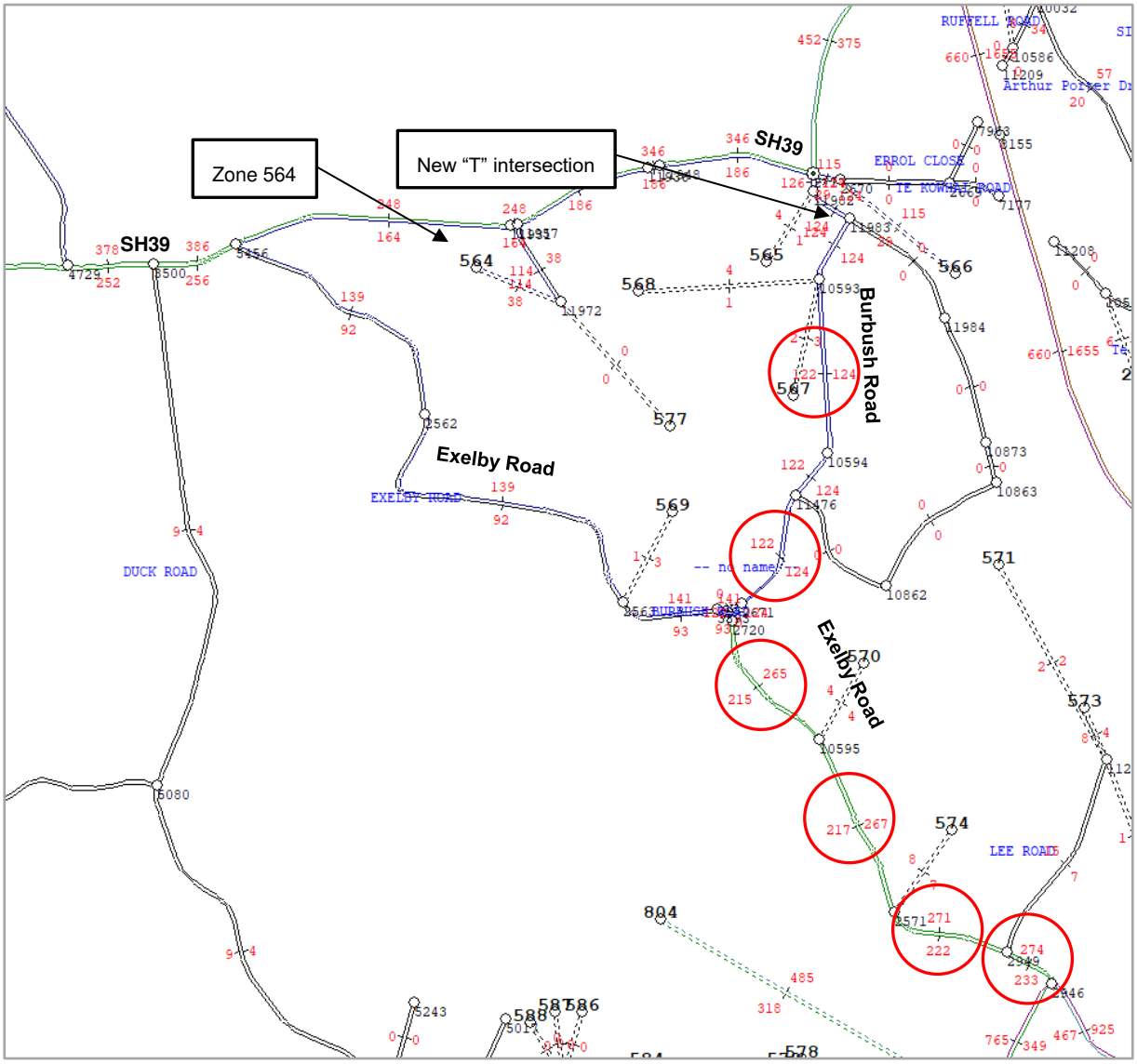
Figure 8: Potential scenario volumes along Burbush Road – Exelby Road (south) link in relation – 2021 AM (two-hourly)



The reduction in volumes along these corridors may indicate sensitivity of the corridor as a route choice. It is noted that the Hamilton Bypass is incorporated into both the 2021 Base and Potential scenario transport network. Recent announcements by the NZTA Waka Kotahi indicate that this link, which will provide a connection between Bombay Hills and south of Cambridge thereby allowing motorway through traffic to bypass Hamilton city, will be completed by mid-2022. The provision of this corridor is considered to reduce congestion levels along SH1. Consequently, this has the potential to make SH1 a more favourable route between Rotokauri North and Hamilton City as opposed to utilising Burbush Road – Exelby Road link (especially during peak hours).

Several other factors that may contribute to a reduction in volumes along Burbush Road include:

- the average speed along Burbush Road reduces from some 99 km/hr to some 75-77 k/hr; and
- the northern portion of Burbush Road is realigned thereby introducing a new "t" intersection and increasing travel distance at the northern end of the corridor (as shown in the Figure 5 above).

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Overall, it is considered that the increase in traffic on Burbush Road (in 2021) based on a potential modelling stage of up to 150 dwellings with initial access directly to SH39 is expected to be minimal (less than 15 vehicles per hour).

3.3.2 2041 SCENARIO (WITH MINOR ARTERIAL ROAD)

Attachment A outlines the traffic volumes predicted near the vicinity of the site along the Burbush Road – Exelby Road link (south of the PPC) for the future year 2041 (Base and Potential with 2000 dwellings). Figures 9 and 10 show this change.

Figure 9: 2041 Base scenario - traffic volumes along Burbush Road (two-hourly) AM&PM

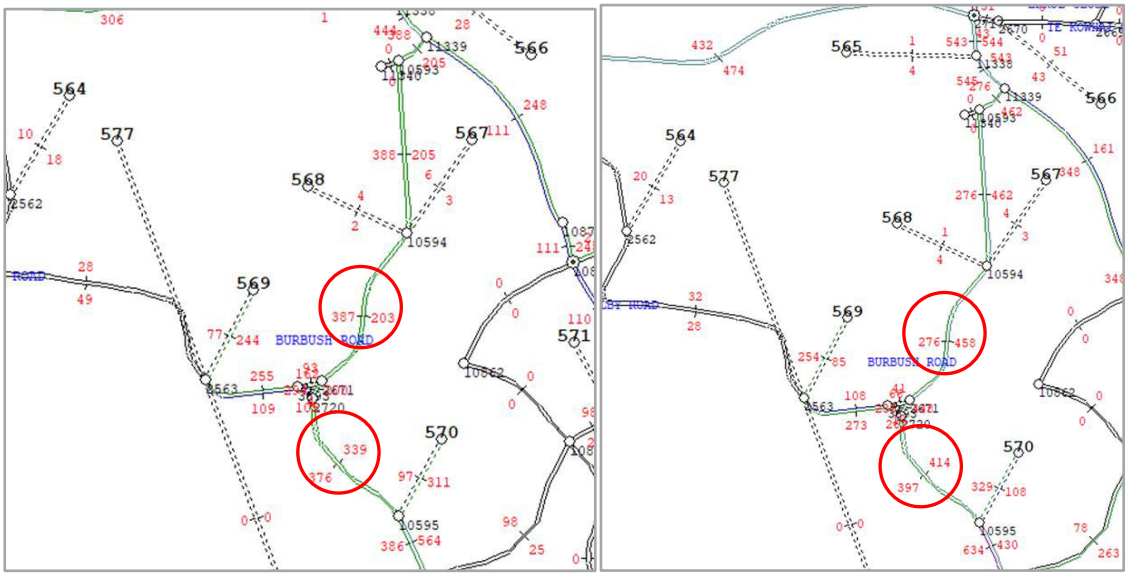
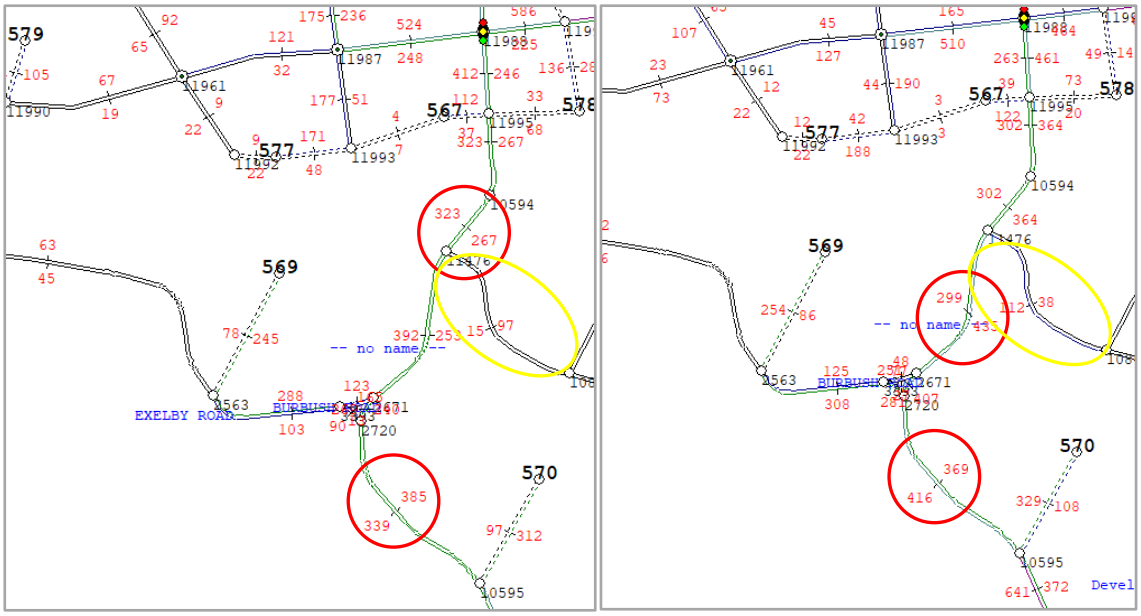


Figure 10: 2041 Potential scenario - traffic volumes along Burbush Road (two-hourly) AM&PM



The results show increases in the order of 170 vehicles (two-way) along the Burbush Road – Exelby Road link in the peak two-hour periods which corresponds to an increase of some 119 vehicles per hour (two-way) respectively for the 2000 dwellings proposed. As can be seen above, a link is provided in the Potential scenario between Burbush Road and Te Kowhai Road (outlined in yellow

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above) which is not included in the Base scenario. This link is identified within the existing Structure Plan and therefore it is anticipated to be established as part of the development to the south of the PPC area.

Based on the modelling outputs, a significant level of volumes is expected to utilise the Minor Arterial road to connect to the south (some 650-750 vehicles during the peak two-hour periods) and therefore this corridor is anticipated to be a more favourable route choice for vehicles travelling to and from the site (as is expected for a corridor with an arterial function) as opposed to the Burbush Road / Exelby Road link.

It is anticipated that any connection proposed onto Burbush Road will involve an upgrade of the corridor up to the intersection with SH39 (along the site's frontage). The remaining length of Burbush Road and Exelby Road (south of the PPC site) will be eventually upgraded by other developers (fronting these roads) in the Rotokauri Area (to the south of the PPC) and as such any required upgrade to these corridors provided as part of the PPC site would be an interim measure only. It is however noted that the existing road widths along Burbush Road and Exelby Road (south of Burbush Road) are already less than typical rural standards (currently less than 6.0m whereas 6.5m typical minimum including sealed shoulder is required[2]) which would not change as a result of the PPC.

3.3.3 2041 SCENARIO (WITHOUT MINOR ARTERIAL ROAD)

As noted above, a 2041 potential scenario has been tested which excludes the provision of the Minor Arterial road. Figure 1111 and Figure 1212 show the volumes predicted along the Burbush Road - Exelby Road link, with and without the Minor Arterial Road respectively.

[2] ASNZS4404 Table 3.2: For a rural road serving approximately 2,500 vehicles per day

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Figure 11:Predicted volumes for the future year 2041 (including minor arterial) – 2041 AM & PM

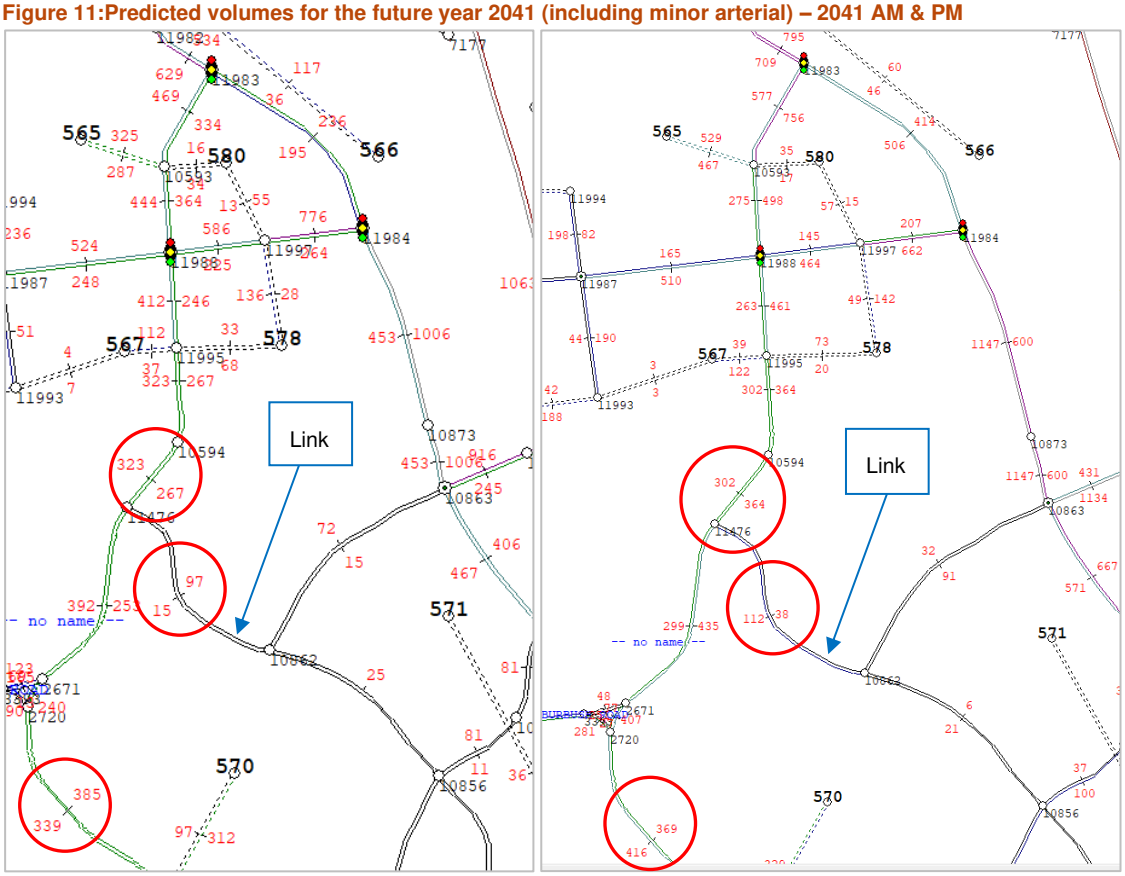
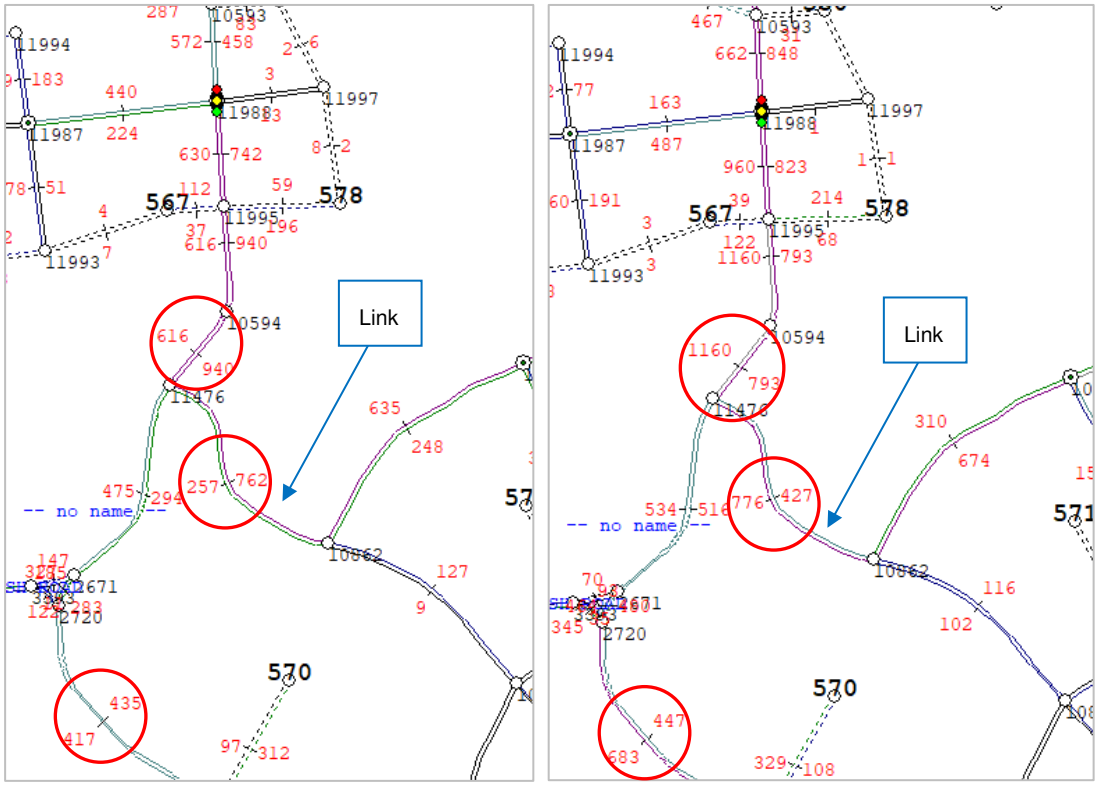


Figure 12: Predicted volumes for the future year 2041 (excluding minor arterial) – 2041 AM & PM



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As shown above, the results indicate that in a situation where the Minor Arterial is not yet constructed, the majority of volumes generated by the site that were expected to utilise the Minor Arterial Road will largely shift to Burbush Road and a link connecting to Burbush Road (outlined in blue above). The results also indicate an increase in vehicle movements along Burbush Road (south of the site) and Exelby Road further afield of approximately:

North of the link

- 966 vehicles during the morning peak two-hour period (680 vph); and
- 1287 vehicles during the evening peak two-hour period (900 vph).

South of the link

- 128 vehicles during the morning peak two-hour period (90 vph); and
- 345 vehicles during the evening peak two-hour period (242 vph).

Given that the Minor Arterial Road is expected to serve various developments within the area, it is considered that the additional movements outlined above are likely an accumulation of volumes from various developments as opposed to solely being associated with the PPC site. This does however show an upgrade to Burbush Road and Exelby Road (south of Burbush Road) will definitely be required if the arterial is not constructed.

3.4 EXELBY ROAD (NORTH OF BURBUSH ROAD)

3.4.1 2021 SCENARIO (150 DWELLINGS)

Based on the WRTM outputs, the overall volumes along Exelby Road (north of Burbush Road) are expected to decrease slightly in the Potential scenario (when compared against the Base scenario).

Figure 133 and Figure 144 show the traffic volumes predicted at the Exelby Road / SH39 intersection within the Base and Potential scenario respectively (during the morning and afternoon peak hours).

Figure 13: Exelby Road / SH39 intersection – 2021 AM&PM (2 hour Base)

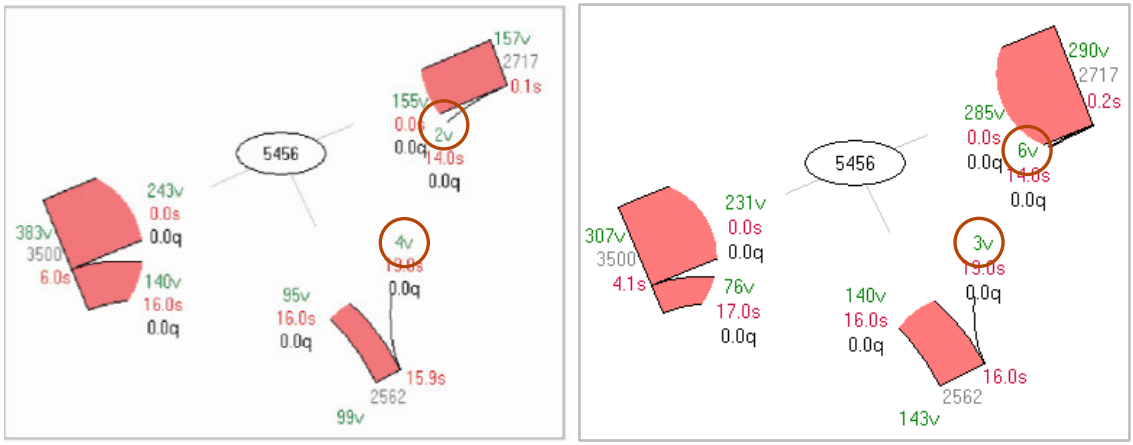

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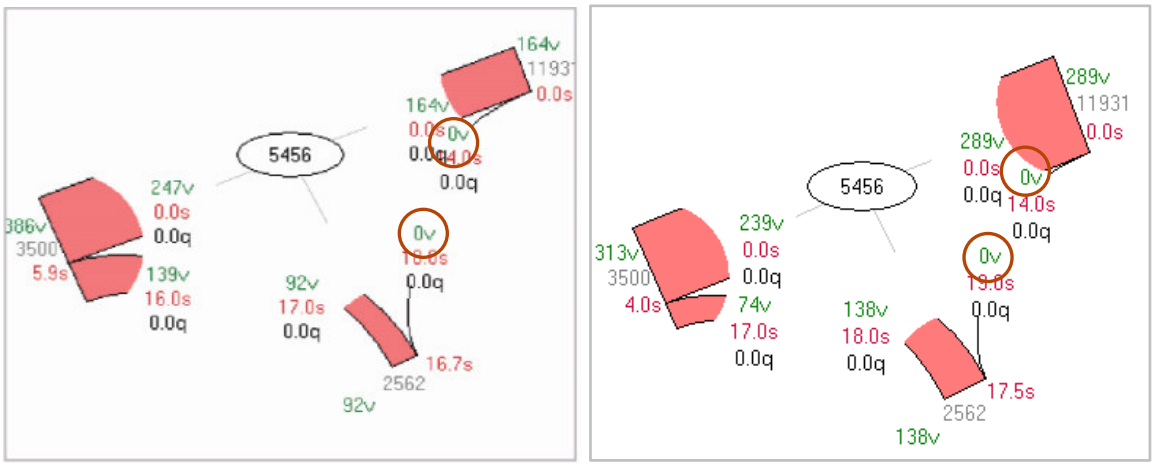
Figure 14: Exelby Road / SH39 intersection – 2021 AM&PM (2 hour Potential)



Based on the above, traffic volumes generated by a theoretical 150 dwelling stage (as outlined previously) t are initially not expected to travel to / from Exelby Road via the Exelby Road / SH39 intersection. In this regard, the reduction in turning volumes at this intersection (shown in orange in Figure 13 and Figure 14 above) is likely associated to a shift of Zone 564. This zone connects to Exelby Road in the Base scenario and is expected to connect to the proposed road network via SH39 in the 2021 Potential scenario. This is likely to have resulted in a reduction in volumes along Exelby Road (approximate decrease of 19 vehicles to the south and 12 vehicles to the north in the peak two-hour period). It is noted that Zone 564 is eventually expected to connect to Exelby Road by the future year 2041 and forms one of the two connections proposed onto Exelby Road.

3.4.2 2041 SCENARIO (WITH MINOR ARTERIAL ROAD)

For this assessment two links to Exelby Road have been assumed, one being at the east-west collector road in Figure 1 and an additional local road connection (with its final location and intersection to be determined at resource consent stage).

The Potential scenario generally shows an increase in volumes along this section of Exelby Road when compared against the 2041 Base scenario (up to 56 vehicles (two-way) during the two-hour peak period). It is noted that the Potential scenario now includes two connections between the PPC site and Exelby Road (north). As shown in Figure 16 below, the 2041 Potential scenario indicates up to 94 vehicles are expected to utilise the Exelby Road connections during the peak two-hour periods or up to 66 vehicles per hour.

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Figure 15: 2041 Base scenario - traffic volumes along Exelby Road (north of Burbush Road) (two-hourly) AM&PM

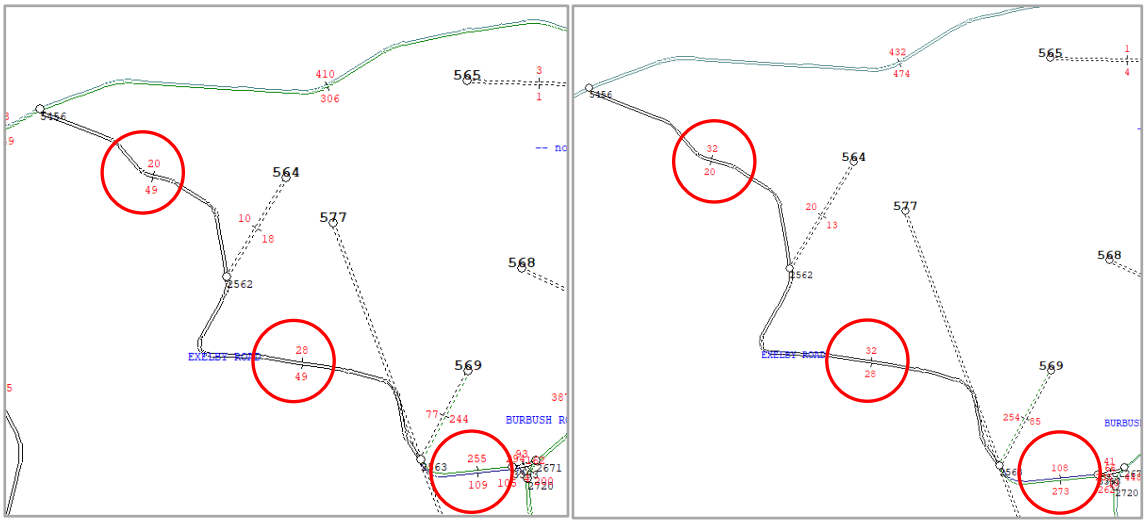

Figure 16: 2041 Potential scenario - traffic volumes along Exelby Road (north of Burbush Road) (two-hourly) AM&PM

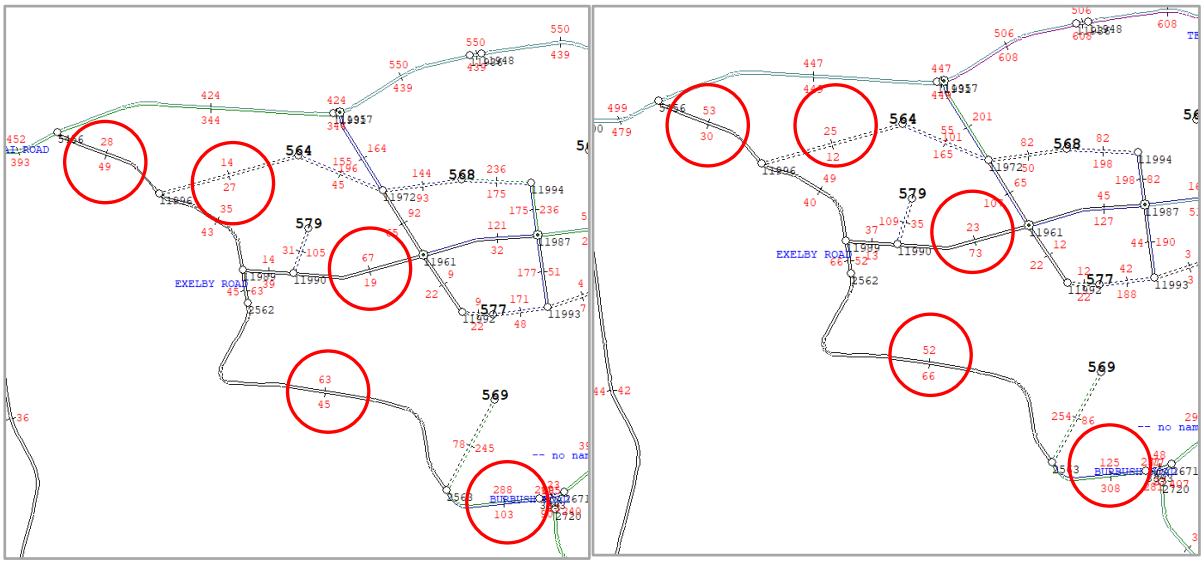

Figure 17 and Figure 18 show the turning volumes at the northern and southern connections proposed onto Exelby Road respectively during the morning and afternoon peak two-hour period.

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Figure 17: turning movements at northern connection onto Exelby Road 2041 AM&PM

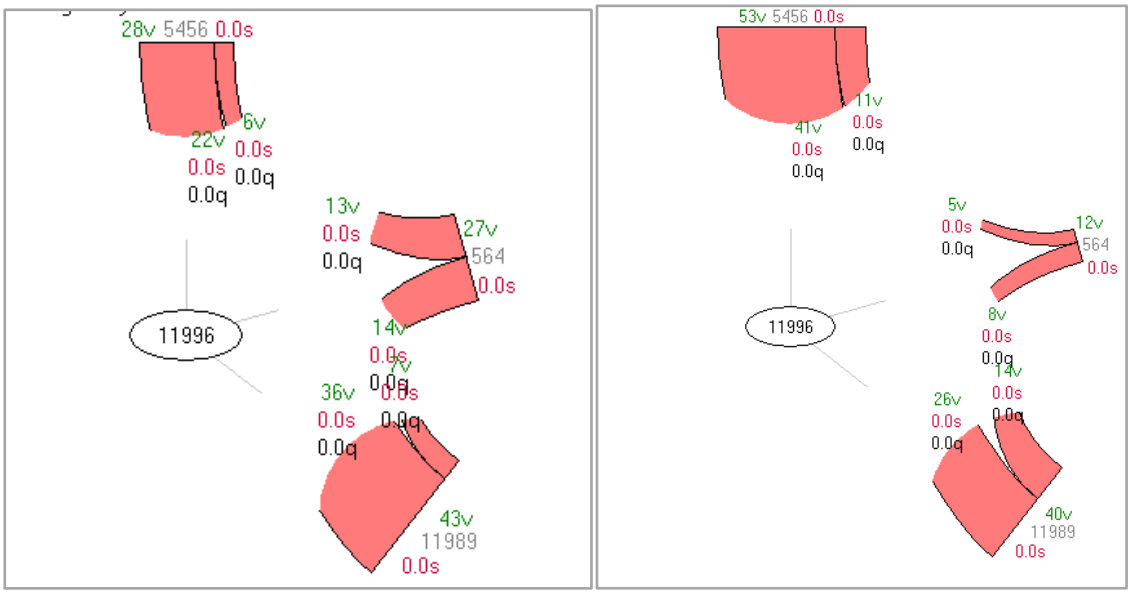
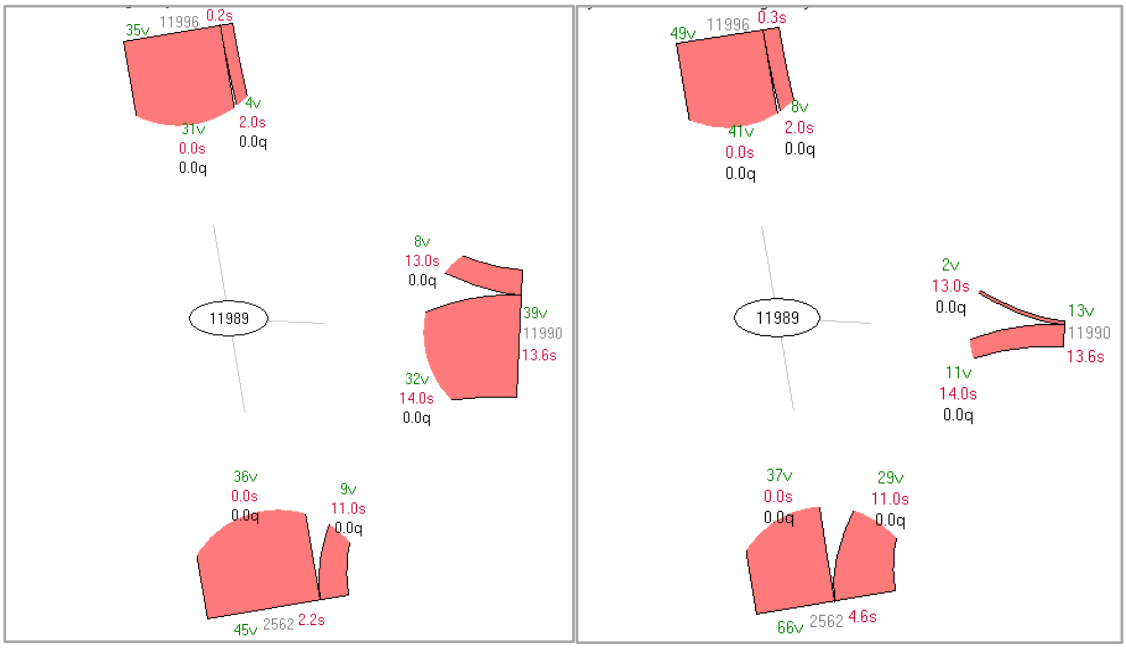


Figure 18: Turning movements at southern connection onto Exelby Road 2041 AM&PM



As can be seen above, the increase in traffic on Exelby Road in 2041 vs the base is in the order of 31-52 vehicles in a two hour period or 22-36 vehicles per hour.

3.4.3 2041 SCENARIO (WITHOUT MINOR ARTERIAL ROAD)

As noted above, a scenario has been tested whereby the Minor Arterial Road is not yet constructed by the future year 2041. It is important to note that this corridor is included within the existing Structure Plan and the designation process to protect land to construct the corridor is currently underway and as such any additional movements along Exelby Road outlined below is expected to be temporarily only until the Minor Arterial Road is complete.

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Figure 1119 and 20 show the volumes predicted along Exelby Road (north of Burbush Road) with and without the Minor arterial road respectively.

Figure 19:Predicted volumes for the future year 2041 (including minor arterial) – 2041 AM & PM

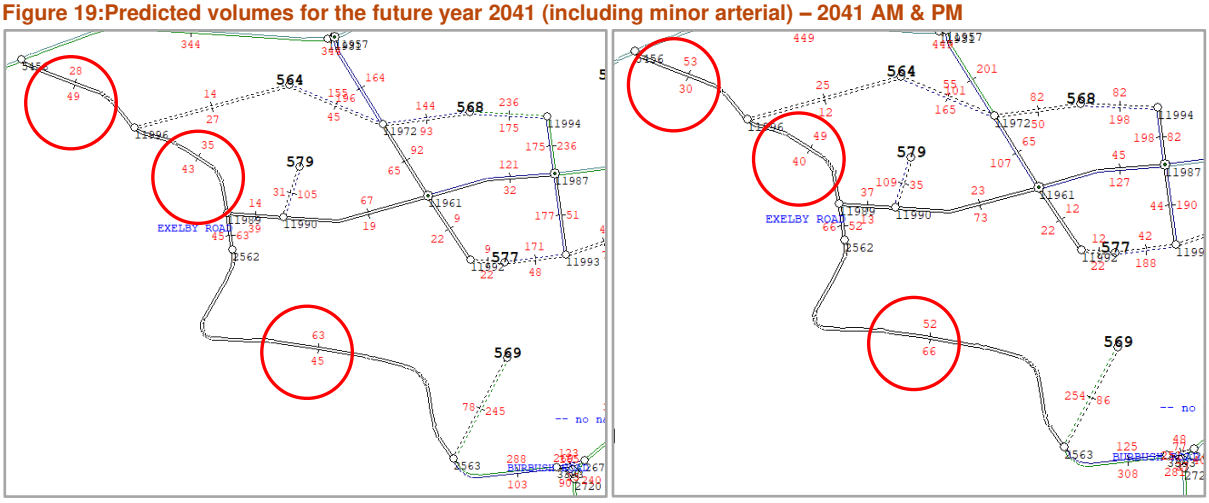
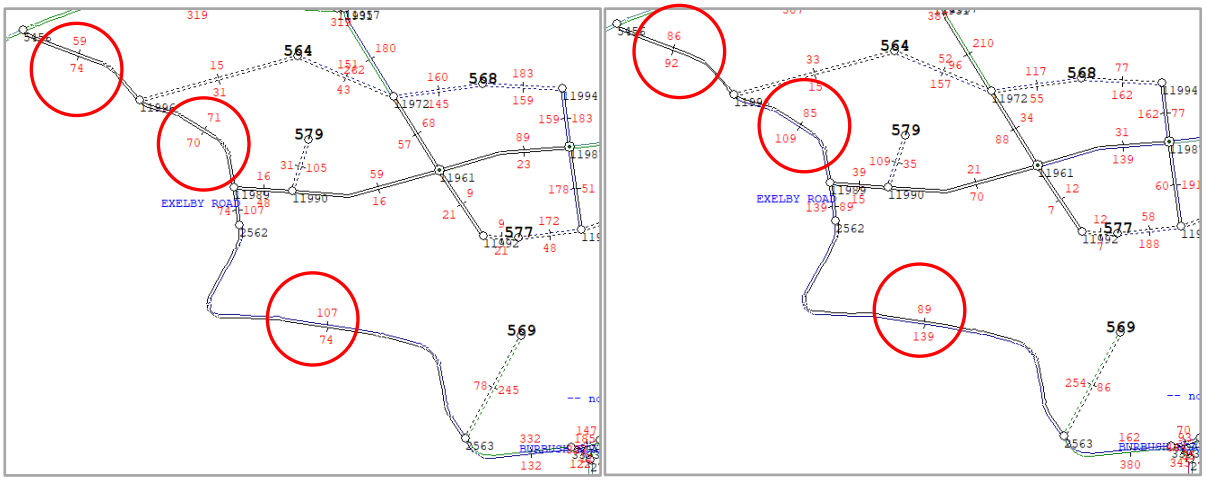


Figure 20: Predicted volumes for the future year 2041 (excluding minor arterial) – 2041 AM & PM



As shown above, the results indicate that in a situation where the Minor Arterial Road is not yet fully constructed, the volumes along Exelby Road are expected to increase in the order of 70 vehicles (two-way) during the morning peak two-hour period and 110 vehicles (two-way) during the evening peak two-hour period (50-80 vehicles per hour). In this regard, when compared against the 2041 potential scenario (including the Minor Arterial Road) the modelling outputs indicate only an additional 16 vehicles are expected to utilise the proposed Exelby Road connections within the PPC therefore indicating some degree of re-routing in the area.

3.5 RURAL ROAD WIDENING

From the above assessment both Burbush Road and Exelby Road will experience an increase in traffic as a result of the PPC. These roads (outside the PPC site boundaries) will be eventually upgraded by other developers (fronting these roads) in the Rotokauri Stage 2 Area (to the south of the PPC) and as such any required upgrade to these corridors provided as part of the PPC would be interim measures only. It is further noted that it is not just the PPC that adds traffic to these routes but also other development in the area including the earlier stages of Rotokauri.

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It is however noted that the existing road widths along Burbush Road and Exelby Road (south of Burbush Road) are already less than typical rural standards (currently less than 6.0m whereas 6.5m typical minimum including sealed shoulder is required).

The Regional Infrastructure Technical Specification (RITS) sets out the standards for design and construction of public infrastructure within Waikato / Hamilton. The RITS references transportation functional classification table contained in the District Plan and NZS 4404 Section 3.3. In this regard NZS4404 provides various rural road widths depending on traffic volume. For local roads less than 1,000vpd NZS4404 recommends a 5.5-5.7m road width with 0.5m sealed shoulders (6.5-6.7m total). For a collector road the road width remains at 5.5-5.7m road width with an increase in sealed shoulders to 1.0m (7.5-7.7m total).

Given the above it is considered reasonable (considering the road is below current Council specification) that an upgrade occurs when the volume reaches the new status of Collector Road (ie changes classification) of 3,500 vehicles per day (widened to the 7.7m). In this regard:

- This level of traffic is not reached for Exelby Road (between PPC and Burbush Road), with or without the minor arterial.
- For Burbush Road and Exelby Road (south of Burbush Road) this level of traffic is reached when:
    - Traffic is approximately 75% of 2041 volumes with minor arterial.
    - Traffic is approximately 30% of 2041 volumes without minor arterial.

It is considered that this level of development can occur in the PPC before the upgrade is required.

3.6 EXELBY ROAD / BURBUSH ROAD INTERSECTION

It is noted that the Exelby Road / Burbush Road intersection is rather unusual in that it has two “legs” and no right turn bay. This is shown in Figure 21.

Figure 21: Exelby / Burbush Road intersection

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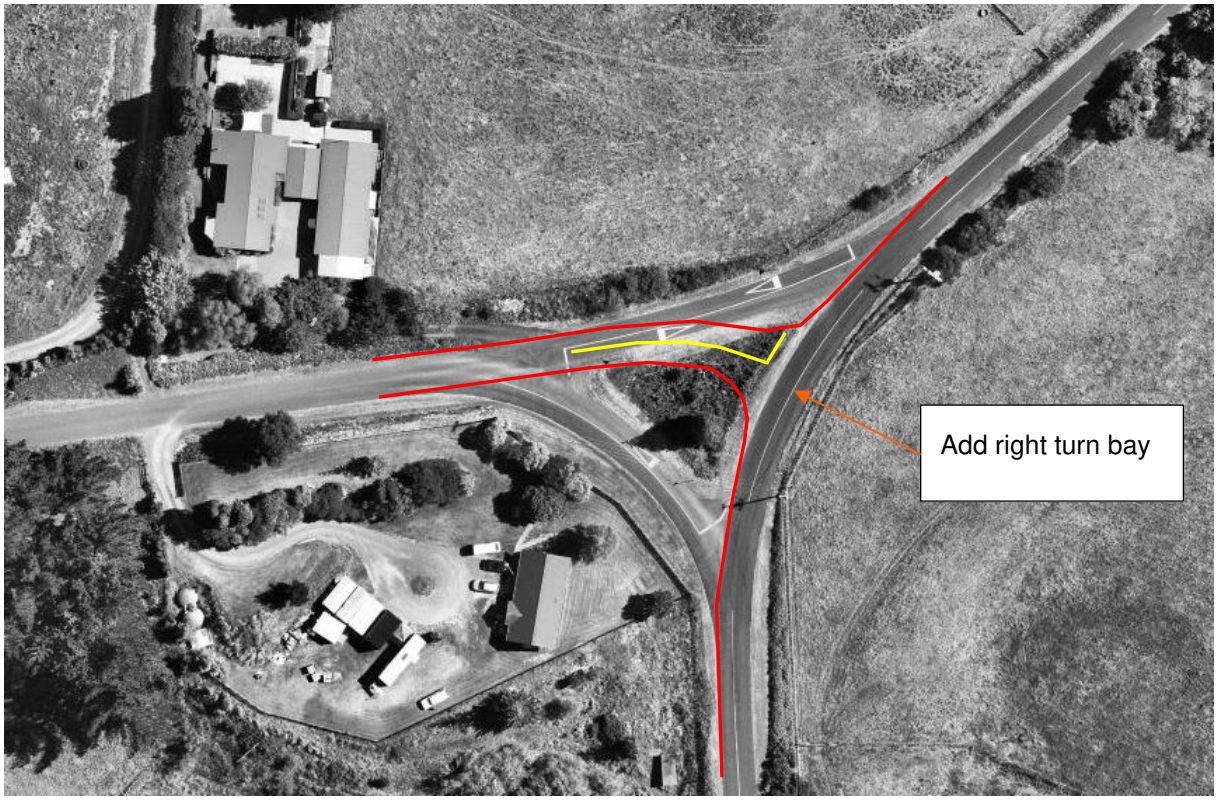
In this regard with the minor arterial in place no upgrade is considered necessary (traffic volumes do not warrant an upgrade). Without the minor arterial it is considered a right turn bay is required and the intersection is upgraded to a more traditional single side road approach as per Figure 21. From a review of the traffic volumes in 2021 and 2041 as well as the Austroads Right turn warrants[3] the right turn bay will likely be required after approximately 30% of all traffic (including other development in Ratokauri) is generated at the intersection. In terms of the PPC this equates to 600 dwellings (worst case in that only PPC develops.

Figure 22: Exelby / Burbush Road intersection upgrade (no arterial)



4 SUMMARY / DISCUSSION

4.1 SH39 / COLLECTOR ROAD

- Modelling shows the single lane roundabout at SH39 / Internal collector road can cater for the proposed PPC.

4.2 EXELBY ROAD (SH39 TO BURBUSH ROAD)

- The 2021 Potential scenario indicates that the traffic volumes generated by the potential development scenario would typically not access Exelby Road or SH39 via the Exelby Road / SH39 intersection.
- In 2041, the two connections proposed onto Exelby Road are expected to serve up to 94 vehicles during the two-hour peak periods (or 67 vehicles per hour). The turning movements associated with these connections largely show vehicles entering / exiting the site from the southbound direction (approximately 70% or 47 vehicles per hour)

[3] Figure 2.26 Austroads Part 6

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- The overall traffic volumes predicted along Exelby Road (north of Burbush Road) decreases between the year 2021 and 2041 scenario's respectively. This is due to existing traffic being displaced to the new future road network.
- To the south of the PPC site, it is considered that a full urban upgrade is not required by the PPC as this should be the responsibility of future Rotokauri (Stage 2) development to the south. While it is recognised that the PPC has the potential to add additional traffic volumes to the south on Exelby Road, this volume is considered minimal and does not in itself warrant an upgrade.
- As such, subject to the above, the only upgrade considered necessary to Exelby Road as a result of the PPC relates to the PPC site frontage though to SH39 where the road should be upgraded to a collector road standard with any final detail of urban/rural edging for the western side to be determined at consenting stage in discussion with HCC and WDC.
- In the situation where the Minor Arterial Road is not yet constructed, an additional 16 vehicles are expected to utilise the Exelby Road connections during the two-hour peak periods which is consider not to be significant and would not warrant any additional upgrades.

4.3 BURBUSH ROAD AND EXELBY ROAD (SOUTH OF BURBUSH ROAD) LINK

- Any connection from the PPC site onto Burbush Road, should include an upgrade of Burbush Road to its collector road status, and should include the new connection to the minor arterial in the north and any upgrade to the northern portion to connection to SH39.
- When comparing the Base and Potential scenarios for each year, the traffic volumes along Burbush Road are expected to decrease as a result of the potential development for the year 2021. However, it is noted that up to 21 vehicle movements along Burbush Road in the peak two hour period (within the 2021 Potential scenario) are likely associated with the PPC site. In this regard, the traffic volumes along Burbush Road and Exelby Road (south of Burbush Road) associated with a potential initial development (150 dwellings) are considered to be negligible.
- In 2041 with the full buildout in place (2000 dwellings plus a potential education facility), the results show increases in the order of 119 vehicles (two-way) per hour south of the PPC site on Exelby Road (with the minor arterial in place). Without this arterial the increase to around 900 vehicles per hour.
- To the south of the PPC site it is considered that a full urban upgrade is not required by the PPC as this should be the responsibility of future Rotokauri development to the south. It is however recognised that the PPC does add noticeable additional traffic volume to the south along the Burbush Road / Exelby Road link and that it is important that necessary upgrades are considered to ensure for a safe and efficient network. In this regard the appropriate upgrade is considered to be seal widening as detailed below.
- The timing of the seal widening (to 7.7m seal edge to seal edge) required depends on the minor arterial timing being:
    - With the minor arterial in place the level of PPC that can occur without widening is 75% or 1500 dwellings.
    - With the minor arterial in place the level of PPC that can occur without widening is 30% or 600 dwellings.

4.4 BURBUSH ROAD/ EXELBY ROAD INTERSECTION

- In a scenario without the minor arterial in place, the Exelby Road / Burbush Road intersection will require an upgrade after 1000 dwellings including a right turning bay, as identified in Figure 21.

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5 IMPLEMENTATION PLAN

As stated above and in the ITA, there are a number of roading and infrastructure projects required for the Rotokauri North area in order to facilitate the growth envisaged for this. Several projects are directly relevant to this site, and these are listed in Table 1 (developer responsibility), while others relate to wider network and are shown in Table 2 (others responsibility). The below also includes a clearer trigger/timing for each infrastructure item.

Table 1: Implementation Plan (Developer)

Project	Upgrade	Trigger / timing	
		With Arterial	Without Arterial
SH39 / New Road roundabout	Single lane roundabout at intersection of SH39 / New Collector Road	First dwelling with connection to SH39 via the new Collector Road	Same
Burbush Road upgrade (along site frontage)	Urban upgrade (both sides) along site frontage through to SH39.	Any new roading connection from the site to Burbush Road	Same
Exelby Road upgrade to urban (along site frontage)	Urban upgrade (eastern side). Upgrade of entire carriageway to western side of road (rural). Along site frontage through to SH39.	Any new roading connection from the site to Exelby Road	Same
Burbush Road / Exelby Road link from the PPC site to the south to urban upgraded road (from others)	Rural road seal widening to the south to meet urban road in rest of Rotokauri	Any new roading connection to Burbush Road and PPC dwellings exceeding 75% or 1500 dwellings. Widening to 7.7m (including sealed shoulders)	Any new roading connection to Burbush Road and PPC dwellings exceeding 30% or 600 dwellings. Widening to 7.7m (including sealed shoulders)
Exelby Road (between Burbush Road and the PPC site)	None	N/A	N/A
Exelby Road / Burbush Road intersection	Intersection upgrade	None	Upgrade to priority intersection with right turn bay after 30% PPC (600 houses)
Bus provision within site	Provide bus route(s) as required throughout site	As development occurs	Same
Shared Cycle Path	3m shared path (or dedicated cycle facility, or a combination of both) to connect to SH39 / Burbush Road roundabout	As development occurs forming the main collector roads where walking and cycling are provided. This is anticipated to occur incrementally to match the relevant development frontage. However, the first stage of any development should make a connection (even via any temporary measures) to enable cycling provision from day 1.	Same

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Table 2: Implementation Plan (others)

Project	Responsibility	Upgrade	Trigger / timing
Bus services within site	Waikato Regional Council	Provide bus route(s) as required throughout site	Likely feasible after 1000 dwellings
North-south arterial	Council / NZTA	Construction of the north-south minor arterial corridor between State Highway 39 and the south-eastern corner of Rotokauri North and its connection to the proposed east-west minor arterial that will pass under the Waikato Expressway Te Rapa Section, or the continuation of the northsouth minor arterial to the south	No trigger necessary, scenarios without this roading connection have been included above in Table 1.

It is anticipated that the above be utilised to inform any necessary infrastructure planning provisions.

It is acknowledged that HCC and Grey Matters have requested that the PPC include **all intersections** with Exelby and Burbush Roads. Based on the modelling above, this is unnecessary as this will not alter the findings above. In addition, any new road connections will be subjected to a full assessment at the time of resource consent will enable any further improvements to be addressed.

6 CONCLUSION

The analyses contained in the letter outlines the traffic volumes and resulting upgrades considered necessary to mitigate the effects of the PCC.

For clarity, matters relating to wording of proposed objectives, policies and rules (or any other methods) including those relating to traffic matters is addressed by Tollemache Consultants in conjunction with any discussion with HCC on planning related matters.

We trust this answers your queries outlined above. Please feel free to contact us if you require any further information.

Yours sincerely

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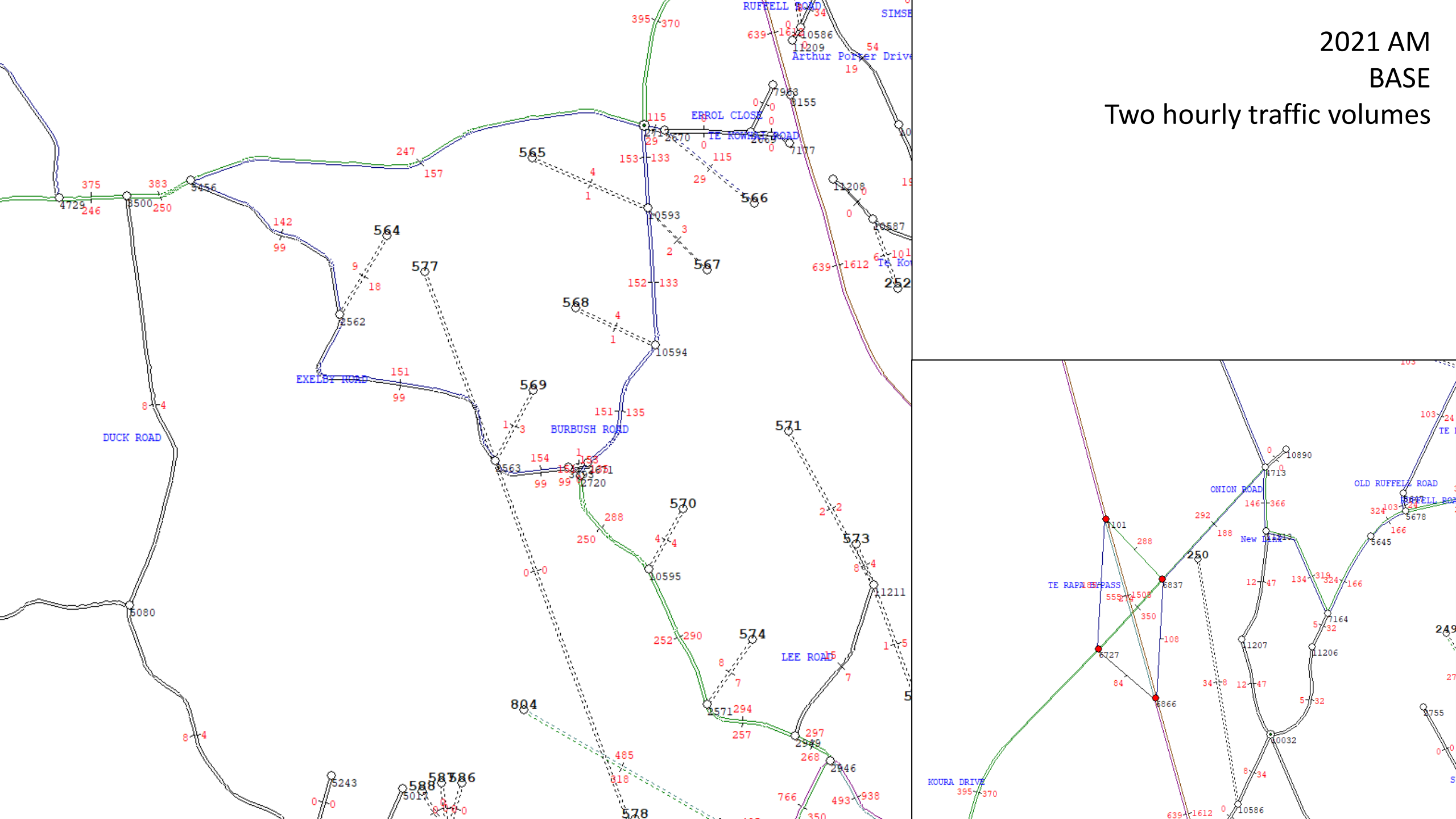
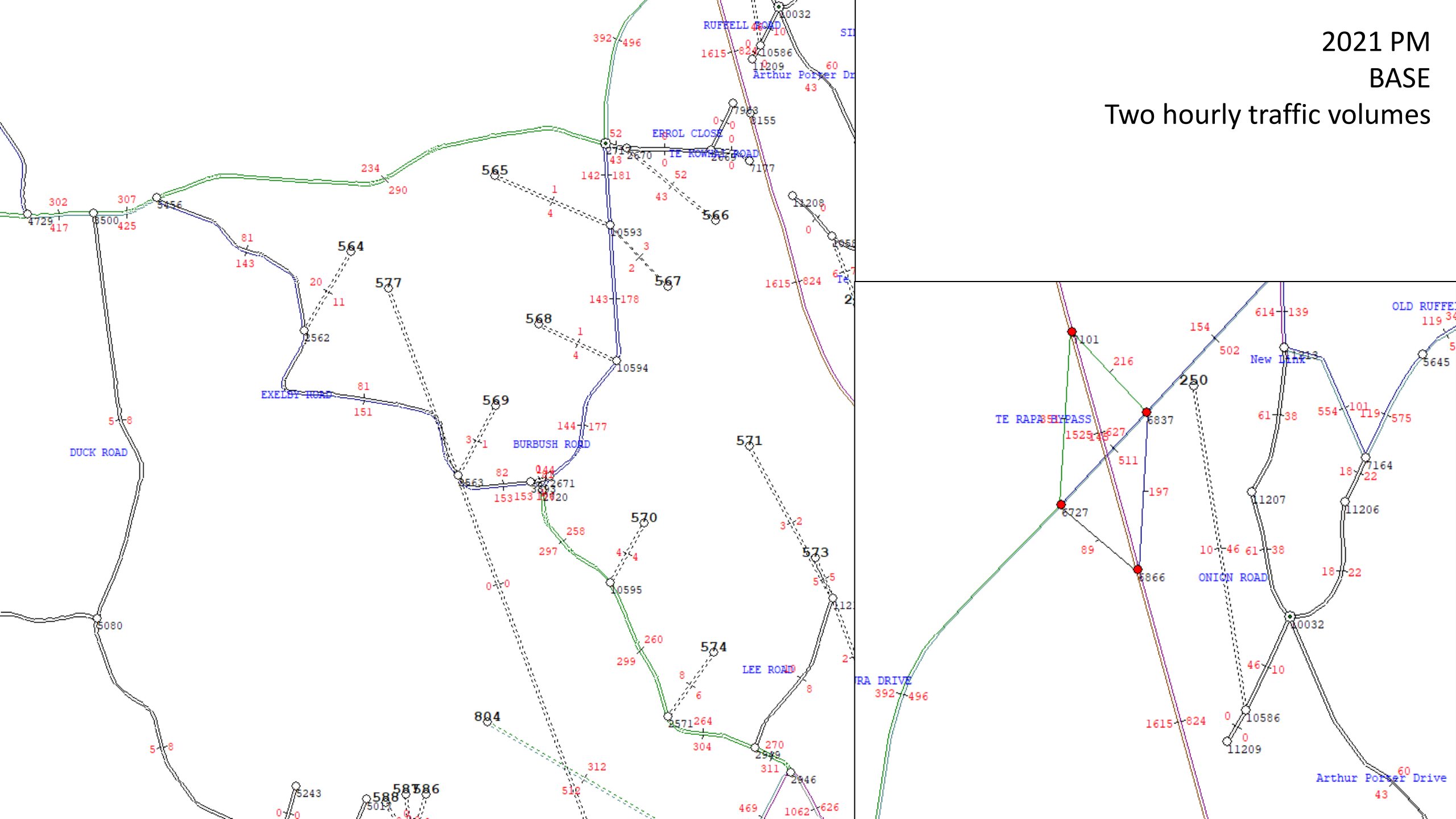
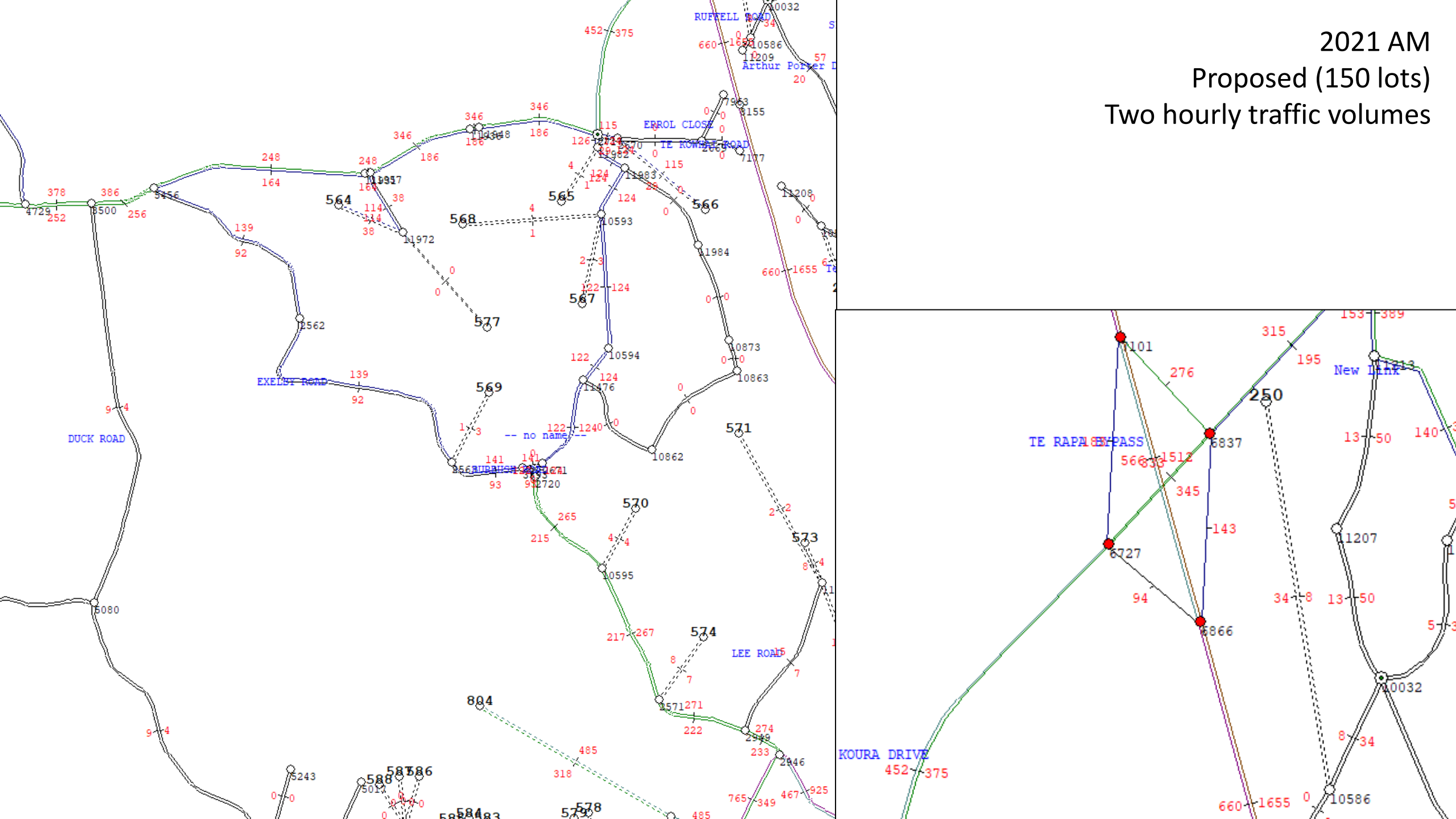
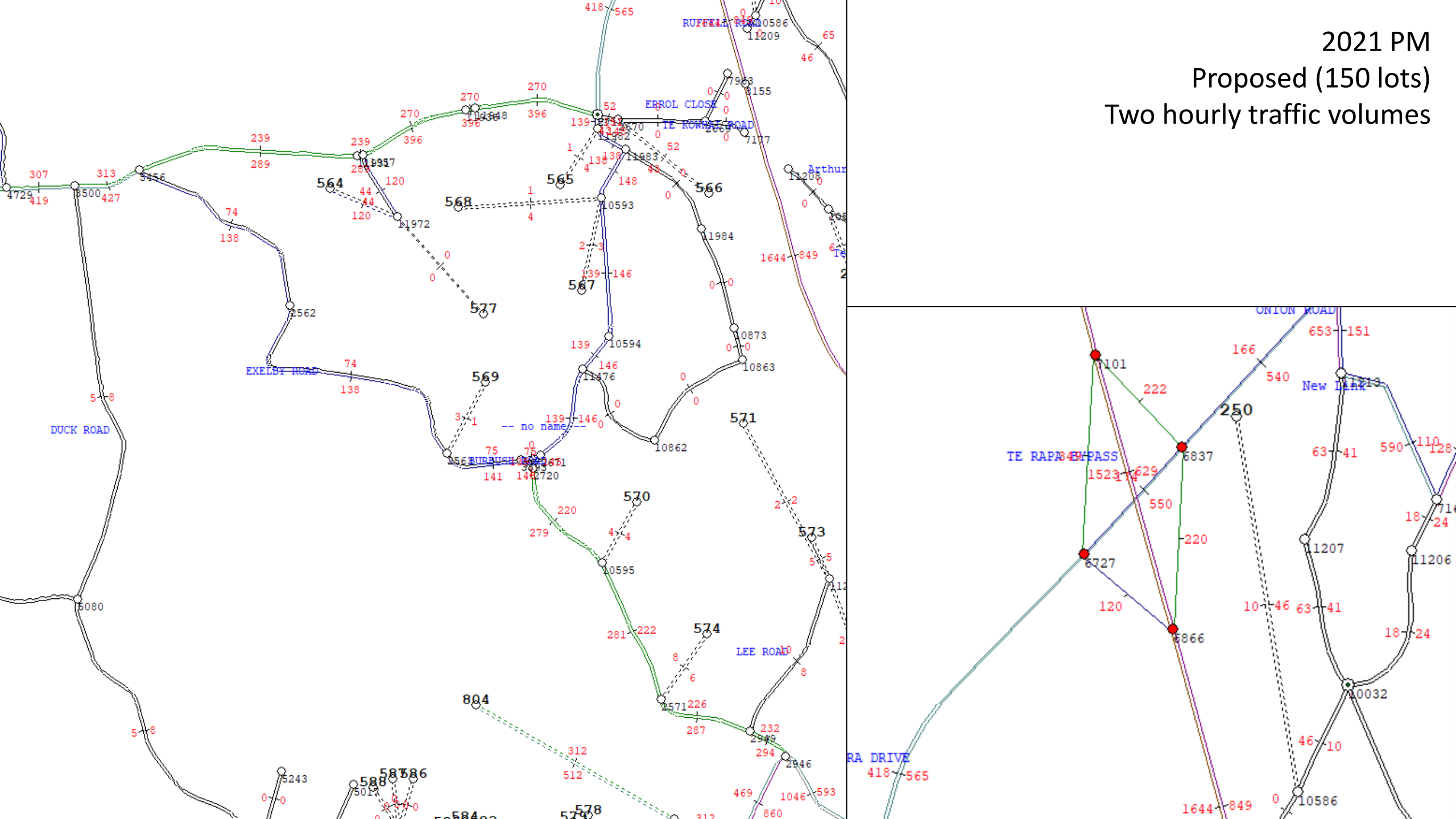
ATTACHMENT A – WRTM OUTPUTS

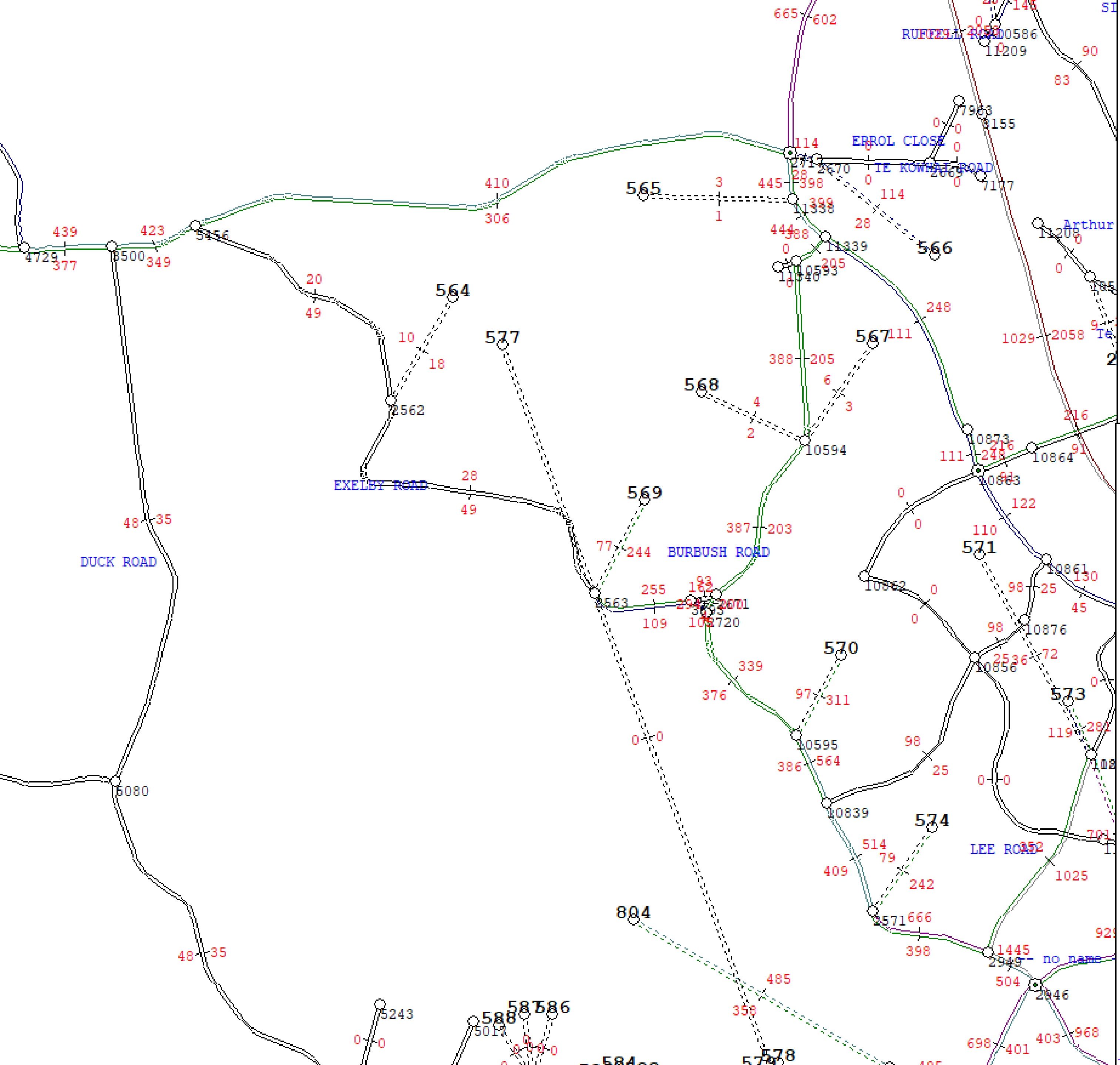

2021 AM
BASE
Two hourly traffic volumes
DUCK ROAD
EXELBY ROAD
BURBUSH ROAD
ERROL CLOSE
LEE ROAD
ONION ROAD
OLD RUFFELL ROAD
KOURA DRIVE
Arthur Potter Drive
TE RAPA BYPASS
565
566
567
564
577
568
569
570
571
573
574
804
578
586
588
250
252

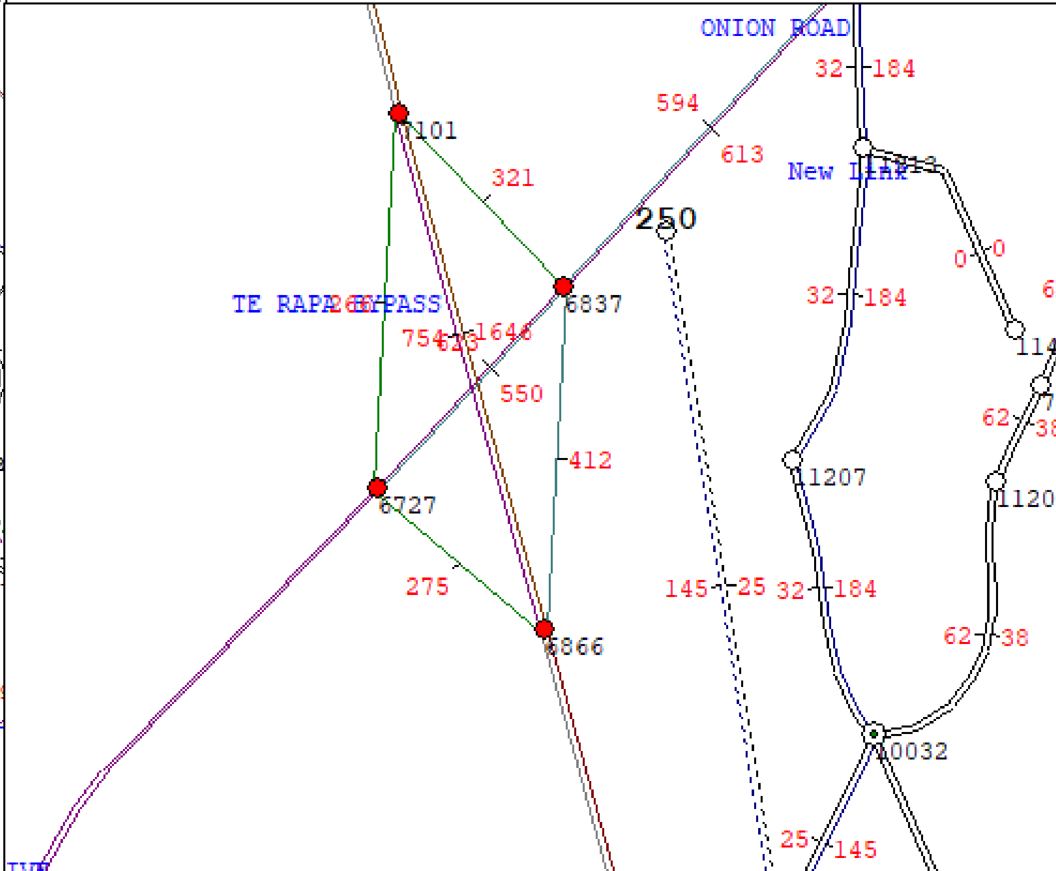

2021 PM
BASE
Two hourly traffic volumes
DUCK ROAD
EXELBY ROAD
BURBUSH ROAD
ERROL CLOSE
RUFFELL ROAD
LEE ROAD
TE RAPA BYPASS
ONION ROAD
New Link
Arthur Porter Drive
565
566
567
568
569
570
571
573
574
577
564
804
250


2021 AM
Proposed (150 lots)
Two hourly traffic volumes
RUFFELL ROAD
ERROL CLOSE
TE ROWLE ROAD
EXELBY ROAD
DUCK ROAD
LEE ROAD
KOURA DRIVE
TE RAPA BYPASS
New Link
-- no name --
564
565
566
567
568
569
570
571
573
574
577
578
584
586
588
804
250

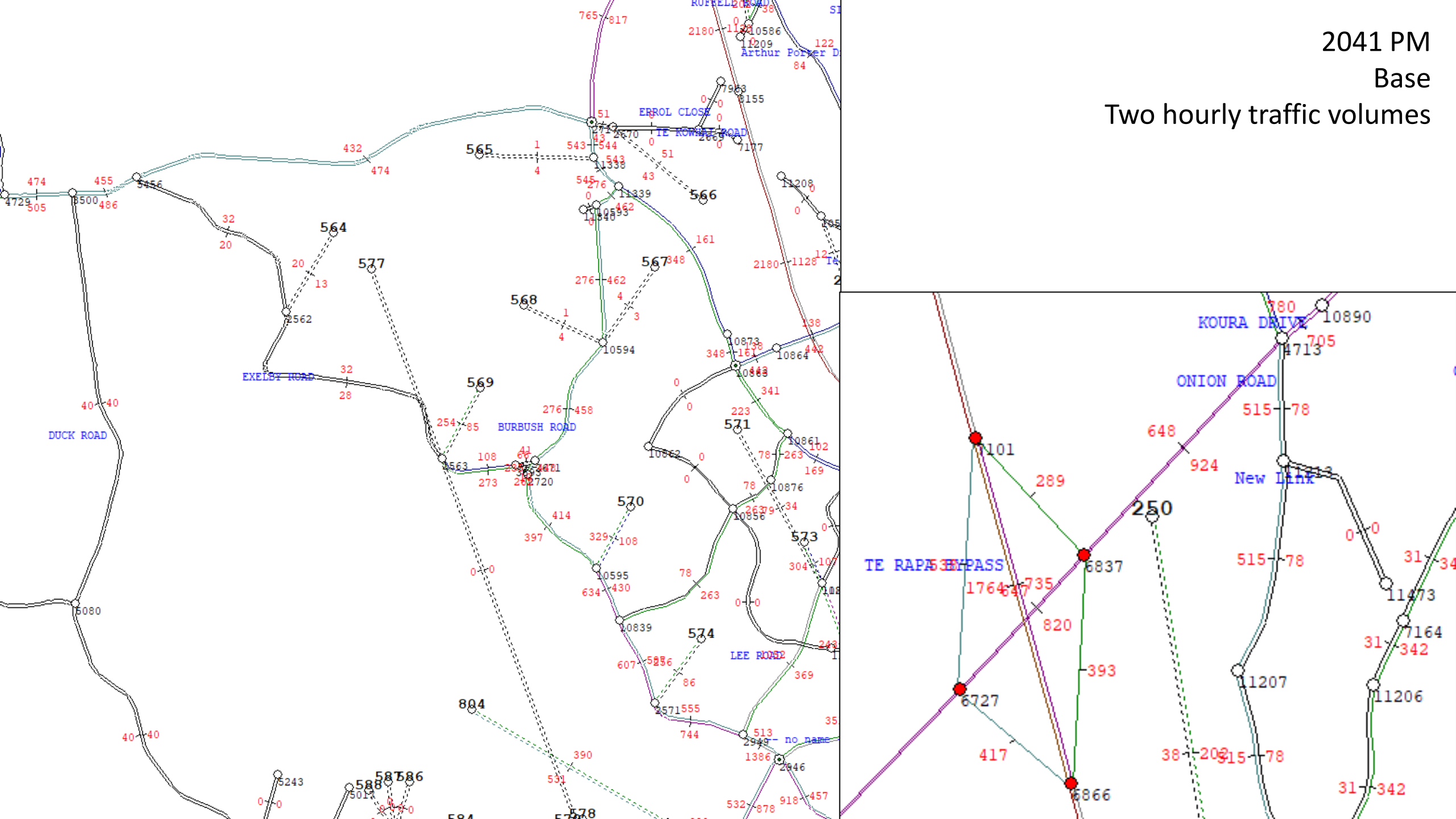

2021 PM
Proposed (150 lots)
Two hourly traffic volumes
DUCK ROAD
EXELBY ROAD
ERROL CLOSE
LEE ROAD
UNION ROAD
TE RAPA BYPASS
-- no name --
564
565
566
567
568
569
570
571
573
574
577
804
250
New Link

2041 AM
Base
Two hourly traffic volumes



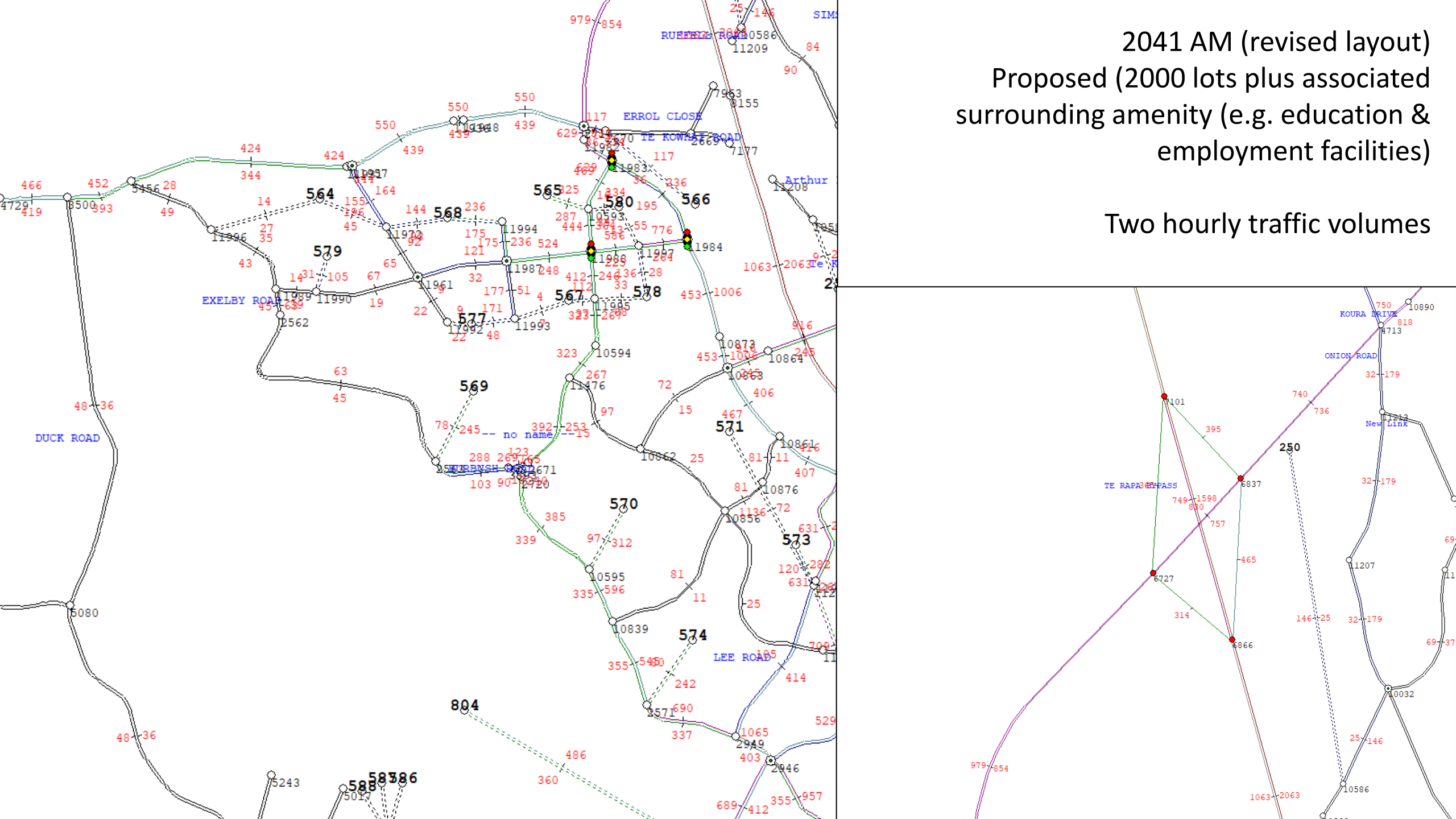


2041 PM
Base
Two hourly traffic volumes



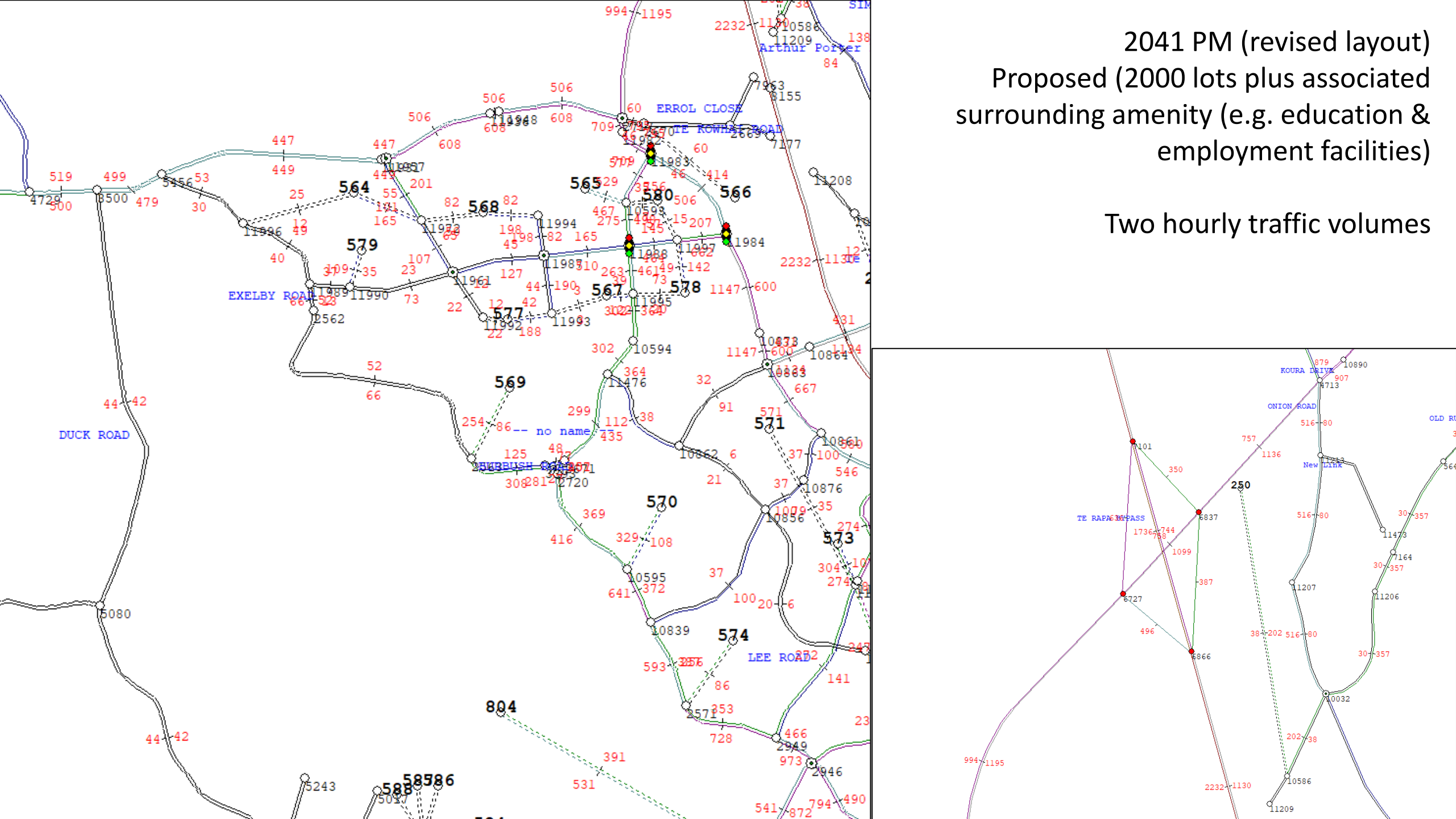
2041 AM (revised layout)
Proposed (2000 lots plus associated surrounding amenity (e.g. education & employment facilities)

Two hourly traffic volumes

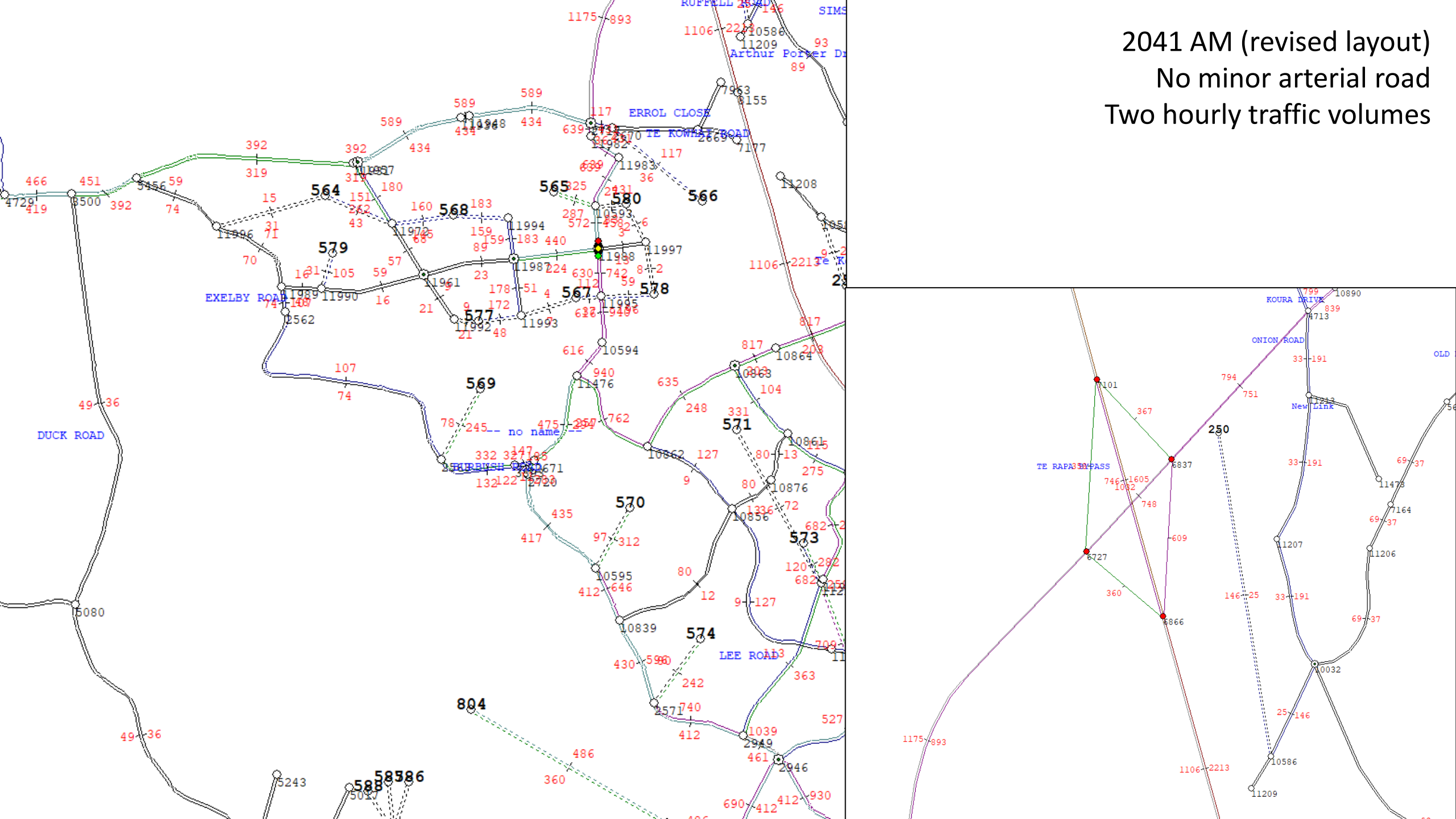


2041 PM (revised layout)
Proposed (2000 lots plus associated surrounding amenity (e.g. education & employment facilities)

Two hourly traffic volumes



2041 AM (revised layout)
No minor arterial road
Two hourly traffic volumes



2041 PM (revised layout)
No minor arterial road
Two hourly traffic volumes