

Mr R Scott
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Auckland

11 April 2022

Copy via email: robert@scottwilkinson.co.nz

Dear Robert

301-303 BUCKLAND ROAD- CLAUSE 23 RESPONSE

Further to your recent instructions, we have reviewed the request for further information related to transport matters from Auckland Council and have responded as follows.

1 ITEM T1: INTENSIVE SCENARIO

Please assess a more intensive development scenario for the site including greater building coverage with a high proportion of more intensive activities including LFR and little, if any, motor vehicle sales or industrial activities.

Comment:

The trip generation in Table 3 of the ITA contains an assessment of traffic generation including a significant proportion as full retail (rather than large format retail) which typically has higher trip generation rates. This assessment was based on a realistic scenario based on the previously approved and accepted Plan Change (PC30) on the Pukekohe Racecourse (scaled due to larger size).

It is considered unrealistic for the entire site to be LFR. This is based on planning and economic assumptions that other activities enabled in the zone (such as light industry) are also in high demand in Pukekohe. An assessment has however been undertaken assuming the 50% of the site would be LFR has now also been undertaken with the following assumptions:

- 7.9ha total site
- 50% (4ha) of the site to be LFR
- LFR site coverage of 33% based on the Pukekohe Mega Centre on Manukau Road (previously consented). This equates to 13,000sqm GFA
- The remainder of the site to be light industry / commercial as per the ITA
- Peak hour trip rates have been established from NZTA's Research Report 453. Section 5.5 (Large Format Retail) of NZTA 453 states that the surveys in the database indicate peak hour trip generation rates of 4.0 trips per 100m² per hour during the weekday late afternoon peak, and 6.0 trips per 100m² per hour during the midday peak on a Saturday.

Applying the 453 report rates yields a LFR trip generation of 520 trips in the evening peak and 780 trips on a Saturday.

From table 3 of the ITA, the other uses generate 59 trips in the evening peak. As they are office / industrial related they are not expected to generate noticeable / any traffic on a Saturday peak.

As such under this LFR scenario the site is expected to generate 579 trips in the evening peak and 780 trip on a Saturday. The 579 trips is less than assesses in the evening peak in the ITA while the Saturday peak of 780 trips has been assessed below (item T3).

2 ITEM T2: TRIP GENERATION RATE

Please adopt higher trip generation rates for retail and provide evidence to demonstrate the adopted trip generation rates represent the activities that could develop on the site.

Comment:

The Business – General Business Zone enables retail greater than 450m² as a permitted activity, retail between 200-450sqm as a discretionary activity and all retail less than 200m² is a non-complying activity. In that regard the question has been addressed in the light of retail as a permitted and discretionary activity. As a general principle the smaller the tenancy the higher the traffic generation per sqm. Given the above, the adopted rates of 12.5/ 100m² GFA for peak hour for retail as per the original ITA scenario, is considered appropriate.

It is also noted that all the traffic (both PPC and PC30) have all been assumed to be new “Primary” trips. As such no reduction has been made for either multi-purpose / linked trips (those that may also visit other stores on the same Plan Change or other plan Change) or pass-by traffic (ie those vehicles already on the road network that deviate into the site). As such the assessment is considered conservative.

3 ITEM T3: WEEKEND PEAK PERIOD

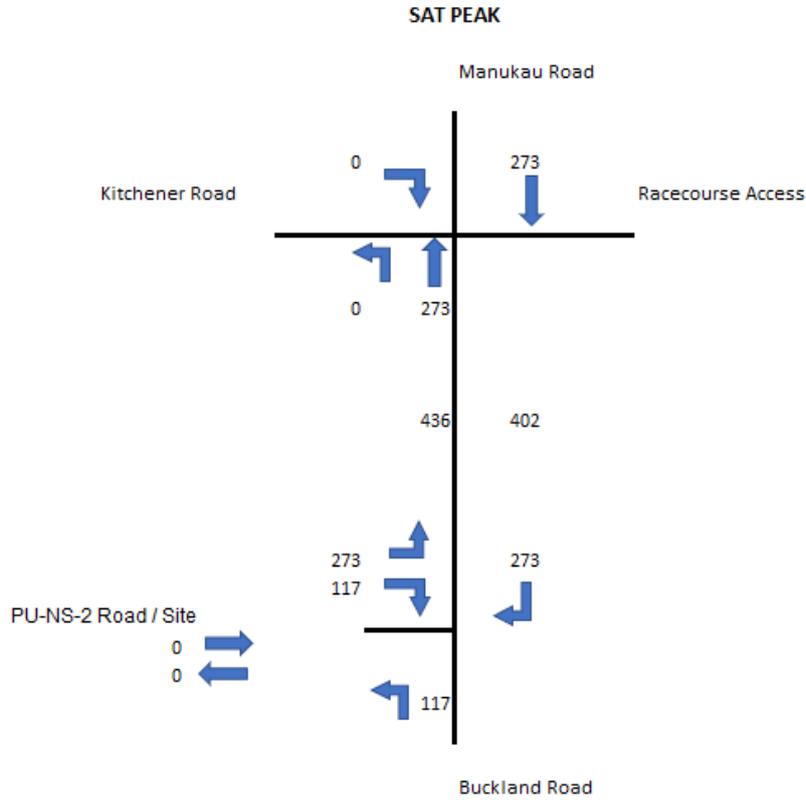
Please provide assessment of the weekend midday peak period.

Comment:

The weekend Saturday peak has been assessed. Traffic generation is based on the worst case LFR assessment above (780 trips per hour).

The distribution has been based on an entry / exit 50/50 split for weekend midday peak and a distribution to be 70% to north and 30% to the south (as per item T5 below). The increase in traffic is shown in Figure 3-1 below.

Figure 3-1: Weekday Peak Hour Trip Generation - Sat



The two intersections have been reviewed / assessed in SIDRA (as per the ITA) as follows.

Table 1: Proposed performance of the Manukau Road/ Kitchener Road/ Buckland Road roundabout Sat

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95 th %ile Queue (m)
Buckland Road (South)	LT	0.793	14.4	B	97
	TH	0.793	14.6	B	97
	RT	0.793	20.3	C	97
Gate 2 (main site access) (east)	LT	0.587	16.8	B	45
	TH	0.587	16.9	B	45
	RT	0.587	22.6	C	45
Manukau Road (north)	LT	0.911	12.8	B	184
	TH	0.911	13.0	B	184
	RT	0.911	18.7	B	184
Kitchener Rd (west)	LT	0.827	33.3	C	101
	TH	0.827	33.3	C	101
	RT	0.827	33.9	D	101

Table 2: Proposed performance of the PU-NS-2 Road / Buckland Road intersection Sat (Priority intersection)

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95 th %ile Queue (m)
Buckland Road (South)	LT	0.312	5.6	A	0
	TH	0.312	0	A	0
	RT	0.009	7.1	A	0
Racecourse Gate	LT	0.163	7.8	A	1
	TH	0.163	37.7	E	1
	RT	0.163	30.0	D	1
Buckland Road (north)	LT	0.230	5.6	A	0
	TH	0.230	0	A	0
	RT	0.315	9.1	A	2
Site access (PU-NS-2 Road) (west)	LT	0.904	35.9	E	15
	TH	0.904	74.3	F	15
	RT	0.904	56.9	F	15

Table 3: Proposed performance of the PU-NS-2 Road / Buckland Road intersection Sat (roundabout)

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95 th %ile Queue (m)
Buckland Road (South)	LT	0.578	7.2	A	40
	TH	0.578	7.5	A	40
	RT	0.578	12.2	B	40
Racecourse Gate	LT	0.055	10.2	B	3
	TH	0.055	10.5	B	3
	RT	0.055	15.2	B	3
Buckland Road (north)	LT	0.573	5.3	A	45
	TH	0.573	5.6	A	45
	RT	0.573	10.3	B	45
Site access (PU-NS-2 Road) (west)	LT	0.511	8.8	A	33
	TH	0.511	9.1	A	33
	RT	0.511	13.8	B	33

The above Saturday assessment shows that an upgrade of the Buckland Road / Manukau Road / Kitchener Road roundabout as proposed by PC30 is still appropriate to cater for the traffic generation associated with the proposed zoning. It is noted that this intersection is approaching capacity in this scenario however as noted previously all the traffic (both PPC and PC30) has all been assumed to be new "Primary" trips. No reduction has been made for either multi-purpose / linked trips (those that may also visit other stores on the same Plan Change or other plan Change) or pass-by traffic (ie those vehicles already on the road network that deviate into the site). As such the assessment is considered conservative.

As an example, a SIDRA sensitivity test of the Manukau Road/ Kitchener Road/ Buckland Road roundabout during the Saturday peak has been made assuming 20% of the traffic using just PCC is

already on Manukau Road / Buckland Road. While the turning movements will remain the same, the through traffic will be reduced (as they will be turning in to the two sites rather than travelling straight through on Manukau Road. Table 4 summarises the result.

Table 4: Proposed performance of the Manukau Rd/ Kitchener Rd/ Buckland Rd roundabout Sat (20% pass by)

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95 th %ile Queue (m)
Buckland Road (South)	LT	0.734	12.1	B	76
	TH	0.734	12.3	B	76
	RT	0.734	18.0	B	76
Gate 2 (main site access) (east)	LT	0.534	13.6	B	39
	TH	0.534	13.7	B	39
	RT	0.534	19.4	B	39
Manukau Road (north)	LT	0.866	10.0	B	140
	TH	0.866	10.2	B	140
	RT	0.866	15.8	B	140
Kitchener Rd (west)	LT	0.750	22.7	C	77
	TH	0.750	22.9	C	77
	RT	0.750	23.6	C	77

This sensitivity test shows noticeable improvement to the intersection, which will be even more noticeable once pass-by trips for PC30 and multi-purpose traffic (generally) is taken into account.

The assessment also shows the priority intersection of PU-NS-2 Road / Buckland Road is appropriate to cater for the traffic in the short term but nears capacity in the medium / long term. It is considered appropriate to allow for this intersection to be roundabout controlled in the future as a result of other development in the area including from the collector PU-NS-2 Road.

4 ITEM T4: DISTRIBUTION

Please recalculate movements with directional splits based and provide evidence to support the splits used.

Comment:

While we consider the distribution of traffic contained in the ITA to be appropriate, we have tested the suggested distribution.

- Commercial / office split is likely to be closer to 90/10 AM and 85/15 PM for both warehousing and office.
- Retail and motor vehicle sales to be around 60/40 AM (opposite in PM), and motor vehicle sales around 75/25 AM and 40/60 PM.
- Distribution to be 70% to north and 30% to the south (as per Item T5 below)

The resultant SIDRA assessment is outlines in the following tables.

Table 5: Revised performance of the Manukau Road/ Kitchener Road/ Buckland Road roundabout AM

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95 th %ile Queue (m)
Buckland Road (South)	LT	0.576	6.6	A	40
	TH	0.576	6.8	A	40
	RT	0.576	12.4	B	40
Gate 2 (main site access) (east)	LT	0.294	7.0	A	15
	TH	0.294	7.2	A	15
	RT	0.294	12.9	B	15
Manukau Road (north)	LT	0.505	4.8	A	35
	TH	0.505	4.9	A	35
	RT	0.505	10.6	B	35
Kitchener Rd (west)	LT	0.414	9.0	A	24
	TH	0.414	9.1	A	24
	RT	0.414	14.8	B	24

Table 6: Revised performance of the PU-NS-2 Road / Buckland Road intersection AM (roundabout)

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95 th %ile Queue (m)
Buckland Road (South)	LT	0.493	5.4	A	31
	TH	0.493	5.7	A	31
	RT	0.493	10.4	B	31
Racecourse Gate	LT	0.036	6.8	A	2
	TH	0.036	7.2	A	2
	RT	0.036	11.8	B	2
Buckland Road (north)	LT	0.328	4.3	A	20
	TH	0.328	4.6	A	20
	RT	0.328	9.2	A	20
Site access (PU-NS-2 Road) (west)	LT	0.169	7.7	A	8
	TH	0.169	8.0	A	8
	RT	0.169	12.7	B	9

Table 7: Revised performance of the Manukau Road/ Kitchener Road/ Buckland Road roundabout PM

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95 th %ile Queue (m)
Buckland Road (South)	LT	0.730	11.3	B	75
	TH	0.730	11.5	B	75
	RT	0.730	17.2	B	75
Gate 2 (main site access) (east)	LT	0.435	11.1	B	27
	TH	0.435	11.3	B	27
	RT	0.435	16.9	B	27
Manukau Road (north)	LT	0.701	5.3	A	65
	TH	0.701	5.4	A	65
	RT	0.701	11.1	B	65
Kitchener Rd (west)	LT	0.525	12.9	B	37
	TH	0.525	13.1	B	37
	RT	0.525	18.7	B	37

Table 8: Revised performance of the PU-NS-2 Road / Buckland Road intersection PM (roundabout)

Leg	Movement	Degree of Saturation (v/c)	Average Delay (s)	LOS	95 th %ile Queue (m)
Buckland Road (South)	LT	0.578	7.2	A	40
	TH	0.578	7.5	A	40
	RT	0.578	12.2	B	40
Racecourse Gate	LT	0.055	10.2	B	3
	TH	0.055	10.5	B	3
	RT	0.055	15.2	B	3
Buckland Road (north)	LT	0.573	5.3	A	45
	TH	0.573	5.6	A	45
	RT	0.573	10.3	B	45
Site access (PU-NS-2 Road) (west)	LT	0.511	8.8	A	33
	TH	0.511	9.1	A	33
	RT	0.511	13.8	B	33

The revised modelling confirms the ITA modelling.

5 ITEM T5: 90% TO THE NORTH

Please provide an assessment with 90% of all trips generated by the site (and by the PC30 development) assigned to and from the north.

Comment:

A distribution of 90% to the north is not considered to be realistic given the existing distribution of traffic at the intersection of Buckland Road with Kitchener Road. The volumes recorded at the Kitchener Road / Buckland Road intersection shows the direction of traffic along Buckland Road to be around 50/50 on a Saturday, and 60/40 on a weekday. This is due to a significant amount of population being south of Pukekohe (esp Buckland, Tuakau and also Pokeno which the shortest time

to the site is via the south). We have however tested a revised scenario without Webb Street of having 70% to / from the north. This scenario has been assessed in item T4 above as requested.

6 ITEM T6: 2036 SCENARIO

Please provide analysis of the proposal against a future development environment such as 2036.

Comment:

The PPSP ITA provides an outline of both future development (including the subject site) and future upgrades in the local and wider area in future areas. These are extensive and considered to be outside the scope of one Plan Change. It is however noted that the SIDRA analysis shows there is still significant spare capacity in the roundabouts proposed indicating ability to cater for additional growth.

It is also noted that the proposed zoning is recognised in the Auckland Unitary Plan as an employment zone. Development of employment zones in the Pukekohe area is considered a positive outcome for the area as it makes Pukekohe more self-sufficient and reduces the need for residents to travel in the peak direction outside the area (eg towards Auckland). It is also noted that the Pukekohe Structure Plan recognises Pukekohe as being a “satellite town” being a town that provides for local employment opportunities to reduce commuter demand.

7 ITEM T7: WEEKEND PEAK

Please assess the impact of the proposal on the transport environment in the weekend midday peak hour.

Comment:

See item T3.

8 ITEM T8: PUKEKOHE PARK

Please assess the impact of the proposal on and during large events at the wider Pukekohe Park site, including on the temporary traffic management deployed for large events.

Comment:

The large events at Pukekohe Park are considered to be infrequent events and are required to be under control of Traffic Management Plans. Given they are infrequent events, additional assessment is not considered appropriate. It is noted that the Business – General Business Zone has been selected for this land in part recognition of the nature of Pukekohe Park and the effects it generates on the immediate locality including large events.

9 ITEM T9: PUBLIC TRANSPORT

Please update the ITA to consider the planned public transport environment.

Comment:

We acknowledge that Auckland Transport is unlikely to have funding to enable additional services or increased frequency of services. This is however typical of greenfield development and outside the control of individual developers / owners and increase in public transport can only occur when surrounding development occurs.

We also noted that Pukekohe-Paerata Structure Plan ITA provides a map of planned public transport services for the future and does not show a future bus route on Buckland Road even though there is a current route. However, even if the PPSP ITA public transport routes are implemented, there will be a connector public transport route on Kitchener Road / Manukau Road which is within 800m (walking distance) of the site.

Again, a single developer cannot control where and when a public transport route is proposed. This land is zoned Future Urban and as such is anticipated to be developed as urban in future.

10 ITEM T10: MANUKAU / KITCHENER / BUCKLAND/ PUKEKOHE PARK GATE 2 INTERSECTION #1 - EVENTS

Please provide an assessment of how this intersection would operate during events at Pukekohe Park in the future.

Comment:

See Item T8.

11 ITEM T11: MANUKAU / KITCHENER / BUCKLAND/ PUKEKOHE PARK GATE 2 INTERSECTION #2 – TRAFFIC LIGHTS

Please provide an assessment of how this intersection could operate under traffic signal control.

Comment:

This intersection has previously been assessed and approved (by Auckland Transport) as a roundabout as part of PC30. Further in previous discussions with Auckland Transport, a roundabout is preferred in this location due to them lowering speeds especially in areas which transition from rural and urban. It is also noted that in Pukekohe all other intersections are roundabouts.

12 ITEM T12: MANUKAU / KITCHENER / BUCKLAND/ PUKEKOHE PARK GATE 2 INTERSECTION #3 - DRAWINGS

Please provide concept drawings of intersection layout(s) showing how a safe and efficient intersection could be provided.

Comment:

See Attachment A which was taken from PC30 hearing. The roundabout is planned to be the same layout.

13 ITEM T13: MODELLING DIAGRAMS

Please provide diagrams from the modelling software to confirm the layout(s) modelled.

Comment:

See Attachment B for the detailed diagrams / summary.

14 ITEM T14: BUCKLAND / PU-NS-2 INTERSECTION LOCATION

Please clarify the proposed location of the PU-NS-2 road alignment through the site, connections with Webb St, the location of the intersection with Buckland Rd, and the rationale for the proposed route and intersection location.

Comment:

The location proposed (as per Figure 11-1 “Implementation Plan”) is opposite Gate 3 of Pukekohe Park. In this regard the location shown in the PPSP ITA is very much indicative and the exact point the new road (PU-NS-2) connects to Buckland Road is considered to be a matter for consideration in the development of the subject site. Figure 14-1 shows the diagram from the PPSP ITA. We agree that the PU-NS-2 road is shown in the PPSP ITA as being north of that proposed in the implementation plan for the subject site. In this regard the PU-NS-2 road and intersection could be moved north (to the exact location in the PPSP ITA) however the location recommended is considered to be more appropriate in that it better serves both sides of Buckland Road. In our view, some flexibility with regard to the future location of the road is considered a positive outcome at this stage.

In terms of Webb Street, the land-use along this road in the Unitary Plan is rural (ie existing land-use will remain). As such providing a connection of an industrial / business zone urban zone directly to this rural road is considered inappropriate at this time. This could however occur in the future.

Figure 14-1: PU-NS-2 road in PPSP ITA



15 ITEM T15: BUCKLAND / PU-NS-2 INTERSECTION (X-ROADS)

Please clarify if this intersection will provide access to or from the racecourse site, and how any such access will be arranged. If the intersection will be separate to any Pukekohe Park access, please provide details on the proposed separation distances.

Comment:

See T14. The location proposed is opposite Pukekohe Park Gate 3 and will be in the form of a roundabout. As such the intersection can also serve Pukekohe Park.

16 ITEM T16: BUCKLAND / PU-NS-2 INTERSECTION (PARK ACCESS)

Please demonstrate how the intersection(s) could operate safely, particularly in relation to Pukekohe Park access.

Comment:

See item T14 and T15 and Appendix A.

17 ITEM T17: BUCKLAND / PU-NS-2 INTERSECTION (SIGHT DISTANCE)

Please provide information on the sight distances and operating speeds at the proposed intersection location(s).

Comment:

See previous comments. The proposal would be for a roundabout if formed as cross-roads and as such with the lowering of speeds due to the roundabout would occur.

The current 85th percentile operating vehicle speeds on Buckland Road were measured to be 71kph northbound and 77kph southbound. As such it is considered that an 80km/hr operating speed is appropriate for the area (currently). For arterial roads such as Buckland Road for a public road Austroads 4A is considered appropriate. Austroads recommends providing 181 m visibility for this approach speed (80km/hr) with 2 seconds reaction time and 3 seconds observation time.

The following two photographs show the available sight distance in either direction from the proposed new road.

Photograph 1: Sight Distance to the north



Photograph 2: Sight Distance to the south



The available sight distance is over 230m in both directions and therefore exceeds the Austroads requirements.

With the roundabout in place it is anticipated the posted and operating speed would reduce to 50-60km/hr and thus the requirement would reduce to 90-120m (easily achieved).

18 ITEM T18: BUCKLAND / PU-NS-2 INTERSECTION

Please provide an assessment of how this intersection would operate during events at Pukekohe Park in the future.

Comment:

The large events at Pukekohe Park are considered to be infrequent events and are required to be under control of Traffic Management Plans.

19 ITEM T19: BUCKLAND / PU-NS-2 INTERSECTION (SIGNALS)

Please provide an assessment of how this intersection would operate under traffic signal control.

Comment:

In previous discussions with Auckland Transport, roundabouts in locations such as the one proposed are preferred due to them lowering speeds especially in areas which transition from rural and urban. It is also noted that in Pukekohe all other intersections are roundabouts.

20 ITEM T20: BUCKLAND / PU-NS-2 INTERSECTION (DESIGN)

Please provide concept drawings of the intersection layout(s) showing how a safe and efficient intersection could be provided.

Comment:

See Appendix A.

21 ITEM T21: BUCKLAND / PU-NS-2 INTERSECTION (SIDRA)

Please provide diagrams from the modelling software to confirm the layout(s) modelled.

Comment:

See Attachment B for the detailed diagrams / summary.

22 ITEM T22: PEDESTRIANS/ CYCLISTS

Please provide an assessment of the need for pedestrian and cyclist facilities, both along and across roads.

Comment:

We agree with the comment that the site will likely attract walking and cycling trips, potentially including trips from Pukekohe Park. In this regard:

- The PPSP ITA identifies both the PU-NS-2 road and Buckland Road as a “secondary” active transport corridor. The PPC proposes construction of a footpath along Buckland Road. Additional measures are considered appropriate including:
 - The internal PU-NS-2 will need to be designed as a Supporting Growth Collector Road with pedestrian / cycling facilities (21m wide as per 8-20 of the PPSP ITA
 - Allowing provision (ie land set aside) for future cycling on Buckland Road (noting at present there are no cycling facilities on Buckland Road so construction of one would essentially be redundant
- The implementation measures include a roundabout which will lower speeds as well as a flush median and footpath which in detailed design will provide crossing facilities.

It is noted that all the above would be subject to further detailed design / Auckland Transport approval.

23 ITEM T23: ACCESS

Please provide data on Austroads SISD sight distances and operating speeds at various locations along the PCA frontage, along with other features such as queuing at intersections or access to Pukekohe Park, to demonstrate where safe access may or may not be possible.

Comment:

See item T3.

24 ITEM T24: SPEED LIMIT

If safe access at any point is dependent on a change to the posted speed limit, please provide discussion on how safe access could be provided in the event a speed limit change is delayed or does not eventuate.

Comment:

See item T17 for assessment of sight distance for current posted speed limit. It is however considered inappropriate to maintain a 80km/hr speed limit on Buckland Road with the proposed urbanisation of the road (as planned).

25 ITEM T25: FLUSH MEDIAN

Please provide a concept design and/ or a series of road cross-section diagrams, showing how an appropriate flush median could be provided while also providing a safe road environment including sealed shoulders, existing features such as trees and streetlighting, and planned features such as pedestrian and cyclist facilities.

Comment:

See Appendix A.

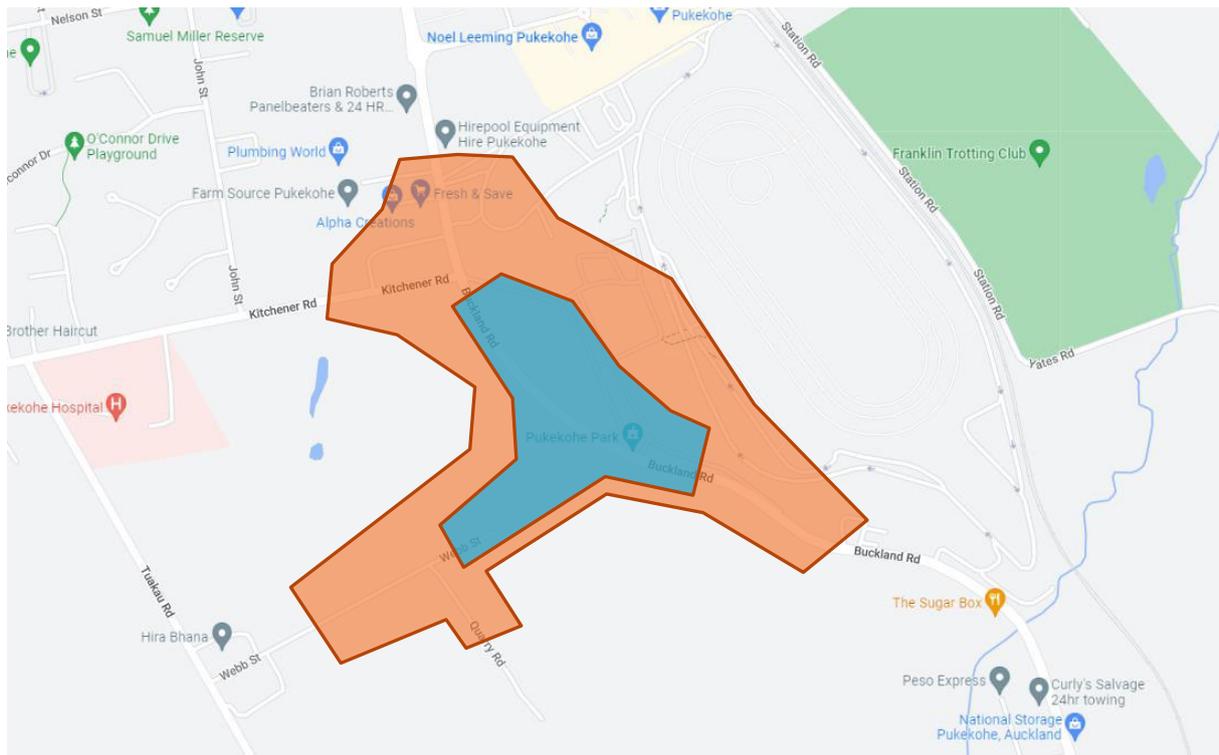
26 ITEM T26: RPS (WALKING)

Please provide an assessment of the walkable catchment that includes walking distances of 400m and 800m.

Comment:

Figure 26-1 shows the 400m and 800m catchment from approximately the centre of the site (assuming existing roads).

Figure 26-1: 400 / 800m catchment



It is recognised that the current walking catchment in this regard (400m / 800m) is limited. This will always be the case for Future Urban zoned land which is first to develop in an area. It is however noted that the site is in walking distance to Buckland Road (existing public transport route) and within PC30 site. Even if the PPSP ITA public transport routes are implemented, there will be a connector public transport route on Kitchener Road / Manukau Road which is within 800m of the site.

27 ITEM T27: HIGH GENERATING ACTIVITIES

Please provide an assessment of how any high trip-generating activities that may locate in the PCA could be efficiently served by key public transport services, or how such activities could be controlled.

Comment:

The site is located within walking distance to Buckland Road which does have an existing public transport route. Generally all Future Urban zoned land will have limited public transport facilities as the land is typically rural in nature. As development occurs the public transport can be improved by Auckland Transport. In this regard Buckland Road (and the new collector road through the site) are both anticipated to have walking / cycling facilities in the future from the PPSP ITA.

In terms of public transport there is a bus route along the site (no bus stops as there is no reason for a bus to stop in a rural environment). If the PPSP ITA public transport routes are implemented, there will be a connector public transport route on Kitchener Road / Manukau Road which is within 800m of the site.

Further any High Generating activity would be also subject to E27 E27.6.1. "Trip generation" rule of the Unitary Plan. This rule (if triggered) requires an assessment of transport, traffic or trip-generation effects for the activity.

28 ITEM T28: IMPLEMENTATION PLAN

Please explain how development of the PCA is proposed to be controlled in the event the transport infrastructure identified in the ITA as being necessary for development is delayed or not provided and/ or a robust mechanism by which Council could ensure that the identified mitigation measures could be achieved prior to development operating.

Comment:

The ITA does not propose a planning mechanism relating to the works identified as this is considered outside the scope of an ITA. However, in our opinion the key items of infrastructure including the following are all triggered straight away:

- installation of a flush median,
- the construction of footpaths, and
- a lowering of the speed limit on Buckland Road

As noted in the ITA the roundabout is likely triggered early in development (but potentially not straight away).

Any new development on the site will essentially require a Resource Consent as any New Building in the Business – General Business Zone is a Restricted discretionary activity (A42). It is noted that under this activity status one of the matters of discretion in H14.8.1. Matters of discretion is 4(f) "the effects of creation of new roads and/or service lanes on the matters listed above". The assessment criteria in H14.8.2(5). Any new development involving industry or large format retail or office activity are also likely to be triggered by the Trip Generation thresholds under E27.6.1 and especially Activities T7-T10 below:

(T7)	Office		5,000 m ² GFA
(T8)	Retail	Drive through	333 m ² GFA
(T8A)		Retail activities (non-drive through)	1667m ² GFA
(T9)	Industrial activities	Warehousing and storage	20,000 m ² GFA
(T10)		Other industrial activities	10,000 m ² GFA

29 ITEM T29: IMPLEMENTATION PLAN (INTEGRATION)

Please explain how the form and location of new or upgraded transport infrastructure would be well integrated with development occurring on the site.

Comment:

See item T28.

Yours sincerely

Commute Transportation Consultants

Leo Hills



Director

Leo@commute.kiwi

APPENDIX A: ROADING LAYOUTS



Revision notes:		
Rev:	Date:	Notes:

Drawn by: LH J002101 - 301-303 Buckland	Client:
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Project: 301-303 BUCKLAND ROAD, PUKEKOHE PROPOSED PRIVATE PLAN CHANGE	Drawing Title: INDICATIVE ROUNDABOUT / ROAD LAYOUT
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Date: 6 April 2022	Scale @ A3: 1:2000 @ A3
Revision: 0 - FOR DISCUSSION	



Figure:
1

APPENDIX B: SIDRA PRINTOUTS

MOVEMENT SUMMARY

 Site: 102v [Manukau Rd/ Kitchener Rd/ Buckland Rd intersection Proposed AM]

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Buckland Rd (south)											
1	L2	107	5.0	0.576	6.6	LOS A	5.5	40.1	0.78	0.69	52.6
2	T1	481	5.0	0.576	6.8	LOS A	5.5	40.1	0.78	0.69	54.2
3	R2	32	5.0	0.576	12.4	LOS B	5.5	40.1	0.78	0.69	54.5
Approach		620	5.0	0.576	7.0	LOS A	5.5	40.1	0.78	0.69	54.0
East: Gate 2 (site main access)											
4	L2	25	5.0	0.294	7.0	LOS A	2.1	15.3	0.75	0.77	50.8
5	T1	53	5.0	0.294	7.2	LOS A	2.1	15.3	0.75	0.77	52.3
6	R2	182	5.0	0.294	12.9	LOS B	2.1	15.3	0.75	0.77	52.5
Approach		260	5.0	0.294	11.1	LOS B	2.1	15.3	0.75	0.77	52.3
North: Manukau Rd (north)											
7	L2	202	5.0	0.505	4.8	LOS A	4.8	35.1	0.59	0.53	53.4
8	T1	349	5.0	0.505	4.9	LOS A	4.8	35.1	0.59	0.53	55.1
9	R2	93	5.0	0.505	10.6	LOS B	4.8	35.1	0.59	0.53	55.3
Approach		644	5.0	0.505	5.7	LOS A	4.8	35.1	0.59	0.53	54.6
West: Kitchener Rd (west)											
10	L2	164	5.0	0.414	9.0	LOS A	3.2	23.7	0.89	0.87	51.1
11	T1	54	5.0	0.414	9.1	LOS A	3.2	23.7	0.89	0.87	52.6
12	R2	84	5.0	0.414	14.8	LOS B	3.2	23.7	0.89	0.87	52.9
Approach		302	5.0	0.414	10.6	LOS B	3.2	23.7	0.89	0.87	51.8
All Vehicles		1826	5.0	0.576	7.7	LOS A	5.5	40.1	0.73	0.67	53.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 Site: 102v [Manukau Rd/ Kitchener Rd/ Buckland Rd intersection Proposed PM]

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Buckland Rd (south)											
1	L2	111	5.0	0.730	11.3	LOS B	10.3	75.4	0.95	0.98	50.5
2	T1	576	5.0	0.730	11.5	LOS B	10.3	75.4	0.95	0.98	51.9
3	R2	25	5.0	0.730	17.2	LOS B	10.3	75.4	0.95	0.98	52.2
Approach		712	5.0	0.730	11.7	LOS B	10.3	75.4	0.95	0.98	51.7
East: Gate 2 (site main access)											
4	L2	16	5.0	0.435	11.1	LOS B	3.7	27.0	0.97	0.96	48.2
5	T1	55	5.0	0.435	11.3	LOS B	3.7	27.0	0.97	0.96	49.6
6	R2	194	5.0	0.435	16.9	LOS B	3.7	27.0	0.97	0.96	49.8
Approach		264	5.0	0.435	15.4	LOS B	3.7	27.0	0.97	0.96	49.6
North: Manukau Rd (north)											
7	L2	180	5.0	0.701	5.3	LOS A	8.9	65.0	0.77	0.57	52.4
8	T1	546	5.0	0.701	5.4	LOS A	8.9	65.0	0.77	0.57	54.0
9	R2	177	5.0	0.701	11.1	LOS B	8.9	65.0	0.77	0.57	54.3
Approach		903	5.0	0.701	6.5	LOS A	8.9	65.0	0.77	0.57	53.8
West: Kitchener Rd (west)											
10	L2	180	5.0	0.525	12.9	LOS B	5.1	37.0	0.99	1.03	48.5
11	T1	52	5.0	0.525	13.1	LOS B	5.1	37.0	0.99	1.03	49.9
12	R2	92	5.0	0.525	18.7	LOS B	5.1	37.0	0.99	1.03	50.1
Approach		323	5.0	0.525	14.6	LOS B	5.1	37.0	0.99	1.03	49.2
All Vehicles		2202	5.0	0.730	10.4	LOS B	10.3	75.4	0.89	0.82	51.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 Site: 102v [Manukau Rd/ Kitchener Rd/ Buckland Rd intersection Proposed SAT]

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Buckland Rd (south)											
1	L2	72	5.0	0.793	14.4	LOS B	13.3	97.2	1.00	1.10	48.4
2	T1	627	5.0	0.793	14.6	LOS B	13.3	97.2	1.00	1.10	49.7
3	R2	47	5.0	0.793	20.3	LOS C	13.3	97.2	1.00	1.10	49.9
Approach		746	5.0	0.793	14.9	LOS B	13.3	97.2	1.00	1.10	49.6
East: Gate 2 (site main access)											
4	L2	31	5.0	0.587	16.8	LOS B	6.2	45.3	1.00	1.10	45.2
5	T1	69	5.0	0.587	16.9	LOS B	6.2	45.3	1.00	1.10	46.4
6	R2	196	5.0	0.587	22.6	LOS C	6.2	45.3	1.00	1.10	46.6
Approach		296	5.0	0.587	20.7	LOS C	6.2	45.3	1.00	1.10	46.4
North: Manukau Rd (north)											
7	L2	327	5.0	0.911	12.8	LOS B	25.2	184.1	1.00	0.88	49.0
8	T1	616	5.0	0.911	13.0	LOS B	25.2	184.1	1.00	0.88	50.4
9	R2	193	5.0	0.911	18.7	LOS B	25.2	184.1	1.00	0.88	50.6
Approach		1136	5.0	0.911	13.9	LOS B	25.2	184.1	1.00	0.88	50.0
West: Kitchener Rd (west)											
10	L2	291	5.0	0.827	33.1	LOS C	13.9	101.3	1.00	1.41	38.7
11	T1	93	5.0	0.827	33.2	LOS C	13.9	101.3	1.00	1.41	39.6
12	R2	64	5.0	0.827	38.9	LOS D	13.9	101.3	1.00	1.41	39.7
Approach		447	5.0	0.827	33.9	LOS C	13.9	101.3	1.00	1.41	39.0
All Vehicles		2625	5.0	0.911	18.4	LOS B	25.2	184.1	1.00	1.06	47.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 Site: 102v [Manukau Rd/ Kitchener Rd/ Buckland Rd intersection Proposed SAT - passby]

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Buckland Rd (south)											
1	L2	72	5.0	0.734	12.1	LOS B	10.5	76.3	0.97	1.02	49.8
2	T1	569	5.0	0.734	12.3	LOS B	10.5	76.3	0.97	1.02	51.2
3	R2	47	5.0	0.734	18.0	LOS B	10.5	76.3	0.97	1.02	51.5
Approach		688	5.0	0.734	12.7	LOS B	10.5	76.3	0.97	1.02	51.1
East: Gate 2 (site main access)											
4	L2	31	5.0	0.535	13.6	LOS B	5.3	38.6	1.00	1.04	47.0
5	T1	69	5.0	0.535	13.7	LOS B	5.3	38.6	1.00	1.04	48.3
6	R2	196	5.0	0.535	19.4	LOS B	5.3	38.6	1.00	1.04	48.5
Approach		296	5.0	0.535	17.4	LOS B	5.3	38.6	1.00	1.04	48.3
North: Manukau Rd (north)											
7	L2	327	5.0	0.866	10.0	LOS B	19.1	139.6	1.00	0.81	50.8
8	T1	558	5.0	0.866	10.2	LOS B	19.1	139.6	1.00	0.81	52.3
9	R2	193	5.0	0.866	15.8	LOS B	19.1	139.6	1.00	0.81	52.6
Approach		1078	5.0	0.866	11.1	LOS B	19.1	139.6	1.00	0.81	51.9
West: Kitchener Rd (west)											
10	L2	291	5.0	0.750	22.7	LOS C	10.6	77.2	1.00	1.26	43.4
11	T1	93	5.0	0.750	22.9	LOS C	10.6	77.2	1.00	1.26	44.5
12	R2	64	5.0	0.750	28.6	LOS C	10.6	77.2	1.00	1.26	44.6
Approach		447	5.0	0.750	23.6	LOS C	10.6	77.2	1.00	1.26	43.8
All Vehicles		2509	5.0	0.866	14.5	LOS B	19.1	139.6	0.99	0.97	49.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 Site: 102v [Manukau Rd/ PPC Road intersection AM]

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Buckland Rd (south)											
1	L2	64	5.0	0.493	5.4	LOS A	4.2	30.7	0.55	0.54	53.0
2	T1	534	5.0	0.493	5.7	LOS A	4.2	30.7	0.55	0.54	54.3
3	R2	11	5.0	0.493	10.4	LOS B	4.2	30.7	0.55	0.54	54.2
Approach		608	5.0	0.493	5.8	LOS A	4.2	30.7	0.55	0.54	54.2
East: Gate 3											
4	L2	11	5.0	0.036	6.8	LOS A	0.2	1.5	0.61	0.62	51.9
5	T1	11	5.0	0.036	7.2	LOS A	0.2	1.5	0.61	0.62	53.2
6	R2	11	5.0	0.036	11.8	LOS B	0.2	1.5	0.61	0.62	53.1
Approach		32	5.0	0.036	8.6	LOS A	0.2	1.5	0.61	0.62	52.7
North: Bucklend Rd (north)											
7	L2	11	5.0	0.328	4.3	LOS A	2.7	19.6	0.29	0.48	53.2
8	T1	309	5.0	0.328	4.6	LOS A	2.7	19.6	0.29	0.48	54.6
9	R2	149	5.0	0.328	9.2	LOS A	2.7	19.6	0.29	0.48	54.5
Approach		469	5.0	0.328	6.1	LOS A	2.7	19.6	0.29	0.48	54.5
West: PPC Road											
10	L2	86	5.0	0.169	7.7	LOS A	1.1	8.1	0.72	0.73	51.7
11	T1	11	5.0	0.169	8.0	LOS A	1.1	8.1	0.72	0.73	52.9
12	R2	37	5.0	0.169	12.7	LOS B	1.1	8.1	0.72	0.73	52.8
Approach		134	5.0	0.169	9.1	LOS A	1.1	8.1	0.72	0.73	52.1
All Vehicles		1243	5.0	0.493	6.3	LOS A	4.2	30.7	0.47	0.54	54.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 Site: 102v [Manukau Rd/ PPC Road intersection SAT]

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Buckland Rd (south)											
1	L2	123	5.0	0.578	7.2	LOS A	5.5	40.3	0.78	0.72	52.1
2	T1	459	5.0	0.578	7.5	LOS A	5.5	40.3	0.78	0.72	53.4
3	R2	11	5.0	0.578	12.2	LOS B	5.5	40.3	0.78	0.72	53.3
Approach		593	5.0	0.578	7.5	LOS A	5.5	40.3	0.78	0.72	53.1
East: Gate 3											
4	L2	11	5.0	0.055	10.2	LOS B	0.4	2.7	0.83	0.74	49.8
5	T1	11	5.0	0.055	10.5	LOS B	0.4	2.7	0.83	0.74	51.0
6	R2	11	5.0	0.055	15.2	LOS B	0.4	2.7	0.83	0.74	50.8
Approach		32	5.0	0.055	12.0	LOS B	0.4	2.7	0.83	0.74	50.5
North: Bucklend Rd (north)											
7	L2	11	5.0	0.573	5.3	LOS A	6.1	44.5	0.62	0.58	51.8
8	T1	423	5.0	0.573	5.6	LOS A	6.1	44.5	0.62	0.58	53.1
9	R2	287	5.0	0.573	10.3	LOS B	6.1	44.5	0.62	0.58	53.0
Approach		721	5.0	0.573	7.5	LOS A	6.1	44.5	0.62	0.58	53.0
West: PPC Road											
10	L2	287	5.0	0.511	8.8	LOS A	4.6	33.2	0.86	0.86	50.9
11	T1	11	5.0	0.511	9.1	LOS A	4.6	33.2	0.86	0.86	52.1
12	R2	123	5.0	0.511	13.8	LOS B	4.6	33.2	0.86	0.86	52.0
Approach		421	5.0	0.511	10.2	LOS B	4.6	33.2	0.86	0.86	51.2
All Vehicles		1766	5.0	0.578	8.2	LOS A	6.1	44.5	0.73	0.70	52.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

 Site: 102v [Manukau Rd/ PPC Road intersection SAT]

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Buckland Rd (south)											
1	L2	123	5.0	0.578	7.2	LOS A	5.5	40.3	0.78	0.72	52.1
2	T1	459	5.0	0.578	7.5	LOS A	5.5	40.3	0.78	0.72	53.4
3	R2	11	5.0	0.578	12.2	LOS B	5.5	40.3	0.78	0.72	53.3
Approach		593	5.0	0.578	7.5	LOS A	5.5	40.3	0.78	0.72	53.1
East: Gate 3											
4	L2	11	5.0	0.055	10.2	LOS B	0.4	2.7	0.83	0.74	49.8
5	T1	11	5.0	0.055	10.5	LOS B	0.4	2.7	0.83	0.74	51.0
6	R2	11	5.0	0.055	15.2	LOS B	0.4	2.7	0.83	0.74	50.8
Approach		32	5.0	0.055	12.0	LOS B	0.4	2.7	0.83	0.74	50.5
North: Bucklend Rd (north)											
7	L2	11	5.0	0.573	5.3	LOS A	6.1	44.5	0.62	0.58	51.8
8	T1	423	5.0	0.573	5.6	LOS A	6.1	44.5	0.62	0.58	53.1
9	R2	287	5.0	0.573	10.3	LOS B	6.1	44.5	0.62	0.58	53.0
Approach		721	5.0	0.573	7.5	LOS A	6.1	44.5	0.62	0.58	53.0
West: PPC Road											
10	L2	287	5.0	0.511	8.8	LOS A	4.6	33.2	0.86	0.86	50.9
11	T1	11	5.0	0.511	9.1	LOS A	4.6	33.2	0.86	0.86	52.1
12	R2	123	5.0	0.511	13.8	LOS B	4.6	33.2	0.86	0.86	52.0
Approach		421	5.0	0.511	10.2	LOS B	4.6	33.2	0.86	0.86	51.2
All Vehicles		1766	5.0	0.578	8.2	LOS A	6.1	44.5	0.73	0.70	52.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 102vv [Manukau Rd/ PPC Road intersection SAT - priority - Conversion]

New Site
 Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Buckland Rd (south)											
1	L2	123	5.0	0.312	5.6	LOS A	0.0	0.0	0.00	0.13	57.0
2	T1	459	5.0	0.312	0.0	LOS A	0.0	0.0	0.00	0.13	58.8
3	R2	11	5.0	0.009	7.1	LOS A	0.0	0.3	0.47	0.61	51.7
Approach		593	5.0	0.312	1.3	NA	0.0	0.3	0.01	0.13	58.3
East: Gate 3											
4	L2	11	5.0	0.163	7.8	LOS A	0.6	4.1	0.83	0.89	41.5
5	T1	11	5.0	0.163	37.7	LOS E	0.6	4.1	0.83	0.89	41.7
6	R2	11	5.0	0.163	30.0	LOS D	0.6	4.1	0.83	0.89	41.4
Approach		32	5.0	0.163	25.2	LOS D	0.6	4.1	0.83	0.89	41.5
North: Bucklend Rd (north)											
7	L2	11	5.0	0.230	5.6	LOS A	0.0	0.0	0.00	0.01	57.9
8	T1	423	5.0	0.230	0.0	LOS A	0.0	0.0	0.00	0.01	59.8
9	R2	287	5.0	0.315	9.1	LOS A	1.6	11.8	0.62	0.87	50.3
Approach		721	5.0	0.315	3.7	NA	1.6	11.8	0.25	0.36	55.6
West: PPC Road											
10	L2	287	5.0	0.904	35.9	LOS E	15.0	109.6	0.86	1.90	34.5
11	T1	11	5.0	0.904	74.3	LOS F	15.0	109.6	0.86	1.90	34.7
12	R2	123	5.0	0.904	56.9	LOS F	15.0	109.6	0.86	1.90	34.4
Approach		421	5.0	0.904	43.0	LOS E	15.0	109.6	0.86	1.90	34.5
All Vehicles		1766	5.0	0.904	12.7	NA	15.0	109.6	0.32	0.66	48.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.