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Dear Michael

Palmerston North City Council – Aokautere Structure Plan
Transportation Assessment

Further to your request, I am pleased to provide below a transportation assessment for the proposed plan change involving the introduction of a Structure Plan to support residential development in Aokautere, Palmerston North. As you are aware my involvement with the proposed plan change has involved assisting with reviewing the structure plan, assessing the related traffic effects, and providing advice on transportation, road design, access and parking. The assessment that follows includes a review of the existing local transportation characteristics, recommendations regarding the proposed internal road network and its connections with the existing road network, and a summary of the potential traffic effects associated with the development of the wider Aokautere area for residential purposes under the proposed zoning.

In summary, the findings of the assessment show that based on existing travel mode share behaviours, there is the potential for the plan change to result in significant additional vehicle traffic on the local road network. A number of mitigation measures, included in Table 12, have been identified to support mode shift towards active and public transport modes as well as to ensure the safe operation of the transport network. With these mitigation measures in place, the proposed Structure Plan would allow for the site to be developed for residential and local business centre (local retail/ commercial/ community) purposes in a manner which is consistent with the District Plan traffic and transportation related objectives and policies.

1. Background

Aokautere is located on the southern edge of the City, to the south of SH57 Aokautere Drive and to the east of Turitea Road. The area currently connects with the external road network at the intersections of each of Pacific Drive and Johnstone Drive with SH57 Aokautere Drive. The northern and southern sections of Johnstone Drive have recently been connected and the link vested in Council. Summerhill Drive is a primary access point to the City with most of the existing traffic from this area travelling to and from the direction of the City via Summerhill Drive and the Fitzherbert Bridge. Any new traffic can be expected to have a similar desire line. The peak hour traffic capacity of this corridor is largely determined by the intersection of Fitzherbert Avenue with Te Awe Awe Street. While there are constraints on the peak hour capacity for vehicle access to the City, more people would be able to access the City with an uptake in bus and cycling for commuter trips.

There are currently around 592 existing suburban lots (496 houses) within the area served by Pacific and Johnstone Drives. These roads also provide access to the International Pacific College, the IPU Tertiary Institute NZ and the One School Global Palmerston North. It is anticipated that the area could accommodate up to a further 1,020 residential lots, and a suburban (local business) centre.

The undeveloped part of the area is rural in nature with the topography comprising of a series of gully systems.

2. Transport Context

The following statutory provisions and strategic documents are relevant to the traffic and transportation aspects of the Proposed Plan Change:

- Government Policy Statement Land Transport 2021("**GPS Land Transport**")
- Road to Zero – Road Safety Strategy 2020-2030 ("**Road to Zero**")
- Horizons Regional Land Transport Plan 2021-2031("**RLTP**")
- Horizons Regional Public Transport Plan 2015-2025 ("**RPTP**")
- Palmerston North Transport Plan 2021-2031 ("**PNTP**")
- Palmerston North Urban Cycle Network Masterplan 2019
- Palmerston North City District Plan ("**District Plan**")
- PNCC 10 Year Plan 2021-2031
- PNITI – Network Options Report January 2021

Key elements of the above documents are included in Appendix 1.

Apart from improving freight connections to support economic development, the GPS Land Transport focuses on safety for all road users and access to a range of travel modes. The RLTP similarly focuses on safety and travel mode choice, with efficiency included for the regional transport network. The RPTP includes objectives of a reliable, integrated, accessible and sustainable public transport system with increased patronage. The PNTP focuses on delivering an integrated, multimodal, and safe transport network. The Urban Cycle Network Masterplan includes the vision of enabling more people to choose cycling more often. Key features of the Masterplan local to Aokautere are:

- The existing provision of connected cycle facilities along Summerhill Drive across the bridge and along Fitzherbert Avenue towards the city centre; and
- The proposed cycle provisions along the Ruapehu Drive corridor from Aokautere Drive to Summerhill Drive.

The Masterplan recognises four main challenges in delivering the city-wide desired outcomes, being:

- Limited funding;
- Competing needs for road width at intersections;
- Vehicle speeds deterring cyclists; and
- Balancing the uses of streets, in particular challenges with effects on on-street parking.

As well as safety and multi-modal priorities, the District Plan transportation objectives and policies include the efficiency of the transport network as an objective. The 10 Year Plan includes city-wide road safety and active transport projects. Funding is allocated for the completion of the ongoing pedestrian and cyclist improvements along Summerhill Drive. PNITI includes projects on Tennent Drive in the short and medium term and the longer-term upgrade of SH57 between Tennent Drive and Summerhill Drive.

As expected, there are a lot of commonalities between the various documents. I summarise the main themes that have relevance to the Proposed Plan Change as follows:

- A transport system where no-one is killed or seriously injured (including active and public transport modes) with a target of a 40% reduction by 2030;
- Better and affordable travel options with 15% of travel in the region by active and public transport modes by 2030 (PNITI target of 30% active mode travel by 2030);
- Reduced emissions from land transport while improving safety and inclusive access with a target of a 30% reduction by 2030;
- Road safety principles include safety as a critical decision-making priority, designing for human vulnerability, allowing for mistakes, strengthening all parts of the road transport system and shared responsibility for improving road safety;
- A reliable, integrated, accessible and sustainable public transport system with increased patronage;
- Integrated transport network with clear priorities for all road users based around place and movement principles;
- Timely provision of transport infrastructure to support city growth with increased investment in active and public transport as a proportion of the transport budget;
- Speed limits and traffic speeds are appropriate for the conditions throughout the transport network;
- New growth areas have well-connected, multi-modal, visually attractive streets which are designed and constructed to meet performance standards and function according to their place in the road hierarchy;
- Space is prioritised within the transport network for active and public transport;
- The land transport network is maintained and developed to ensure that people and goods move safely and efficiently through and within the city;
- Maintain and upgrade existing roads and provide for new roads to meet the current and future needs of the city;
- The safety and efficiency of land transport is protected from the adverse effects of land use, development and subdivision activities;
- Alignment with the Palmerston North City Council 10 Year Plan; and
- Alignment with the anticipated outcomes of the PNITI Network Options Report.

This summary list is used later in this assessment as the basis for reviewing the alignment of the transport aspects of the Proposed Plan Change with the various national, regional, and local statutory provisions and strategic documents.

3. Existing Traffic Environment

3.1 Road Geometry

The cross-section of SH57 Aokautere Drive between Silkwood Place and Cashmere Drive is shown in Figure 1. This shows the transition from a cross-section with a flush median and turning bays towards the west and traffic lanes separated by a centre line towards the east. There is a single traffic lane in each direction with a footpath along the northern side of the road. There is a footpath on both sides to the west of Pacific Drive with a pedestrian crossing point with a central refuge along the frontage to the Summerhill Shopping Centre.

SH57 is a Major Arterial in the Palmerston North road hierarchy and has a speed limit of 70km/h along this section from just west of the intersection of Old West Road (SH57) with Summerhill Drive.

Figure 1: Cross-section Aokautere Drive (SH57)

The existing cross-section on Pacific Drive in the vicinity of its intersection with Johnstone Drive is shown in Figure 2. Pacific Drive has a generous cross-section comprising wide traffic lanes with adjacent parking lanes with a footpath set within a wide berm along each side.

Pacific Drive is a Minor Arterial Road in the Palmerston North road hierarchy and has a speed limit of 50km/h.

As shown in Figure 2, Johnstone Drive, heading to the north from Pacific Drive, has a two-lane traffic width with additional width for parking along each side. Footpaths run along both sides of the road. Johnstone Drive is a Collector Road in the Palmerston North road hierarchy and has a speed limit of 50km/h.

Turitea Road is a local road in the Palmerston North road hierarchy and has a speed limit of 80km/h. It is a rural road providing access to local farms and rural residential properties. It has a variable alignment both in terms of vertical and horizontal geometry. There are two single lane bridges between the intersections with Valley Views and Ngahere Park Road. The section of Turitea Road between SH57 and just beyond Ngahere Park Road typically has a sealed width of between 5.5 and 7.0m. The cross-section in the vicinity of Ngahere Park Road is shown in Figure 3.

Valley Views is a no exit Local Road which connects with Turitea Road to the west. The existing road is approximately 1,100m long and has a carriageway width of 6m within a road reserve width of 16m. It has a speed limit of 80km/h and provides access to rural residential properties. A typical cross-section is shown in Figure 4.

Figure 2: Cross-section of Pacific Drive and Johnstone Drive (southern end)

Figure 3: Cross-section of Turitea Road near Ngahere Park Road

Figure 4: Cross-section of Valley Views

The existing local traffic characteristics are summarised in Table 1.

Road Name	Status in PNCC District Plan Road Hierarchy	Weekday Traffic Volume (vpd)	Weekday Peak Hour Traffic Volume (vph)
SH57 Aokautere Drive	Major Arterial Road	12,900	1,340
Pacific Drive (at SH57)	Minor Arterial Road	2,465	281
Johnstone Drive (at SH57)	Collector Road	465	52
Turitea Road	Local Road	1,318	Not known
Valley Views	Local Road	216[1]	27[1]

Table 1: Existing Local Traffic Characteristics

Notes:
1. Estimate based on 27 households with 8 vehicle movements per day per household and one vehicle movement per household during the weekday evening.

Both the Council's provisions for road cross-sections included in the Engineering Standards for Land Development and the Street Design Manual along with those included in the New Zealand Standard 4404:2010 Land Development and Subdivision Infrastructure are summarised and compared in Table 2. The Engineering Standards include for arterial roads to be designed by specific design in consultation with the appropriate road controlling authority. NZS 4404:2010 includes guidance for up to connector/ collector status roads.

Based on the Council's Street Design Manual, as SH57 Aokautere Drive transitions from a rural to an urban arterial there will be a need to provide for pedestrian movements on both sides and to ensure that cyclists are safely accommodated. The 2021-2031 Long Term Plan includes provision for a separated 3m wide sealed shared path along the southern edge of Aokautere Drive, running from Old West Road to Polson Hill Drive.

While classified as a Minor Arterial Road, Pacific Drive carries traffic volumes more in line with a Residential Collector, it is unlikely that Pacific Drive will accommodate more than 10,000vpd. The existing section of Pacific Drive and Johnstone Drive have cross sections which are either well matched or could be readily adjusted to meet the provisions of NZS4404:2010 for Residential Collector Roads.

Turitea Road has a varying cross-section along its length. Overall, it matches most closely with the provisions of NZS4404:2010 for a Local Rural Road carrying around 1,000vpd although there are sections with cross-sections more aligned with a Connector/ Collector Rural Road capable of carrying around 2,500vpd. The section of Turitea Road from Valley Views to SH57 could reasonably be expected to safely accommodate 2,500vpd.

Valley Views has a carriageway width of 6m and is accordingly best matched to the provisions of NZS4404:2010 for a Local Rural Road carrying around 1,000vpd.

The available sight lines at the various local intersections are generally satisfactory apart from at the intersection of Valley Views and Turitea Road. The available sight line for a vehicle exiting Valley Views looking towards northbound traffic on Turitea Road is around 80m. This compares to the Austroads guidance to provide a safe intersection sight distance of 123m for a 60km/h design speed, being the speed that vehicles are estimated to be travelling on this approach to the intersection. Figure 5 shows a planned

minor upgrade to the intersection that is triggered by the existing consent for 30 additional lots off the end of Valley Views. The improvements include the introduction of Stop control and the widening of the northbound carriageway through the intersection. While this arrangement does not improve the sightlines, it does provide additional seal width if a northbound vehicle on Turitea Road needs to take evasive action.

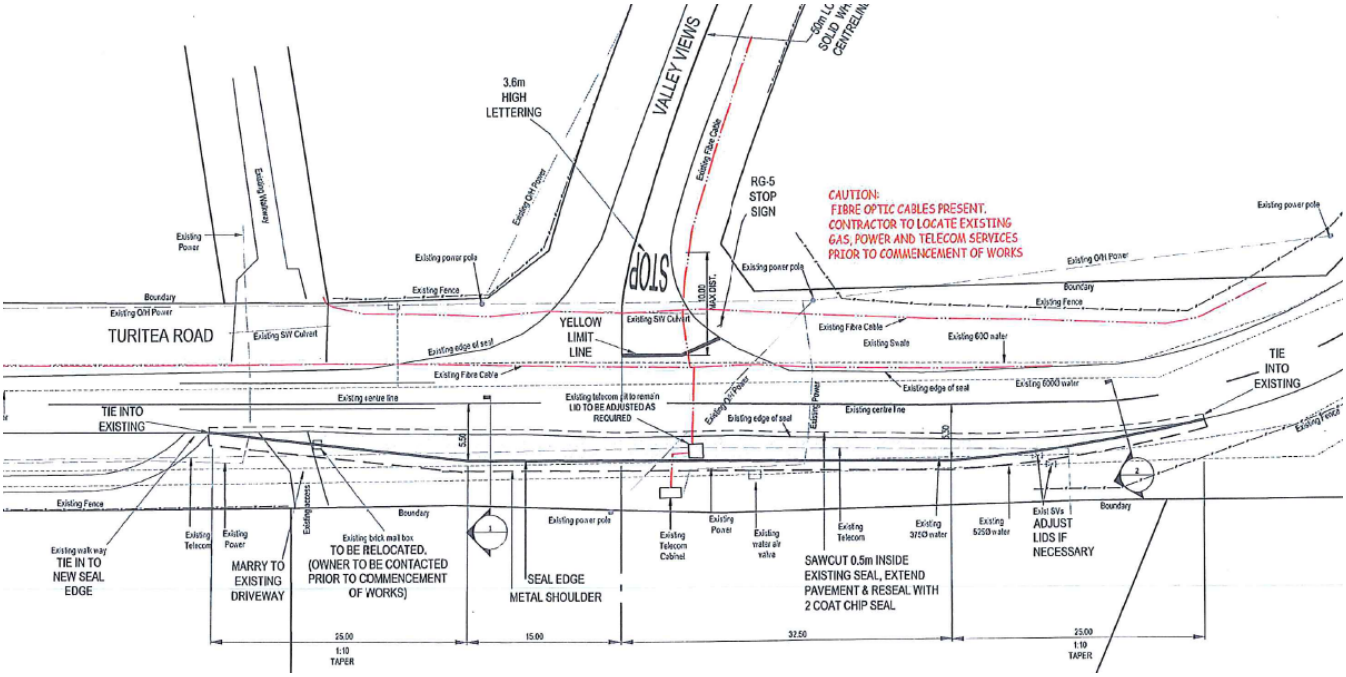


Figure 5: Planned Improvements at Turitea Road/ Valley Views Intersection

	PNCC Engineering Standards			PNCC Street Design Manual			NZS4404: 2010		
	Residential Local Road	**Residential Collector Road**	**Rural Local & Collector Roads**	**Rural Local Road**	**Residential Collector Road**	**Urban Arterial**	**Rural Local**	**Rural Connector/ Collector**	**Residential Connector/ Collector**
Typical Daily Traffic Volumes (vpd)	0-3,000	3,000-10,000	3,000-10,000	0-3,000	3,000-10,000	8,000-20,000	Up to 1,000	Up to 2,500	Up to 8,000
Min. Road Reserve Width (m)	15.5	19.1	18.6	18.5-23.5	20.5-23.5	19.7-22.7 single traffic lanes	15	20	20
Footpaths (m)	2*1.8	2 * 2.5	None	None	2 * 2.5-3.0	2 * 2.0-3.0	Shared on shoulder and berm	Separate from the carriageway 2*1.5	2 * 2.0
Grass Berms (m)	2 * 1.9	2 * 1.5	2*4.0	2 * 3.5-4.5	2 * 1.5-2.0	2 * 1.5-2.0	8.3m total	12.8m total	7.6m total unless some needed for cycle facilities
Cycle Lanes (m)	Shared with traffic	2 * 1.5	Sealed shoulder	Shared with traffic	2 * 1.5m separate provision	2 * 1.5m separate provision	Shared with traffic	On sealed shoulder where it is part of local authority defined route	Separate provision for cyclists if part of local authority defined route
Traffic Lanes (m)	2 * 3.0	2 * 3.0	2*3.5 +2*1.8m sealed shoulder	2 * 2.75-3.75	2 * 2.75-3.25	2 (or 4)* 3.25-3.75	5.5-5.7	5.5-5.7	2 * 4.2
Parking Lanes (m)	1*2.1	1 * 2.1	None	None	2 * 2.0	2 * 2.1	None	None	Separate parking lanes
Min. Carriageway Width (m)	8.1	11.1	10.6	7.5	9.5 including parking lanes	12.7 inc. parking lanes but excl. separated cycle lanes	6.5	7.0	8.4 plus parking & cycle lanes if needed

Table 2: Comparison of Local and National Roading Provisions

3.2 Traffic Flows

Waka Kotahi (NZTA) have provided traffic count data for the following three sites on SH57:

- immediately to the west of Pacific Drive;
- west of Albany Drive (west of SH57 entry to Massey); and
- east of the Pahiatua Track.

The following information has been extracted from these traffic counts:

- the average daily traffic count on SH57 in the vicinity of Pacific Drive is 12,900vpd. The weekday traffic peak in this location occurs between 5 and 6pm with 1,340vph and on a Saturday between 11am and 12 noon with 1,000vph. There has been 8% traffic growth in this location between February 2020 and February 2021;
- since the permanent closure of SH3 through the Manawatu Gorge in July 2017, there has been an annual increase in traffic flow of 8% at the site to the east of the Pahiatua Track. The traffic count in this location for October and November 2020 shows an average daily traffic flow of 1,930vpd with 8% heavy vehicles; and
- since the closure of SH3 through the Gorge, there has been an annual increase in traffic flow of 10% at the site to the west of Albany Drive. The traffic count in this location for August to November 2020 shows an average daily traffic flow of 3,060vpd with 11% heavy vehicles.

There has been strong traffic growth with a significant proportion of heavy vehicle traffic in all three SH57 locations.

While the traffic carrying capacity of the Fitzherbert Bridge (two traffic lanes in each direction) places a constraint on the amount of traffic that can enter the city in this location, the main capacity constraint is the downstream traffic signals at the intersection of Fitzherbert Avenue and Te Awe Awe Street. Based on discussions with Council officers, it is estimated that the intersection operates at 80-90% of its capacity during the weekday traffic peaks. Scope for capacity improvements is limited with there already being four southbound and three northbound traffic lanes at the Fitzherbert Avenue stop lines. Cycle lanes are marked at the intersection.

Council counts for Pacific Drive, between Abby Road and Johnstone Drive, and on Johnstone Drive to the south of Stratford Court undertaken in March 2021 show the following:

Pacific Drive

- average daily traffic flow of 2,465vpd with 8% heavy vehicles;
- weekday evening peak hour flows of 281vph between 5 and 6pm;
- Saturday peak hour flows of 183vph between 10 and 11am;

Johnstone Drive

- average daily traffic flow of 465vpd with 18% heavy vehicles;
- weekday evening peak hour flows of 52vph between 3 and 4pm; and
- Saturday peak hour flows of 50vph between 7 and 8am and then between 3 and 4pm.

The Pacific Drive count excludes traffic activity associated with the IPU Tertiary Institute, the International Pacific College and around 71 houses (mainly on Abby Road and Woodgate Court). The location and timing of the Johnstone Drive count have resulted in it reflecting the existing construction traffic activity that is occurring in this location rather than capturing the traffic activity associated with the dwellings accessing Johnstone Drive to the north of the count location. It is estimated that there are around 76

houses with access to Johnstone Drive to the north of the count location. With an estimated 496 houses within the existing catchment to Pacific and Johnstone Drives and excluding the traffic activity of those houses that were not captured by the traffic counts, the following existing trip generation rates have been calculated:

- Daily: 8 vehicle movements per day per household
- Weekday PM peak: 1.0 vehicle movements per hour per household
- Saturday midday peak: 0.7 vehicle movements per hour per household.

As part of this assessment the traffic flows at the intersections of each of SH57 with Summerhill Drive, Pacific Drive and Johnstone Drive were counted. The existing layout of each of these intersections is shown in Figures 6, 7 and 8.

Figure 6: SH57/ Summerhill Drive

Figure 7: SH57 Aokautere Drive/ Pacific Drive

Figure 8: SH57/ Johnstone Drive

The surveys were undertaken in April 2021 outside of the school holiday period. The results are shown in Figures 9 and 10.

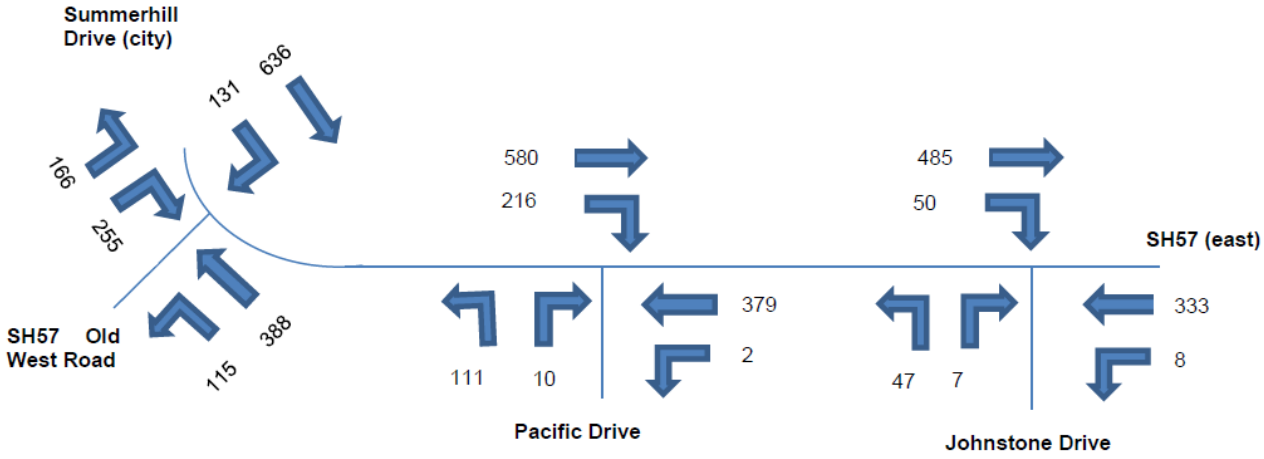


Figure 9: Surveyed Traffic flows – Weekday PM Peak (vph)

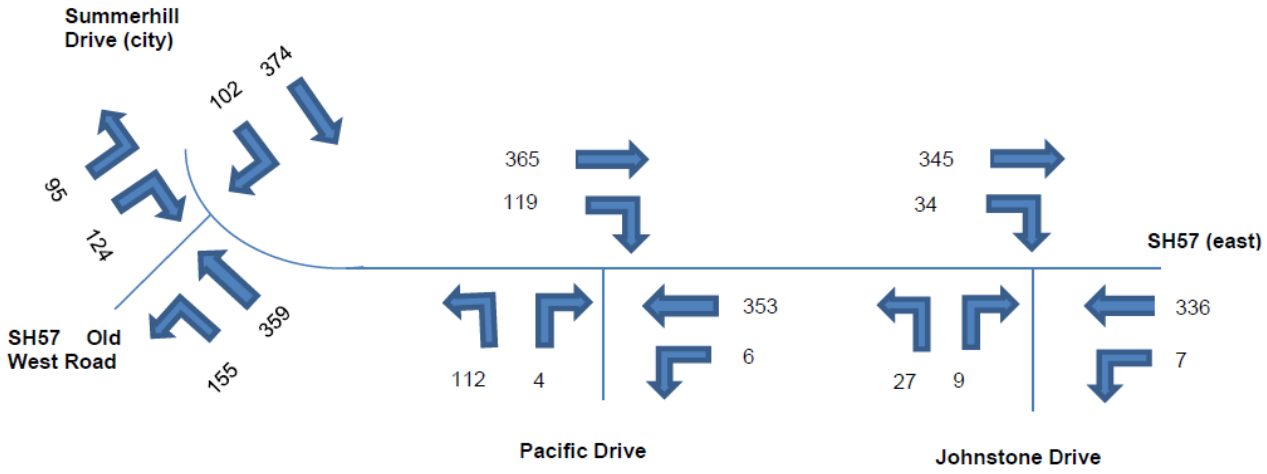


Figure 10: Surveyed Traffic Flows – Saturday Midday PM Peak (vph)

3.3 Existing Intersection Performance

The existing performance of the three SH57 intersections was modelled using the SIDRA intersection analysis software. The intersections were modelled with the existing speed limits on each of the approaches. The results of this analysis are summarised in Tables 3, 4 and 5.

The Levels of Service included in the intersection performance results are based on the average delay per vehicle at a sign-controlled intersection as follows:

Level of Service (LOS)	Average delay per vehicle (s)
A	d≤10
B	10<d<15
C	15<d<25
D	25<d<35
E	35<d<50
F	50<d

Levels of service of E and F are undesirable and can lead to drivers accepting unsafe gaps in the traffic flow with an associated risk of crashes. Longer delays are typically considered acceptable at roundabouts and traffic signals given that the through traffic flows are more controlled with improved turning opportunities for vehicles on all approaches.

SH57/ Summerhill Drive

Time Period	SH57 Old West Rd		Summerhill Drive		SH57 Aokautere Dv		Total
	L	R	T	R	T	L	
Weekday PM							
Input Flow (vph)	166	255	636	131	388	115	1,691
Ave. Delay (s)	7	8	4	5	4	5	5
Level of Service	A	A	A	A	A	A	A
95%ile Queue (veh)	1	2	0	0	0	0	
Saturday Midday							
Input Flow (vph)	95	124	374	102	359	155	1,209
Ave. Delay (s)	6	7	4	5	4	5	5
Level of Service	A	A	A	A	A	A	A
95%ile Queue (veh)	0	1	0	0	0	0	

Table 3: SH57/ Summerhill Drive Intersection – Existing Performance

As shown, the modelling shows that the SH57/ Summerhill Drive intersection performs well if all traffic turning right out of SH57 Old West Road makes the turn in two parts, first onto the median and then merging with the through traffic. Casual observations indicate that drivers typically look for a gap in both traffic flows and make the turn in a single manoeuvre. The right turn out of SH57 Old West Road has a Level of Service of E during the weekday evening peak if all drivers seek a gap in both traffic flows. It is considered likely that the SH57 Old West Road approach is currently performing with or close to a level of Service of E during the weekday traffic peaks. At this level of service there is increased risk taking by drivers as they take smaller gaps in the traffic with an associated increased risk of crashes.

SH57 Aokautere Drive/ Pacific Drive

Time Period	Pacific Drive		SH57 Aokautere Dv (W)		SH57 Aokautere Dv (E)		Total
	L	R	T	R	T	L	
Weekday PM							
Input Flow (vph)	111	10	580	216	379	2	1,298
Ave. Delay (s)	6	9	0	7	0	5	2
Level of Service	A	A	A	A	A	A	A
95%ile Queue (veh)	0	0	0	1	0	0	
Saturday Midday							
Input Flow (vph)	112	4	365	119	353	6	959
Ave. Delay (s)	6	8	0	6	0	5	2
Level of Service	A	A	A	A	A	A	A
95%ile Queue (veh)	0	0	0	1	0	0	

Table 4: SH57/ Pacific Drive Intersection – Existing Performance

As shown, the modelling shows that this intersection of SH57 Aokautere Drive/ Pacific Drive performs well if traffic turning right out of Pacific Drive makes the turn in two parts, first onto the median and then merging with the through traffic. Similarly, to at the Summerhill Drive/SH57 intersection, casual observations indicate that drivers typically look for a gap in both traffic flows and make the turn in a single manoeuvre. The right turn out of Pacific Drive has a level of service of C during the weekday evening peak if all drivers seek a gap in both traffic flows.

SH57 Aokautere Drive/ Johnstone Drive

Time Period	Johnstone Drive		SH57 Aokautere Dv (W)		SH57 Aokautere Dv (N)		Total
	L	R	T	R	T	L	
Weekday PM							
Input Flow (vph)	47	7	485	50	333	8	930
Ave. Delay (s)	6	8	0	7	0	5	1
Level of Service	A	A	A	A	A	A	A
95%ile Queue (veh)	0	0	0	0	0	0	
Saturday Midday							
Input Flow (vph)	27	9	345	34	336	7	758
Ave. Delay (s)	6	7	0	7	0	5	1
Level of Service	A	A	A	A	A	A	A
95%ile Queue (veh)	0	0	0	0	0	0	0

Table 5: SH57/ Johnstone Drive Intersection – Existing Performance

As shown, the existing intersection performs well. The road layout includes road markings to encourage and support drivers turning right out of Johnstone Drive to make the turn in two parts.

3.4 Walking and Cycling Links

Figure 11 shows an extract from the Council's walkway and cycleway map. As shown, paths in the vicinity of the site include:

- existing on-road cycle facility along Summerhill Drive and as far as the intersection with Pacific Drive; and
- a proposed extension east of the on-road cycle facility in the form of a shared path along SH57 towards the Pahiatua Track.

With regard to the Summerhill Drive facility, Council is currently finalising the cycle lanes south of Springdale Grove. It is understood that due to existing and forecast traffic volumes on Summerhill Drive, Council is considering future plans to separate the cycle lane section between Williams Terrace and the Tennent Drive overpass, using the existing carriageway width. Future improvements will also be needed to connect the cycleway to the shared path that runs adjacent to Tennent Drive.

As included in Appendix 1, the Ruapehu Drive corridor is also identified as a possible future cycle route.

Figure 11: Cycling and Shared Path Network (Extract from Council's 2018 Active and Public Transport Plan)

There is also a pedestrian connection into the Adderstone Reserve as shown in Figure 12. This connection is immediately to the east of the Silkwood Place intersection. As shown, there is no particular provision to assist pedestrians crossing SH57 in this location.

Figure 12: Pedestrian Access to the Adderstone Reserve from SH57 (extract from Google Streetview)

At the southern end, the Adderstone Reserve Walkway connects with the footpath along the eastern side of Pacific Drive as shown in Figure 13.

Figure 13: Pedestrian Access to Adderstone Walkway from Pacific Drive (extract from Google Streetview)

There is currently no infrastructure to assist pedestrians and cyclists crossing SH57 Aokautere Drive in the vicinity of Pacific Drive. This raises concerns with regard to the safety of vulnerable road users, severance between the communities on each side of the road and ongoing reliance on vehicle travel if the active mode options are not considered to be safe. This is an existing problem that is getting worse as traffic flows on SH57 grow and residential catchment accessed via Pacific Drive also grows.

3.5 Public Transport

There are currently no bus services along either Pacific Drive or Johnstone Drive beyond the IPU Tertiary Institute at the northern end of Pacific Drive. The recent connection of the two ends of Johnstone Drive creates a loop within Aokautere that may make a bus service feasible. The proposed collector road network within the Proposed Plan Change also forms a loop and has been designed with the possibility of accommodating a bus route. Accordingly, Horizons will have the necessary flexibility to determine appropriate bus routes and bus stop locations when there is sufficient demand to make these services viable.

3.6 Road Safety

A search of the Waka Kotahi (NZTA) crash database for the local area for the most recent five-year period shows a total of 24 reported crashes. Twelve of these crashes, six minor injury and six non-injury, were on SH57 as shown in Figure 14. Seven of these crashes were on Turitea Road, one fatal, two minor injury and four non-injury and five were on Pacific Drive, two serious injury, two minor injury and one non-injury crash, as shown in Figure 15.

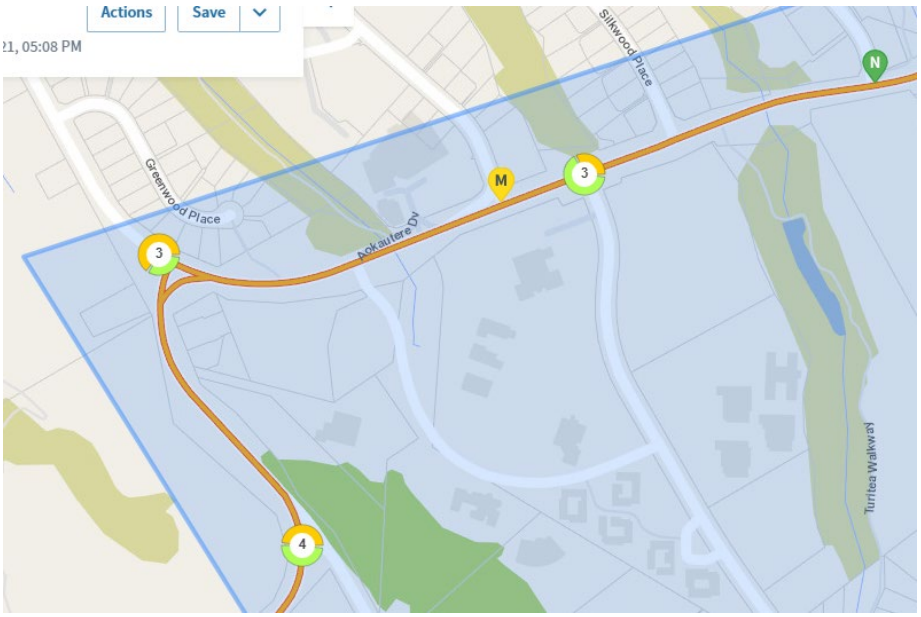


Figure 14: SH57 Reported Crashes

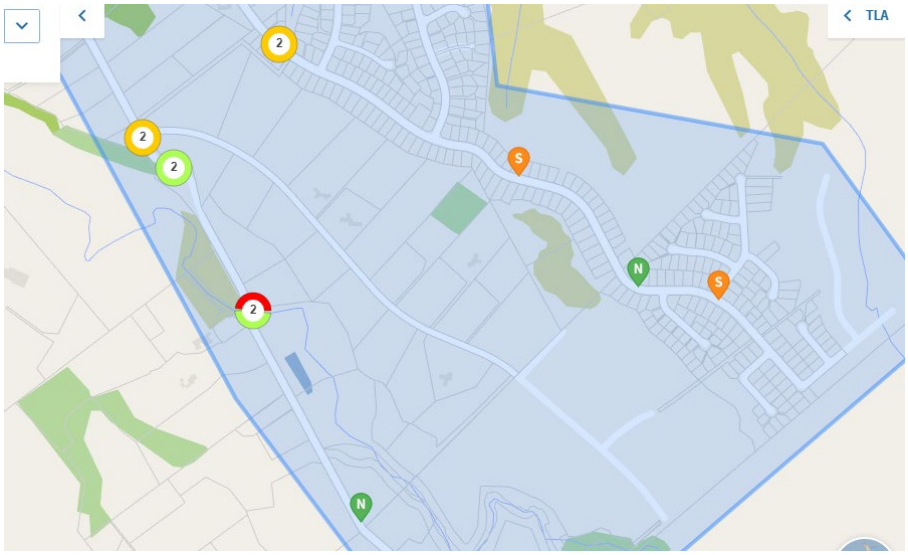


Figure 15: Turitea Road and Pacific Drive Reported Crashes

The fatal and injury crashes can be summarised as follows:

SH57

- a minor injury crash at the intersection with Pacific Drive involving a car turning right being hit by a westbound vehicle on SH57;

- a minor injury crash at the intersection with Ruapehu Drive involving a merging van hitting an eastbound cyclist;
- a minor injury crash 49m to the north of Old West Road involving an eastbound vehicle hitting an eastbound vehicle turning right from the centreline;
- a minor injury crash at the intersection with Summerhill Drive involving a northbound motorcyclist on Old West Road losing control when turning;
- a minor injury crash at the intersection with Turitea Road involving a northbound car on SH57 Old West losing control turning left;
- a minor injury crash at the intersection with Turitea Road involving a vehicle turning right into Turitea Road hitting a southbound cyclist;

Pacific Drive

- a minor injury crash at the intersection with Abby Road involving a northbound vehicle on Pacific Drive losing control and going off the road;
- a minor injury crash at the intersection with Abby Road involving a northbound vehicle on Pacific Drive hitting a parked car;
- a serious injury crash at the intersection with Johnstone Drive involving a westbound vehicle on Pacific Drive losing control turning right;
- a serious injury crash at the intersection with Silicon Way involving a westbound motorcycle on Pacific Drive hitting the rear of a vehicle turning right from the centreline;

Turitea Road

- a minor injury crash 50m to the south of Valley Views involving a southbound vehicle on Turitea Road losing control turning left; and
- a minor injury crash 20m to the north of Valley Views involving a southbound vehicle and a cyclist;
- a fatal crash involving a head-on collision on one of the single lane bridges.

Patterns emerging from the crash records include three of the injury crashes involving cyclists and two involving motorcyclists. Given the traffic flows on each road, the crash risk is greater on Turitea Road than Pacific Drive. Two of the three injury crashes on Turitea Road involved the road environment, one being the combined vertical and horizontal geometry to the south of the Valley Views intersection and the other being one of the single lane bridges. The faster speed environment on Turitea Road compared with the suburban road network increases the risk of serious injury or death when there is a crash.

3.7 Future Transport Environment

The future roading environment will include an extension to Abby Road such that it forms a through connection between Pacific Drive and Johnstone Drive. This is a separate project to the proposed plan change. The link usefully improves the connectivity between existing parts of Aokautere and to future residential areas that would be facilitated by the proposed plan change.

4. Proposed Structure Plan

Aokautere is identified as a growth area in Council's City Development Strategy 2018. Aokautere is located on the southern edge of the City, to the south of SH57 Aokautere Drive and to the east of Turitea Road. The Structure Plan facilitates the development of some 1,020 residential lots and a suburban (local business) centre. In terms of transportation matters, the proposed Structure Plan includes provisions for roading connections to the external road network, internal roading layout, proposed road hierarchy and associated cross-section provisions.

The proposed roading layout is included here as Figure 16. The key transportation related aspects of the Structure Plan can be summarised as follows:

- connections with the external road network are via the existing intersections of each of Pacific Drive and Johnstone Drive with SH57 Aokautere Drive;
- a new connection is included to Turitea Road, south of Ngahere Park Road, primarily providing access to some 42 rural residential lots;
- potential for around 13 lots have access to the end of Valley Views;
- the remaining 965 additional lots will have vehicle access through the internal road network to SH57 Aokautere Drive via either Pacific or Johnstone Drives;
- two road connections onto the existing section of Pacific Drive are included, one between 129 and 133 Pacific Drive and the other between 151 and 155 Pacific Drive;
- the internal road layout includes the extension of Pacific Drive towards the south. A network of new Connector Roads provides access to Local Streets and residential lots located along the various gully systems. The Connector Road system runs from the south of the site through to the northern end of Johnstone Drive. The roading within the southern part of the site will be rural in nature providing access to rural residential properties. The Structure Plan also includes a pocket of residential development accessed from Abby Road;
- proposed cross-sections have been included for the following anticipated road types:
    - one-way links (Royal Crescent and Local Centre) (Local Streets)
    - shared surface links (Local Streets)
    - Local Streets with options of buildings on one or both sides
    - cross-gully links (Urban Connectors)
    - Local Streets with options of gully both sides, houses both sides, gully one side
    - Urban Connectors with options of gully both sides, houses both sides, gully one side
    - Activity Streets with commercial/ mixed use/ retail frontages
    - Peri-Urban Streets providing access to rural residential properties
    - Connector Roads: modified (existing Pacific Drive)
- reduced speed limits of 30km/h are included for some road typologies.

The terminology used for the road hierarchy within the Structure Plan is based on the Waka Kotahi NZTA One Network Framework which is gradually being adopted throughout the country. It balances the movement and place function of road corridors. In due course it can be expected that both the District Plan and the Engineering Standards are updated to reflect this national system of road classification.

In designing the layout of new roads an effort has been made to minimise the number and lengths of any no-exit roads. This is in line with guidance included in documents such as NZS4404:2010 Land Development and Subdivision Infrastructure which at Section 3.3.8 includes:

'No-exit' roads should not be provided where through roads and connected networks can be designed. Where no-exit roads are provided, they should ensure connectivity for pedestrians and cyclists.

However, the nature of the topography associated with the system of gullies means that some no-exit roads are needed to provide access.

The Council's Engineering Standards (2021) at Section 3.4.2 include for no-exit roads in urban areas to have a maximum length of 100m and serve up to 20 households. In rural areas, the length increases to 300m with up to 25 households. The standard also requires that pedestrian connectivity is provided.

The network of Connector Roads has been designed to facilitate circulation by buses. With the recent connection of the two ends of Johnstone Drive, there is now an opportunity to circulate on the existing sections of Pacific Drive and Johnstone Drive. If buses were to travel along the full existing length of Pacific Drive and onto the proposed north-south collector route, most lots within the area would be within 500m of the bus route.

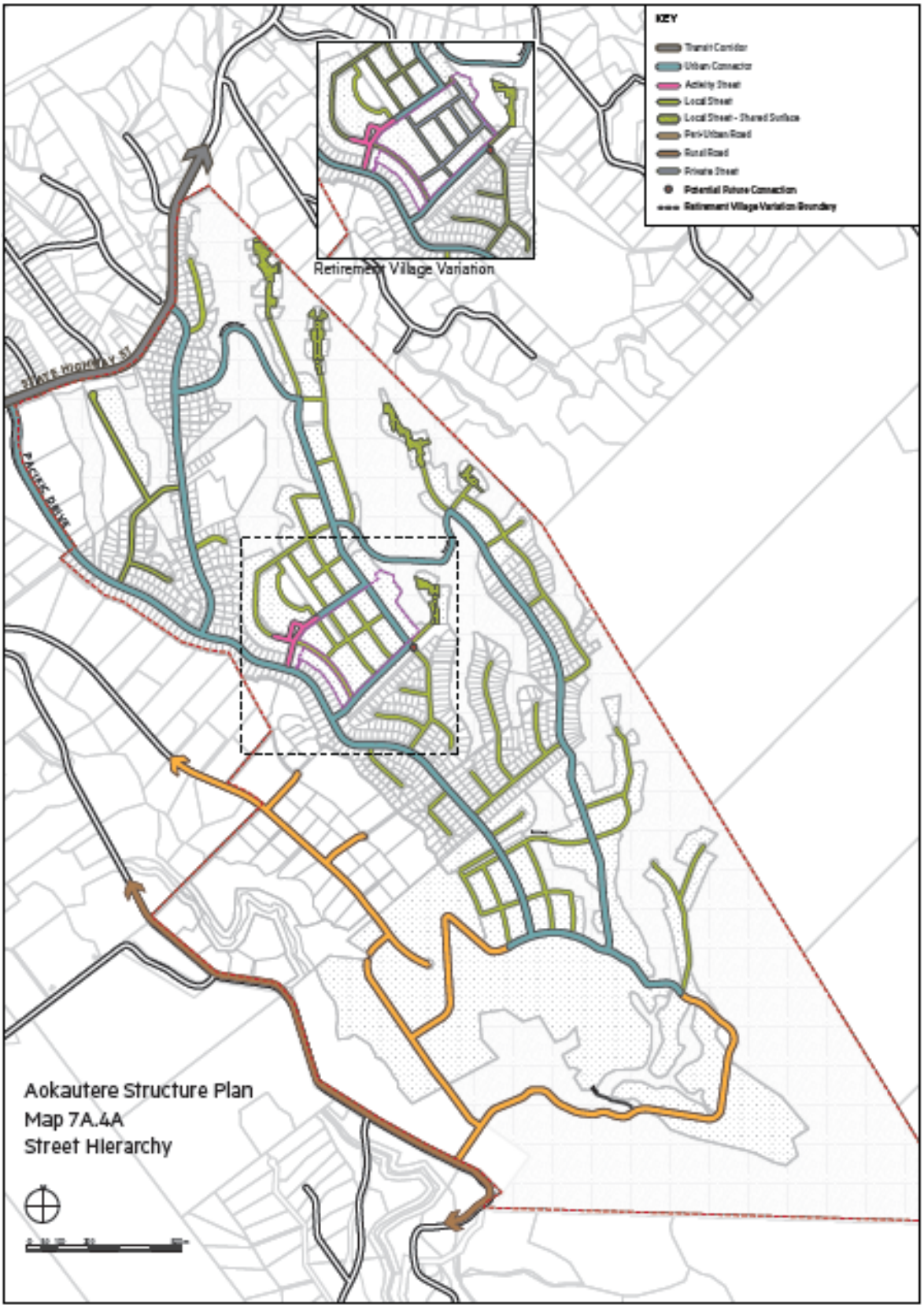


Figure 16: Proposed Aokautere Structure Plan – Roading Layout

The proposed road cross-sections are included in the McIndoe Urban reporting. Again, given the nature of the topography, it has been necessary to develop bespoke cross-sections for roads with either one or both frontages to a gully. From a transportation perspective the cross-section provisions have been guided

by both the Engineering Standards and the following design parameters which are generally based on the latest guidance from Waka Kotahi (NZTA):

Footpaths

- minimum of 1.8m wide on all urban streets;
- minimum of 2.4m wide on shopping streets or in front of schools;

Cycle provisions

- cycle lanes minimum 1.6m wide if not adjacent to parking;
- cycle lanes minimum 1.8m wide if adjacent to parking;
- for connector roads and above if cycles and traffic shared in lane minimum traffic lane width of 4.2m if not adjacent to parking, increasing to 4.5m if alongside parking;
- for local streets with shared cycles and traffic, recommend maximum of 3.2m traffic lane width so that cyclists claim road and do not get squeezed. Also, best with 30km/h or less speed environment, less than 3,000vpd, not on bus route and not adjacent to high turnover parking;
- shared use paths (minimum width 3m) for pedestrians and cyclists only where there are likely to be few if any mobility or visually impaired pedestrians;

Parking

- parking lanes with 2m minimum width; and
- increase to 2.3m wide if larger vehicles such as trucks parking kerbside.

The inclusion of shared, rather than separated, paths for the use of pedestrians and cyclists has been minimised however it has been necessary to include them along the Connector Roads where the roads cross the gully network. The topography of these areas is challenging, and the road cross-sections need to be minimised. Separate pedestrian and cycle paths are included where Activity Streets have frontages with shops and businesses.

A minimum berm width of 2.5m is included between the property boundary and the movement lane (vehicle and/or cycle) on all roads where there are vehicle accesses onto the frontage road. This allows for the driver of an exiting vehicle to be clear of the property boundary prior to the vehicle entering the movement lane.

In summary, it is concluded that the location of the future residential area and the transport connections are generally appropriate and provide good links to significant transport corridors, with support for passenger transport options and multi-nodal connections to the wider area beyond the structure plan area.

A further consideration is the possibility that part of the area of the Proposed Plan Change, close to the proposed Local Business Zone may be developed as a retirement village. In that scenario, from a transport and connectivity perspective, the key matters would be that public road connections are provided along the solid red lines in Figure 17 and that at least one of the dashed red line public road connections is provided in order to facilitate local traffic movement through the local street network, for instance to and from the Local Business centre, without unnecessarily needing to use Pacific Drive. Pedestrian linkages to the commercial centre should also be included to minimise walk distances to/from the centre and all parts of the retirement village.

Figure 17: Key Public Road Links

5. Traffic Effects

Based on the existing trip generations, it is anticipated that the additional 994 lots that would be facilitated by the Structure Plan would generate the following traffic activity:

- Daily: 7,950vpd
- Weekday PM peak: 994vph
- Saturday midday peak: 696vph.

Since the analysis of the traffic effects was undertaken the number of potential additional residential lots has increased to 1,020 to1,064 dwellings depending on the number of residential units included above commercial and retail activities within the proposed commercial centre. This increase of 26 to 70 residential units will not materially change the assessment results and the analysis of the traffic associated with 994 lots has not been updated for the higher yield.

If part of the area of the Proposed Plan Change close to the proposed Local Business Zone is developed as a retirement village, it is understood that the site of the retirement village would potentially replace some 184 residential lots (mix of low and medium density). Retirement villages typically have lower peak traffic generations than the standard residential activity that could be accommodated within the same site. The timing of traffic peaks associated with retirement villages also tends to occur during the inter-peak period on the local road networks. As such, the replacement of part of the residential area with a retirement village would be expected to result in lower weekday peak hour traffic flows. Accordingly, this traffic scenario has not been assessed.

While the replacement of standard residential dwellings with a retirement village is expected to result in less traffic activity during the traffic peaks on the local road network, the scale of the reduction will be modest and does not change the overall findings and recommendations of this assessment.

The April 2021 intersection traffic counts show the following split between inward and outward trips for the catchment of Pacific and Johnstone Drives during the peak hours:

- Weekday PM peak: 61% inward, 39% outward
- Saturday midday peak: 52% inward, 48% outward.

The April 2021 intersection traffic counts show the following split in travel direction onto and off SH57 Aokautere Drive for the catchment of Pacific and Johnstone Drives during the peak hours:

Weekday PM Peak

- Inward: 92% from west (Summerhill), 8% from east (Pahiatua)
- Outward: 91% to west, 9% to east

Saturday Midday Peak

- Inward: 96% from west (Summerhill), 4% from east (Pahiatua)
- Outward: 90% to west, 10% to east

The traffic associated with the 994 additional lots is forecast to load onto the external road network as follows:

- Valley Views: 13 houses (104vpd)
- Turitea Road: 42 houses (336vpd)
- Johnstone Drive: 244 houses (1,952vpd)
- Pacific Drive: 695 houses (5,560vpd)

These levels of forecast traffic activity are based on existing trip generation rates and mode choices and can be considered conservative. The 2018 Census data includes the following journey to work data for Palmerston North as a whole and Poutoa (the statistical area unit which includes the area of the Proposed Plan Change):

Palmerston North

- Bus 1.6%
- Bike/ walk/ jog 10.2%

Poutoa

- Bus 1.5%
- Bike/ walk/ jog 8.1%

The Palmerston North Transport Plan includes targets of 15% mode share for active modes by 2024 increasing to 30% by 2030. The Regional Land Transport Plan includes a target of increased patronage on public transport. An increase of active mode share to 30% and of bus share to 4.2% (2018 level for Christchurch and also NZ average), could see a reduction in vehicle trips by around 25% for the Poutoa statistical area by 2030. Factors influencing this change include the availability and standard of public transport and active mode facilities, level of congestion along the vehicle route and availability and cost of parking at the destination. The increased take up of electric bicycle use reduces the disincentive of distance and topography.

The assessment that follows is based on the conservative forecasts based on existing travel mode splits. The key potential traffic effects associated with the proposed structure plan and associated residential development are:

- effects on SH57 Aokautere Drive and its intersections;
- effects on Summerhill Drive;
- safe performance of Turitea Road, including the intersection with Valley Views;
- safe performance of Valley Views;
- effects on the internal roading within the Aokautere area;
- safe provision for pedestrians and cyclists moving within the internal transport network and within the external transport network where interaction with vehicle traffic will increase as a result of the increased residential activity; and the
- ability to accommodate potential future bus services.

Each of these potential traffic effects are discussed in turn below.

5.1 SH57 Aokautere Drive

With 90 to 96% of the existing Aokautere traffic travelling to/ from the direction of central Palmerston North and based on existing trip generation rates and mode choices, up to some additional 6,700 to 7,200vpd could be expected on SH57 Aokautere Drive to the west of Pacific Drive. Weekday evening peak hour and Saturday midday peak hour increases would be 860vph and 610vph, respectively. This would result in daily traffic flows of around 20,000vpd and weekday evening and Saturday midday peak hour traffic flows of 2,200vph and 1,600vph respectively on this section of SH57.

These forecast traffic flows are approaching capacity for an arterial road with a single traffic lane in each direction. There may be some balancing of ongoing traffic growth on SH57 once the Pahiatua Track is no longer relied on for crossing the Ranges.

The forecast additional traffic flows through each of the Summerhill Drive, Pacific Drive and Johnstone Drive intersections with SH57 for each of the peak hours are shown in Figures 18 and 19. These forecasts include the assumption that the additional traffic to and from Turitea Road is all travelling to and from the City. It has also been assumed that 15% and 10% of trips between the west and Pacific and Johnstone Drives travels to/from SH57 Old West Road during the weekday evening and Saturday midday peaks, respectively.

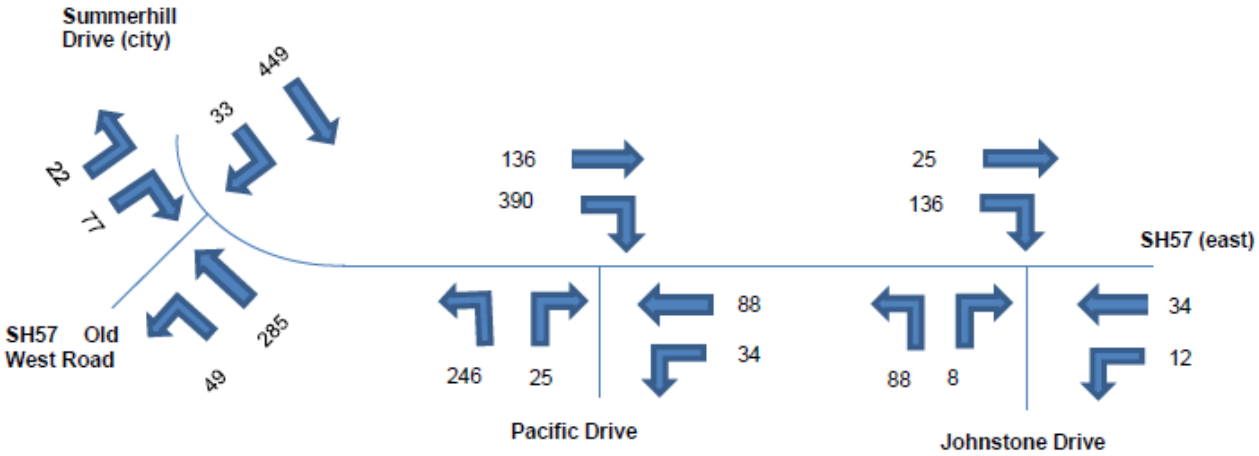


Figure 18: Forecast Additional Traffic – Weekday PM Peak (vph)

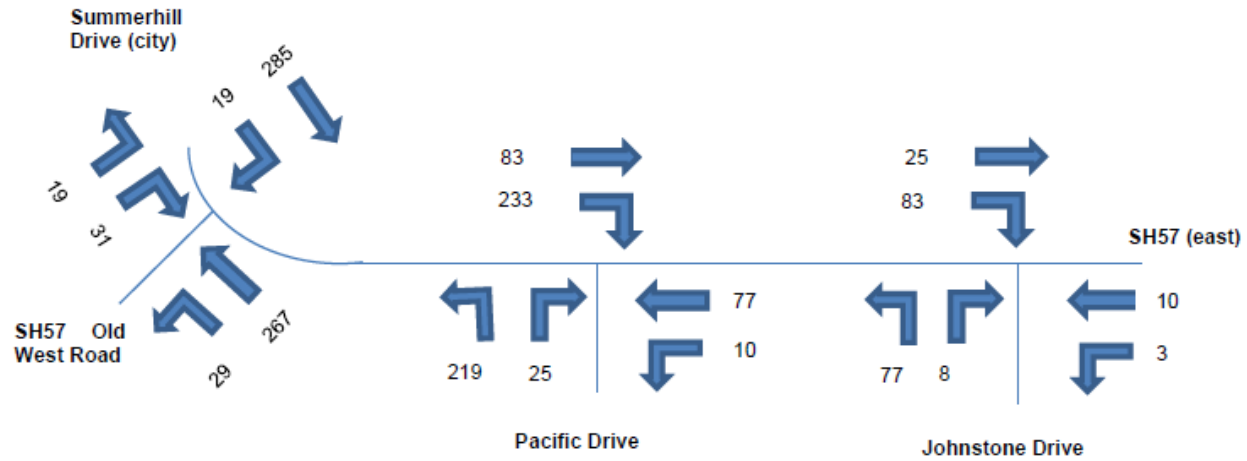


Figure 19: Forecast Additional Traffic – Saturday Midday Peak (vph)

Figures 20 and 21 show the combined existing and forecast additional traffic flows. Traffic associated with the 30 consented lots at the end of Valley Views has also been included.

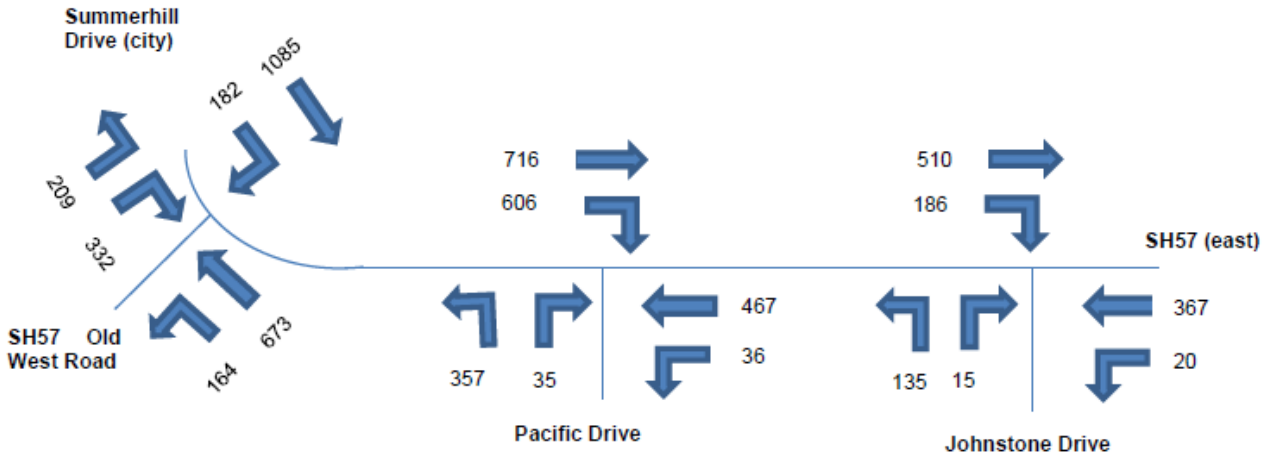


Figure 20: Forecast Traffic – Weekday PM Peak (vph)

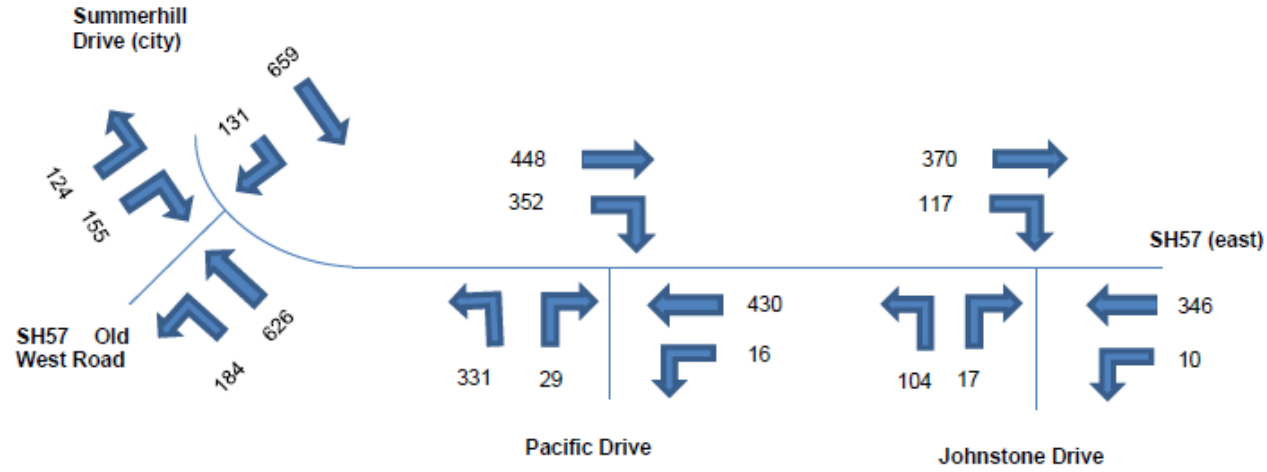


Figure 21: Forecast Traffic – Saturday Midday Peak (vph)

These forecast traffic volumes have then been used to model the forecast performance of each of the intersections using the SIDRA intersection modelling software. Heavy vehicle proportions of 8% have been assumed throughout. The forecast performance is summarised in Tables 6, 7 and 8.

Time Period	SH57 Old West Rd		Summerhill Drive		SH57 Aokautere Dv		Total
	L	R	T	R	T	L	
Weekday PM							
Input Flow (vph)	209	332	1,085	182	673	164	2,645
Ave. Delay (s)	10	23	5	5	4	6	7
Level of Service	B	C	A	A	A	A	A
95%ile Queue (veh)	2	6	0	1	0	1	
Saturday Midday							
Input Flow (vph)	124	155	659	131	626	184	1,879
Ave. Delay (s)	9	12	4	5	4	5	5
Level of Service	A	B	A	A	A	A	A
95%ile Queue (veh)	1	2	0	0	0	1	

Table 6: SH57/ Summerhill Drive Intersection – Forecast Performance

For the intersection to perform satisfactorily, as shown above, it will be essential for the right turn from Old West Road to be upgraded such that drivers are comfortable making the turn in two stages. This will assist with ensuring the ongoing safe and efficient operation of the SH57 route.

Time Period	Pacific Drive		SH57 Aokautere Dv (W)		SH57 Aokautere Dv (E)		Total
	L	R	T	R	T	L	
Weekday PM							
Input Flow (vph)	357	35	716	606	467	36	2,217
Ave. Delay (s)	8	20	0	12	0	5	5
Level of Service	A	C	A	B	A	A	A
95%ile Queue (veh)	2	1	0	7	0	0	
Saturday Midday							
Input Flow (vph)	331	29	448	352	430	16	1,606
Ave. Delay (s)	8	12	0	8	0	5	4
Level of Service	A	B	A	A	A	A	A
95%ile Queue (veh)	2	0	0	2	0	0	

Table 7: SH57/ Pacific Drive Intersection – Forecast Performance

During the weekday evening peak there is a modelled queue of seven vehicles for the right turn into Pacific Drive. This length of queue will use up all the storage space back to the Ruapehu Drive intersection. Any additional queuing would block back through the adjacent intersection. Again, the satisfactory performance of the right turn out of Pacific Drive relies on drivers making the turn in two parts. If drivers wait for a gap in both traffic flows before turning right out, the forecast average delay for the turn is 86 seconds with a level of service of F during the weekday evening peak. This level of delay can also result in increased risk taking with drivers taking smaller gaps in the traffic to make turns.

Time Period	Johnstone Drive		SH57 Aokautere Dv (W)		SH57 Aokautere Dv (N)		Total
	L	R	T	R	T	L	
Weekday PM							
Input Flow (vph)	135	15	510	186	367	20	1,233
Ave. Delay (s)	7	10	0	7	0	5	2
Level of Service	A	A	A	A	A	A	A
95%ile Queue (veh)	1	0	0	1	0	0	
Saturday Midday							
Input Flow (vph)	104	17	370	117	346	10	964
Ave. Delay (s)	7	8	0	7	0	5	2
Level of Service	A	A	A	A	A	A	A
95%ile Queue (veh)	1	0	0	1	0	0	

Table 8: SH57/ Johnstone Drive Intersection – Forecast Performance

As shown, the intersection of Johnstone Drive and SH57 Aokautere Drive is expected to continue to perform well with its existing layout.

5.2 Cashmere Drive/ Aokautere Drive

The existing intersection of Cashmere Drive and SH57 Aokautere Drive does not include a right turn bay and merge arrangement as shown in Figure 22. Traffic counts were undertaken at the intersection and the performance checked to establish if upgrades are needed. The forecast performance of the intersection is summarised in Table 9. As shown, the intersection in its current form can accommodate the forecast additional traffic.

Figure 22: Cashmere Drive/ Aokautere Drive (SH57)

Time Period	Cashmere Drive		SH57 Aokautere Dv (W)		SH57 Aokautere Dv (E)		Total
	L	R	L	T	T	R	
Weekday AM							
Input Flow (vph)	10	65	5	423	816	8	1,317
Ave. Delay (s)	6	28	5	0	0	9	1
Level of Service	A	D	A	A	A	A	A
95%ile Queue (veh)	0	1	0	0	0	0	
Weekday PM							
Input Flow (vph)	8	17	20	713	527	5	1,290
Ave. Delay (s)	9	23	5	0	0	13	1
Level of Service	A	C	A	A	A	B	A
95%ile Queue (veh)	0	0	0	0	0	0	

Table 9: SH57/ Cashmere Drive Intersection – Forecast Performance

5.3 Summerhill Drive

With the potential for more than 2,000vph forecast on Summerhill Drive during the weekday evening peak, there will be limited gaps in the traffic flows. Traffic counts were undertaken at the intersection of Ruapehu Drive and Summerhill Drive and the performance checked to establish if upgrades are needed. The existing intersection layout is shown in Figure 23 and the forecast performance of the intersection is

summarised in Table 10. As shown, the increased through traffic flows results in the side road traffic not being able to access Summerhill Drive.

Figure 23: Ruapehu Drive/ Summerhill Drive

Time Period	Ruapehu Dv			Summerhill Dv (City)			Summerhill Dv (Aokautere)			Mountain View Rd			Total
	L	T	R	L	T	R	L	T	R	L	T	R	
Weekday AM													
Input Flow (vph)	6	1	114	73	650	4	1	1486	5	12	1	1	2354
Ave. Delay (s)	9	>3600	>3600	5	0	67	6	1	8	258	467	410	485
Level of Service	A	F	F	A	A	F	A	A	A	F	F	F	F
95%ile Queue (veh)	0	96	96	0	0	0	0	0	0	2	2	2	
Weekday PM													
Input Flow (vph)	11	1	71	136	1319	9	1	906	9	5	1	1	2470
Ave. Delay (s)	51	>3600	>3600	5	1	11	5	0	58	39	515	273	203
Level of Service	F	F	F	A	A	B	A	A	F	E	F	F	F
95%ile Queue (veh)	0	61	61	0	0	0	0	0	0	1	1	1	

Table 10: Ruapehu Drive/ Summerhill Drive Intersection – Forecast Performance

The intersection was then modelled with signals and the concept layout used for analysis purposes in SIDRA is shown in Figure 24. The forecast performance of the intersection is summarised in Table 11. As shown, with signals the intersection can perform satisfactorily. However, the topography in this location makes it unlikely that traffic signals with the necessary multiple traffic lanes can be accommodated as well as maintaining cycle lanes for cyclists. The key effects that need addressing are the safety of the right turns into and out of Ruapehu Drive and Mountain View Road and the safety of cyclists travelling along Ruapehu Drive and accessing the citybound cycle lane on Summerhill Drive.

Possible mitigation measures include Ruapehu Drive operating as a left in/ left out intersection with an opportunity for u-turns created further to the south along Summerhill Drive. A right turn out of Mountain View Road would continue to need to be accommodated. One possibility would be to introduce a roundabout at the Williams Terrace intersection with Summerhill Drive. This would also assist vehicles turning to and from Williams Terrace. Options for safely accommodating cyclists travelling between the northern end of Ruapehu Drive and the city include introducing a crossing facility across Summerhill Drive, either signalised or an underpass, or accommodating two-way cycle flows along the eastern side of Summerhill Drive and towards the Fitzherbert Bridge.

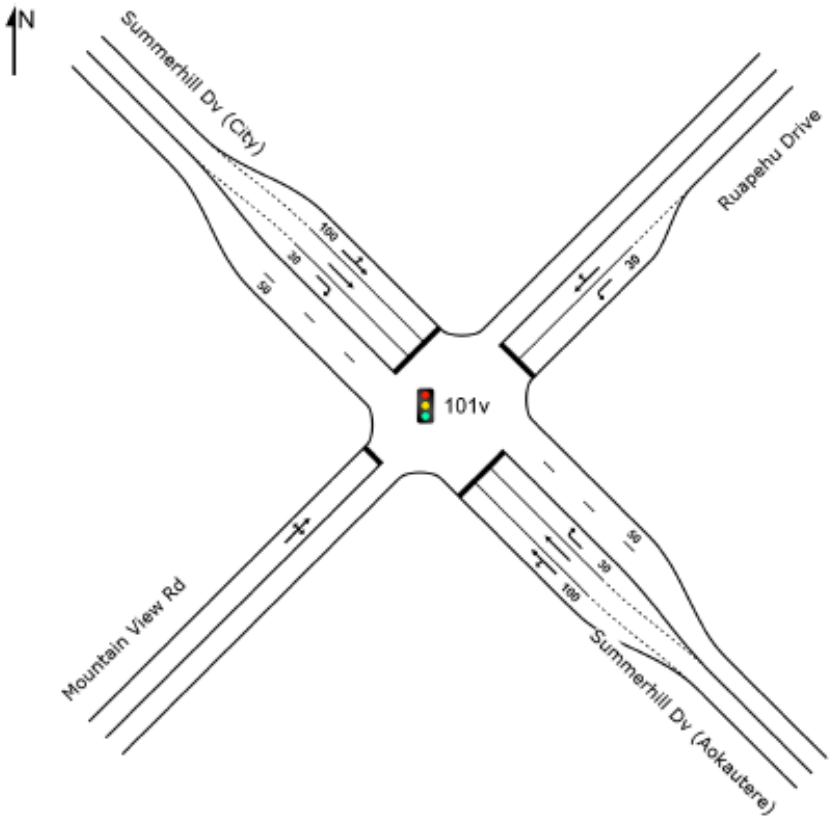


Figure 24: Ruapehu Drive/ Summerhill Drive Signals

Time Period	Ruapehu Dv			Summerhill Dv (City)			Summerhill Dv (Aokautere)			Mountain View Rd			Total
	L	T	R	L	T	R	L	T	R	L	T	R	
Weekday AM													
Input Flow (vph)	6	1	114	73	650	4	1	1486	5	12	1	1	2354
Ave. Delay (s)	58	63	68	7	4	25	8	7	10	61	54	59	9
Level of Service	E	E	E	A	A	C	A	A	A	E	D	E	A
95%ile Queue (veh)	0	8	8	2	10	0	5	37	0	1	1	1	
Weekday PM													
Input Flow (vph)	11	1	71	136	1319	6	1	906	9	5	1	1	2467
Ave. Delay (s)	67	66	70	7	4	9	6	3	17	65	60	65	6
Level of Service	E	E	E	A	A	A	A	A	B	E	E	E	A
95%ile Queue (veh)	1	5	5	4	28	0	2	11	0	0	0	0	

Table 11: Ruapehu Drive/ Summerhill Drive Intersection – Forecast Performance - Signals

Council are separately progressing works to introduce a flush median and pedestrian refuges on Summerhill Drive along with separated cycle lanes.

5.4 Turitea Road

While connectivity from the Aokautere area to Turitea Road is desirable, it is recommended that additional traffic activity onto Turitea Road (including via Valley Views) from the Aokautere area is restricted to facilitating access between the local communities rather than risking becoming a competing route for traffic travelling to and from the city, for the following reasons:

- restriction of future development and growth within the Turitea Road catchment. Recent traffic count data indicates a daily traffic flow of 1,318vpd on the busiest section of Turitea Road close to SH57 at the northern end. This is forecast to increase to 1,558vpd, an 18% increase, with the consented but yet to be occupied lots at the end of Valley Views. There is further land that could be subdivided within the Turitea Road catchment that has no alternative option for connecting to the road network;
- road safety concerns at the intersection of Turitea Road and Valley Views. Whether there is more traffic on the Turitea Road southern approach or on the Valley Views or a combination of the two, the risk of crashes between vehicles on the two approaches increases as a result of the limited sight line;
- road safety concerns associated with the two one-lane bridges on Turitea Road to the south of Valley Views. There has been a fatal crash on one of the bridges and increased traffic flows will increase the risk of future crashes;
- the variable and narrow carriageway width along the length of Turitea Road. The seal width varies between around 5.5 and 7m. Based on the provisions of NZS4404:2010 which is less conservative than both the Council's Engineering Standards and Street Design Manual, the existing seal width can accommodate around 1,000vpd. Again, based on NZS4404:2010 a consistent seal width of 7.0m could be expected to accommodate up to 2,500vpd;
- even if there were a speed limit reduction, the conflict between traffic at the intersection of Turitea Road and Valley Views is not addressed. The existing approach speed from the south is estimated to be up to 60km/h and the available sight line is significantly less than the Austroads requirement for the safe intersection sight distance in a 60km/h speed environment; and
- the challenges of delivering safety improvements at the intersection of Turitea Road and SH57 are also a factor given the vertical and horizontal geometry of the road alignments through the intersection.

It is understood that Council has some funds allocated in the Long Term Plan for improvements to Turitea Road and the Valley Views intersection to support additional rural-residential growth within the Turitea catchment. As such, it is considered that the traffic associated with some 55 additional lots (13 on Valley Views and 42 on Turitea Road) which are anticipated to rely on Turitea Road for access can be safely accommodated. With the introduction of a roundabout or a change in priority at the intersection, additional traffic flows could potentially be safely accommodated on Valley Views and at the intersection. To ensure a future option for a road connection between Valley Views and Aokautere it is recommended that provision is made for a future road connection where the proposed Structure Plan currently shows a break in the road at the end of the Valley Views extension. In the short term this link can provide for pedestrian and cyclist connectivity between the two areas.

5.5 Valley Views

Valley Views has a 6m wide carriageway with estimated existing traffic flows of 216vpd based on 27 households with a trip generation rate of 8 vehicle movements per day per household. There is an existing consent to develop 30 additional houses at the end of Valley Views. As such, the base traffic flows are estimated to be 456vpd (57 households). The Structure Plan allows for some 13 additional lots with access to Valley Views. This will result in an estimated total daily traffic volume of 560vpd. This is well within the available capacity of Valley Views which based on the guidance in NZS4404:2010 could be expected to

accommodate at least 1,000vpd. Subject to safety improvements at the intersection with Turitea Road, Valley Views could readily accommodate additional traffic beyond that resulting from the proposed Plan Change.

5.6 Internal Roading

The main traffic effects within the development area are expected to be associated with the additional traffic on Pacific Drive. The intersection traffic counts showed two-way traffic flows at the northern end of Pacific Drive of 340vph and 240vph during the weekday evening and Saturday midday peaks, respectively. Based on the number houses it is estimated that existing traffic flows at the southern end of Pacific Drive are around 90vph and 63vph during the weekday evening and Saturday midday peaks, respectively.

It is estimated that some 365 additional households will access the southern end of Pacific Drive with 365vph and 256vph additional traffic flows during the weekday evening and Saturday midday peaks, respectively. Traffic flows at the northern end of Pacific Drive are forecast to increase by 695vph and 487vph during the weekday evening and Saturday midday peaks, respectively.

With forecast traffic flows increasing from 455vph at the existing southern end of Pacific Drive to 1,035vph at SH57, it is anticipated that intersection control in the form of either roundabouts or signals will be needed at the intersections of Pacific Drive with each of Abby Road, Johnstone Drive and the next two proposed intersections to the south. The introduction of intersection controls along Pacific Drive as well as providing for turning vehicles will assist with controlling vehicle speeds for through traffic. Signalised intersections or roundabouts on raised platforms will also have safety benefits for pedestrians crossing Pacific Drive.

Regarding the two new intersection connections to the existing section of Pacific Drive, it is noted that the vehicle crossing for 133 Pacific Drive will be close to the new intersection. The vehicle crossing to 127 Pacific Drive is located at the boundary with 125 Pacific Drive. The other intersection between 151 and 155 Pacific Drive has already been formed and the driveways to 151 and 155 Pacific Drive have usefully been constructed connecting onto the side road. It is recommended that, if possible, the side road goes through 129 Pacific Drive and that 131 Pacific Drive become available for development. This would maximise the separation to adjacent vehicle crossings on Pacific Drive with 131 Pacific Drive having access to the new side road and this arrangement has been reflected in the proposed roading and lot configuration.

5.7 Public Transport and Active Modes

Given the direction at a regional level for increased bus use, it is considered desirable to allow for accommodating future bus services on the collector road network. This would result in most of the dwellings being within 500m of a bus route. A minimum road reserve width of 16.6m is included for the collector roads with a trafficable width, clear of parking, of at least 6.5m. The proposed collector road network includes two links across gully systems. At this stage it is unclear where future bus routes will go. It is understood that Horizons' current thinking is to provide high frequency services along main thoroughfares with less penetration into the local road network. The road network has been designed to deliver a range of options for the delivery of bus services.

The network of existing and proposed walkways, cycle lanes and shared paths include the existing walkway through the Adderstone Reserve and the Te Araroa Trail connection from Pacific Drive through to Turitea Road. A shared path along the southern side of SH57 Aokautere Drive is included such that there is a continuous path from Johnstone Drive to Pacific Drive.

The safety and capacity improvements to the SH57 intersections should also include provision for pedestrians crossing SH57 Aokautere Drive, in particular to the west of the Pacific Drive intersection and also in the vicinity of Silkwood Place to provide a link to the Adderstone Reserve. The traffic activity on

SH57 Aokautere Drive already creates a degree of severance between the Aokautere and Summerhill communities and this will continue to get worse with increased traffic flows on SH57.

6. Mitigation Measures

Table 12 provides a summary of the assessed transport effects associated with the Proposed Plan Change and includes recommended mitigation measures along with triggers for these upgrades. The recommended mitigation measures that are within the area of the proposed plan change are shown on the Structure Plan. The locations of the recommended off-site mitigation measures are shown in Figure 25. The numbers in Figure 25 refer to those in Table 12.

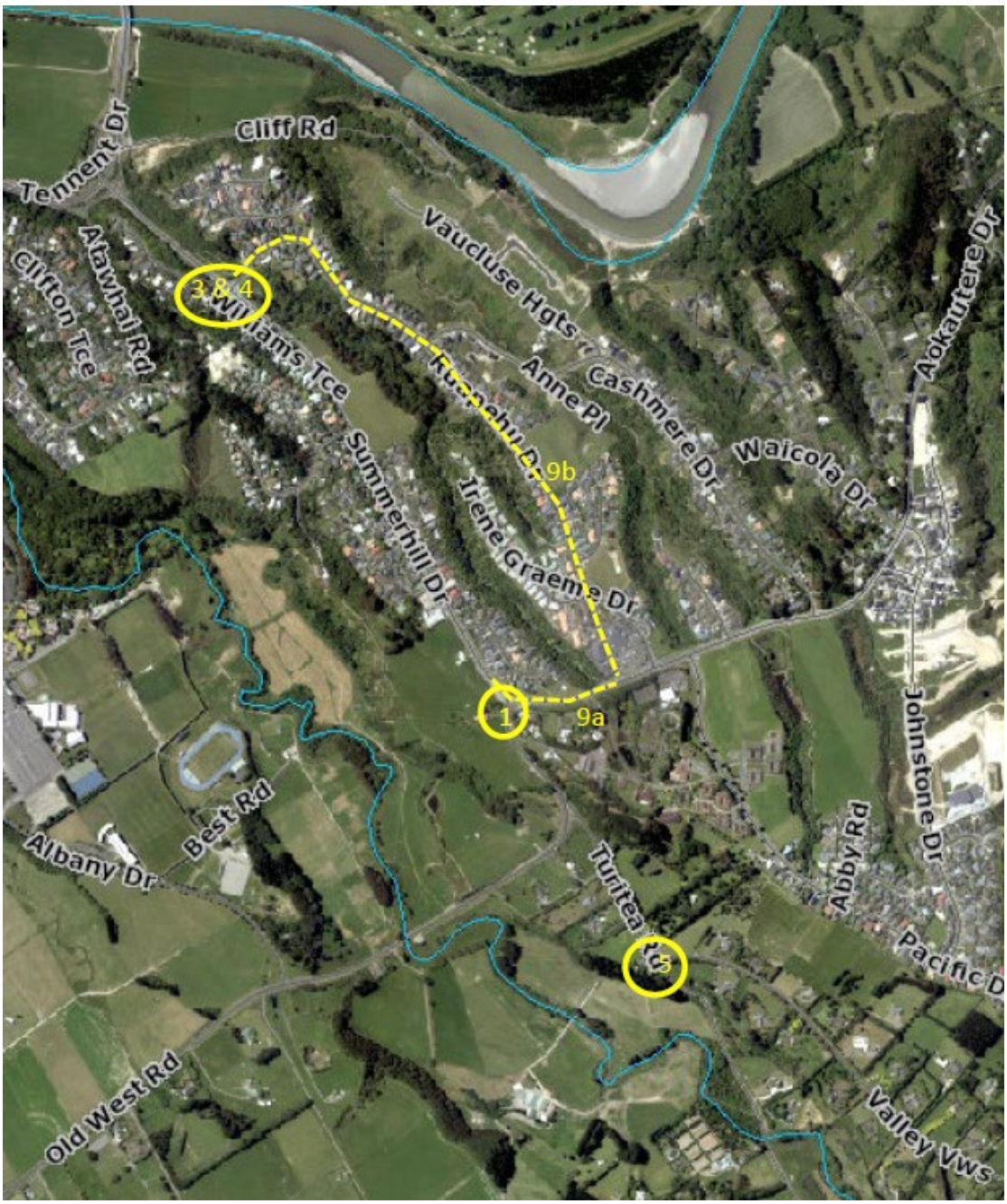


Figure 25: Location of Off-Site Recommended Mitigation

Location	Transport Effect	Recommended Mitigation	Threshold/ Timing
1. SH57 Old West Road/ Aokautere Drive/ Summerhill Drive	The right turn out of SH57 Old West Road has an existing Level of Service of E during the weekday evening peak if all drivers seek a gap in both traffic flows. The level of service and safety of this turn will deteriorate further with the additional traffic associated with the Proposed Plan Change.	Improvements to facilitate safe right turns from SH57 Old West Road into SH57 Aokautere Drive. This could be achieved with a wider central median and longer merge lane. The possible signalisation of the intersection would be driven by safety rather than the traffic carrying performance of the intersection with a particular consideration being the safe passage of citybound cyclists across the Old West Road approach	The level of service and safety of this turn is already a concern. Safety improvements should be developed, programmed, and implemented with Waka Kotahi prior to the traffic associated with the Proposed Plan Change being loaded onto the road network.
2. SH57 Aokautere Drive/ Pacific Drive	There are no existing facilities to assist pedestrians and cyclists crossing Aokautere Drive at Pacific Drive. There is existing demand for these movements for Aokautere residents accessing the Summerhill shopping centre or cycling to/from work, school, university or for recreational purposes. This has safety and severance effects and increases the reliance on cars for access. Forecast delays for the right turn out of Pacific Drive with the traffic associated with the Proposed Plan Change will result in increased risk taking by drivers and an associated increase in the risk of crashes.	There is already a need to provide for pedestrians and cyclists in this location and given that Pacific Drive will accommodate the majority of traffic associated with the further development of the Aokautere area, it is recommended that the intersection is signalised.	Given the existing need to provide crossing facilities for pedestrians and cyclists in this location, plans for the signalisation of the intersection should be developed, programmed, and implemented with Waka Kotahi prior to the traffic associated with the Proposed Plan Change being loaded onto the road network.
3. Mountain View Road/ Ruapehu Drive/ Summerhill Drive	The existing delays for traffic turning right out of Ruapehu Drive during the weekday traffic peaks has reached a level where drivers get frustrated and move into smaller gaps in the traffic with an associated increased risk of crashes.	It is recommended that Ruapehu Drive operates with left in/ left out with an opportunity for u-turns created further to the south along Summerhill Drive. A right turn out of Mountain View Road would need to continue to be accommodated. One possibility would be to introduce a roundabout at the Williams Terrace	This is an existing safety concern during the weekday traffic peaks. Safety improvements should be developed, programmed and implemented by the Council prior to the traffic associated with the Proposed Plan Change being loaded onto the road network.

Location	Transport Effect	Recommended Mitigation	Threshold/ Timing
		intersection with Summerhill Drive. This would also assist vehicles turning to and from Williams Terrace.	
4. Northern end of Ruapehu Drive (closest to City)	As a result of existing peak hour traffic flows on Summerhill Drive, safety concerns for cyclists crossing Summerhill Drive to access the downhill cycle lane close to the intersection with Ruapehu Drive. This will be exacerbated by additional traffic flows on Summerhill Drive as a result of the Proposed Plan Change.	Develop an option for safely accommodating cyclists travelling between the northern end of Ruapehu Drive and the City. This might include introducing a crossing facility across Summerhill Drive (signalised or an underpass) or accommodating two-way cycle flows along the eastern side of Summerhill Drive and towards the Fitzherbert Bridge.	This is an existing safety concern during the weekday traffic peaks. Safety improvements should be developed, programmed, and implemented by the Council prior to the traffic associated with the Proposed Plan Change being loaded onto the road network.
5. Turitea Road/ Valley Views	The horizontal and vertical alignment of the Turitea Road approach from the south results in restricted sight lines at the intersection with Valley Views. This is particularly a problem for vehicles turning right out of Valley Views. Even if there were a speed limit reduction on Turitea Road, the conflict between traffic at the intersection of Turitea Road and Valley Views is not addressed. The existing approach speed from the south is estimated to be up to 60km/h and the available sight line is significantly less than the Austroads requirement for the safe intersection sight distance in a 60km/h speed environment	Some mitigation is already planned as part of a consented 30 lot subdivision at the end of Valley Views. Further review of the safety of the intersection to accommodate additional traffic on the Valley Views and Turitea Road approaches is recommended. Options for safety improvements include a lengthening of the merge for the right turn onto Turitea Road beyond that included for the consented subdivision, a possible change in priority, and the addition of real-time warning signage for vehicles approaching the intersection or changes to the alignment of the Turitea Road approach from the south. Depending on the nature of any mitigation at the intersection, it may be possible to allow for a road connection from the end of Valley Views to the wider area included within the Proposed Plan Change. As such it is recommended that an option for	It is understood that Council has some funds allocated in the Long Term Plan for improvements to Turitea Road and the Valley Views intersection, beyond the improvements to be completed as part of the consented 30 lot subdivision, to support additional rural-residential growth within the Turitea catchment. As such, it is considered that the traffic associated with the 55 additional lots (13 on Valley Views and 42 on Turitea Road) which are anticipated to rely on Turitea Road for access can be safely accommodated once the improvements as part of the Long Term Plan are implemented or in the interim subject to a review of the performance of the intersection as part of a resource consent application.

Location	Transport Effect	Recommended Mitigation	Threshold/ Timing
		this future connection is accommodated within the Structure Plan.	
6. Existing Abby Road and Johnstone Drive Intersections with Pacific Drive	Additional traffic associated with the development of the area of the Proposed Plan Change will result in additional delays for side road traffic accessing Pacific Drive. Once the delays decline to a level of service of E on the side roads there is an associated safety risk as drivers take smaller gaps in the traffic flow.	Change of control to either roundabouts or traffic signals.	When the level of service for side road traffic declines to a level of service of E at peak times. Some development within the area of the Proposed Plan Change is likely to be able to be accommodated before any mitigation is needed.
7. Two future intersections with the existing section of Pacific Drive	Delay and associated safety concerns for future traffic accessing Pacific Drive from side roads. Ensuring safe pedestrian and cyclist access to the future Neighbourhood Centre.	Either constructed as roundabouts or signals once the side roads are needed for access to future development or constructed as Give Way controlled intersections and upgraded to either roundabouts or signals once performance threshold reached.	When the level of service for side road traffic declines to a level of service of E at peak times or when needed to support safe pedestrian access across Pacific Drive to the future Neighbourhood Centre. Some development within the area of the Proposed Plan Change is likely to be able to be accommodated before any mitigation is needed.
8. SH57 Aokautere Drive between Johnstone Drive and Pacific Drive	Existing lack of connectivity and safety for pedestrians and cyclists along this section of SH57 will be exacerbated by additional vehicle traffic (some from the Proposed Plan Change Area and some external) on SH57 and additional demands for pedestrian and cyclist travel along this section including access to the Adderstone Reserve.	The planned shared path along the southern side of SH57 Aokautere Drive is needed to connect Johnstone Drive and Pacific Drive and to provide access to the Adderstone Reserve from both directions on SH57. A pedestrian crossing facility, most likely in the form of dropped kerbs and a median island, is also needed at a point along the section of SH57 Aokautere Drive between Cashmere Drive and Johnstone Drive.	Safety improvements for active modes should be developed, programmed, and implemented with Waka Kotahi prior to the traffic associated with the northeast area of the Structure Plan being loaded onto the road network.

Location	Transport Effect	Recommended Mitigation	Threshold/ Timing
9. Travel routes to and from the City	Peak hour traffic congestion and a decline in road safety associated with additional vehicle movements if existing mode choice patterns continue.	Introduction of high frequency bus services which can be accessed from throughout the suburban part of the Proposed Plan Change area. The internal road network has been designed to accommodate bus services circulating through the area. Facilitation of commuter cycling between Aokautere and the City. Either connection into the recently upgraded facilities on Summerhill Drive (9a) or given the desire line along with lower traffic volumes and the target of providing for a significant increase in cyclist numbers, provision along the Ruapehu Drive corridor (9b). This could include a mix of on and off-road facilities.	Ongoing planning with Horizons Regional Council. A commuter cycle route should be identified by Council and any associated upgrades programmed and implemented prior to the traffic associated with the Proposed Plan Change being loaded onto the road network.

Table 12: Recommended Mitigation

7. District Plan Transportation Requirements

Objectives and policies included in the District Plan which have an influence on transportation matters within this development area include:

District Plan Provision	Comment on Alignment
City View Objectives	
1. Planning for residential, industrial, commercial, and rural-residential growth sustains a compact, orderly, and connected urban form which avoids the adverse environmental effects of uncontained urban expansion into the rural zone.	The reliance on connections to SH57 Aokautere Drive provides ready access to the urban road network. Only a small number of rural-residential properties are expected to rely on Turitea Road for connection to the wider road network.
3. The integrated and efficient provision of, and access to, infrastructure, network utilities and local services is facilitated for all residents.	The development area has ready access to the strategic road network via SH57 and Summerhill Drive.
9. Subdivisions, buildings, and infrastructure are designed and constructed to promote a coordinated, healthy, and safe environment.	A number of mitigation measures including the introduction and change in control at intersections, new sections of footpath and shared paths are expected to result in a safe travel environment for all road users.
23. Infrastructure operates in a safe and efficient manner, and the effects of activities which could impact on the safe and efficient operation of this infrastructure are avoided, remedied, or mitigated.	Mitigation measures, in particular for the intersections along SH57 Aokautere Drive are included to ensure the ongoing safe and efficient operation of the arterial road network.
24. All forms of transport, including public transport, walking, cycling, and private vehicles are adequately provided for to assist with sustainable energy use and a healthy lifestyle.	Active modes and private vehicles can be readily accommodated within the development area. Allowance is included for the possible introduction of bus services on the collector road network in the future.
25. Infrastructure and physical resources of regional or national importance are recognised and provided for by enabling their establishment, operation, maintenance, upgrading and protection from the effects of other activities.	Mitigation measures are proposed to ensure the ongoing safe and efficient operation of the SH57 intersections.
Subdivision Objective 2 ***To ensure that subdivision is carried out in a manner which recognises and gives due regard to the natural and physical characteristics of the land and its future use and development, and avoids, remedies, or mitigates any adverse effects on the environment.***	
Policies	
2.1 To require lots to have areas and dimensions to meet the needs of users and to sustain the land resource by ensuring that:	
1. Lots in the Residential Zone have the necessary area and dimensions to enable the siting and construction of a dwelling and accessory buildings, the provision of private outdoor space, service courts, vehicle access and parking in accordance with the relevant Permitted Activity Performance Standards.	The indicative site layout includes lot sizes and shapes that allow for vehicle access to on-site parking. Noting that the NPS Urban Development 2020 removes the requirement to provide on-site parking in Palmerston North.
2.2 To ensure that all new lots have safe and adequate vehicle access from the roading network by providing that:	
1. Every lot is to have access from a formed existing road, or a new road to be formed, to enable vehicles to enter the site with the dimensions of access sufficient to accommodate the	The indicative site layout allows for each lot to have its own access to frontage roading. Given the individual accesses to single residential lots with frontages to local or

District Plan Provision	Comment on Alignment
level of vehicle usage anticipated. The access should be designed to enable vehicles to turn within the lot and to leave it in a forward direction.	collector roads the Permitted Activity Performance Standard for on-site turning does not apply. The extension to Pacific Drive is expected to be a collector rather than an extension of the existing minor arterial classification.
2. *The construction is to be to a standard and of materials to support the anticipated traffic, require minimum maintenance and to control and dispose of stormwater runoff.*	Noted.
3. *Any allotment with frontage to a Major or Minor Arterial road which has no alternative means of access to an existing public road in the local road network, shall have access arrangements approved by Council, in terms of an Access Management Structure Plan.*	Two new lots are shown with frontage to the existing section of Pacific Drive. These lots also have frontage to a proposed side road.
2.3 To ensure safe, convenient, and efficient movement of people, vehicles, and goods in a high quality environment with minimum adverse effects by providing that:	
1. *The layout of the transport network shall, as appropriate for their position in the roading hierarchy, ensure that people, vehicles, and goods can move safely, efficiently, and effectively, minimise any adverse effect on the environment, make provision for network utility systems and make provision for amenity values. The layout of the transport network shall:*	
• *provide adequate vehicular access to each lot;*	The indicative site layout allows for each lot to have its own access to frontage roading.
• *link to, and provide for, and be compatible with the existing and future transport networks, taking into account orderly and integrated patterns of development and adjoining developments;*	The Aokautere Drive section of SH57 is transitioning from a rural to an urban context.
• *connect to all adjoining roads, providing for choice of routes where practicable;*	While a single connection to Turitea Road is included, further connection to Turitea Road has not been included to minimise adverse road safety effects. An option for a future connection to Valley Views has been included.
• *identify significant destinations and provide for safe and convenient access to these by all modes;*	Based on existing traffic patterns almost all traffic movements are expected to be to or from the direction of the City.
• *encourage multi-modal street links, providing pedestrian links; and*	The Structure Plan includes provision for footpaths, cycle lanes, shared paths, and connections with existing walkways.
• *provide adequate access for emergency vehicles.*	The road layout included in the Structure Plan can be expected to allow for emergency vehicle access to all properties.
2. *The development provides for a high quality public realm considering;*	
• *the potential for the street to be a place of recreational walking and cycling;*	A mix of footpaths, shared paths, cycle lanes and shared space streets are included.
• *the safety and visibility of pedestrians;*	Pedestrians are provided for on footpaths or shared paths.
4. *The structure of a road shall:*	
• *have a design life of at least 25 years based on Equivalent Design Axle, or equivalent design methods;*	Noted.
• *be constructed from materials suitable for the intended use;*	Noted.
• *maintain adequate surface smoothness; and*	Noted.

District Plan Provision	Comment on Alignment
• *be protected from the adverse effects of surface and ground water.* 6. *Urban roads are to be well lit by specifically designed street lighting, are to be constructed to such standards and in such materials as will result in minimum maintenance having regard to the anticipated levels and types of traffic.* ***2.4 To improve land utilisation, to safeguard people, property, and the environment from the adverse effects of unstable land by ensuring that:*** *3. When land is subdivided that the resultant lots contain safe and adequate building sites and have roading and access suitable for activities.*	Noted. Lighting will be able to be provided to the required standard. The number and length of no exit roads has been minimised although not totally avoided given the extensive gully systems. The layout of the road network has been designed to provide route choice options for the majority of properties.
Residential Zone Objective 1 ***To enable the sustainable use and development of the Residential Zone to provide for the City's current and future housing needs.*** ***Policies*** *1.3 To promote the efficient use of the urban infrastructure and other physical resources.* *1.4 To ensure network infrastructure and services are available to support residential development and intensification.*	Ready connection to the arterial road network. As above.
Land Transport Objective 1 ***The City's land transport networks are maintained and developed to ensure that people and goods move safely and efficiently through and within the City.*** ***Policies*** *1.1 Identify and apply the roading hierarchy to ensure the function of each road in the City is recognised and protected in the management of land use, development, and the subdivision of land.* *1.2 All roads in the City have function and design characteristics consistent with their place in the roading hierarchy.* *1.3 Maintain and upgrade the existing roads in the City and provide for new roads to meet the current and future needs of the City.* *1.4 The road network stormwater control system shall protect the road, road users and adjoining land from the adverse effects of water from roads and minimise any adverse effect on the environment.* *1.5 Require all new public roads, private roads, accessways and privateways to be designed and constructed to meet performance standards relating to the safety and efficiency of vehicle movement, and to ensure the safe use of the road transport network for all users, particularly in respect of:* *a) Road width and alignment which should be sufficient for two vehicle lanes except where traffic volumes are insufficient;* *b) The formation and surface sealing of all roads, accessways and privateways to standards appropriate to the volume of traffic expected to be carried;*	The internal road network includes local and collector roads. Particular consideration has been given to the roads that provide links between the gullies. As above. Mitigation measures have been identified for a number of intersections to ensure the ongoing safe and efficient operation of existing roads. Noted. Allowed for in road cross-sections. Readily achievable.

District Plan Provision	Comment on Alignment
c) Provision for necessary network utility facilities within roads; and	Anticipated.
d) Safe design and construction of roads, road access points and intersections, including alignment, gradient, vehicle parking, manoeuvring, and turning requirements.	As shown in the Structure Plan, a safe design for the internal roading and access arrangements is expected.
1.6 Encourage the development of safe and accessible pedestrian paths and cycleways, as well as convenient and accessible cycle parking, to support the opportunity for people to use active and non-vehicular modes of transport throughout the City.	Footpaths, shared paths, and cycle lanes included. Council have already included in their strategic planning, a shared path along SH57 between Pacific Drive and Johnstone Drive.
1.7 To support and encourage the provision of public transport and its use throughout the City as an integral part of the transportation system.	The internal road network allows for the possible future circulation of buses.
1.8 Convenient, safe, and accessible car parking, loading and manoeuvring facilities are available for residents, staff, visitors, and customers for all activities without creating congestion or conflicts with moving vehicles, pedestrians, or cyclists on adjacent roads.	Anticipated that private on-site and kerbside parking will be available. Rubbish collection trucks will be able to efficiently circulate through the internal road layout.
Land Transport Objective 2	
The land transport network is safe, convenient, and efficient while avoiding, remedying, or mitigating adverse effects in a way that maintains the health and safety of people and communities, and the amenity values and character of the City's environment.	
Policies	
2.1 Restrict the through movement of traffic where the movement has adverse visual, noise and safety effects on the adjoining areas by using the road hierarchy to direct higher volume and heavy traffic movements on identified arterial routes and discouraging this traffic from other areas, such as residential areas.	The roading layout provides for efficient connection to the arterial road network. Adverse traffic effects on Turitea Road have been minimised.
2.2 Avoid, remedy, or mitigate the impact of roads and parking areas on visual amenity values of the community by requiring the provision of landscaping.	Addressed in the urban design assessment.
2.4 Avoid adverse effects on amenity and character by ensuring that new roads are well designed and visually complement the character of the surrounding area.	Addressed in the urban design assessment.
Land Transport Objective 3	
The safety and efficiency of the land transport network is protected from the adverse effects of land use, development, and subdivision activities.	
Policies	
3.1 Avoid, remedy, or mitigate the adverse effects of increased traffic or changes in traffic type, which would compromise the safe and efficient operation of any road, or the safe and convenient movement of pedestrians and cyclists on roads.	Mitigation measures, in particular upgrades to intersections and provisions for pedestrians and cyclists have been identified.
3.2 Require vehicle crossing places and vehicle entrances from public roads to be located, constructed, and maintained to standards appropriate to the expected traffic volume, pedestrian movement, and speed environment of each road.	Detail to be included at resource consent stage.
3.3 Ensure that buildings and activities do not compromise the necessary clear sight lines for trains and road vehicles at level rail crossings, or of vehicles at road intersections.	Road cross-sections and building setbacks will allow for satisfactory sight lines at internal intersections. This will be demonstrated at resource consent stage.

District Plan Provision	Comment on Alignment
3.4 Ensure adequate on-site parking and manoeuvring space is provided for each type of activity in a safe and visually attractive manner. *3.5 Ensure that buildings and activities make provision for adequate and safe on-site loading.*	Detail to be included at resource consent stage. Loading provisions for the commercial area will need to be considered at the resource consent stage. The internal road layout is such that rubbish collection trucks will be able to efficiently circulate through the site.

Table 13: Alignment with District Plan Provisions

As such the proposed Structure Plan and associated development that would be facilitated are well aligned with the transport related objectives and policies of the District Plan.

8. Alignment with Transport Strategies

Commentary on the alignment of the Proposed Plan Change with the transport context included in Section 2 of this report is provided in Table 14 below:

National/ Regional/ Local Transport Context	Comment on Alignment
A transport system where no-one is killed or seriously injured (including active and public transport modes) with a target of a 40% reduction by 2030	The recommended mitigation measures include safety improvements that will benefit existing and future road users.
Better and affordable travel options with 15% of travel in the region by active and public transport modes by 2030 (PNITI target of 30% active mode travel by 2030)	Active modes and public transport are provided for within the area of the Proposed Plan Change and improvements are recommended to accommodate active mode connections better and more safely onto and through the wider road network.
Reduced emissions from land transport while improving safety and inclusive access with a target of a 30% reduction by 2030	Provision is included for increased active mode and public transport use which will in turn assist with reducing emissions from land transport.
Road safety principles include safety as a critical decision-making priority, designing for human vulnerability, allowing for mistakes, strengthening all parts of the road transport system and shared responsibility for improving road safety	The recommended mitigation measures include many safety improvements that will benefit existing and future road users.
A reliable, integrated, accessible and sustainable public transport system with increased patronage	The proposed collector road network within Aokautere area can accommodate buses.
Integrated transport network with clear priorities for all road users based around place and movement principles	The proposed road hierarchy and road cross-sections have been selected in line with place and movement principles.
Timely provision of transport infrastructure to support city growth with increased investment in active and public transport as a proportion of the transport budget	Mitigation measures have been identified for implementation from the outset of further development within the Aokautere area.
Speed limits and traffic speeds are appropriate for the conditions throughout the transport network	Both Waka Kotahi and Council can be expected to undertake ongoing speed reviews throughout the city.
New growth areas have well-connected, multi-modal, visually attractive streets which are designed and constructed to meet performance standards and function according to their place in the road hierarchy	The internal streets have been designed to accommodate all road users. Most travel will be to and from SH57 Aokautere Drive via

National/ Regional/ Local Transport Context	Comment on Alignment
	Pacific Drive and Johnstone Drive, but local connections are included to Turitea Road (all modes) and Valley Views (pedestrian/cycle).
Space is prioritised within the transport network for active and public transport	The internal streets have been designed to accommodate all road users.
The land transport network is maintained and developed to ensure that people and goods move safely and efficiently through and within the city	The current focus at a national, regional and local level is primarily on safety and promoting active and public transport modes rather than efficiency with the exception of regional traffic routes. The proposed mitigation includes a number of safety improvements but also seeks to ensure that vehicles can move efficiently along the SH57 corridor.
Maintain and upgrade existing roads and provide for new roads to meet the current and future needs of the city	Given the capacity constraints in the wider road network, in particular the intersections on the city side of the river and the targets of increased active and public mode use, the focus is on providing for improved cycle and bus connectivity with the city.
The safety and efficiency of land transport is protected from the adverse effects of land use, development and subdivision activities	The proposed mitigations include safety improvements along with measures to ensure safe and efficient traffic flow along the SH57 route.
Alignment with the Palmerston North City Council 10 Year Plan	The 10 Year Plan has a strong focus on improved cycle facilities and connectivity throughout the city and includes provision for the completion of the works on Summerhill Drive. The need for additional cycle treatments along the Ruapehu Drive corridor have also been identified as part of this assessment.
Alignment with the anticipated outcomes of the PNITI Network Options Report	The PNITI projects that will have the most significant effect on this part of the road network are indicated for the long term and therefore have less certainty, being a new river crossing to the west of the city and the upgrade of SH57 from Tennent Drive to Summerhill Drive.

Table 13: Alignment with National/ Regional/ Local Transport Context

As such the proposed Structure Plan and associated development has good alignment with the national, regional and local transport context.

9. Summary and Conclusion

The findings of this assessment can be summarised as follows:

- in recent years there has been a shift in priority towards the delivery of safe and multi-modal transport infrastructure with clear targets for improved road safety, increased active mode and public transport use and reduced emissions from land transport;

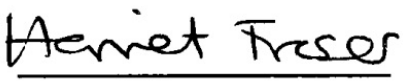
- the existing section of Pacific Drive and Johnstone Drive have cross sections which are either well matched or could be readily adjusted to meet the provisions of NZS4404:2010 for Residential Collector Roads;
- Turitea Road has a varying cross-section along its length. Overall, it matches most closely with the provisions of NZS4404:2010 for a Local Rural Road carrying around 1,000vpd although there are sections with cross-sections more aligned with a Connector/ Collector Rural Road capable of carrying around 2,500vpd. The section of Turitea Road from Valley Views to SH57 could reasonably be expected to safely accommodate 2,500vpd;
- Valley Views has a carriageway width of 6m and is accordingly best matched to the provisions of NZS4404:2010 for a Local Rural Road carrying around 1,000vpd;
- the available sight lines at the various local intersections are generally satisfactory apart from at the intersection of Valley Views and Turitea Road;
- the average daily traffic count on SH57 in the vicinity of Pacific Drive is 12,900vpd. The weekday traffic peak in this location occurs between 5 and 6pm with 1,340vph and on a Saturday between 11am and 12 noon with 1,000vph;
- while the traffic carrying capacity of the Fitzherbert Bridge (two traffic lanes in each direction) places a constraint on the amount of traffic that can enter the city in this location, the main capacity constraint is the downstream traffic signals at the intersection of Fitzherbert Avenue and Te Awe Awe Street. It is estimated that the intersection operates at 80-90% of its capacity during the weekday traffic peaks. Scope for capacity improvements is limited with there already being four southbound and three northbound traffic lanes at the Fitzherbert Avenue stop lines. Cycle lanes are marked at the intersection;
- based on traffic count data for Pacific Drive and Johnstone Drive the following existing trip generation rates have been calculated:
  Daily: 8 vehicle movements per day per household
  Weekday PM peak: 1.0 vehicle movements per hour per household
  Saturday midday peak: 0.7 vehicle movements per hour per household.
- at present drivers turning right onto SH57 Aokautere Drive from SH57 Old West Road or Pacific Drive, typically look for a gap in both traffic flows rather than pause in the median;
- there are existing safety concerns on Turitea Road to the south of Valley Views due to its narrow cross-section, horizontal and vertical geometry, speed environment and the one-lane bridges;
- the Structure Plan facilitates the development of some 1,020 residential lots and a suburban centre. In terms of transportation matters, the proposed Structure Plan includes provisions for roading connections to the external road network, internal roading layout, proposed road hierarchy and associated cross-section provisions;
- the number and length of ‘no exit’ roads have been minimised, but the topography associated with the gully systems means that some ‘no exit’ roads are needed to provide access;
- the network of collector roads has been designed to facilitate circulation by buses. With the recent connection of the two ends of Johnstone Drive, there is now an opportunity to circulate on the existing sections of Pacific Drive and Johnstone Drive. If buses were to travel along the full existing length of Pacific Drive and onto the proposed north-south connector route, most lots within the area would be within 500m of the bus route;
- the inclusion of shared, rather than separated, paths for the use of pedestrians and cyclists has been minimised but has been necessary along the Connector Roads where the roads cross the gully network. The topography of these areas is challenging, and the road cross-sections need to be minimised. Separate pedestrian and cycle paths are included where the Activity Streets have frontages with shops and businesses;
- a minimum berm width of 2.5m is included between the property boundary and the movement lane (vehicle and/or cycle) on all roads where there are vehicle accesses onto the frontage road. This allows for the driver of an exiting vehicle to be clear of the property boundary prior to the vehicle entering the movement lane;

- an increase of active mode share to 30% and of bus share to 4.2% (2018 level for Christchurch and also NZ average), could see a reduction in vehicle trips by around 25% for the Poutoa statistical area by 2030; and
- there is a good alignment with both the District Plan objectives and policies and the wider regional and national transport context.

In summary, the findings of the assessment show that based on existing travel mode share behaviours, there is the potential for the plan change to result in significant additional vehicle traffic on the local road network. A number of mitigation measures, included in Table 12, have been identified to support mode shift towards active and public transport modes as well as to ensure the safe operation of the transport network. With these mitigation measures in place, the proposed Structure Plan would allow for the site to be developed for residential and local business centre (local retail/ commercial/ community) purposes in a manner which is consistent with the District Plan traffic and transportation related objectives and policies.

Please do not hesitate to be in touch should you require clarification of any of the above.

Yours faithfully



Harriet Fraser

Appendix 1: Transport Context

Government Policy Statement Land Transport 2021 (GPS Land Transport)

The GPS Land Transport has the following strategic priorities:

a. Developing a transport system where no-one is killed or seriously injured;
b. Providing people with better travel options to access places for earning, learning, and participating in society;
c. Improving freight connections to support economic development; and
d. Transforming to a low carbon transport system that supports emissions reductions aligned with national commitments, while improving safety and inclusive access.

Road to Zero – Road Safety Strategy 2020-2030

The vision of Road to Zero is “a New Zealand where no one is killed or seriously injured in road crashes” and has the target reducing death and serious injuries on New Zealand roads by 40% over the next decade. The seven principles identified to guide the design of the network and for making road safety decisions are:

a. Promote good choices but plan for mistakes;
b. Design for human vulnerability;
c. Strengthen all parts of the road transport system;
d. Shared responsibility for improving road safety;
e. Actions are grounded in evidence and evaluated;
f. Road safety actions support health, wellbeing and liveable places; and
g. Safety is a critical decision-making priority.

Horizons Regional Land Transport Plan 2021-2031 (RLTP)

The RLTP has the 30 year vision of: A region that connects central New Zealand and supports safe, accessible and sustainable transport options. The objectives included in the RLTP are:

Objective 1: Travel Choice - Transport users in the region have access to affordable transport choices that are attractive, viable, and encourage multi-modal travel.

Objective 2: Connectivity and Efficiency - The regional transport network connects central New Zealand and is efficient, reliable, and resilient.

Objective 3: Safety - The transport network is safe for all users.

Objective 4: Environment - The impact of transport on the environment and the transport system's vulnerability to climate change is minimised.

Objective 5: Land Use Integration - Transport and land use are integrated to support well connected communities that promote a strong regional economy and liveable region.

The RLTP includes aspirational targets intended to signal the desire to drive change in certain areas of the regional transport system. These targets are:

Mode share: 15% of travel in the region to be active and public transport modes by 2030.

Safety: 40% reduction in deaths and serious injuries on the region's roads by 2030.

Resilience: 20% reduction in road closures on priority routes associated with natural hazards or unplanned events.

Carbon emissions: 30% reduction in regional carbon emissions from land transport by 2030.

Horizons Regional Public Transport Plan 2015-2025 (RPTP)

The following objectives apply to all public transport service units, taxi services and shuttle services that Horizons provides financial assistance to:

a. A reliable, integrated, accessible and sustainable public transport system;
b. An effective procurement system that delivers the desired public transport services;
c. A safe and accessible network of supporting infrastructure; and
d. Increasing patronage.

Palmerston North Transport Plan: Strategic Transport Chapter 2021-2031 (PNTP)

The purpose of the PNTP Strategic Transport Chapter is to provide transport infrastructure that supports day-to-day city activity and city growth in ways that integrate active and public transport. Desired outcomes of the PNTP and as relevant to this Proposed Plan Change include:

a. Palmerston North has an integrated transport network with clear priorities for all users based around place and movement principles.
b. The Palmerston North Integrated Transport Initiative (PNITI)/ Regional Freight Ring Road to be completed.
c. Palmerston North has safe streets, with zero deaths or serious injuries.
d. The urban network supports amenity outcomes, prioritises active and public transport, and directs freight to the Regional Freight Ring Road.
e. There is timely provision of transport infrastructure to support city growth and economic development opportunities.
f. Speed limits and traffic speeds are appropriate for the conditions throughout the transport network.
g. Street design is responsive to land-use, place and movement.
h. More people choose modes of transport other than motor vehicles.
i. New growth areas have well-connected, multi-modal streets.
j. Roads are designed to minimise long-term financial liabilities.

Palmerston North Transport Plan: Active and Public Transport Chapter 2021-2031 (PNTP)

The purpose of the PNTP Active and Public Transport Chapter is to increase the availability and uptake of active and public transport options. Desired outcomes relevant to this Proposed Plan Change include:

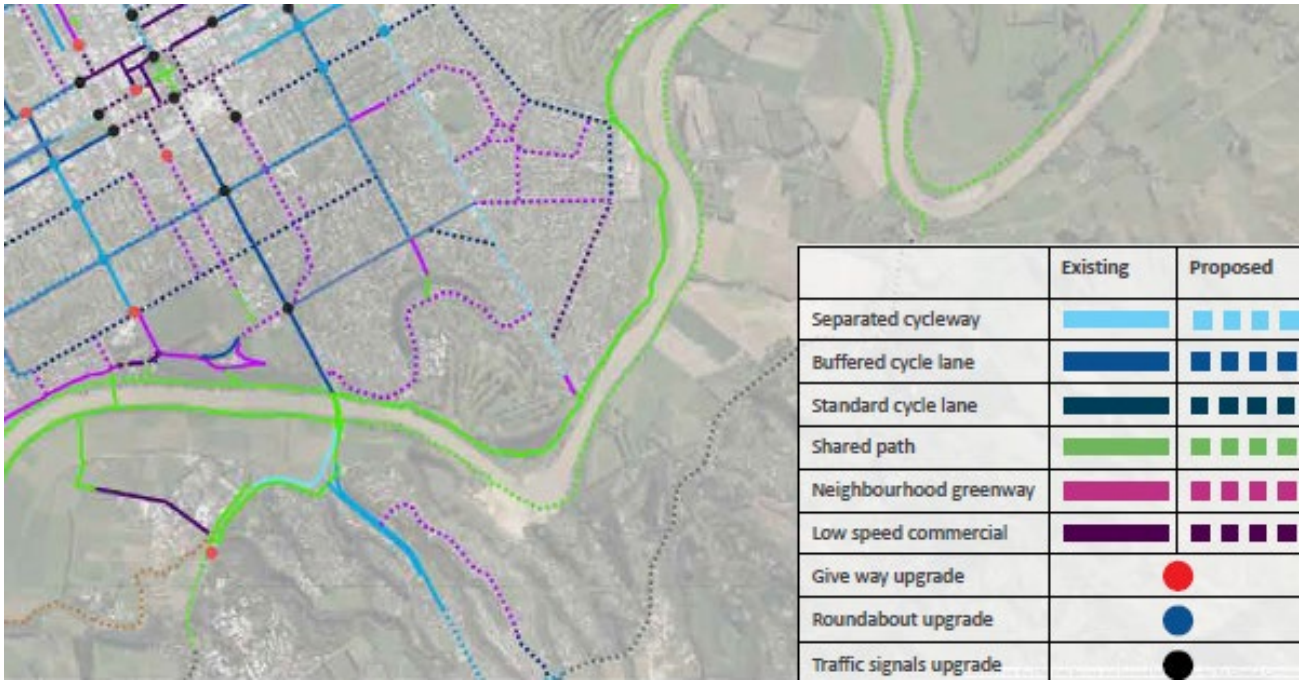
a. An integrated multi-modal transport network that connects people with destinations and place.
b. The transport network prioritises walking and cycling alongside other modes.
c. Active transport participation is increased to 15% of all journeys by 2024, to 20% by 2027; and to 30% by 2030.
d. There is increased investment in active and public transport as a proportion of the transport budget.

e. Active and public transport are genuine mode choices.
f. There is a significant mode-shift to active and public transport.
g. There are zero deaths and serious injuries from active and public transport.
h. The city has a strong cycling culture.
i. Walking and cycling journeys are safe and positive experiences.
j. An active transport network provides for commuting and recreational users.
k. People choose transport modes that reduce carbon emissions.
l. Space is prioritised within the transport network for active and public transport.
m. Traffic speeds are reduced through street design and speed limit bylaws to encourage the use of active and public transport and keep users safe.
n. There is increased investment in active and public transport.

Palmerston North Urban Cycle Network Masterplan 2019

The vision for the Urban Cycle Network Masterplan is that the Urban Cycle Network investment results in an environment and culture change that enables more people in Palmerston North to choose cycling more often.

The figure below is an extract from a diagram in the masterplan which shows urban cycle network opportunities.



Key features of this diagram are:

- The existing provision of connected cycle facilities along Summerhill Drive across the bridge and along Fitzherbert Avenue towards the city centre; and
- The proposed cycle provisions along the Ruapehu Drive corridor from Aokautere Drive to Summerhill Drive.

The Masterplan recognises four main challenges in delivering the desired outcomes, being:

- Limited funding;

- Competing needs for road width at intersections;
- Vehicle speeds deterring cyclists; and
- Balancing the uses of streets, in particular challenges with effects on on-street parking.

Palmerston North City District Plan (District Plan)

The Land Transport section of the District Plan includes the following objectives and policies that apply to the Proposed Plan Change:

Objective 1 - The City's land transport networks are maintained and developed to ensure that people and goods move safely and efficiently through and within the City.

Policy 1.1 - Identify and apply the roading hierarchy to ensure the function of each road in the City is recognized and protected in the management of land use, development and the subdivision of land.

Policy 1.2 - All roads in the City have function and design characteristics consistent with their place in the roading hierarchy.

Policy 1.3 - Maintain and upgrade the existing roads in the City and provide for new roads to meet the current and future needs of the City.

Policy 1.5 - Require all new public roads, private roads and vehicle accesses to be designed and constructed to meet performance standards relating to the safety and efficiency of vehicle movement, and to ensure the safe use of the road transport network for all users.

Policy 1.6 - Encourage the development of safe and accessible pedestrian paths and cycleways, as well as convenient and accessible cycle parking, to support the opportunity for people to use active and non-vehicular modes of transport throughout the City.

Policy 1.7 - To support and encourage the provision of public transport and its use throughout the City as an integral part of the transportation system.

Objective 2 - The land transport network is safe, convenient and efficient while avoiding, remedying or mitigating adverse effects in a way that maintains the health and safety of people and communities, and the amenity values and character of the City's environment.

Policy 2.1 - To restrict the through movement of traffic where the movement has adverse visual, noise and safety effects on adjoining areas by using the roading hierarchy to direct higher volume and heavy traffic movements on identified arterial routes and discouraging this traffic from other areas, such as residential areas.

Policy 2.2 - To avoid, remedy or mitigate the impact of roads and parking areas on visual amenity values of the community by requiring the provision of landscaping.

Policy 2.4 - Avoid adverse effects on amenity and character by ensuring that new roads are well designed and visually complement the character of the surrounding areas.

Objective 3 - The safety and efficiency of the land transport network is protected from the adverse effects of land use, development and subdivision activities.

Policy 3.1 - Avoid, remedy or mitigate the adverse effects of increased traffic or changes in traffic type, which would compromise the safe and efficient operation of any road or level crossing, or the safe and convenient movement of pedestrians and cyclists on roads or at level crossings.

Policy 3.2 - Require vehicle crossing places and vehicle entrances from public roads to be located, constructed, and maintained to standards appropriate to the expected traffic volume, pedestrian movement and speed environment of each road.

Policy 3.3 - Ensure that buildings and activities do not compromise land transport network safety, including maintaining the necessary clear sight lines for road vehicles at level crossings and road intersections.

Palmerston North 10 Year Plan 2021-2031

The current 10 Year Plan includes the following new capital projects which are relevant to the Proposed Plan Change:

Roading

- Road to Zero – Transport Safety Improvements
- PNITI
  - Intersection & Bridge Improvements
  - Strategic Transport Corridor Improvements
  - Urban Transport Projects Enabling PNITI

Active and Public Transport

- City-wide – Urban Cycle Infrastructure Network Improvements
- Urban Cycle Network Development
- City-wide – Cycle Phases at Intersections
- Summerhill Drive – Pedestrian and Cyclist Improvements
- City-wide – Off Road Shared Path Network Improvements
- City-wide – Footpath Improvements
- City-wide – Public transport Infrastructure Improvements
- City-wide – Supporting Cycle Infrastructure Improvements
- Regional Shared Path Network Improvements
- Summerhill Drive – On-street Parking Infrastructure

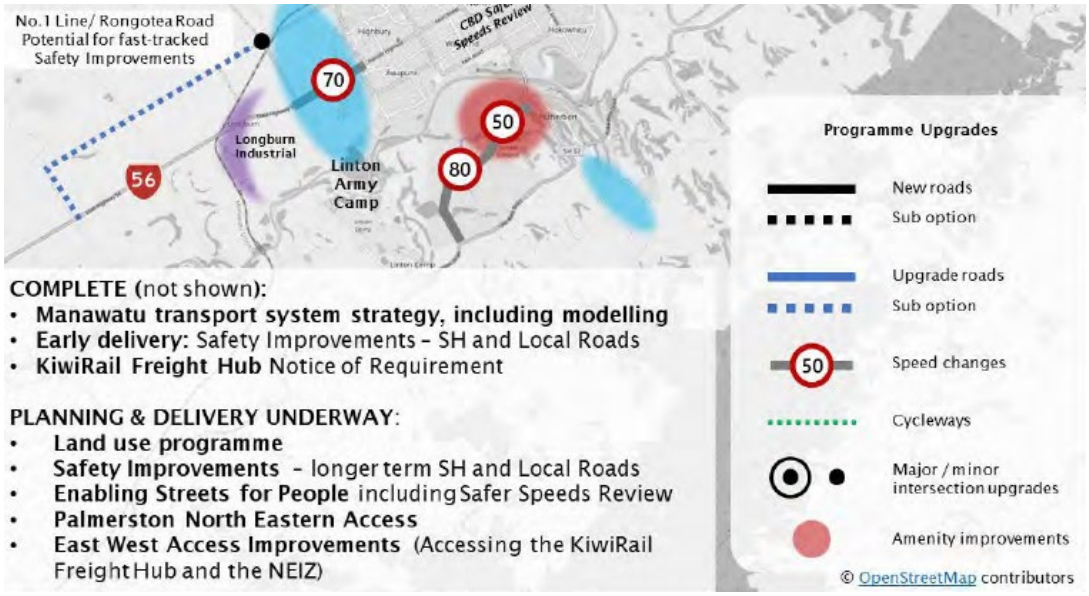
Palmerston North Integrated Transport Initiative (PNITI) Network Options Report January 2021

The PNITI Report prepared by Waka Kotahi includes a suite of programmes divided into short, medium and longer term projects. The report indicates that the full programme could potentially be delivered by around 2030. The works are intended achieve the following:

- Reduce freight movements on residential and place-based streets by up to 50%;
- Support and enable Urban Cycling Masterplan initiatives and investments….:
- Reduce the number of congested intersections by 50% and improve journey times on key freight routes by up to 10 minutes;

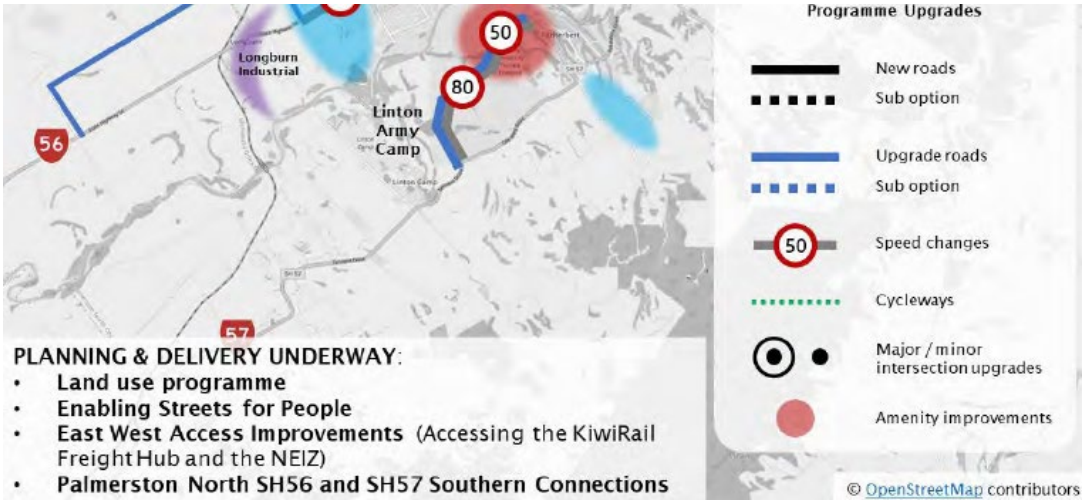
- Reduce deaths and serious injuries by 35-40% across the rural freight network;
- Support economic development…; and
- Improves safety and access for new housing developments at Whakarongo, Aokautere and City West.

The Short Term projects in the vicinity of Aokautere are shown in Figure 0-1 of the PNITI report. An extract is included below. The projects include speed limit and amenity improvements on Tennent Drive between SH57 and the Fitzherbert Bridge.



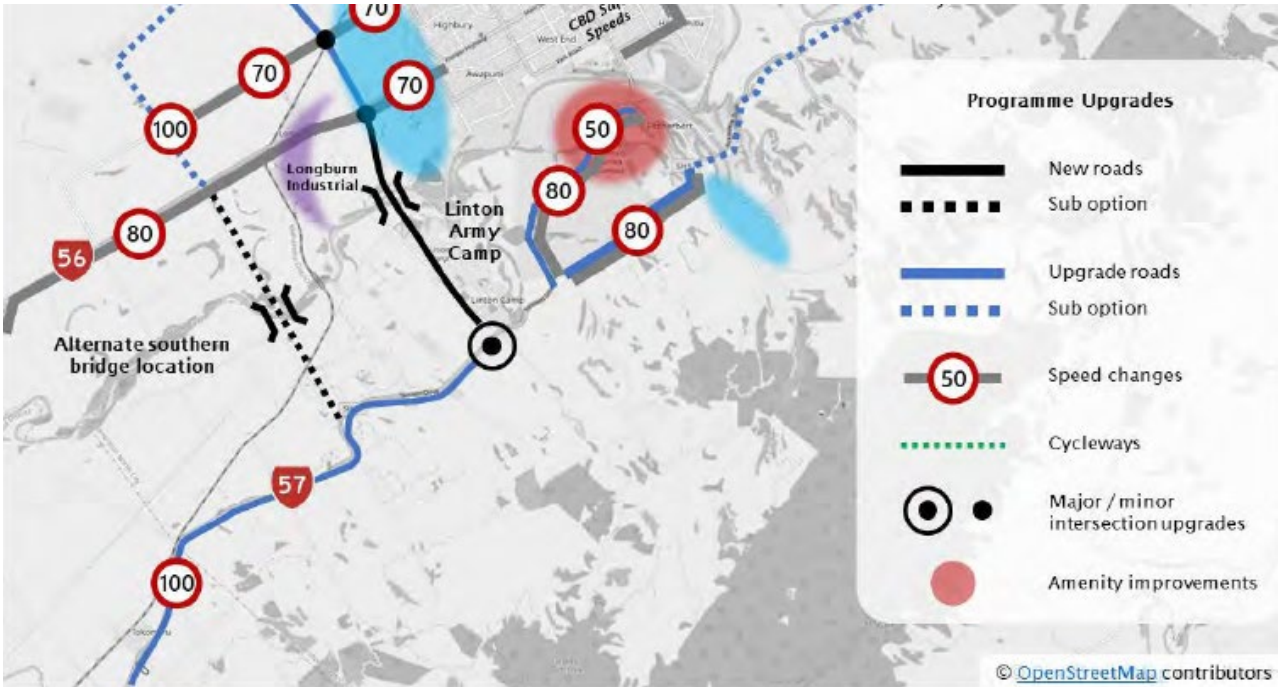
PNITI Short Term Works

The Medium Term projects in the vicinity of Aokautere are shown in Figure 0-2 of the PNITI report. An extract is included below. Road upgrades are shown along Tenent Drive between SH57 and the Fitzherbert Bridge.



PNITI Medium Term Works

The Longer Term projects in the vicinity of Aokautere are shown in Figure 0-3 of the PNITI report, an extract is included below.



PNITI Longer Term Works

The Longer Term projects include a new road bridge and associated roading connecting SH57 and SH56 to the wets of the city, upgrades and speed limit changes on SH57 between Tennent Drive and Summerhill Drive and a sub option of upgrading SH57 Aokautere Drive to the east of Summerhill Drive.