Whakatane District Council

Proposed Residential Subdivision, Shaw Road, Huna Road

Scoping Assessment

October 2012

Traffic Design Group

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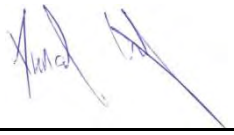
Quality Assurance Statement



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Status: Final

Date: October 2012

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1. Introduction

Traffic Design Group Ltd ("TDG") has been appointed by Whakatane District Council (Council) to prepare a Scoping Assessment of a proposed 200 lot residential subdivision on the outskirts of Whakatane, adjacent to State Highway 30 (SH30). This report includes an assessment of the traffic issues associated with the development, with particular focus on the effects of:

- Development traffic generation;
- Provision of connections to the wider road network, and
- Traffic effects on the surrounding road network, with specific consideration of the operating performance of the SH30 / Huna Road intersection and the SH30 Shaw Road intersections.

The purpose of the assessment is to identify the likely issues and potential mitigation that may be required in order to safely and efficiently manage the development on the road network.

2. Background Information

2.1 Whakatane District Council Urban Growth Strategy

The *Whakatane Integrated Urban Growth Strategy* (2010) assesses growth options for the Whakatane District to 2050. The purpose of this Strategy is to provide ways of planning for and managing growth in a proactive manner. The Strategy has identified potential future growth areas which are shown on a plan titled "Future Directions" and included below as Figure 1

The Strategy identified a preferred growth scenario targeting 25,000 people by 2050 with the location of growth subject to consultation as part of the District Plan Review.

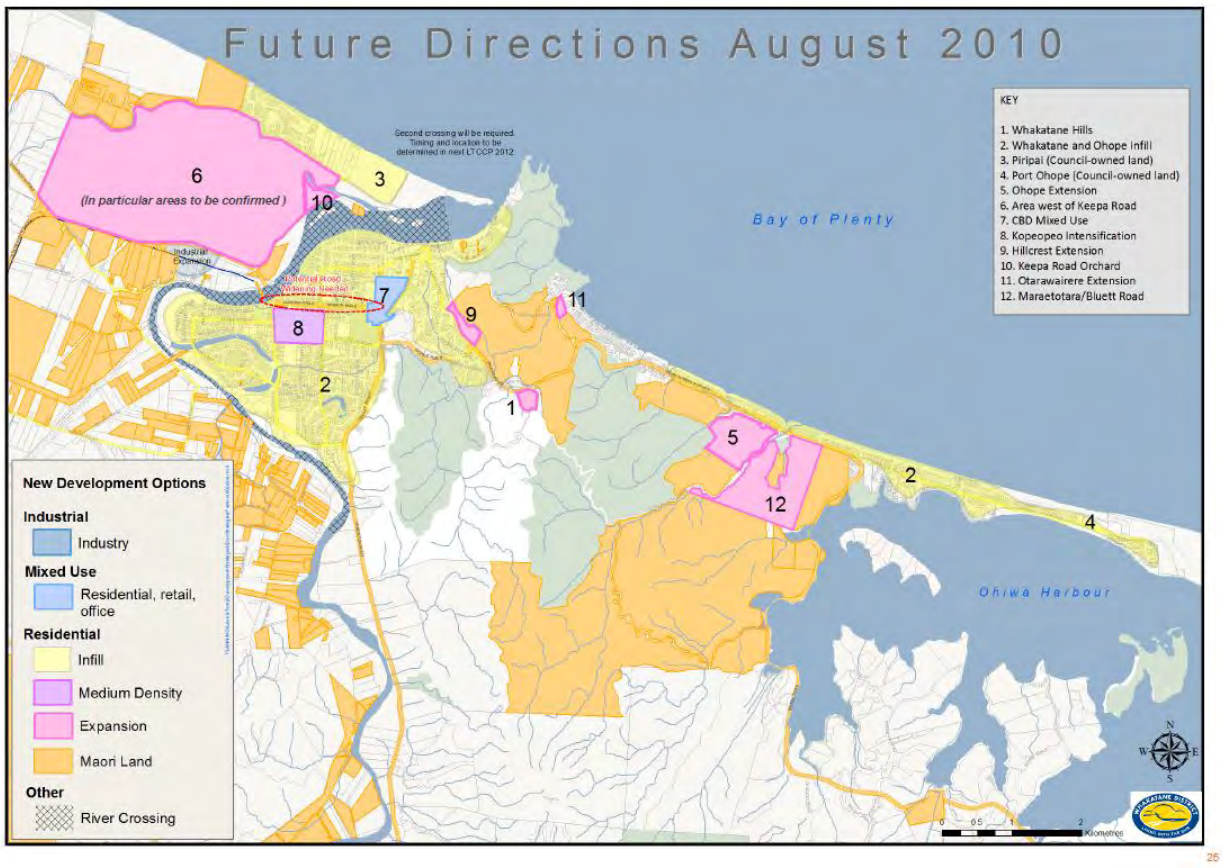


Figure 1: Future Directions Growth Areas

Area 6 (Area west of Keepa Road) as identified as potential future residential expansion encompasses a large block of land which includes the site that is the subject of this current assessment.

The Strategy recognised that all options would have an effect on the Landing Road Bridge as stated in Section 7:

> *"A new State Highway river crossing will be required regardless of options. The Whakatane River bridge will require additional capacity by 2016*".

An assessment of the effects of each growth area option was included in the Strategy and the following transport issues where identified for the area west of Keepa Road:

- *Any growth west of the river will put further congestion on the bridge and routes into town;*
- *Increases the exposure to route security issues as there is only one bridge across the river to link town and the Town Centre to the westward growth; and*
- *Increased densities will increase the threshold to support public transport*.

2.2 Whakatane Township Network Investigation

A report prepared for WDC in 2007 "*Whakatane Township Network Investigation Report*" (Burnett and Olliver Ltd and Gabites Porter Consultants included modelling of the Whakatane transport was based on an earlier Residential Review (being the medium growth scenario). It is understood that this modelling was reasonably consistent with Council's preferred growth scenario of a population of 25,000.

The following extracts from the *Whakatane Integrated Urban Growth Strategy* summarise the key aspects of this study:

> *"Part of the 2007 study included the SH2 Alternative Routes Scoping Study which was jointly undertaken between the Whakatane District Council and New Zealand Transport Agency. This considered the State Highway network in relation to route efficiency and security. The outcome of this study was a proposal to consider replacing the Pekatahi Bridge closer to the urban area of Whakatane. It concluded that the most affordable option for a second bridge was a location on the southern outskirts of the Whakatane urban area, crossing the river from Poroporo to Taneatua Road at a point where the river is at its most narrow.*
>
> *….However, a shift in the focus of the NZTA since the 2007 report means that the form, function and route security of the State Highway network through the district is being reviewed. This work will consider how the network contributes to the region and to the rest of the New Zealand economy, in particular, the connectivity between the ports of Tauranga and Gisborne*.

Previous transportation modelling done to assess the implications of urban growth show the following:

- *Residential growth in Coastlands has a minimal effect on traffic volumes and congestion compared to The Hub retail development.*
- *Traffic modelling shows that additional capacity on the existing bridge is required by 2016. Faster population growth would bring the need for this forward which means planning for this should be underway.*
- *Similarly, the bridge/Landing Road roundabout will need upgrading, probably sooner than 2026 if population growth is faster than medium growth projections*".

2.3 District Plan Review

Subsequent to the preparation of the *Integrated Urban Growth Strategy*, it is understood that Council have updated growth and land development forecasts and Council have advised that they have adopted a medium growth rate. The growth rate projections for the Whakatane Ward for the period 2011 to 2026 are now provided as Household Equivalent Units (HEU). The growth rate now being projected is 540 HEUs split over each five year period.

3. Existing Transportation Infrastructure

3.1 Location in the Road Network

The proposed development site occupies two adjacent blocks of land bounded by SH30 to the south, Huna Road to the west, Shaw Road to the east / southeast, and rural pastoral land to the north. The site is located approximately 2km west of the SH30 road bridge over the Whakatane River. Figure 2 shows the location of the site within the local road hierarchy, while Figure 3 shows the site in the context of its immediate surroundings.

3.1.1 SH30

SH30 is classified in the District Plan as a Primary (Regional) Arterial Road, providing the sole road crossing of the Whakatane River in the vicinity of the Whakatane township, and linking the town to the wider road network to the west, making it the link to the larger population centres of Rotorua and Tauranga and further afield to Hamilton and Auckland.

Adjacent to the site SH30 is a two lane rural road on flat terrain with a 100km/h speed restriction. The total sealed width is typically around 10.0m, and marked with two 3.5m wide traffic lanes and 1.5m wide shoulders. Photograph 1 below shows the form of SH30 adjacent to the site.

Photograph 1: Facing east toward Whakatane on SH30 with the site on the left

3.1.2 Huna Road

Huna Road is a rural road classified in the District Plan as a local road, with the primary purpose of providing access to adjacent properties. Adjacent to the site Huna Road is in level to gently rolling terrain and has a 100km/h speed restriction. The total sealed width is typically around 7.2m, and marked with a centreline only.

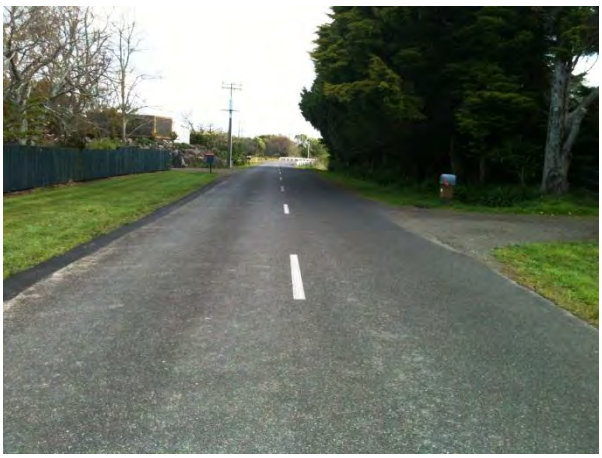
Photograph 2: Facing south on Huna Road toward SH30 with the site on the left

At the south-western corner of the site, is the intersection of Huna Road and SH30 as shown in Photograph 2 above.

3.1.3 Shaw Road

Shaw Road is also classified as a local road. Shaw Road intersects SH30 at right angles along the southern boundary of the site then immediately undergoes a sharp bend to the right, to run in an east west direction almost parallel to SH30, with the Kope Canal located between Shaw Road and SH30, as shown on Figure 2 (the section of Shaw Road parallel to the canal is also known as Kope Canal Road). The road continues in this direction for a length of 230m before undergoing another sharp bend, this time to the left. Beyond this sharp bend Shaw Road runs along the eastern boundary of the site parallel to Huna Road for a length of 790m before the road ends, effectively making it a rural cul-de-sac for property access only.

Photograph 3: Facing east on Kope Canal section of Shaw Road with the site on the left



Photograph 4 Facing south on Shaw Road with the site on the right

The section of Shaw Road parallel to the canal shown in Photograph 3 is typically 6.0 to 6.2m wide and marked with a centreline only. The road is elevated above the surrounding land by approximately 2.0m effectively running along the top of a stop-bank for the canal, with sloping embankments adjacent to both sides of the road.

The section of Shaw Road adjacent to the eastern boundary of the site is at the grade of the surrounding land as is shown in Photograph 4 above. This section of Shaw Road has a seal width typically between 6.5 and 6.8m wide.

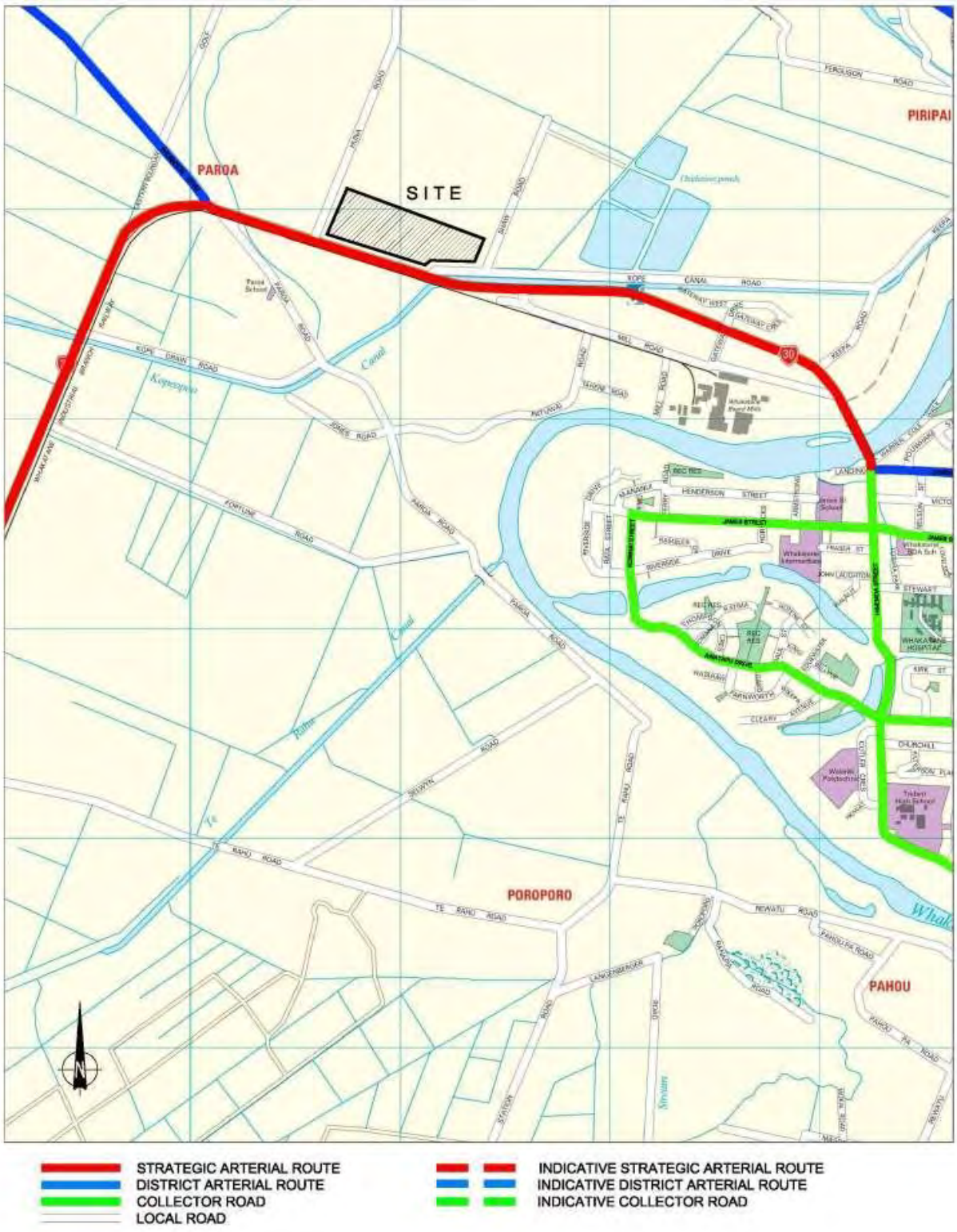


Figure 2: Site Location in the Road Network

Figure 3: Aerial Photograph of Site and Surrounds

4. Travel Patterns

4.1 SH30

Traffic volumes on SH30 are relatively high for a two lane rural facility. NZTA's latest reported ADT for SH30 recorded approximately 1.5km east of the site, 315 to the west of Keepa Road is 14,489vpd. This ADT was recorded in 2011, and is approximately 900vpd lower than the peak recorded at this site of 15,401 in 2008.

The latest available week of count data from this site was recorded in June 2012. The peak hour data from the June 2012 count is summarised in the table below:

DIRECTION	7- DAY AVERAGE DAILY TRAFFIC (vpd)	WEEKDAY AVERAGE DAILY TRAFFIC (vpd)	WEEKDAY AM PEAK HOUR (vph)	WEEKDAY PM PEAK HOUR (vph)
Westbound	6,814	7,330	572	764
Eastbound	6,802	7,302	811	789
Two-Way	**13,616**	**14,631**	**1,383**	**1,553**

Table 1: SH30 Count Site Traffic Flow Data from June 2012

The data in Table 1 indicates that the ADT on SH30 has continued the reducing trend shown between 2008 and 2011 into 2012.

It is noted that a count was undertaken on SH30 during Easter weekend in 2012, and that on the Thursday the PM peak hour traffic volume peaked at 2,140vph. While this illustrates that traffic volumes do at times reach volumes significantly higher than the typical weekly peaks, these volumes have not been specifically considered in the effects assessment.

Peak hour turning movement surveys were undertaken at the intersection of Shaw Road / SH30 on Wednesday the 12th of September and Huna Road SH30 on Thursday the 13th of September.

On reviewing the survey data there is a discrepancy between the recorded traffic volumes on SH30 between the two survey days. The data recorded during the Huna Road survey is consistent with our expectation of what the peak hour flows would be, being approximately 10% lower than those recorded at the NZTA count site, closer to Whakatane and the Hub retail centre.

On that basis the traffic volumes recorded on SH30 during the Huna Road turning movement survey have been adopted as the SH30 peak hour volumes in this assessment. These volumes are shown in Table 2 below.

DIRECTION	WEEKDAY AM PEAK HOUR (vph)	WEEKDAY PM PEAK HOUR (vph)
Westbound	551	774
Eastbound	710	636
Two-Way	**1,261**	**1,410**

Table 2: SH30 Peak Hour Traffic Flows in Vicinity of the Site

4.2 Future Traffic Forecasts for SH30

The most recent traffic forecasts for SH30 to the west of the Landing Road bridge have been adopted from the draft report currently under preparation for WDC and NZTA – the "Whakatane Access and Security Scoping Study". This study includes traffic growth forecasts for the "medium growth scenario" and these forecasts which are based on the Whakatane Regional Transport Model are tabled below in Table 3.

YEAR	HOUSEHOLDS	ADT (vpd)
2006	6,546	16,142
2016	7,590	18,850
2026	8,839	21,266
2036	9,965	22,679

Table 3: ADT Flow Data from WRTM: SH30 East of Keepa Road

Based on the growth forecasts in Table 3, the equivalent annual compounding growth rate is 1.14%.

4.2.1 Local Roads

Traffic Counters were installed on Huna Road and Shaw Road for the week ending 21 September 2012 .and the following table summarises the daily and peak hour volumes record

ROAD	ADT (vpd)	WEEKDAY PEAK HOUR (vph)
Huna Road	269	39
Shaw Roadd	154	24

Table 4: Local Road ADT and Peak Hour Traffic Volumes

5. Road Safety

A search has been undertaken of the NZTA Crash Analysis System to identify all recorded crashes in the vicinity of the site. The search covered SH30, from a point 250m west of Huna Road to a point 250m east of Shaw Road, plus Huna Road and Shaw Road along the site frontages. The search covered the years 2007 to 2011 inclusive, and also includes data available for 2012. Three crashes were recorded which matched these parameters, all of which were on SH30.

One crash occurred approximately 150m west of Huna Road when a westbound car driver lost control in heavy rain and collided with an oncoming vehicle, resulting in minor injuries.

One non-injury crash occurred approximately 400m east of Huna Road when an eastbound car driver was distracted by a cigarette and lost control, leaving the carriageway.

One non-injury crash occurred approximately 80m east of Shaw Road when a westbound van driver lost control and collided with the guardrail.

No trend is evident in terms of crash type or location which would suggest a safety issue with the existing road layout.

6. Proposed Development

It is proposed to develop the full site as a 200 lot residential subdivision. Figure 3 shows that this is expected to occur in two stages, with the first block to be developed being the eastern block.

However the full development will be critical in terms of assessing traffic effects and will also dictate the location and number of access points onto the exiting road network. On this basis the subdivision has been considered as a whole, with an assessment of the full 200 lots. The potential staged approach to the development has also been considered based on a first stage of approximately 100 lots located on the eastern side of the site.

Currently the site is occupied by three residential dwellings, a berry fruit orchard, an olive grove and general pastoral farmland. The berry fruit orchard has a 60 space car park and is expected to generate reasonable volumes of traffic at times of peak operation. However peak traffic activity is unlikely to occur during the AM and PM commuter peak periods when a residential subdivision generates its peak traffic. For the purposes of this assessment the traffic generated by these existing activities on the site has not been specifically assessed which is therefore results in a conservative approach to the effects analysis.

7. Traffic Generation

The expected traffic generation rates for the proposed activities have been identified from the Trips Database Bureau report, November 2011.

The report identifies an 85th percentile daily traffic generation of residential dwellings at 10.4 trips per day.

Ten per cent of the daily figure has been adopted as the peak hour figure, giving 1.0 traffic movements per lot per hour. It is noted that areas on the edge of town tend to have lower rates due to combined trips and on that basis the selected trip rates are may be marginally conservative, i.e. high.

Time Period	Data Source	Trips per Dwelling	Total Trips
Daily	Trips Database Bureau 2011	10.4 vpd	2,080 vpd
Peak Hour	Trips Database Bureau 2011	1.0 vph	200 vph

Table 5: Trip Generation

Table 5 shows that the site is expected to generate up to 2,080 vehicle movements per day and up to 200 vehicle movements per hour in the morning and evening peak periods.

Given the nearest commercial centre is located approximately 1.5km from the site it is likely that pedestrian movements to and from the site will be low. However, the site is within easy cycling distance of the CBD and consideration to the provision of cyclists may be necessary in the detailed traffic assessment phase for the site.

7.1 Trip Distribution

It is expected that the vast majority of site generated traffic will travel to / from Whakatane to the east. For the purposes of this assessment it has been assumed that 90% of traffic will travel to / from the east and that 10% will travel to / from the west. Consistent with this expectation it follows that more traffic will access SH30 via Shaw Road to the east of the site, than by Huna Road to the west of the site. For the purposes of this assessment it has been assumed that 75% of traffic will access SH30 via Shaw Road and that 25% of traffic will access SH30 via Huna Road.

During the AM and PM peak hours the split between site entry and site exit movements has been based on the ITE[1] proportions of 75% outbound and 25% inbound in the morning, and 37% outbound and 63% inbound in the PM peak hour.

[1] Institute of Transportation Engineers Trip Generation 8th Edition

8. Site Access / Egress

The site has direct road frontage onto Huna Road, Shaw Road (Kope Canal section), Shaw Road, and SH30.

The Shaw Road and Huna Road intersections with SH30 are separated by 585m. It would be undesirable to construct an additional road intersection onto SH30 between them, unless one or both of the existing intersections was closed.

While options that include the construction of a new SH30 intersection and closure of both or one of the existing intersections could be developed, it unlikely that such an option would be cost effective and or offer significant benefits over the provision of access directly onto Huna Road and Shaw Road.

On this basis the primary focus of this assessment has been on identifying an access arrangement for the site that considers the provision of an access onto Huna Road, a further access onto Shaw Road, and an optional third access onto Shaw Road (Kope Canal section).

8.1 Huna Road

Huna Road is a rural road with a straight horizontal alignment and 100km/h speed limit. Operating speeds in the vicinity of the site frontage are expected to be 90-100km/h.

Three is a vertical crest curve in Huna Road immediately beyond the sites northern boundary that restricts sight lines to the north from the sites frontage onto Huna Road.

Photograph 5: Facing north on Huna Road toward with the site on the right

Photograph 5 above was taken from a location approximately 20m south of the access to the berry orchard on the right, and shows the crest curve in the distance that limits sight lines. The available sight line from the location of the existing berry orchard was measured to be 215m during the site visit. Lesser sight distances are expected from locations further to the north although the rate at which the sight distance reduces was not specifically measured.

Austroads Part 4A: Unsignalised and Signalised Intersections provides guidance on sight distance requirements at intersections.

The desirable Safe Intersection Sight Distance (SISD) for a 90km/h and 100km/h operating speeds respectively are 214m and 248m based on a two second reaction time and a 3 second observation period before braking.

The desirable sight distance standard is often not achieved on the rural road network in New Zealand, and lesser standards have been developed acknowledging this, known as Extended Design Domain (EDD) values. These are values outside the Normal Design Domain that through research and or operating experience have been found to provide a suitable solution in constrained situations.

The very low existing traffic volumes on Huna Road, and the simple form of the proposed new intersection as a Tee junction make it an appropriate location for consideration of EDD principles.

Adopting a 100km/h operating speed and the Austroads EDD parameters including a reaction time of 2.0 sec, and observation time of 2 sec, gives a SISD requirement of 197m.

On this basis it is assessed that 200m is an acceptable minimum sight distance to provide at a new access intersection onto Huna Road from the subdivision.

The locations where this minimum sight distance can be achieved will need to be quantified accurately during further design, but it is anticipated that this minimum sight distance will prevent the new intersection from being located more than 20-30m north of the existing berry orchard access.

Locating the new intersection in close proximity to SH30 is also undesirable, as it can result in interaction of vehicles slowing or accelerating for the respective intersections and queuing interaction. Vehicle volumes on Huna Road are very low and queuing by vehicles on Huna Road waiting to turn into the subdivision road will not be expected to exceed one or two vehicles.

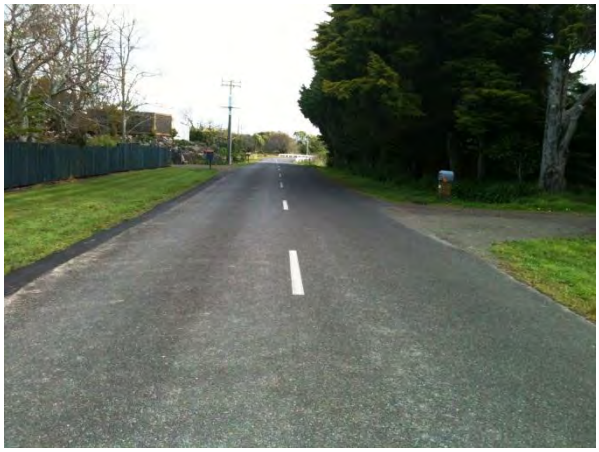
It is recommended that the intersection is restricted to being no closer to SH30 than 100m. At this location sight distance to north would nominally meet the Austroads desirable standard for a 100km/h operating speed, while still maintaining an acceptable separation from SH30, with no risk of queuing interaction between the new intersection and SH30.

There is an existing access on the western side of Huna located 110m from SH30. This access services one dwelling, and three further rural lots developed with pastoral land or crops. While it would be desirable to locate the new intersection away from this access it is not assessed as a necessary requirement, as the access is expected to generate very low traffic volumes.

8.2 Shaw Road

Shaw Road is also a rural road with a 100km/h speed limit. The section of Shaw Road parallel to Huna Road is 790m long and has an assessed operating speed of 80km/h. Vehicles negotiating the tight curve that separates Shaw Road from the Kopu Canal section have an assessed operating speed of 30km/h- 40km/h. The desirable Austroads SISD for a 40km/h operating speed is 73m. On this basis any new intersection constructed onto Shaw Road should not be located within 73m of the curve.

There is an existing site access onto Shaw Road at a distance of 115m from the apex of the tight curve. This access is shown in Photograph 6 below on the right hand side. The access serves one small lot with a single residential dwelling, and it is anticipated that this lot and its access will remain.



Photograph 6: Facing south on Shaw Road with the site on the right

Photograph 7 Facing north on Shaw Road with the site on the left

On this basis there is some scope to locate a new intersection between this access and a point 73 north of the curve. However the most desirable location for a new road intersection onto Shaw Road would be to the north of this access driveway to separate the intersection from two dwellings located adjacent to the eastern side of Shaw Road at distances 40m and 80m from the curve.

There is approximately 85m of site frontage to the north of the existing access driveway, and it is recommended that the new road intersection is constructed in this length.

8.3 Shaw Road (Kope Canal Section)

The section of Shaw Road running parallel to the canal is 220m long with a very tight horizontal curve at each end.

Based on an operating speed of 40km/h at both curves the desirable Austroads SISD requirement is 73m. It is therefore recommended that a new intersection onto the Kope Canal section of Shaw Road be restricted to the middle section at least 73m clear of the commencement of the curve in either direction. This leaves a centrally located length of approximately 74m over which a new road intersection can be located.

8.4 New Intersection Design Standards

For the purposes of assessing appropriate intersection design standards it has been assumed that three new intersections will be constructed. With the majority of traffic expected to be to / from Whakatane the distribution between the three intersections has been assumed to favour what will likely be the most convenient / shortest route for this movement. On this basis the following table summarises the indicative expected percentage and volume of subdivision traffic that will use each intersection.

The design of the subdivision layout will be able to be modified to influence these percentages, but the percentages shown are expected to be indicative of an internal layout that does not attempt to specifically influence the distributions.

INTERSECTION	PERCENTAGE OF TRAFFIC	DAILY VOLUME OF TRAFFIC	PEAK HOUR VOLUME OF TRAFFIC
Huna Road	25%	520	50
Shaw Road	25%	520	50
Shaw Road (Kope Canal)	50%	1,040	100

Table 6: New Intersection Turning Volumes

8.4.1 Huna Road

The turning movements at this intersection will be almost exclusively right turn movements from Huna Road and left turn movements onto Huna Road.

A Basic Right Turn (BAR) widening treatment as detailed at Figure 7.5 of *Austroads Part 4A Unsignalsied and Signalised Intersections* is recommend for the Huna Road intersection. This will facilitate the passing of vehicles that are slowing to pull into the subdivision, by following vehicles on Huna Road.

8.4.2 Shaw Road

The turning movements at both intersections on Shaw Road will be almost exclusively left turn movements from Shaw Road and right turn movements onto Huna Road.

A Basic Left Turn (BAL) widening treatment as detailed at Figure 8.2 of *Austroads Part 4A Unsignalsied and Signalised Intersections* is recommend for both Shaw Road intersections, with the widening on the Shaw Road (major road) approach to the intersection.

9. Assessment of Effects

9.1 Local Road Carriageway Widths

Daily traffic volumes on Huna Road between SH30 and the new subdivision access road will increase by 520 vpd, and on Shaw Road they will increase by 1,040 vpd up to the first subdivision access road intersection, and by 5,20 vpd up to the second intersection.

The resultant ADTs on the local roads will be:

- Huna Road 789vpd
- Shaw Road 1,194vpd

Table 3.3 Rural Roads, of Council's Engineering Code of Practice specifies minimum carriageway widths for rural roads. For local roads 6.0m is the specified seal width requirement.

On this basis both existing carriageways will continue to comply with Council's requirements for a rural local road.

However it is assessed that the section of Shaw Road that would carry an ADT of approximately 1,194vpd between SH30 and the first access intersection would warrant having its seal widened from the current 6.0-6.2m to a seal width of 7.0m (7.2m carriageway). This is the seal width requirement for a rural collector road, and the projected volumes are considered to be more consistent with this level of road status and carriageway width requirement.

Huna Road is already constructed to a 7.2m seal width and this is assessed as an appropriate width to accommodate the additional traffic.

Further, if the subdivision intends to provide an urban style frontage onto any of the existing roads with vehicle crossings providing individual lot access, then it will be necessary to apply the urban road design standards from the Engineering Code of Practice to the existing roads for the purpose of upgrading.

9.2 SH30 Intersections

The following four figures show the modelled flows adopted at the two intersections for the AM and PM peak hours. The flows represent a design year of 2022, with the base flows increased at a compounding rate of 1.14% over the surveyed 2012 flows. The full 200 lot subdivision flows have been added to the base flows in accordance with the traffic distribution described earlier.

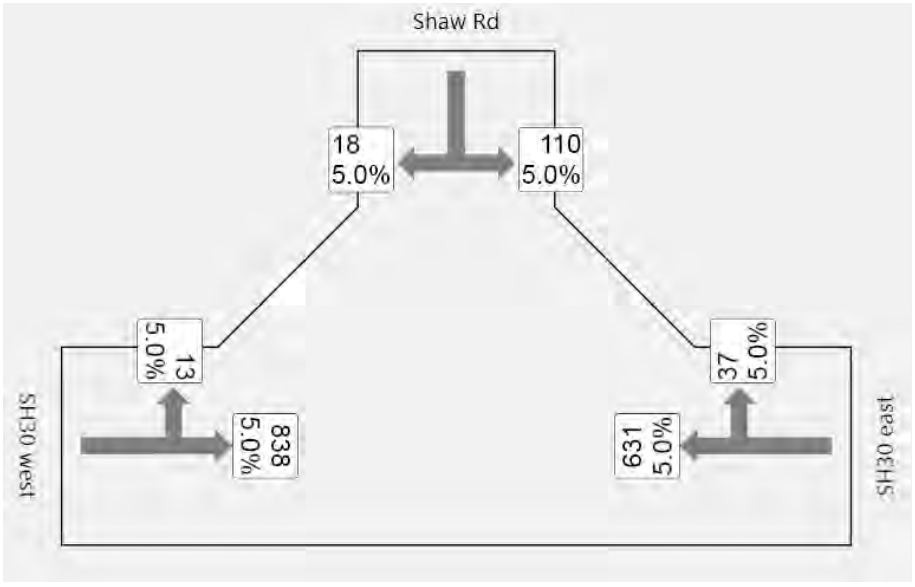


Figure 4: Shaw Road AM Peak Hour Modelled Flows

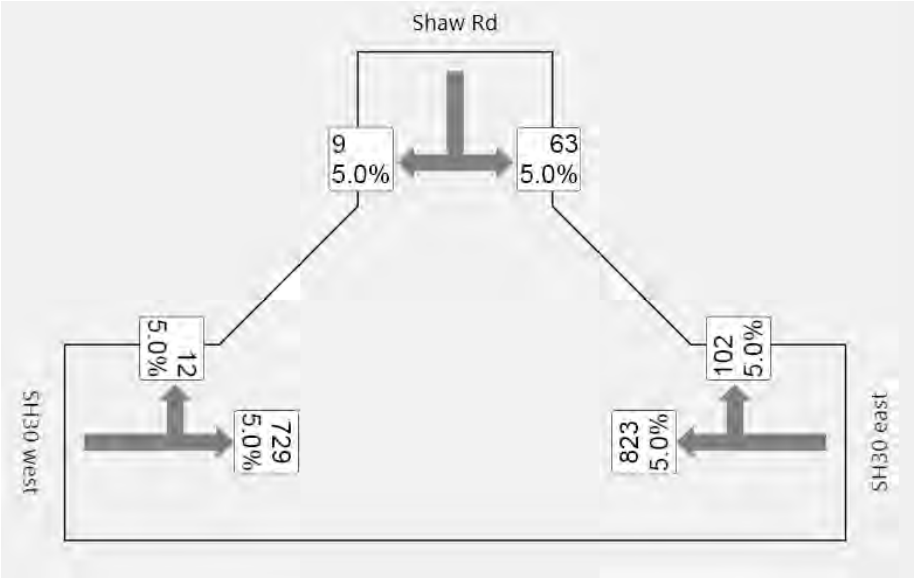


Figure 5: Shaw Road PM Peak Hour Modelled Flows

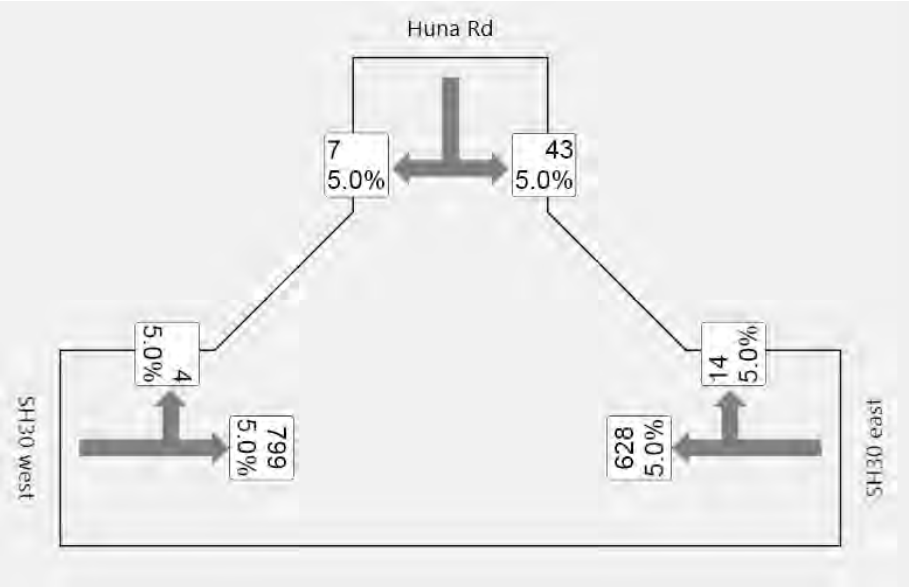


Figure 6: Huna Road AM Peak Hour Modelled Flows

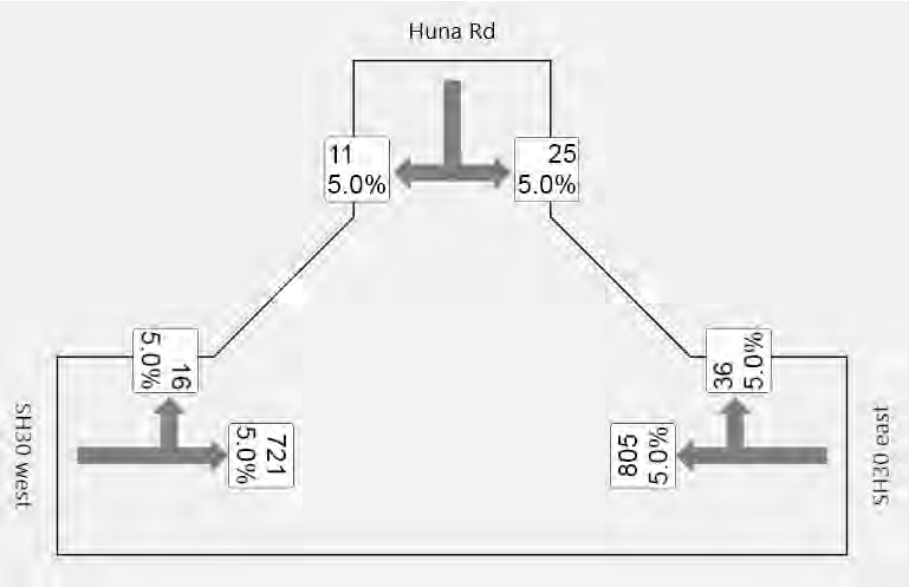


Figure 7: Huna Road PM Peak Hour Modelled Flows

The following tables summarise the results of the intersection modelling.

MOVEMENT SUMMARY

Site: SH30 - Shaw Rd 2022 AM

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: SH30 east											
5	T	664	5.0	0.352	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R	39	5.0	0.095	16.3	LOS C	0.3	2.3	0.74	0.92	41.5
Approach		703	5.0	0.352	0.9	NA	0.3	2.3	0.04	0.05	58.6
North: Shaw Rd											
7	L	116	5.0	0.382	24.6	LOS C	1.5	10.7	0.83	1.06	37.0
9	R	19	5.0	0.188	46.0	LOS E	0.5	3.9	0.92	1.01	27.0
Approach		135	5.0	0.382	27.6	LOS D	1.5	10.7	0.84	1.06	35.2
West: SH30 west											
10	L	14	5.0	0.475	8.4	LOS A	0.0	0.0	0.00	1.09	49.0
11	T	882	5.0	0.475	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		896	5.0	0.475	0.1	NA	0.0	0.0	0.00	0.02	59.8
All Vehicles		1734	5.0	0.475	2.6	NA	1.5	10.7	0.08	0.11	56.3

Table 7: Shaw Road AM Peak Model Summary

MOVEMENT SUMMARY

Site: SH30 - Shaw Rd 2022 PM

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: SH30 east											
5	T	866	5.0	0.459	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R	107	5.0	0.208	14.7	LOS B	0.8	5.6	0.69	0.91	42.8
Approach		974	5.0	0.459	1.6	NA	0.8	5.6	0.08	0.10	57.5
North: Shaw Rd											
7	L	66	5.0	0.169	18.7	LOS C	0.6	4.1	0.71	1.00	40.9
9	R	9	5.0	0.128	55.7	LOS F	0.3	2.5	0.94	1.00	24.1
Approach		76	5.0	0.169	23.4	LOS C	0.6	4.1	0.74	1.00	37.6
West: SH30 west											
10	L	13	5.0	0.413	8.4	LOS A	0.0	0.0	0.00	1.09	49.0
11	T	767	5.0	0.413	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		780	5.0	0.413	0.1	NA	0.0	0.0	0.00	0.02	59.8
All Vehicles		1829	5.0	0.459	1.9	NA	0.8	5.6	0.07	0.10	57.2

Table 8: Shaw Road PM Peak Model Summary

MOVEMENT SUMMARY

Site: SH30 - Huna Rd 2022 AM

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: SH30 east											
5	T	661	5.0	0.350	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R	15	5.0	0.032	15.0	LOS B	0.1	0.8	0.69	0.88	42.6
Approach		676	5.0	0.350	0.3	NA	0.1	0.8	0.02	0.02	59.5
North: Huna Rd											
7	L	45	5.0	0.134	20.2	LOS C	0.4	3.1	0.75	1.00	39.8
9	R	7	5.0	0.082	39.2	LOS E	0.2	1.3	0.89	1.00	29.5
Approach		53	5.0	0.134	22.9	LOS C	0.4	3.1	0.77	1.00	38.0
West: SH30 west											
10	L	4	5.0	0.448	8.4	LOS A	0.0	0.0	0.00	1.10	49.0
11	T	841	5.0	0.448	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		845	5.0	0.448	0.0	NA	0.0	0.0	0.00	0.01	59.9
All Vehicles		1574	5.0	0.448	0.9	NA	0.4	3.1	0.03	0.04	58.6

Table 9: Huna Road AM Peak Model Summary

MOVEMENT SUMMARY

Site: SH30 - Huna Rd 2022 PM

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: SH30 east											
5	T	847	5.0	0.449	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R	38	5.0	0.073	14.1	LOS B	0.3	1.8	0.65	0.89	43.4
Approach		885	5.0	0.449	0.6	NA	0.3	1.8	0.03	0.04	59.0
North: Huna Rd											
7	L	26	5.0	0.066	18.2	LOS C	0.2	1.5	0.68	1.00	41.3
9	R	12	5.0	0.159	48.9	LOS E	0.4	2.6	0.92	1.00	26.1
Approach		38	5.0	0.159	27.6	LOS D	0.4	2.6	0.76	1.00	35.1
West: SH30 west											
10	L	17	5.0	0.411	8.4	LOS A	0.0	0.0	0.00	1.09	49.0
11	T	759	5.0	0.411	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		776	5.0	0.411	0.2	NA	0.0	0.0	0.00	0.02	59.7
All Vehicles		1699	5.0	0.449	1.0	NA	0.4	2.6	0.03	0.05	58.4

Table 10: Huna Road PM Peak Model Summary

The modelling shows that all movements operate with a good level of service at both intersections during both peaks, with the exception of the right turn exit movement from both local roads onto SH30.

This (right turn out) movement is operating with delays that range between 39 seconds at Huna Road during the AM peak to 56 seconds at Shaw Road during the PM peak. However at both intersections the movement has very low volumes, and consequently queuing and intersection capacity are not problematic. At Shaw Road during the PM peak (the worst performing scenario) the 95th percentile queue is 0.3 vehicle lengths, and the movement volume to capacity ratio is 0.13.

Notwithstanding the low level of queuing and spare capacity, a 56 second delay is in the LOS F category and is less acceptable. While the capacity of the right turn movement is not a specific concern due to low volumes, such as is the case at the subject sites, the primary concern that remains as delay increases is that road safety will be adversely affected.

A further two scenarios have been modelled at the intersection of Shaw Road and SH30 for the 2022 design year, PM peak, being:

- without any subdivision traffic; and
- a 100 lot subdivision.

The results of this further modelling are summarised below.

MOVEMENT SUMMARY

Site: SH30 – No Subdivision Shaw Rd 2022 PM

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: SH30 east											
5	T	837	5.0	0.443	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R	18	5.0	0.033	13.6	LOS B	0.1	0.8	0.63	0.83	43.8
Approach		855	5.0	0.443	0.3	NA	0.1	0.8	0.01	0.02	59.5
North: Shaw Rd											
7	L	14	5.0	0.033	17.6	LOS C	0.1	0.8	0.66	0.98	41.7
9	R	3	5.0	0.032	43.7	LOS E	0.1	0.6	0.91	1.00	27.8
Approach		17	5.0	0.033	22.5	LOS C	0.1	0.8	0.71	0.98	38.1
West: SH30 west											
10	L	3	5.0	0.399	8.4	LOS A	0.0	0.0	0.00	1.10	49.0
11	T	749	5.0	0.399	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		753	5.0	0.399	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		1624	5.0	0.443	0.4	NA	0.1	0.8	0.01	0.02	59.4

Table 11: Shaw Road PM Peak –No Subdivision Model Summary

MOVEMENT SUMMARY

Site: SH30 - Shaw Rd 2022 PM with 100 lots

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: SH30 east											
5	T	852	5.0	0.451	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R	63	5.0	0.119	14.1	LOS B	0.4	3.1	0.66	0.89	43.3
Approach		915	5.0	0.451	1.0	NA	0.4	3.1	0.05	0.06	58.5
North: Shaw Rd											
7	L	40	5.0	0.099	18.2	LOS C	0.3	2.3	0.69	1.00	41.2
9	R	6	5.0	0.074	49.3	LOS E	0.2	1.5	0.92	1.00	25.9
Approach		46	5.0	0.099	22.4	LOS C	0.3	2.3	0.72	1.00	38.2
West: SH30 west											
10	L	8	5.0	0.406	8.4	LOS A	0.0	0.0	0.00	1.10	49.0
11	T	758	5.0	0.406	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		766	5.0	0.406	0.1	NA	0.0	0.0	0.00	0.01	59.9
All Vehicles		1727	5.0	0.451	1.2	NA	0.4	3.1	0.04	0.06	58.2

Table 12: Shaw Road PM Peak Hour 100 Lot Subdivision Model Summary

This modelling shows that under the base scenario with no subdivision, the right turn from Shaw Road is expected to be operating with a 44 second delay and LOS E by 2022. Therefore the proposed 200 lot subdivision results in a 12 second increase in the delay experienced by this movement as compared to the pre-existing base case.

Under the scenario with a 100 lot subdivision the right turn from Shaw Road is expected to be operating with a 49 second delay and LOS E by 2022. Therefore a staged 100 lot subdivision results in a 5 second increase in the delay experienced by the right turn out movement as compared to the pre-existing base case.

Based on the modelling done it is assessed that a 100 lot subdivision should be acceptable up to the design planning horizon of 2022, and that the 200 lot subdivision is marginally acceptable over the same time period.

However it must be acknowledged that the SH30 volumes are such that a right turn movement

from either Shaw Road or Huna Road onto the highway will be becoming difficult in the year 2022 regardless of whether this subdivision occurs or not. Further to this, if additional growth is to occur elsewhere or the underlying growth in traffic volumes exceeds the modelled value, then the intersections will come under additional pressure. It is further noted that any significant change to the assessed trip distribution, i.e. increase in traffic split to/from the west, would further increase the volume and delay for right turn out movements. Further sensitivity tests are necessary to understand the effects of such changes to the distribution pattern.

Ideally a strategy for the highway is needed that considers all expected growth in the area, and a Structure Plan for the development of the surrounding land.

Further work is required to determine the timing / trigger for the need to upgrade access from the subdivision site onto SH30. This upgrade to the access onto SH30 could involve the upgrade of one or both intersections, or alternatively the construction of a single new intersection to replace them both. Any need for an upgrade of the intersections would therefore result from increases to SH30 volumes as much as the proposed development itself.

In addition to determining the location of any upgraded access to the highway there are also options regarding the intersection form, with either a seagull type Tee intersection or a roundabout being viable alternatives.

Seagull intersections permit the right turn exit from a side road to be undertaken in two stages, with drivers required to give way to traffic from their right first, to reach a sheltered median, after which they utilise an acceleration lane before merging with the traffic from their left.

A Seagull type Tee intersection would provide no effective delay to the highway through traffic and would suit a situation such as exists at the subject intersections, where the right turn volumes are relatively low, but receiving a poor LOS due to limited gaps in the priority traffic stream.

A roundabout is a more significant investment and more substantial intersection form. A roundabout is typically suited to situations where the intersecting roads have more evenly matched volumes of traffic and importance in a roading hierarchy. At a roundabout all traffic is delayed to some degree due to the geometry and low volume roads typically operate with a high LOS. Roundabouts are widely acknowledged to be the safest form of at-grade road intersection.

9.3 Wider Network Effects

9.3.1 Current Flow Observations

Whakatane District Council have advised that morning, evening and holiday peak times traffic queues are intermittently extending back well in advance of the Landing Road bridge and in the morning peak, traffic coming into town can be queued for up to 2km west of the Landing Road roundabout (i.e. beyond the bridge and two existing roundabouts on SH30). In the evening peak, queues have been observed for a similar distance, from the Landing Road bridge, back down the entire length of Landing Road and Domain Road, and back down McAlister Street.

9.3.2 Previous Studies

It is stated in the *Whakatane Integrated Urban Growth Strategy* (2010) that previous modelling has shown that *"A new State Highway river crossing will be required regardless of options. The Whakatane River bridge will require additional capacity by 2016*".

Furthermore, the draft "*Whakatane Access and Security Scoping Study*" concluded that:

"*Forecast growth rates from both historic trends and the WRTM model show modest increases in traffic in the future, and so significant widespread congestion is not likely to occur based on the evidence presented to date. The exception to this is the Landing Road/Domain Road roundabout where the existing queues may start to effect capacity at adjoining intersections and could produce some wider delays if not addressed*".

9.3.3 Effects of Huna Road / Shaw Road Development

The residential growth demand for the district has been forecast by WDC and the "medium growth" scenario has been previously modelled using the Regional Model (WRTM). The addition of 200 lots as proposed by this development will fulfil some of that already anticipated future growth.

On this basis, it is considered the wider network effects of this development have already been assessed as part of the WRTM modelling to date which have identified that upgrades will be required in the future at the Landing Road Bridge and the Bridge/Landing Road roundabout.

The timing of those required upgrades may be brought forward by the proposed development if the development progresses faster than has been previously modelled for residential development as a whole on the west side of the river. To understand the effect of the development on the timing of the upgrades will require further assessment of the WRTM modelled assumptions with respect to the location and growth expectations.

Notwithstanding the growth already anticipated within the district, the proposed development when complete will potentially add an additional 200 veh/h to the state highway network in the peak hour periods. Not all of this traffic will use the Landing Road Bridge as "The Hub" retail area will attract some of the trips and reduce the need to travel further with others travelling to/from the west. Conservatively based on 80% of the traffic crossing the bridge, and based on the distribution described in this report. The morning peak increase in eastbound movements at the bridge is 120 veh/h. This additional generation compares with the existing eastbound flow of 811 veh/h (June 2012 morning peak). While this increase in flow can be expected to increase the queuing and delay at the Landing Road roundabout, the flow is within the expected capacity of the two way bridge itself. Again the timing of any bridge upgrade will be sensitive to the future growth rates.

Any increase in queuing or level of service reduction will likely result in peak spreading or a natural adjustment of the trip distribution times as a result of the poor level of service with the net effect being a lengthening of the peak flow periods over which the high flows occur.

It is noted that the peak hour flows have actually been decreasing over recent years, however it is recognised that there are still times of particularly heavy traffic flow such as Easter weekend and other holiday periods where the capacity of the existing SH30 network between Keepa Road and Landing Road is reached or exceeded.

9.4 NZTA Consultation

A draft of the Scoping Report was sent to NZTA for comment, and the following key issues summarise the feedback received from NZTA on 30 October 2012:

- A suggestion that Whakatane District Council and NZTA work together to develop a network master plan for the area (Urban Growth areas) that would identify traffic growth

and the impacts of that growth for the wider area, including appropriate mitigation and funding mechanisms;

- NZTA advised they may be able to support this current proposal once the network plan was complete and a clear investment strategy for the local network developed;
- Specific comments related to the Shaw/ Huna Road development:
  i) Retain current "t"- intersection layouts as neither seagulls nor a roundabout are supported due to safety concerns. A widened shoulder is preferred with costs to be met by the developer;
  ii) Internal link road between Huna and Shaw Roads is supported;
  iii) Query with respect to the provision for cyclists and pedestrian movements between the development and Whakatane or the Hub retail centre.

10. Conclusion

This Scoping Assessment has been prepared with the objective of identifying any significant transportation issues that require either further investigation or potential mitigation in order to manage the additional traffic associated with the development of a 200 lot residential subdivision on a 21ha block bounded by Huna Road, Shaw Road and SH30.

The proposed residential site is located within a larger area referred to as "*West of Keepa Road* " that has been identified by Whakatane District Council as a future residential expansion area in the *Whakatane Integrated Urban Growth Strategy.* However no structure plan or analysis of the growth west of Keepa Road has been undertaken at this stage and therefore this current proposal has been assessed in isolation of the necessary development of Council's long term growth plans for the area.

In the absence of a Structure Plan for the site, this report has assessed and recommended feasible access location options for the site based on the current road environment. Locations have been identified for both Huna Road and Shaw Road access which shows that access is feasible from the side roads, although the District Plan requirements for intersections would assist to cover the specific requirements for design.

The effects of the development on the adjacent road network have been assessed and the following issues have been identified as either requiring further investigation and/or mitigated in order for the transportation effects of the development to be adequately managed:

- Shaw Road to be upgraded between SH30 and the subdivision access to either rural collector standard (7.2m carriageway) or, alternatively, urban standard if the subdivision was to have direct property access to the local road. In either case a footpath and kerb and channel is desirable on the frontage of the subdivision. Similarly, Huna Road whilst already meeting a rural standard should be considered for an urbanised road frontage.
- Modelling of the SH30 intersection with Shaw Road based on forecast flows for 2022 indicates that right turn movements without the subdivision are operating with high delays due to the high volume of traffic on SH30. Further investigation is recommended to confirm the forecast flows and growth on SH30. The addition of 200 lots increases the volume of right turn movements and hence delays to a Level of Service F. The number of vehicles queued is small however the length of delay is of potential safety concern which will only grow as traffic on SH30 increases as expected in future years. If the subdivision was approved on the basis of insignificant traffic flows now or even as a staged approach (modelling has shown that a 100 lot stage could be managed in the current environment up to 2022), at some stage in the future an intersection upgrade would likely be necessary.

  Should an improved access be necessary to accommodate the existing and proposed flows, this can be located at either Shaw Road, Huna Road or somewhere between with a connection between Shaw and Huna Roads upstream of the intersection. Each has its own issues and merits with Shaw Road being closest to town and a combined intersection requiring re-routing of Shaw and Huna Road traffic through a residential subdivision. Whichever option is adopted should consider the implications of further growth west of Keepa Road as noted in the growth study.

  Several options have been considered for the form of intersection upgrade include either a seagull channelized layout or a roundabout. Additional investigation required to identify the preferred option. The seagull layout will likely be the most cost efficient to achieve while a roundabout is regarded as the safest option but will require a large inscribed diameter and therefore may require extensive widening and/or land requirements.

However, a major change to the intersection form would introduce potential delays to the highway traffic and the dis-benefits are likely to outweigh the benefits to a small volume of right turning traffic. NZTA have advised that they support retention of the current intersection layout with some minor shoulder widening.

Further work, including sensitivity testing, is required to determine the necessity for and timing of any proposed upgrade of the SH30 intersections with consideration to the likely programme for the site development and the overall strategy for the highway including all expected growth in the area.

- The effects on the wider arterial network between the subdivision and CBD have been previously recognised in previous investigations by Council. The residential growth demand for the district has been forecast by WDC and the "medium growth" scenario has been previously modelled using the Regional Model (WRTM). The addition of 200 lots as proposed by this development will fulfil some of that already anticipated future growth.

  On this basis, it is considered the wider network effects of this development have already been assessed as part of the WRTM modelling to date which have identified that upgrades will be required in the future at the Landing Road Bridge and the Bridge/Landing Road roundabout. This development may potentially accelerate the timing of these upgrades.

Traffic Design Group Ltd
October 2012