TRAFFIC PLANNING CONSULTANTS LTD

PROPOSED DEVELOPMENT

TE MATAORA CONCEPT

KAWAKAWA

TRAFFIC IMPACT ASSESSMENT

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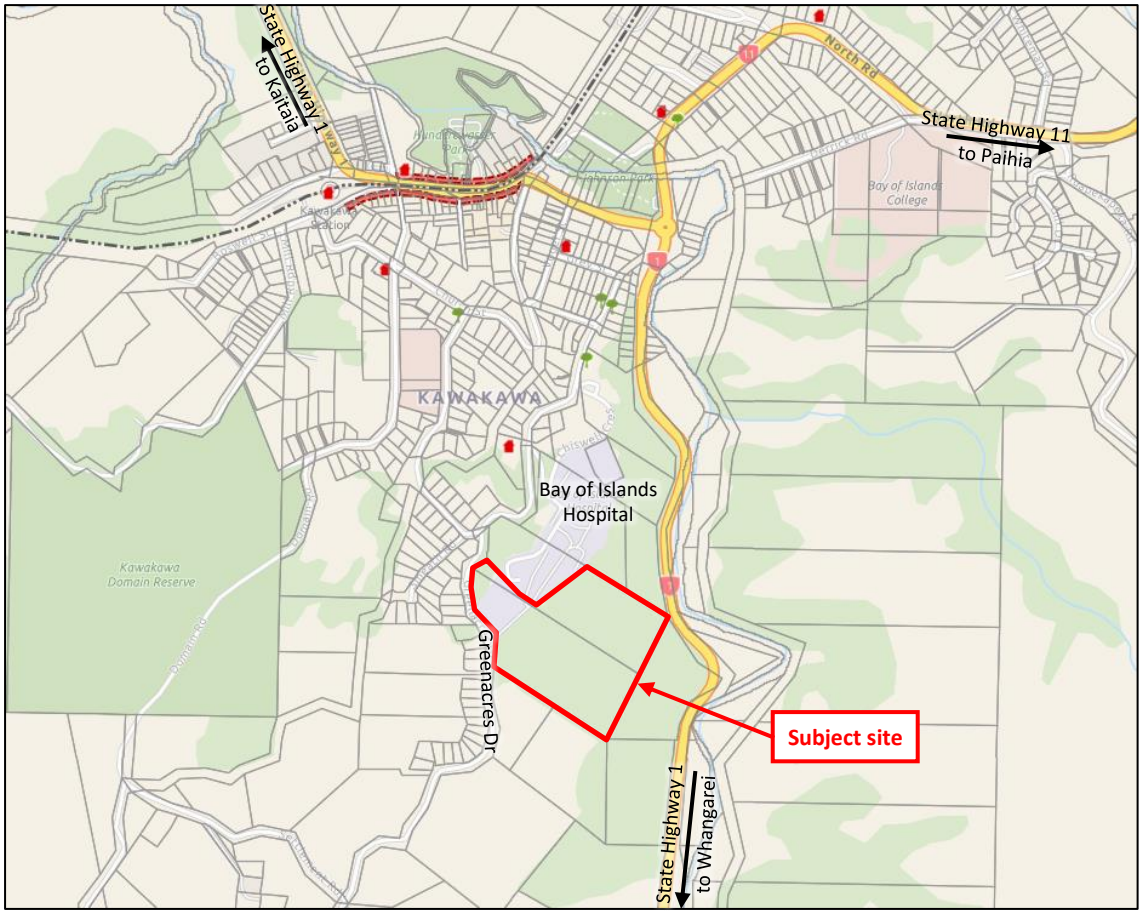
1. Turning Movements
2. SIDRA Intersection Analysis Results

1.0 INTRODUCTION

This report examines and describes the traffic engineering effects of a proposed subdivision providing 182 dwellings over three stages of the Te Mataora development in Kawakawa.

The report specifically describes the existing transport environment, proposed activity, District Plan provisions, the traffic effects of the proposal and an assessment against the relevant District Plan criteria.

The site is located to the east of Greenacres Drive and south of the Bay of Islands Hospital as shown in Figure 1.



Source: https://fndc.maps.arcgis.com/apps/webappviewer

Figure 1 – Site Location

The site is zoned Rural Production under the Far North District Council – Operative District Plan (FNDC-ODP). The site is zoned Hospital and Rural Residential under the Proposed District Plan.

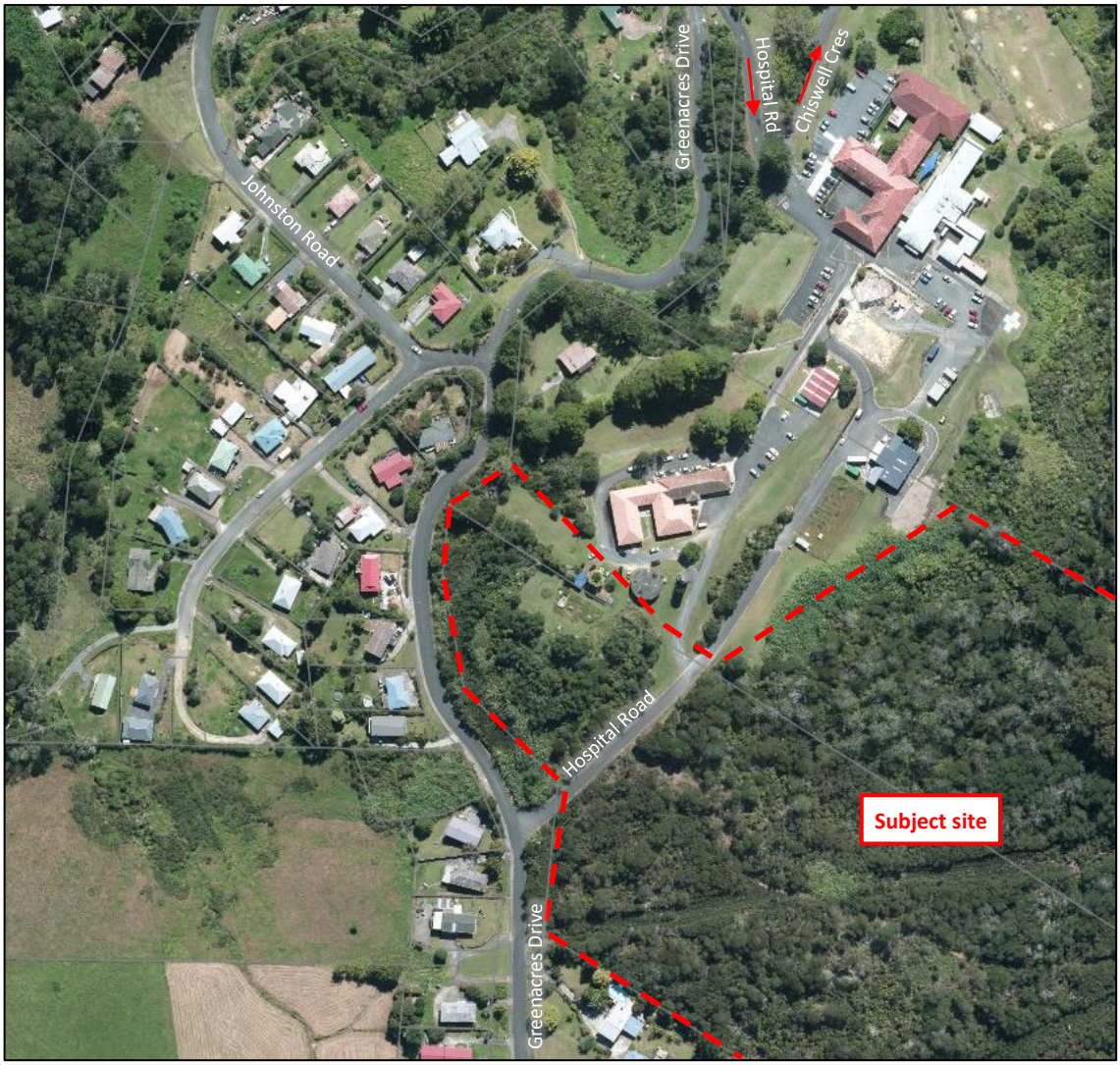
Vehicle access to the development is from Hospital Road, which in turn connects to Greenacres Drive.

By way of a summary of the detail contained within this report, it can be stated that the traffic planning effects of the proposed subdivision can be accommodated on the road network without compromise to its function, capacity or safety.

2.0 EXISTING TRANSPORT ENVIRONMENT

2.1 The Road Network

The site is located to the east of Greenacres Drive and south of the Bay of Islands Hospital. The typical traffic environment in the vicinity of the site is shown in Figure 2.



Source: https://fndc.maps.arcgis.com/apps/webappviewer

Figure 2 – Local Area Traffic Management

2.1.1 Hospital Road

Hospital Road provides access to and through the Hospital site on which the proposed development is located. In the vicinity of the site, it has a carriageway width of some 6.5 metres and caters for two-way traffic flow together with the ability to park on the road although observations indicate that on-street parking does not occur in this general location. The typical traffic environment on Hospital Road is shown in Figure 3.

Figure 3 – Hospital Road Traffic Environment

This portion of Hospital Road is private and has a speed limit of 50km/hr.

Traffic flows on this part of Hospital Road, in the vicinity of the site, would be less than 300 vehicles per day.

2.1.2 Greenacres Drive

Greenacres Drive runs along the western boundary of the Hospital and is part of a route that leads from State Highway 1 to the Bay of Islands Hospital via Vogel Street, Grey Street and McFarlane Street. It typically provides one traffic lane in each direction together with on-street car parking as shown in Figure 4.

Figure 4 – Greenacres Drive Traffic Environment

Greenacres Drive to the south of the main Hospital entry access has a One Network Road Classification (ONRC) of an Access, which primarily provide the function of access to adjacent properties. North of this, the route is identified as a Secondary Collector Road which has the dual function of providing access and moving traffic.

The speed limit on Greenacres Drive is 50km/hr.

Traffic flows on this route through Greenacres Drive vary along its length with daily traffic flows in the order of approximately:

- 300 vehicles per day at the southern intersection with Hospital Road,
- 1,000 vehicles per day between the main Hospital entry access and Grey Street,
- 1,200 vehicles per day along Vogel Street.

2.1.3 Johnston Road

Johnstone Road provides part of a route leading to the Hospital from the western side of the Kawakawa main street via Albert Stret and Church Street. It provides for two-way traffic flow together with on-street car parking over most of its length.

This route is classified in ONRC as a Low Volume roads and Access roads.

Traffic flows on this route through Johnston Road vary along its length with daily traffic flows in the order of approximately:

- 300 vehicles per day on Johnston Road,
- 700-800 vehicles per day between Johnston Road and SH 1.

2.2 Traffic Safety

Information from the New Zealand Transport Agency's "Crash Analysis System" for the five-year period, January 2017 to December 2021, indicates that 14 crashes have been reported along the two routes between the site and SH 1. The reported crashes are shown in Figure 5.

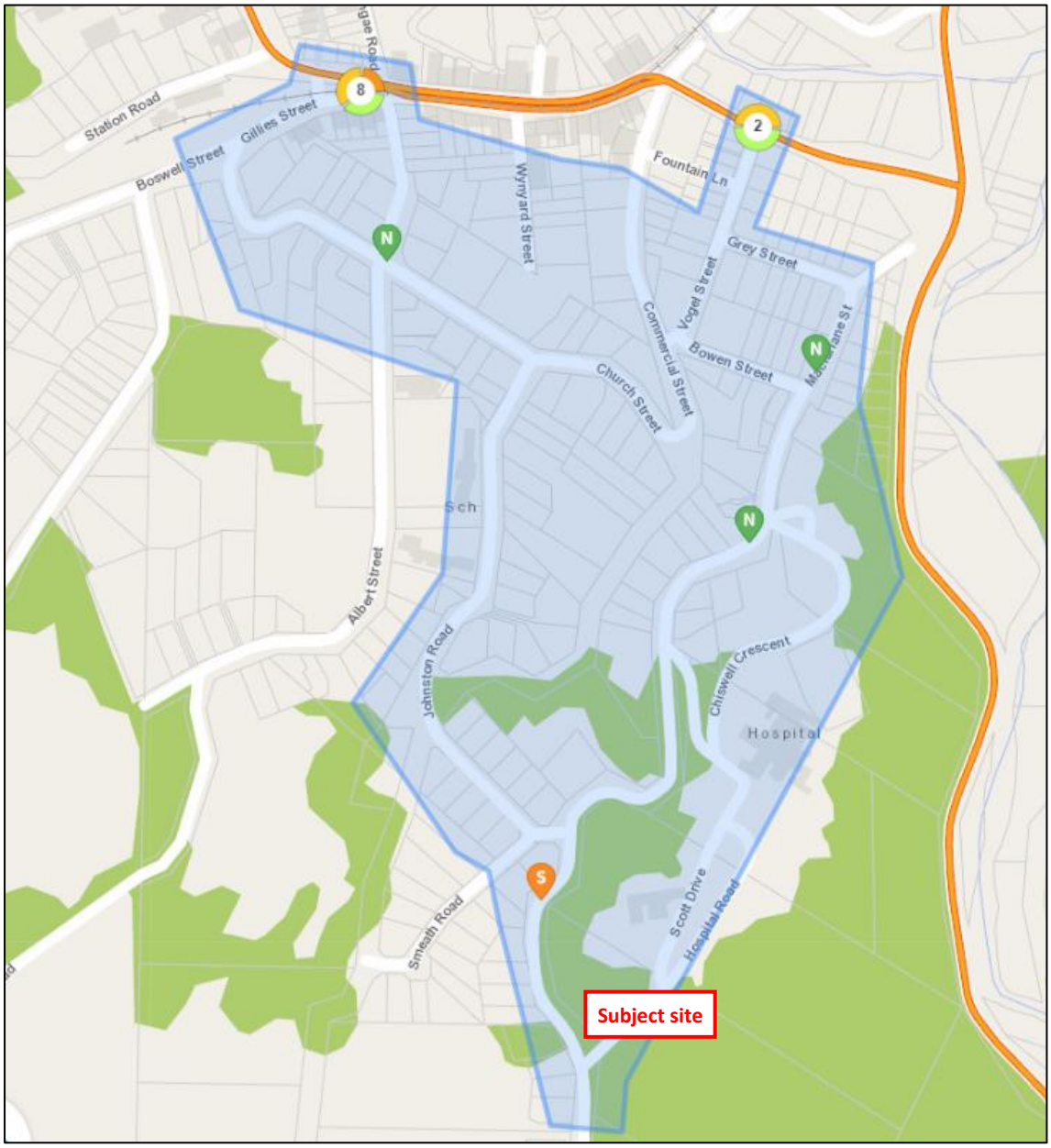


Figure 5 – Access Route Reported Crashes

The majority of the reported crashes occurred in the vicinity of the intersection of SH 1 and Albert Street. Figure 6 provides a closer look at this location.

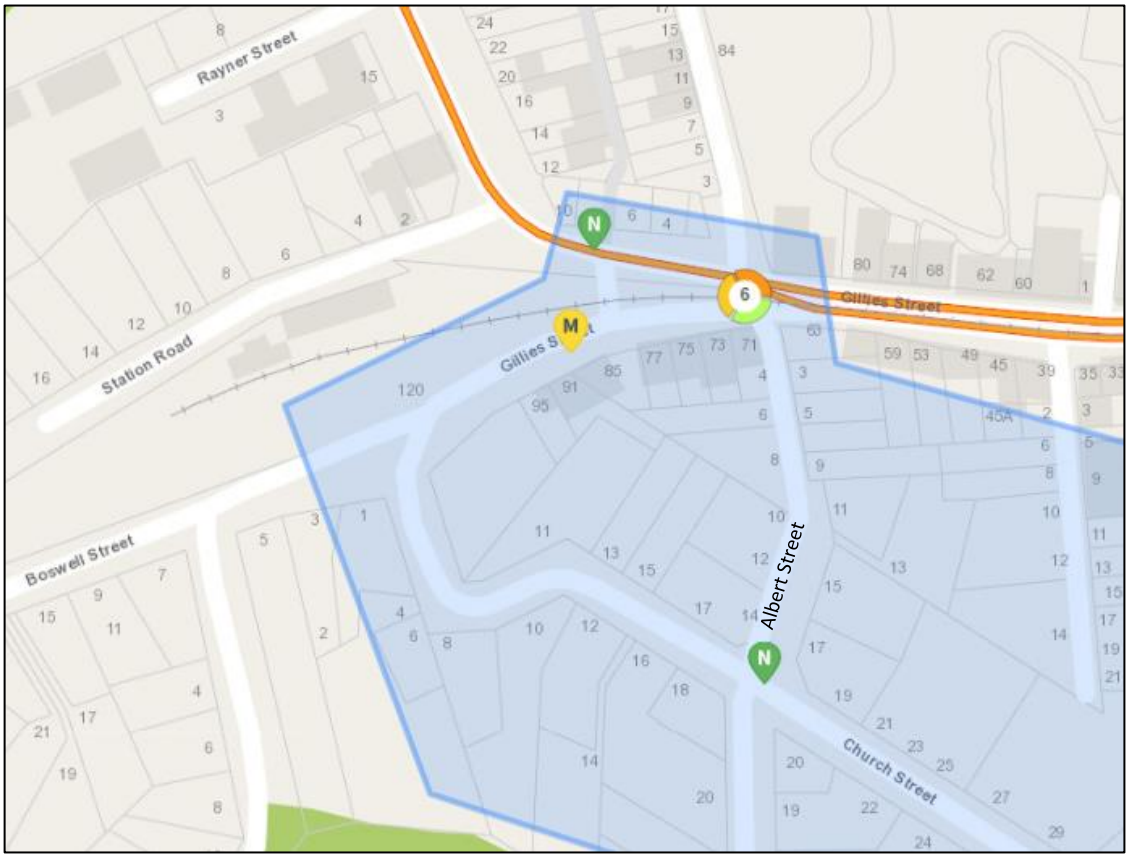


Figure 6 – Intersection SH 1 and Albert Street Reported Crashes

Of the six crashes located in the vicinity of the SH 1 and Albert Street intersection three involved motorcyclists hitting the railway track and losing control of their bikes, with one rider sliding into another vehicle. These crashes account for the injury crashes at the location, 1 serious and 2 minor. One further vehicle pulled out in front of a train and was hit.

Overall, the reported crash history would not suggest a traffic safety problem along these routes that would be exacerbated by the proposal.

2.3 Public Transport Accessibility

There is currently no public transport provision within the Kawakawa town area although there are inter-city connections to other regional and inter-regional destinations.

There is also a BusLink service provided on Tuesdays and Thursdays between Kaikohe and Waitangi, with a stop at Kawakawa.

2.4 Pedestrian Facilities

A footpath is provided along at least one side of Greenacres Drive in the vicinity of the Hospital.

2.5 Cycle Facilities

There are no dedicated cycle facilities provided in this location with cyclists sharing the road with other road users.

3.0 THE PROPOSAL

3.1 Description

The three stages of the Te Mataroa development involves the provision of 182 dwellings, including residential dwellings and aged care apartments, as shown in Figure 7.

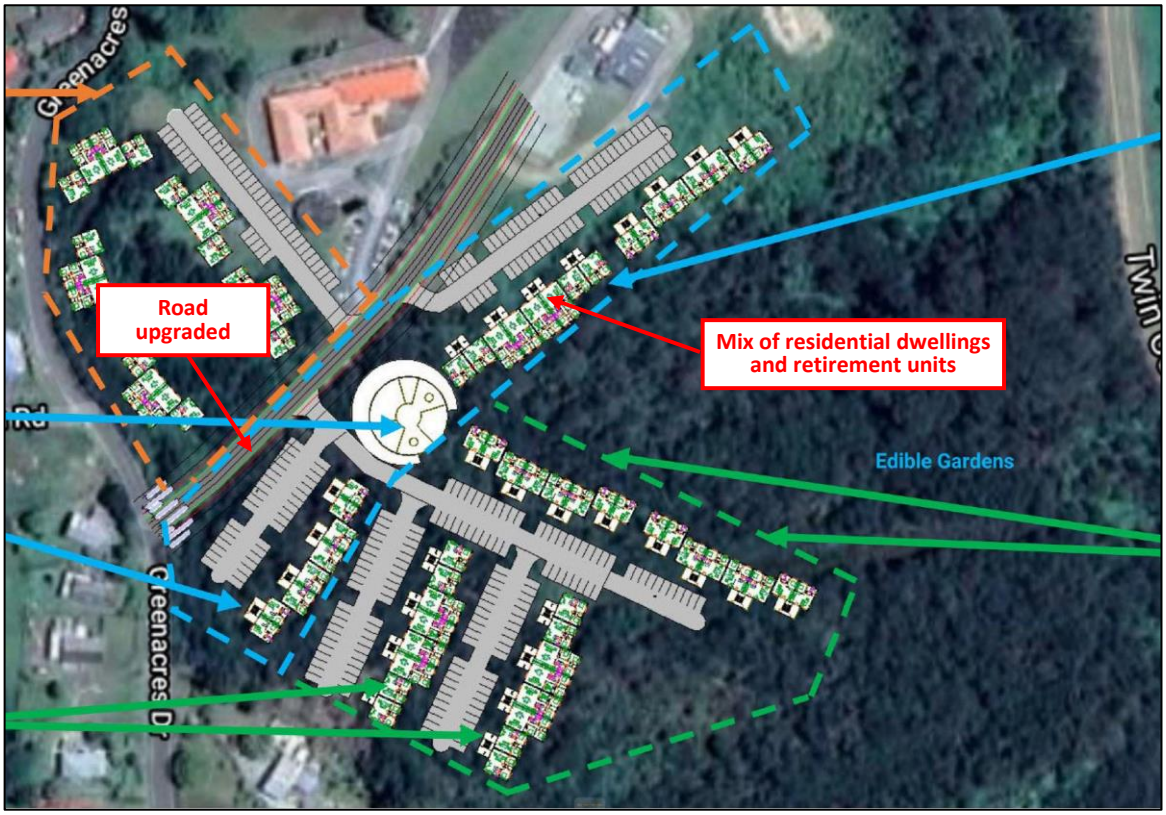


Figure 7 – Full Development Concept Plan

A breakdown of the type of units proposed is shown in Table 1.

Table 1 – Number of Units by Type

Stage	Unit Type	Number
1	Iwi Homes	20
2	Aged Care	48
	Apartments	18
	Wellness Centre	1,000m^2
3	Aged Care	48
	Apartments	48
TOTAL		**182**

The salient transportation features are summarized as follows:

- Three new internal roads from Hospital Road, with a further three roads off these roads.
- Footpaths provided throughout the development including connections to Greenacres Drive.
- A roading layout and design that encourages a low-speed environment through a combination of physical dimension, alignment and appropriate traffic calming.
- Pedestrian connectivity through the site to ensure the walkability of the development including identified crossing points.

3.2 Traffic Generation

In respect of traffic generation potential of the proposed subdivision, typical traffic generation rates have been sourced from:

- The New Zealand Trips and Parking Database (NZTPD); and
- New Zealand Transport Agency research report 453 "Trips and Parking Related to Land Use" released in November 2011 (NZTA 453).

The traffic generation rate of residential dwellings does vary depending on the type of unit and the location of the development. The NZTPD indicates typical daily traffic generation rates of 6 to 8 traffic movements per dwelling per day with corresponding peak hour traffic generation rates of about 0.8 traffic movements per dwelling per hour.

Retirement village units typically have a traffic generation of 2 to 4 traffic movements per unit per day with peak hour traffic generation of about 0.3 traffic movements per unit per hour.

In respect of directionality, typically in the morning peak hour 75% of the movements will be departures and 25% arrivals. In the evening peak hour, 65% will be arrivals and 35% departures.

Given the above, Table 2 indicates the potential traffic generation of the proposed development once fully completed.

Table 2 – Traffic Generation Potential

Activity	Daily Traffic	Peak Hour
Iwi Homes	120-160	16
Aged Care	192-384	29
Apartments	396-528	53
TOTAL	**708-1,072**	**98**

The traffic generation potential of the full development is in the range of 700 to 1,100 traffic movements per day with commuter peak hour traffic generation of about 100 traffic movements per hour.

3.3 Road Design Philosophy

3.3.1 Design Parameters

The objective is to create a low-speed, high residential amenity environment. In relation to road widths, the United Kingdom Department for Transport publication "Manual for Streets" indicates that street dimensions have a significant influence on vehicle speeds within the streets. This research also forms the basis of NZS 4404:2010 "Land Development and Subdivision Infrastructure".

The research indicates that keeping lengths of street between junctions and bends short is particularly effective when combined with street width. This is reflected in Figure 8 based on appropriate traffic calming measures being provided on longer lengths of road.

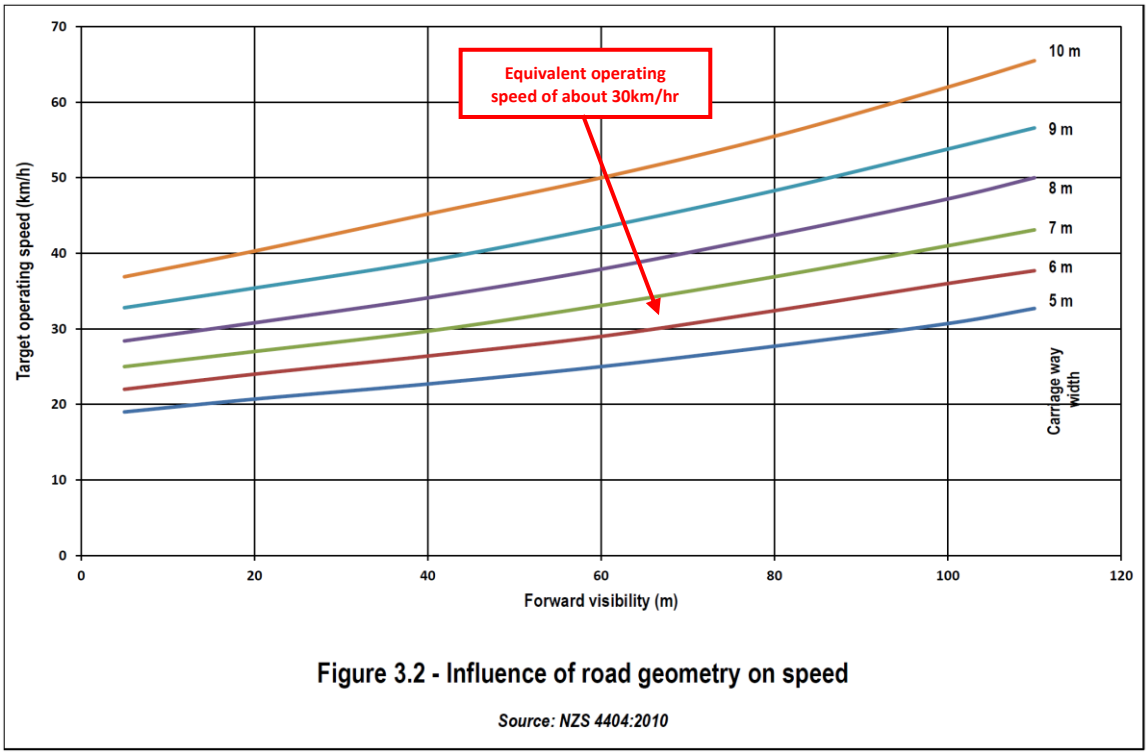


Figure 3.2 - Influence of road geometry on speed

Source: NZS 4404:2010

Figure 8 – Influence of Road Geometry on Speed

As a comparison, the cross-sectional requirements of New Zealand Standard 4404:2010 "Land Development and Subdivision Infrastructure" (NZS 4404) have also been considered. NZS 4404 indicates that the two fundamental roles of a road are to provide a space for interaction between people for a range of purposes (place context) and access to land uses so that movement between places can occur (link context). It describes a relationship between land use, area type and the transport context.

For the context of the proposed traffic environment in this location, Table 3 indicates the dimensional and traffic flow parameters indicated in NZS 4404:2010.

Table 3 – NZS 4404:2010 Road Design Standards

Local Attributes	Locality Served	Legal Road Width	Target Operating Speed	Parking	Carriageway Width	Typical Maximum Traffic Flows (vehicles per day)
Primary access to housing	1 to 200 dwelling units	15 metres	30	Parking separate and recessed	5.5m to 5.7m	Approx. 2,000vpd
Access to houses / townhouses	1 to 20 dwelling units	9 metres	20km/hr	In movement lane	5.5m to 5.7m	Up to 200 vpd
Primary access to housing	1 to 200 dwelling units	15 metres	30km/hr	In the movement lane or separate and recessed	5.5m to 5.7m	Up to 2,000 vpd

The proposed development will be designed in a manner consistent with the provisions of NZS 4404 and the over-arching objective of creating a low-speed, high residential amenity environment.

3.4 External Road Intersection

Vehicle access to the existing public road network will occur via the intersection of Hospital Road and Greenacres Drive.

3.4.1 Intersection Design

In relation to the appropriate intersection design, the AUSTROADS Guide to Traffic Management "Part 6: Intersections Interchanges and Crossings" provides some guidance into possible treatment type thresholds for different levels of traffic generation including when a right turn bay treatment may be warranted on the main road.

Figure 9 indicates the appropriate diagram from the AUSTROADS guide together with the potential combination of right turn traffic and traffic flows on Greenacres Drive.

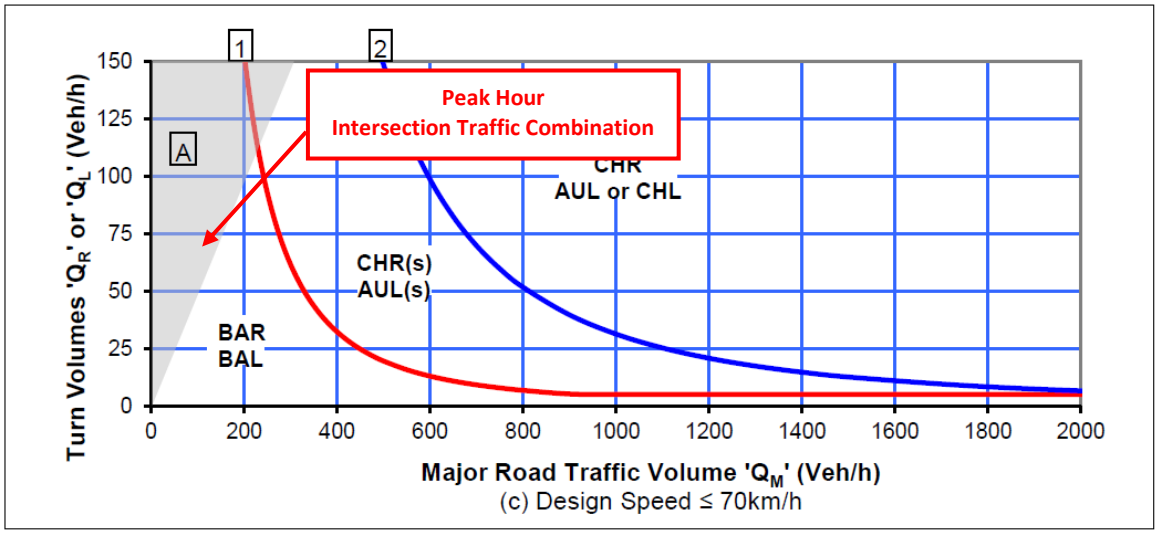


Figure 9 – AUSTROADS Turning Treatment Guide

From Figure 9, the intersection access would not meet the warrant for a treatment beyond a basic intersection arrangement.

3.4.2 Sight Distances

The operational safety at an intersection is influenced by the available sight distance, the speed of approaching traffic, and the ability of a vehicle to avoid a collision, either by stopping in time or by being able to take other evasive action.

Appropriate sight distance standards at an intersection are indicated in the AUSTROADS publication "Guide to Road Design" Part 4A "Unsignalised and Signalised Intersections". There are three key sight distance parameters indicated in the guide:

2. Safe Intersection Sight Distance (SISD) provides a sufficient distance for a driver of vehicle on the major road to observe a vehicle from a minor road approach moving into a collision situation and to decelerate to a stop before reaching the collision point. It is measured from driver eye height (1.1m) to the top of an approaching car (1.25m).

3. Minimum Gap Sight Distance (MGSD) provides a sufficient distance for a driver of a vehicle entering onto a major road to see a vehicle in the conflicting traffic stream in order to safely commence the desired manoeuvre. It is measured from driver eye height (1.1m) to the object height of approaching vehicle (0.65m).

The SISD criteria are shown in Figure 10.

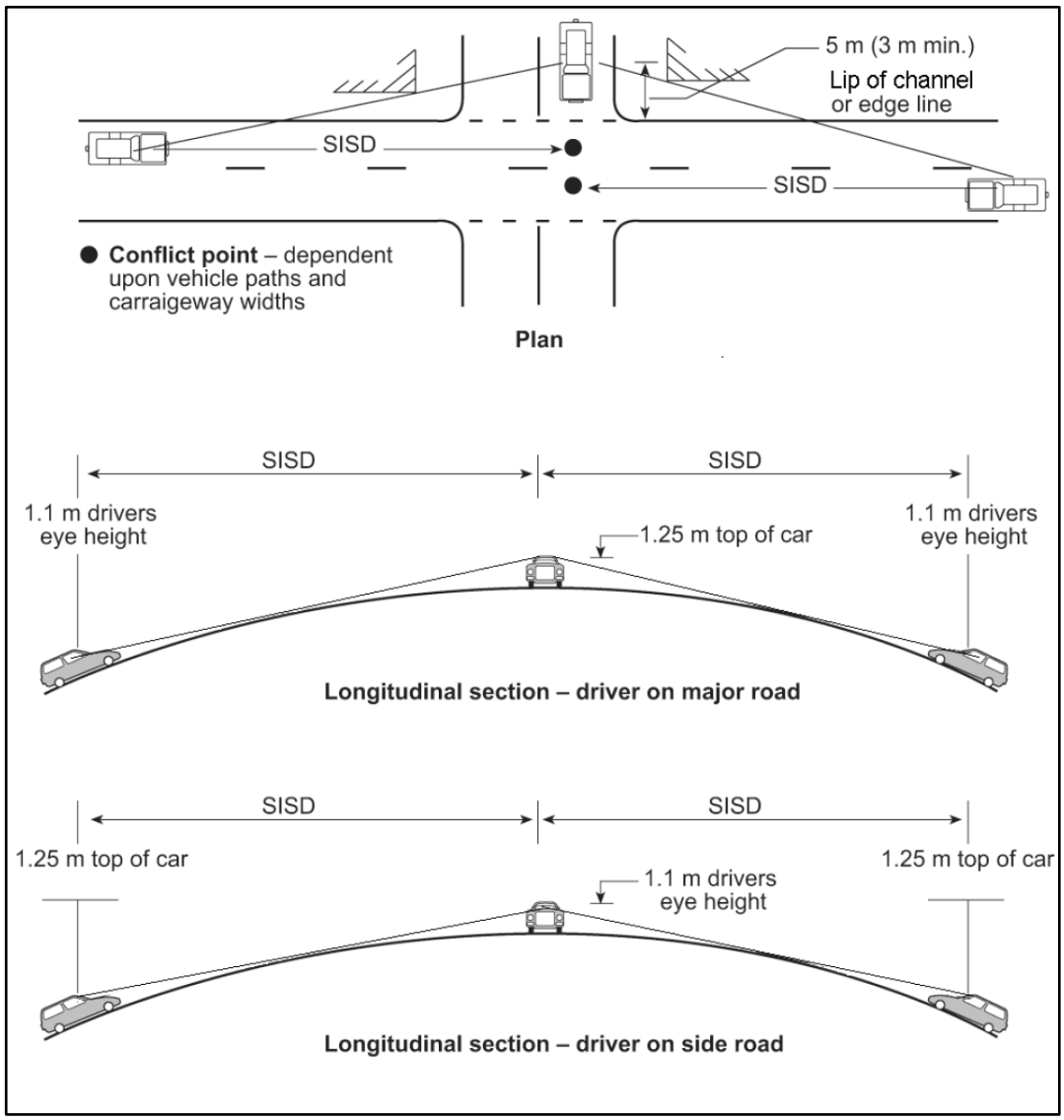


Figure 10 – Safe Intersection Sight Distance Measurement

An operating speed of 40 km/hr has been adopted for traffic approaching Hospital Road from both directions on Greenacres Drive due to the horizontal alignment of the road in this location.

Figure 11 indicates the sight distances available from the proposed loop road while Table 4 provides an assessment of the available sight distances against the AUSTROADS Guide.

To the north

To the south

Figure 11 – Intersection Sight Distances

Table 4 – Intersection Sight Distances

Safe Intersection Sight Distance			
Direction	**Speed**	**Recommended Sight Distance**	**Available Sight Distance**
To the north	40 km/hr	73 metres	85 metres
To the south	40 km/hr	73 metres	>150 metres
Minimum Gap Sight Distance			
Direction	**Speed**	**Recommended Sight Distance**	**Available Sight Distance**
To the north	40 km/hr	55 metres	85 metres
To the south	40 km/hr	55 metres	>150 metres

The sight distance analysis indicates that the sight distances available from the intersection exceeds that recommended in both directions.

3.5 Internal Access Points

There will be three internal access points proposed for the development as shown in Figure 12.

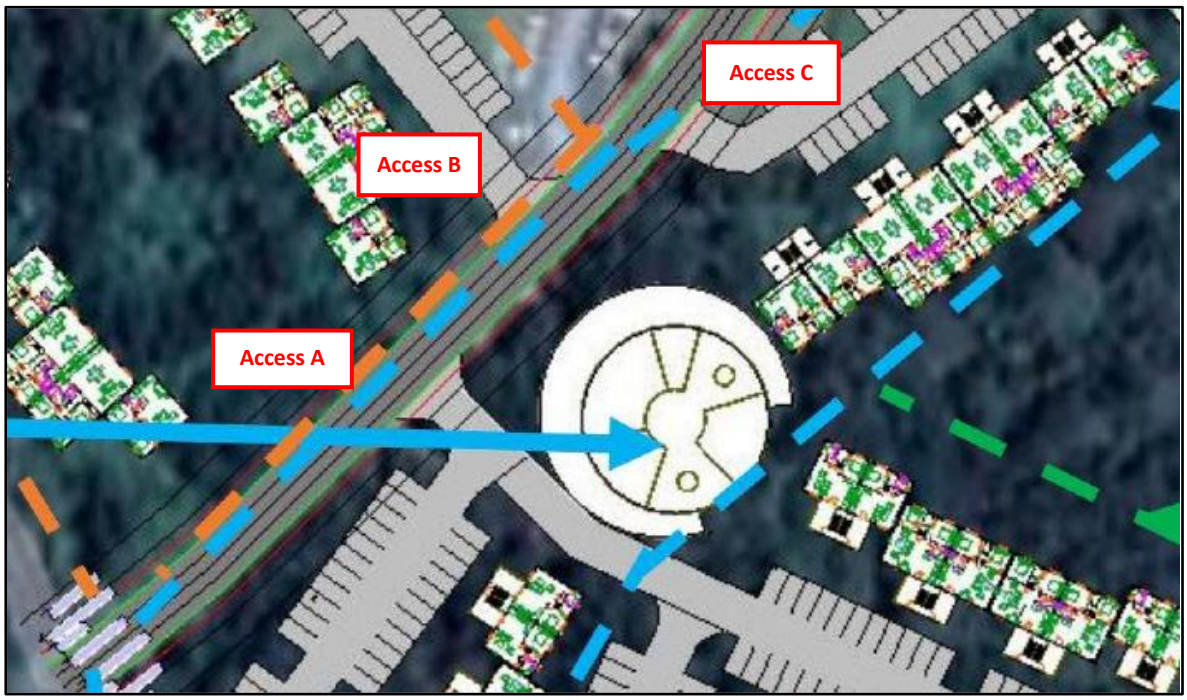


Figure 12 – Proposed Subdivision Layout

In considering vehicle access to a site, it is important that:

- adequate sight distance is provided, and
- the access is designed to ensure safe traffic and pedestrian movement.

3.5.1 Internal Access Sight Distances

In respect of sight distance, the appropriate standard is the Land Transport Safety Authority publication "Guidelines for Visibility at Driveways". There are two components to the sight distance measurement. The first being the Sight Distance requirement and the second being the Lines of Clear Sight. The sight distance / lines of clear sight required is dependent upon the traffic generation of the proposal, the 85th percentile speed of vehicles on the frontage road and also the classification of the frontage road.

The operating speed on Hospital Road is 30 to 40km/hr. For the purpose of the sight distance assessment, a speed environment of 40 km/hr has been used which would require sight distances of about 30 metres which all of the proposed vehicle access points comply with.

On this basis the proposed internal vehicle access arrangements are considered to be acceptable.

3.5.2 Internal Access Design

The proposed vehicle crossings have been designed in accordance with that indicated in the FN-ODP. The designs are consistent with good design practice and minimise the potential for traffic congestion to occur as a result of vehicles entering and exiting the subject site.

It is noted that each vehicle crossing ensures good levels of inter-visibility between vehicles entering and exiting the site and pedestrians using the footpath to be provided within the subdivision.

4.0 FAR NORTH DISTRICT COUNCIL – OPERATIVE DISTRICT PLAN

Section 15 of the FNDC-ODP identifies the Traffic, Parking, and Access requirements associated with private property.

4.1 Traffic Intensity

4.1.1 FNDC-ODP Requirements

Rule 15.1.6A identifies the Traffic Intensity thresholds for a site.

Two-way traffic generation for the proposed activities have been identified in Section 3.2 based on similar operations elsewhere, with a maximum hourly traffic generation of 100 two-way traffic movements per hour (50 one way traffic movements per hour) and a daily traffic generation of 700 to 1,100 traffic movements per day. For activities within the rural production zone residential zone with a daily traffic intensity of more than 200 one-way movements, the proposal falls within the category of a Discretionary Activity.

4.1.2 Assessment Criteria

Rule 15.1.6A.4.1 identifies the assessment criteria for considering controlled activities, including:

(a) the time of day when the extra vehicle movements will occur;

The proposed development will add approximately 100 traffic movements per hour during the morning and afternoon peak traffic periods.

(b) the distance between the location where the vehicle movements take place and any adjacent properties;

The vehicle access arrangements are designed to a suitable standard with appropriate sight distances available. The reported crash history does not indicate a traffic safety problem in this location, and this would not be expected to change given the sight distances available.

(c) the width and capability of any street to be able to cope safely with the extra vehicle movements;

The roads used to access the development have adequate capacity to cater for the amount of traffic generated by the proposal.

(d) the location of any footpaths and the volume of pedestrian traffic on them;

There will be internal footpaths provided to connect with the existing public footpaths in this location.

(e) the sight distances associated with the vehicle access onto the street;

The available sight distances exceed those recommended.

(f) the existing volume of traffic on the streets affected;

Current traffic flows on Greenacres Road are in the range of 500 to 1,500 vehicles per day which is well within their nominal traffic capacity.

(g) any existing congestion or safety problems on the streets affected;

As noted previously, the reported crash history does not indicate a traffic safety problem with these current arrangements, and this would not be expected to change given that traffic generation between the existing and proposed activities does not change

(h) with respect to effects in local neighbourhoods, the ability to mitigate any adverse effects through the design of the access, or the screening of vehicle movements, or limiting the times when vehicle movements occur;

Existing boundary screening is in place and this will not change as a result of the proposal.

(i) with respect to the effects on through traffic on arterial roads with more than 1000 vehicle movements per day, the extent to which Council's "Engineering Standards and Guidelines" (2004) are met;

The Engineering Standards and Guidelines 2004 indicates the following in relation to vehicle access:

Crossings for accesses which carry 60 vehicles per day or more, and have access onto rural roads which are expected to carry more than 1,000 vehicles per day within 10 years shall, in addition to the above requirements, be in accordance with Diagram D of the Addendum to TNZ's "Planning for a Safe and Efficient State Highway Network under the Resource Management Act". For the purposes of these Standards, the "Edgeline of the Existing Road" in Diagram D shall be taken to be the edge of the lane

Diagram D from Appendix 5B – Accessway Standards and Guidelines. (Transit Planning Policy Manual Version 1 – Manual No:SP/M/001) is shown in Figure 13.

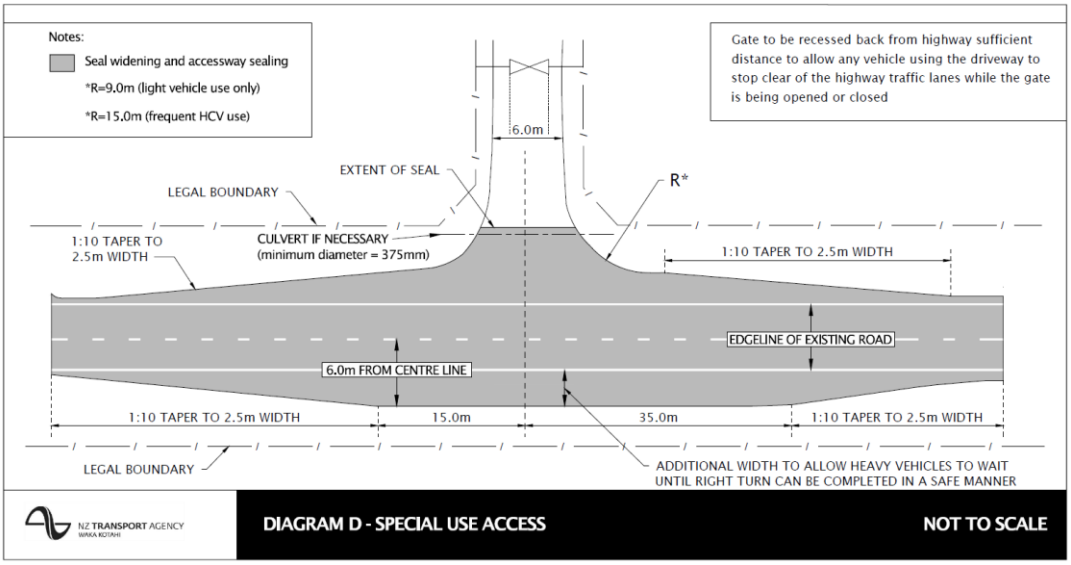


Figure 13 – NZTA Diagram D Vehicle Crossing and Accessway Standard

However, Greenacres Drive is not an arterial road and as such the above standard does not apply.

The existing vehicle access to the development is shown in Figure 14.

Figure 14 – Existing Vehicle Access

The existing vehicle access has been in place for some time but will be upgraded to a formal intersection with appropriate priority control provided.

(j) effects of the activity where it is located within 500m of reserve land administered by the Department of Conservation upon the ability of the Department to manage and administer that land;

Not relevant in relation to the proposal.

(k) the provision of safe access for pedestrians moving within or exiting the site.

Appropriate pedestrian access will be provided to the development from the public road network.

4.2 Car Parking

4.2.1 FNDC-ODP Requirements

Rule 15.1.6B1 indicates that for permitted activities the minimum number of on-site parking spaces shall be determined by reference to Appendix 3C.

Appendix 3C indicates that residential activities shall be provided with 2 car parking spaces per unit and pensioner housing with 1 car parking space per unit. The proposal will comply with these provisions.

4.2.2 Parking Provided

Each site will be able to accommodate a minimum of 2 cars parked and hence complies with the District Plan provisions.

4.2.3 Accessible Parking

Rule 15.1.6B.1.4 identifies the rate of accessible parking for a site:

- Where 20 or less parking spaces provided, one accessible space shall be provided;
- For between 21 and 50 spaces, two spaces shall be provided; and
- For every additional 50 parking spaces or part of a car park, not less than 1 shall be provided.

Accessible car parking is not required for residential activities and as such no accessible car parking is provided.

4.2.4 On-site Parking Layout

Rule 15.1.6B.1.5 identifies the car parking space standards.

Appendix 3D indicates the requirements for the size and location of parking spaces. The proposal will comply with these provisions.

4.3 Loading and Servicing

4.3.1 FNDC-ODP Requirements

Rule 15.1.6B.1.6 indicates the minimum rate of loading spaces to be provided for commercial and industrial zones. For the residential activities, no loading spaces are required.

4.3.2 Loading Space Provided

No formal loading space has been provided. However the site has been designed to accommodate the tracking requirements of an 8 metre Medium Rigid Truck.

Refuse collection will be managed by way of private contractor.

4.4 Vehicle Access

4.4.1 FNDC-ODP Requirements

Rule 15.1.6C of the FNDC-ODP indicates the requirements for vehicle access to sites.

Rule 15.1.6C.1.1 has the following requirements for private accessways in commercial and industrial zones:

- The first 6 metres within the site boundary shall not be steeper than 1:20
- Access shall not be permitted onto a local road within 30m of its intersection with an arterial or collector road

The proposal complies with these requirements.

In addition, Appendix 3B requires that commercial private accessways used by Household Equivalents of more than 5 have:

- a carriageway width of 6.0 metres
- a maximum sealed gradient of 1 in 5

The proposal complies with these requirements.

Rule 15.1.6C.1.2 has the following requirements for privates accessways in urban commercial and industrial zones:

- having two-way operations, excluding service stations, from the road to any parking or loading space shall not be less than 6m or more than 7m in width
- have a minimum overhead clearance of 4.2m
- shall be sealed if they serve two or more activities.

The proposal complies with these requirements.

Rule 15.1.6C.1.4 has the following requirements for privates accessways over footpaths:

- no more than two crossings per site
- maximum width of a crossing shall be 6m for all activities except service stations and supermarkets.

The proposal complies with these requirements even though there are currently no footpaths along the site frontage.

Rules 15.1.6C.1.6 to 8 include the following requirements:

- Private access off streets in the urban zones the vehicle crossing is to be constructed in accordance with Council's "Engineering Standards and Guidelines" (June 2004 – Revised 2009).
- Provision shall be made such that there is no need for vehicles to reverse off a site except where there are less than 4 parking spaces gaining access from a local road.
- All bends and corners on the private accessway are to be constructed to allow for the passage of a Heavy Rigid Vehicle.
- Any access where legal width exceeds formation requirements shall have surplus areas (where legal width is wider than the formation) grassed.
- Runoff from impermeable surfaces shall, wherever practicable, be directed to grass swales and/or shall be managed in such a way as will reduce the volume and rate of stormwater runoff and contaminant loads.
- Where a site has more than one road frontage or frontage to a service lane or right-of-way (ROW) in addition to a road frontage, access to the site shall be in a place that:

  (i) facilitates passing traffic, entering and exiting traffic, pedestrian traffic and the intended use of the site;

  (ii) is from the road or service lane or ROW that carries the lesser volume of traffic.

The proposal complies with these requirements.

5.0 EFFECTS ON SURROUNDING ROAD NETWORK

The traffic related effects of the proposal centre on:

- the effects of the additional traffic generated by the proposal,
- the effects on traffic and pedestrian safety, and
- construction related traffic effects.

5.1 Effects of Traffic Generated by the Proposal

5.1.1 Analysis Methodology

A four-step process has been used in the methodology to assess the traffic related effects of the proposal:

1. Trip Generation;
2. Trip Distribution;
3. Trip Assignment; and
4. Analysis of Intersection Operation of Assigned Trips.

In the first step, the amount of traffic generated is estimated using recognised data sources. In the second step, the directions the trips use to approach and depart the development are estimated. In the third step, the trips are assigned to specific street segments and intersection turning movements. The fourth step involves analysing the effects on vehicle access and intersection capacity associated with the proposal.

5.1.2 Traffic Generation

The proposed development will generate in the range of 700 to 1,100 traffic movements per day with peak hour traffic generation of about 100 traffic movements per hour.

5.1.3 Trip Distribution and Assignment

In general, the operational characteristics of a road network are defined by the operations of key intersections within the network. Intersections are typically considered to be the critical analysis locations, because conflicting traffic movements at intersections impose capacity constraints on the overall road network.

Traffic Distribution is shown in Figure 15 with traffic accessing State Highway either via the Vogel Street intersection or the Albert Street intersection. For analysis purposes, 40% of traffic has been assigned to Albert Street and 60% to Vogel Street.

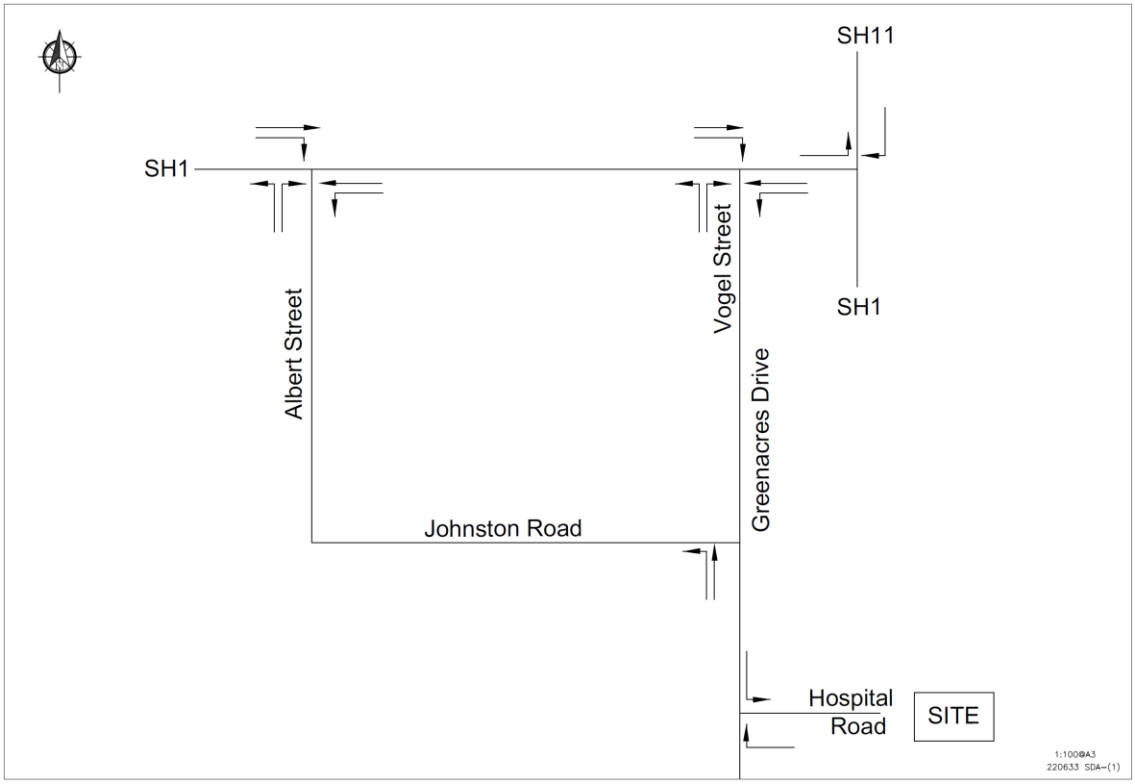


Figure 15 – Traffic Distribution

5.1.4 Analysis Results – Vehicle Access

The development will be accessed from the existing vehicle access to Greenacre Drive which is a simple T intersection. The majority of additional traffic generated by the proposed development will arrive and depart to/from the north resulting in mostly left turn entry movements and right turn exit movements.

The anticipated additional turning movements at this access are shown in Figure 16. The operational performance of this access has been analysed using the SIDRA Intersection software package for both the AM Peak Hour and the PM Peak Hour. The results of this analysis are shown in Figure 17 and Figure 18.

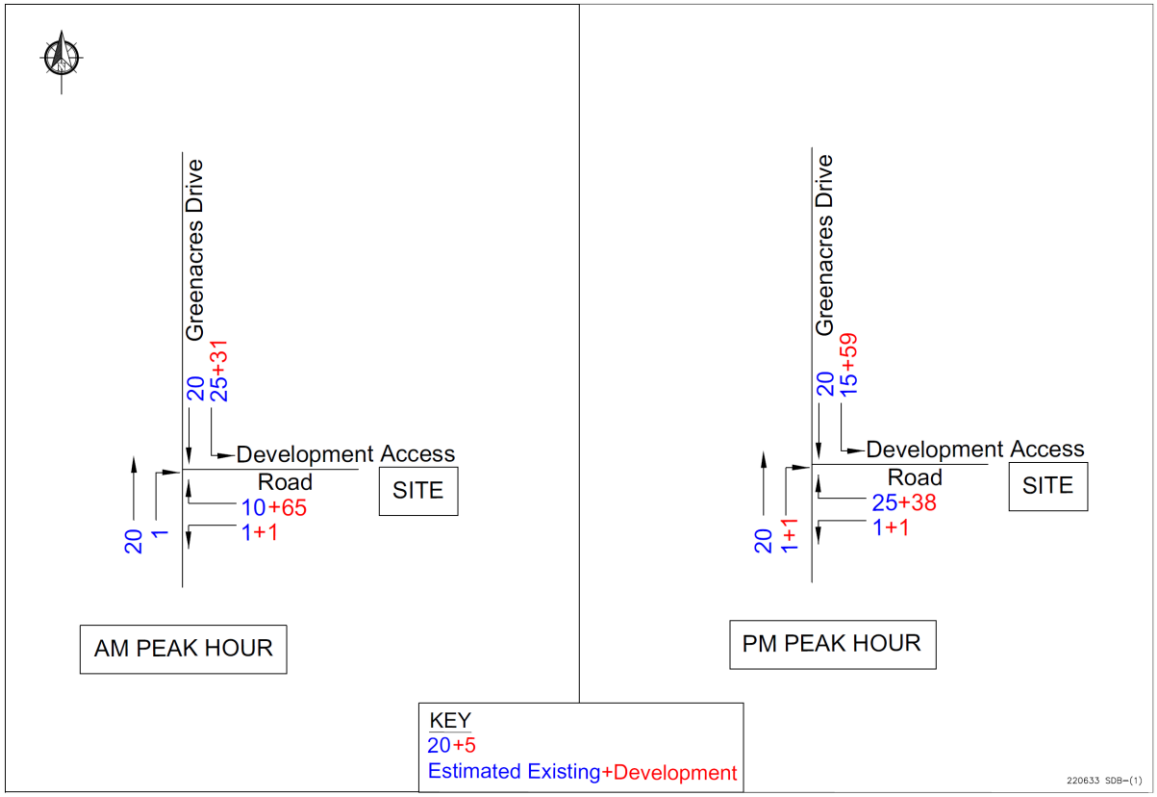


Figure 16 – Greenacre Drive and Development Access Road Turning Movements

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Greenacre - nbound													
Lane 1	21	0.0	1931	0.011	100	0.2	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	21	0.0		0.011		0.2	NA	0.0	0.0				
East: Site access													
Lane 1	77	0.0	1936	0.040	100	4.6	LOS A	0.1	0.7	Full	500	0.0	0.0
Approach	77	0.0		0.040		4.6	LOS A	0.1	0.7				
North: Greenacre - sbound													
Lane 1	76	0.0	1881	0.040	100	3.4	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	76	0.0		0.040		3.4	NA	0.0	0.0				
Intersection	174	0.0		0.040		3.5	NA	0.1	0.7				

Figure 17 – SIDRA Intersection AM Peak Hour Analysis

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Greenacre - nbound													
Lane 1	22	0.0	1912	0.012	100	0.5	LOS A	0.0	0.1	Full	500	0.0	0.0
Approach	22	0.0		0.012		0.5	NA	0.0	0.1				
East: Site access													
Lane 1	65	0.0	1926	0.034	100	4.6	LOS A	0.1	0.6	Full	500	0.0	0.0
Approach	65	0.0		0.034		4.6	LOS A	0.1	0.6				
North: Greenacre - sbound													
Lane 1	94	0.0	1876	0.050	100	3.6	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	94	0.0		0.050		3.6	NA	0.0	0.0				
Intersection	181	0.0		0.050		3.6	NA	0.1	0.6				

Figure 18 – SIDRA Intersection PM Peak Hour Analysis Results

The SIDRA analysis confirms that the access will operate well within its practical capacity with the development traffic included.

5.1.5 Analysis Results – Wider Road Network

Additional turning movements will occur at the priority-controlled intersection of State Highway 1 with Vogel Street and Albert Street. The potential additional turning movements at these intersections are shown on the plans included in Attachment 1.

Both intersections have been analysed using the SIDRA Intersection software package. The detailed results of this analysis are included in Attachment 2 and the results summarised in Table 5 for Vogel Street and in Table 6 for Albert Stret.

Table 5 – State Highway 1 / Vogel Street Intersection SIDRA Analysis Results

Analysis Period	Model Parameter			
	Degree of Saturation	Level of Service	Average Delay	Queue Length
Weekday AM Peak Hour	0.265	NA	1.8 seconds	0.7 vehicles
Weekday PM Peak Hour	0.270	NA	1.7 seconds	0.6 vehicles

Table 6 – State Highway 1 / Albert Street Intersection SIDRA Analysis Results

Analysis Period	Model Parameter			
	Degree of Saturation	Level of Service	Average Delay	Queue Length
Weekday AM Peak Hour	0.253	NA	1.2 seconds	0.4 vehicles
Weekday PM Peak Hour	0.256	NA	1.2 seconds	0.4 vehicles

The SIDRA analysis confirms that both intersections will operate well within their practical capacity with the development traffic included.

5.2 Effects on Traffic and Pedestrian Safety

Analysis of the crash records does not indicate a traffic safety problem in the vicinity of the site.

The greatest potential effect on traffic and pedestrian safety associated with the proposal will occur at the vehicle accesses to the site when vehicles are entering and exiting the subject site.

In respect of the impact on traffic and pedestrian safety associated with the vehicle accesses, the following are noted:

- Vehicles exiting the site have adequate sight distance available which makes it easier to select appropriate gaps in the traffic stream.
- The vehicle access points to the site ensure adequate inter-visibility between vehicles entering / exiting the site and people using the footpath in this location which minimises the potential for pedestrian / vehicle conflict.

These aspects combine to ensure that the overall effect of the proposal on traffic and pedestrian safety in the area will be less than minor.

5.3 Construction Traffic Effects

The construction of the proposed development will be staged over a period of time.

Deliveries to the site during the construction period will consist of normal construction materials with perhaps around 20 truck movements per day over the busier part of the construction period.

There will also be traffic movements associated with the various trades required to develop the site. These will vary over the course of the construction period but are likely to be lower than the level of traffic generated by the development once completed.

As is usual for a construction site of the size proposed a Construction Traffic Management Plan will be developed that identifies the construction methodology, vehicle access arrangements, management of pedestrians and cyclists, and signage requirements during the construction period.

With an appropriate Construction Traffic Management Plan in place, the levels of traffic generated during the construction period can be accommodated on Molesworth Drive with little or no effect.

Given the above, the effect of construction traffic is considered to be less than minor.

6.0 CONCLUSIONS

Based on the analyses described in this report, the following conclusions can be made in respect of the proposed development in Kawakawa:

- The estimated traffic generation of the proposal is likely to be in the order of 1,100 traffic movements per day, with a peak hour of 100 traffic movements per hour.

- The traffic generated by the proposal can be accommodated on the road network with little or no effect.

- The roads and intersections are designed to an appropriate standard and in a manner that ensures the residential environment sought for the development can be achieved.

- Appropriate provisions will be made for pedestrians and cyclists.

- Vehicle access to the site is designed to a suitable standard and has adequate sight distances available.

Overall, it is considered that the traffic engineering effects of the proposed development can be accommodated on the road network without compromising its function, capacity or safety. Therefore, from a traffic engineering perspective it is considered that the proposal will have a less than minor impact.

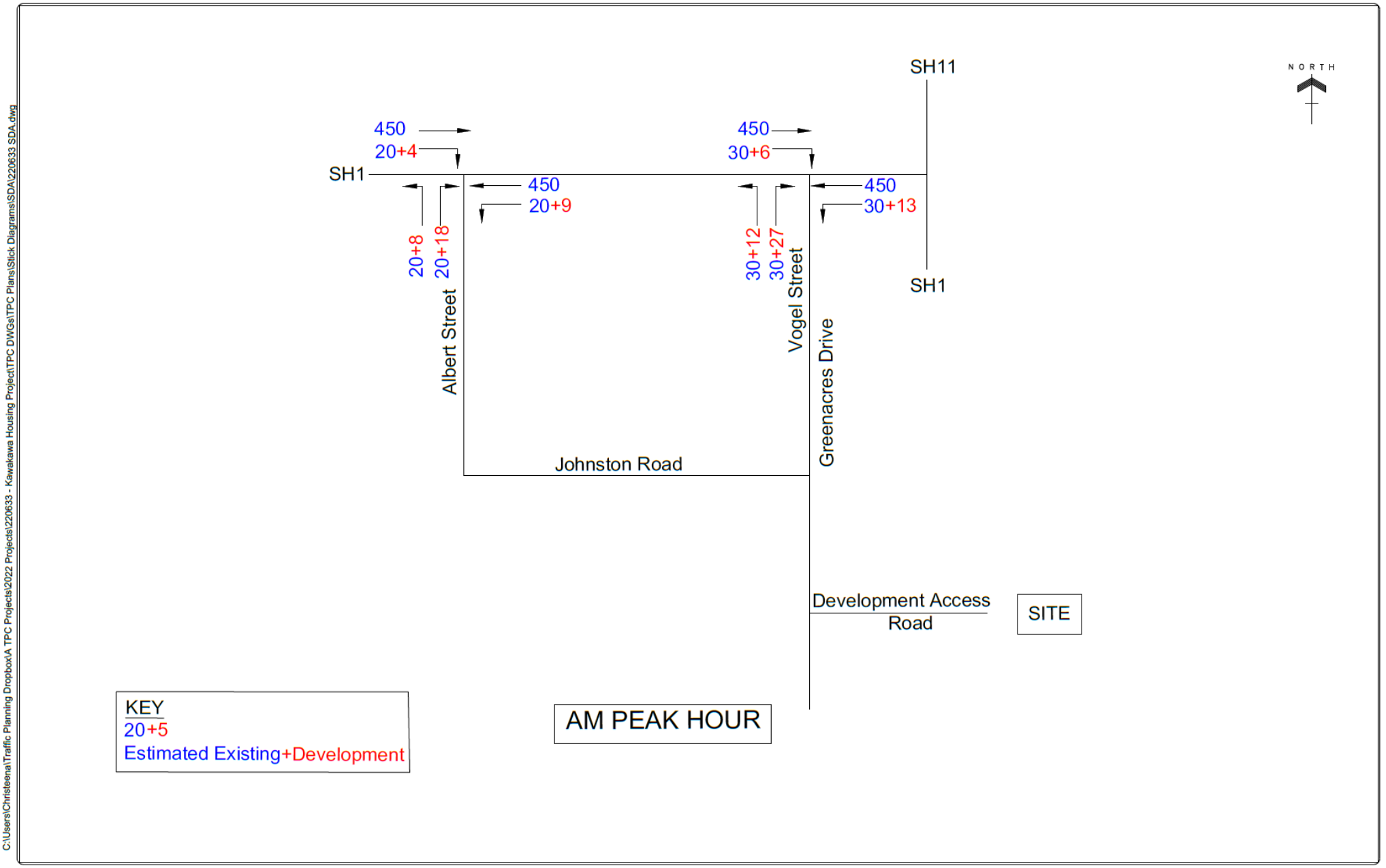
Prepared by:

Bryce Hall

Karen Hall

ATTACHMENT 1

Intersection Turning Movements



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Rev	Revisions	By	Date

TPC TRAFFIC PLANNING CONSULTANTS LTD
Level 1, 400 Titirangi Rd, Titirangi, P.O Box 60-255, Auckland 0604
Phone: 09 817-2500 www.trafficplanning.co.nz

Project Title: Proposed Development
Kawakawa Housing Project

Sheet Title: Intersection Turning Movement - AM Peak Hour

Designed	CE	Drawn	CE	Project No - (Sheet No)	Scales 1:150 (A3)
Checked	BH	Approved	BH	220633 SDA - (1)	Date 20.10.22

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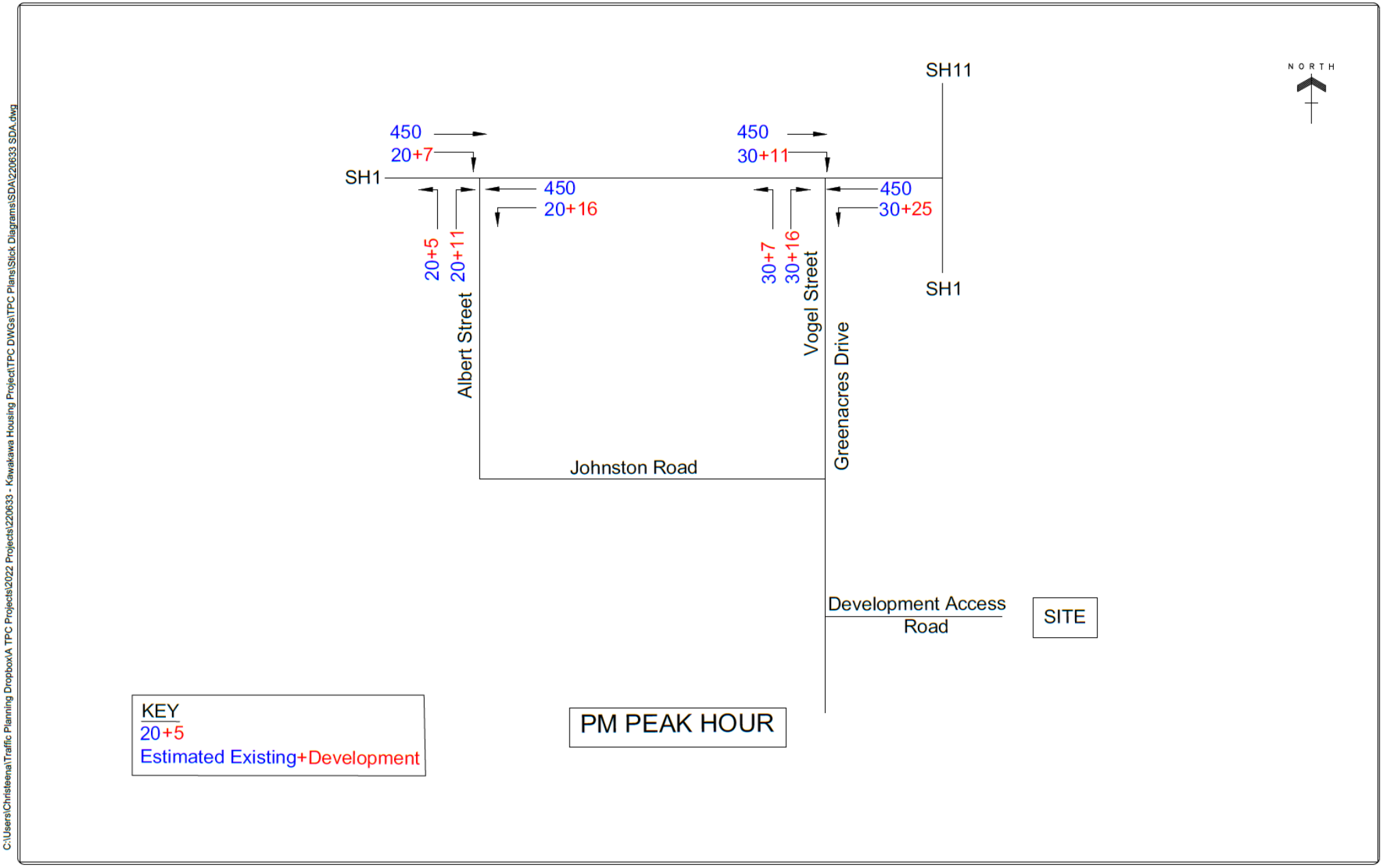

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Project Title: Proposed Development
Kawakawa Housing Project

Sheet Title: Intersection Turning Movement - PM Peak Hour

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ATTACHMENT 2

SIDRA Intersection Analysis Results

State Highway 1 / Vogel Street Intersection - AM Peak Hour

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Vogel St													
Lane 1	99	0.0	489	0.202	100	13.1	LOS B	0.7	4.8	Full	500	0.0	0.0
Approach	99	0.0		0.202		13.1	LOS B	0.7	4.8				
East: SH1 wbound													
Lane 1	493	0.0	1942	0.254	100	0.5	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	493	0.0		0.254		0.5	NA	0.0	0.0				
West: SH1 ebound													
Lane 1	486	0.0	1837	0.265	100	0.8	LOS A	0.4	3.1	Full	500	0.0	0.0
Approach	486	0.0		0.265		0.8	NA	0.4	3.1				
Intersection	1078	0.0		0.265		1.8	NA	0.7	4.8				

State Highway 1 / Vogel Street Intersection - PM Peak Hour

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Vogel St													
Lane 1	83	0.0	491	0.169	100	12.9	LOS B	0.6	4.0	Full	500	0.0	0.0
Approach	83	0.0		0.169		12.9	LOS B	0.6	4.0				
East: SH1 wbound													
Lane 1	505	0.0	1939	0.260	100	0.6	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	505	0.0		0.260		0.6	NA	0.0	0.0				
West: SH1 ebound													
Lane 1	491	0.0	1819	0.270	100	1.0	LOS A	0.5	3.6	Full	500	0.0	0.0
Approach	491	0.0		0.270		1.0	NA	0.5	3.6				
Intersection	1079	0.0		0.270		1.7	NA	0.6	4.0				

State Highway 1 / Albert Street Intersection - AM Peak Hour

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Albert St													
Lane 1	66	0.0	501	0.132	100	12.6	LOS B	0.4	3.1	Full	500	0.0	0.0
Approach	66	0.0		0.132		12.6	LOS B	0.4	3.1				
East: SH1 wbound													
Lane 1	479	0.0	1944	0.246	100	0.4	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	479	0.0		0.246		0.4	NA	0.0	0.0				
West: SH1 ebound													
Lane 1	474	0.0	1874	0.253	100	0.6	LOS A	0.3	2.0	Full	500	0.0	0.0
Approach	474	0.0		0.253		0.6	NA	0.3	2.0				
Intersection	1019	0.0		0.253		1.2	NA	0.4	3.1				

State Highway 1 / Albert Street Intersection - PM Peak Hour

Lane Use and Performance

	DEMAND FLOWS [Total veh/h	HV] %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh	Dist] m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Albert St													
Lane 1	56	0.0	505	0.111	100	12.5	LOS B	0.4	2.6	Full	500	0.0	0.0
Approach	56	0.0		0.111		12.5	LOS B	0.4	2.6				
East: SH1 wbound													
Lane 1	486	0.0	1943	0.250	100	0.4	LOS A	0.0	0.0	Full	500	0.0	0.0
Approach	486	0.0		0.250		0.4	NA	0.0	0.0				
West: SH1 ebound													
Lane 1	477	0.0	1864	0.256	100	0.6	LOS A	0.3	2.3	Full	500	0.0	0.0
Approach	477	0.0		0.256		0.6	NA	0.3	2.3				
Intersection	1019	0.0		0.256		1.2	NA	0.4	2.6				