57 & 57A Schnapper Rock Road Plan Change

Transportation Assessment

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Transportation Assessment

KBS Design Limited

Quality Assurance Information

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Executive Summary

Hobson Green Limited commissioned Abley Limited (Abley) in partnership with KBS Design Group Limited to prepare a Transportation Assessment (TA) report with respect to a proposed Private Plan Change at 57 & 57A Schnapper Rock Road to enable the construction of between 90 – 110 dwellings in total.

We have reviewed the existing transport network and found that it is generally able to support a future residential development at this location in terms of accessibility, safety, public transport service and facilities and amenities within walking and cycling distance.

One public road is likely to provide access to dwellings within the future subdivision. This public road will connect to the existing network, with the likely new intersection being located on the northwest frontage. We have reviewed sight distance requirements and concluded that the intersection should be located a minimum of 100m away from the Oakway Drive roundabout. The eventual subdivision will confirm the exact location of the intersection, and the number and layout of dwelling sites and private accessways.

We have conservatively estimated that the proposal, if fully developed, will generate approximately 96 vehicle trips in the peak hour and 946 vehicle trips per day. We have distributed these trips on the network using Journey to Work data and some inferences based on regional routing. We have assessed the impact of these trips on the current and future network by gathering updated traffic data on nearby roads and undertaking SIDRA intersection modelling at three key intersections, with the Level of Service results summarised as follows for the 2021 and 2031 scenarios:

	Level of Service - AM		Level of Service - PM	
	No development	With development	No development	With development
Albany Highway / Oakway Drive	2021: C 2031: C	2021: C 2031: C	2021: C 2031: C	2021: C 2031: C
Oakway Drive / Schnapper Rock Road	2021: A 2031: A	2021: A 2031: A	2021: A 2031: A	2021: A 2031: A
Schnapper Rock Road / Albany Highway / Bush Road	2021: D 2031: C	2021: C 2031: C	2021: D 2031: D	2021: D 2031: D

Based on our analysis of the trip generation of the proposal and its potential effects on the current and future transport network, we conclude that the vehicle trips generated by the proposal will be able to be accommodated and there is no indication that they will significantly impact the operation of any of the studied intersections.

On balance, the proposed Plan Change is considered to be acceptable from a transport planning perspective.

Below is a list of recommendations for the development of future subdivision and land use plans based on the provisions of the AUPOP and our considerations to date:

- We recommend that the future public road be located in such a manner that it forms an intersection with Schnapper Rock Road on the northwest frontage of the proposal site (not the northeast frontage), and is located a minimum of 97m from the Oakway Drive / Schnapper Rock Road roundabout.
- An internal footpath should be provided to connect the site to the eastern frontage (near the Watercare designation) to ensure pedestrians do not have to walk around the long way if travelling east.
- A footpath connection to the Kyle Road subdivision to the south should be investigated to improve connectivity and integration with this development.
- Car parking and bicycle parking should be provided in accordance with the requirements of the AUPOP.
- Vehicle crossings and accessways shall be designed to avoid the need for vehicles to reverse when entering or exiting onto a public road, except where this is expressly permitted.
- It is recommended that a footpath is to be provided along the northeast boundary of the site (including in front of the Watercare designation) to connect with the surrounding walking network.
- Pedestrian crossing facilities and traffic calming measures are recommended to be investigated on Schnapper Rock Road along the northeast frontage of the site and at the Schnapper Rock Road / Oakway Drive roundabout.

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1. Introduction

Hobson Green Limited commissioned Abley Limited (Abley) in partnership with KBS Design Group Limited to prepare a Transportation Assessment (TA) report with respect to a proposed Private Plan Change at 57 & 57A Schnapper Rock Road. The proposal is to establish a mix of Residential - Mixed Housing Suburban Zone and Residential - Single House Zone. A Plan Change is required as this land is currently zoned as Residential – Large Lot.

The purpose of this TA is to evaluate the potential transportation related effects of the Plan Change on the future receiving environment. In accordance with Auckland Transport's *Integrated Transport Assessment Guidelines 2015*, the need for a full Integrated Transport Assessment (ITA) is triggered for a Plan Change only where the total number of dwellings is 120 or greater. As the proposed plan change is expected to yield between 90-110 dwellings (with 110 being an upper limit), a full ITA is not required; nevertheless, as the proposal is near to this threshold, we have generally considered the issues assessed in a full ITA, including the estimated traffic volumes associated with the likely yield of dwellings in order to appreciate how the proposal may affect the transport network.

1.1 Background

The site is located within the Schnapper Rock suburb and encompasses a total area of 4 hectares. The site is currently zoned as Residential – Large Lot in the Auckland Unitary Plan (Operative in Part) (AUPOP). The only current land use established on the site is the Watercare designated area in the northeast part of the site, which is to be unaffected by the proposed Plan Change.

Existing features to be retained include the Significant Ecological Area (SEA) near the western boundary and the Watercare designation, while a future resource consent proposal will establish the Riparian Margin. The Plan Change is intended to support a Master Plan which will be developed at a future stage. With a view to providing a conservative assessment, we have considered that the final provision of dwellings may fall within the range of 90-110 dwellings.

The site has frontage to Schnapper Rock Road along the northwest and northeast boundaries.

One public road is likely to provide access to dwellings, which are likely to include a mixture of terraced housing and detached housing. This public road will connect to the existing network, with the likely new intersection being located on the northwest frontage. The eventual subdivision will confirm the exact number and layout of dwelling sites and private accessways.

2. Existing Land Use and Transport Environment

2.1 Locality

The site is located at 57 & 57A Schnapper Rock Road, approximately 20km north of Auckland CBD. The site has an area of approximately 4ha and is located in the southeast quadrant of the suburb of Schnapper Rock. The location of the site is shown in **Figure 2.1** below. The site is currently bound by large lot residential properties to the southwest and south east. The site is currently vacant, with the exception of the Watercare designated section, which is not proposed to be altered by the proposed Plan Change.

Figure 2.1 Aerial image of 57 & 57ASchnapper Rock Road

The location of the site in the context of the wider Schnapper Rock area is shown in **Figure 2.2**. The land surrounding the site is primarily used for residential purposes. Albany Junior High and Kristin School are located within 1km to the north, while Upper Harbour Primary School is approximately 1km to the west across the Kyle Road gully. The commercial area in Rosedale is located to the east of Schnapper Rock on the opposite side of Albany Highway.

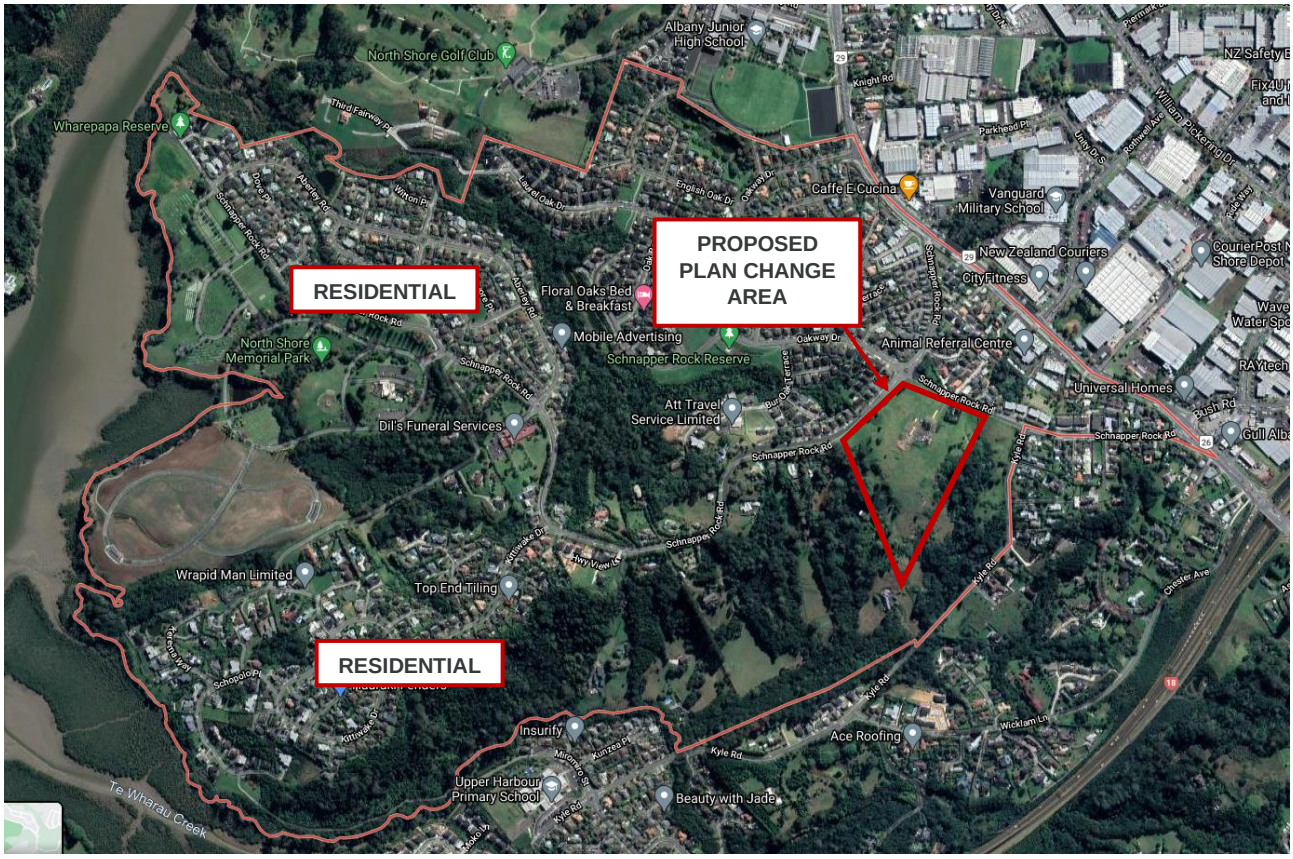


Figure 2.2 Schnapper Rock suburb context

2.2 Zoning

The site is located in the Residential – Large Lot Zone as classified in the AUPOP. The Residential – Large Lot Zone is a defined as:

"...residential development on the periphery of urban areas. Large lot development is managed to address one or more of the following factors:

- *it is in keeping with the area's landscape qualities; or*
- *the land is not suited to conventional residential subdivision because of the absence of reticulated services or there is limited accessibility to reticulated services; or*
- *there may be physical limitations to more intensive development such as servicing, topography, ground conditions, instability or natural hazards where more intensive development may cause or exacerbate adverse effects on the environment.*

To manage existing or potential adverse effects, larger than standard site sizes are required and building coverage and impervious surface areas are restricted."

The operative zoning of the site and surrounding area is shown in **Figure 2.3** below.

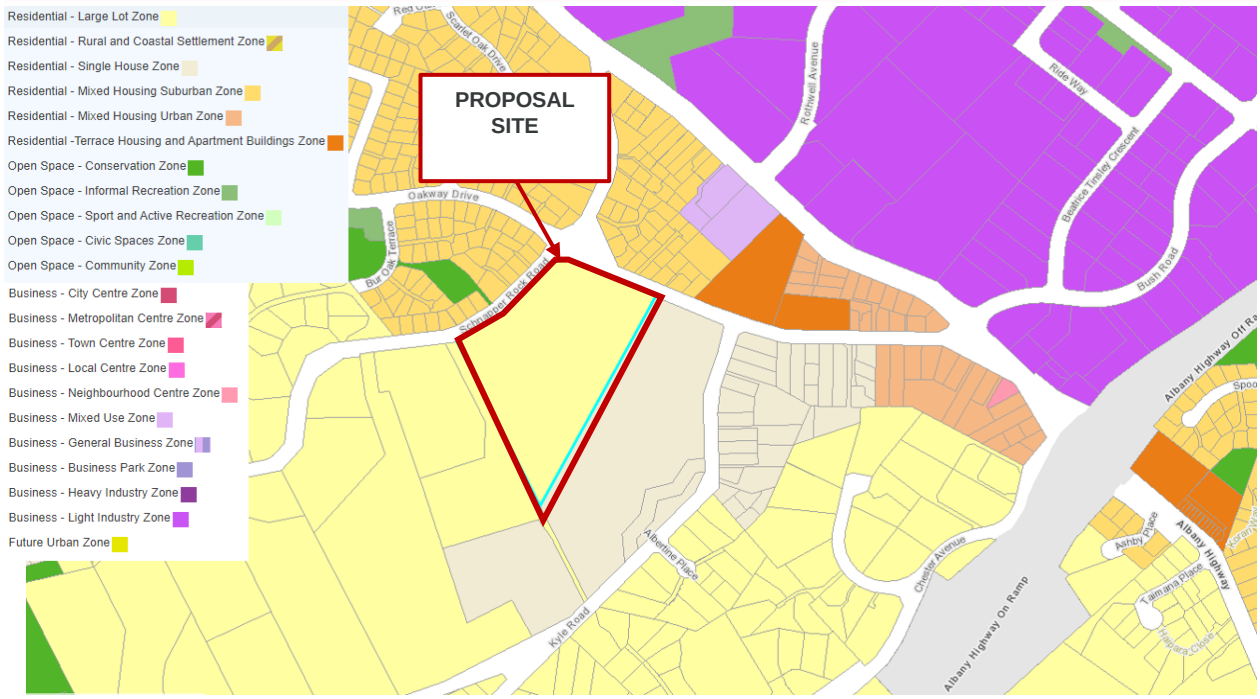


Figure 2.3 Zoning of site and surrounding areas.

The site is currently undeveloped, with the exception of the Watercare Designated section, which is not proposed to be altered. At present, the north-eastern corner of the site comprises a storage yard for Pipeline and Civil Limited and is fenced off.

Existing Site Access

The proposal site currently has two vehicles access points along the northeast boundary of the site as shown in **Figure 2.4**. The two accesses serve the Watercare designated section, which is not proposed to be altered.

Figure 2.4 Existing site accesses

3. Surrounding Transport Environment

3.1 Local Road Network

The site has road frontage to Schnapper Rock Road on both the north-eastern boundary and the north-western boundary. The roads are described further below.

Schnapper Rock Road – northeast site frontage

Schnapper Rock Road runs northwest to southeast along this frontage, is not classified as an arterial road in the AUP. The posted speed limit is 50km/h. The road carriageway is approximately 9.5m wide and has one traffic lane in each direction. No marked shoulder is provided on either side of the road, however kerbside parking is permitted on one side of the road. A footpath is provided on the north side of the road, at a width of 1.8m. On the south side of the road, there is a footpath only for part of the frontage, which terminates along the Watercare designation. The road has broken yellow lines indicating No Stopping At All Times (NSAAT) between the intersection of Schnapper Rock Road / Oakway Drive and the location where the Watercare designation begins. There are no dedicated cycle facilities on either side of the carriageway.

Within the One Network Road Classification system (ONRC), Schnapper Rock Road is classified as a Secondary Collector Road along the frontage of the site. A general view of Schnapper Rock Road along the frontage of the site is shown in **Figure 3.1**.

Figure 3.1 Schnapper Rock Road looking north-west

Schnapper Rock Road – northwest site frontage

Schnapper Rock Road runs in a southwest to northeast direction along this frontage of the site and is not classified as an arterial road in the AUP. The speed limit is 50km/h. The road carriageway is approximately 9.5m wide and has one traffic lane in each direction. No marked shoulder is provided on either side of the road, however parallel parking is

permitted on both sides of the road. A footpath is provided on both sides of the road, at a width of 1.8m. The road has NSAAT lines leading up to the intersection of Schnapper Rock Road and Oakway Drive. There are no dedicated cycle facilities on either side of the carriageway.

Within the One Network Road Classification system (ONRC), Schnapper Rock Road is classified as a Secondary Collector road along the frontage of the site. A general view of Schnapper Rock Road along the frontage of the site is shown in **Figure 3.2**.

Figure 3.2 Schnapper Rock Road looking north-east

3.2 Intersection Arrangements

There are three intersections that connect the site to the surrounding road network as follows:

- Intersection of Schnapper Rock Road and Albany Highway
- Intersection of Schnapper Rock Road, Albany Highway and Bush Road
- Intersection of Schnapper Rock Road and Oakway Drive.

A map of these intersections in relation to the site is shown in **Figure 3.3**.

Figure 3.3 Nearby Intersections

Intersection of Schnapper Rock Road and Albany Highway

The intersection of Schnapper Rock Road and Albany Highway located northeast of the site is a give-way intersection with priority given to Albany Highway. The intersection is shown in **Figure 3.4** looking north-east from Schnapper Rock Road. This intersection only allows left in and left out of Schnapper Rock Road, with right turns prohibited by a raised median and associated signage. There is a raised table on the approach to the intersection on Schnapper Rock Road to reduce vehicle speeds prior to making a left turn onto Albany Highway. The raised table is accompanied with tactile paving to indicate this location for crossing Schnapper Rock Road. There is a cycle lane and a T2 lane along Albany Highway. There is clear visibility on both sides of the road for over 100m as the road is flat and fairly straight on either side.

Albany Highway has two-lanes in each direction meaning vehicles left-turning into Schnapper Rock Road will not impede through traffic travelling north on Albany Highway.

Figure 3.4 Intersection of Schnapper Rock Road and Albany Highway (north)

Schnapper Rock Road, Albany Highway Intersection and Bush Road

The intersection of Schnapper Rock Road, Albany Highway and Bush Road located southeast of the site is a signal-controlled intersection with left turn slip lanes on both approaches of Albany Highway and on Bush Road. The intersection is shown from an aerial view in **Figure 3.5**. The north approach on Albany Highway has two through lanes, one right turn lane, one slip lane, and a cycle lane. The south approach on Albany Highway has two through traffic lanes, two right turn lanes, one left turn lane, and a cycle lane. Schnapper Rock Road and Bush Road both have two lanes on their approaches that have no cycle lanes. Pedestrians can cross all four legs at the signalised crossings.

The left-turn slip lane on Albany Highway means that vehicles left-turning into Schnapper Rock Road will not impede on through traffic travelling north on Albany Highway.

Figure 3.5 Aerial image of Schnapper Rock Road / Albany Highway / Bush Road Intersection

Intersection of Schnapper Rock Road and Oakway Drive

The intersection of Schnapper Rock Road and Oakway Drive located north-east of the site is a give-way roundabout intersection. The intersection is shown in **Figure 3.6** looking south-west from Oakway Drive. On each approach a raised median is provided that can be used as a safe crossing point for pedestrians. No cycling facilities are provided on this intersection. There is clear visibility on each approach.

Figure 3.6 Intersection of Schnapper Rock Road and Oakway Drive (looking south-west towards Schnapper Rock Road)

3.3 Existing Traffic Volumes

Auckland Transport undertakes traffic counts of roads on its network, typically at yearly intervals. The most recent Annual Average Daily Traffic (AADT) follows for the streets in the immediate vicinity of the site as summarised in **Table 3.1**.

Table 3.1 Traffic Counts

Location	Count date	Counts
Schnapper Rock Road Near Albany Highway / Bush Road intersection	5th December 2014	7586 vpd (5-day ADT) AM Peak Volume: 658 PM Peak Volume: 714 2.3% HCV
Schnapper Rock Road North – east of Schnapper Rock Road and Oakway Drive intersection	5th December 2014	2856 vpd (5-day ADT) 254 vph (AM Peak hour) 321 vph (PM Peak hour) 2.3% HCV
Oakway Drive Near Albany Highway	28th February 2014	3045 vpd (5-day ADT) 494 vph (AM Peak hour) 408 vph (PM Peak hour) 4.7% HCV
Albany Highway North of Schnapper Rock Road and Bush Road intersection.	12 May 2017	20657 vpd (5-day ADT) 1886 vph (AM Peak hour) 1870 vph (PM Peak hour) 6% HCV
Bush Road Near Albany Highway Intersection	3 September 2016	12133 vpd (5-day ADT) 1217 vph (AM Peak Hour) 1088 vph (PM Peak Hour) 5.4% HVC

3.4 Walking Facilities

Footpaths 1.8m wide are generally provided on both sides of the roads surrounding the site. The only exception is along the north-eastern boundary of the site a footpath at 1.8m is provided only on one side of the road. Drop curves and pedestrian refuge islands are provided near the Schnapper Rock Road and Oakway Drive intersection on all four legs. Street lighting is provided along the frontage of the site on one side of the road. The existing footpaths connect well into the existing urban environment. A general view of Schnapper Rock Road along the frontage of the site is shown in **Figure 3.7**.

Figure 3.7 Schnapper Rock Road facing south- east, along the north-eastern boundary

Abley recommends that the footpath be extended to fully connect to the network, in order to provide a walkable and pleasant environment. Some footpath additions are being made in relation to the Kyle Road subdivision, however the section on the subject site frontage is not known to be included in that project and this should be investigated as part of the preparation of subdivision plans should the proposed Plan Change be adopted.

3.5 Cycling Facilities

On road painted cycle paths or shared paths are provided on Albany Highway near the site. The site is located approximately 100m from these dedicated cycling facilities. The site is located approximately 35mins from the Hobsonville Point Ferry Terminal that will connect to the CBD; dedicated cycling facilities are provided for most of the way; however it is not likely this would be a convenient distance for a majority of cyclists. A dedicated cycling facility also links the site to the Albany and Rosedale commercial areas; about 15 minutes' journey. The cycle route map[1] is shown in **Figure 3.8**.

Overall, the site is considered moderately well connected to cycling facilities.

[1] https://maps.at.govt.nz/arcgis/apps/webappviewer/index.html?id=88a582e934f6473dba32cb3ab909890a

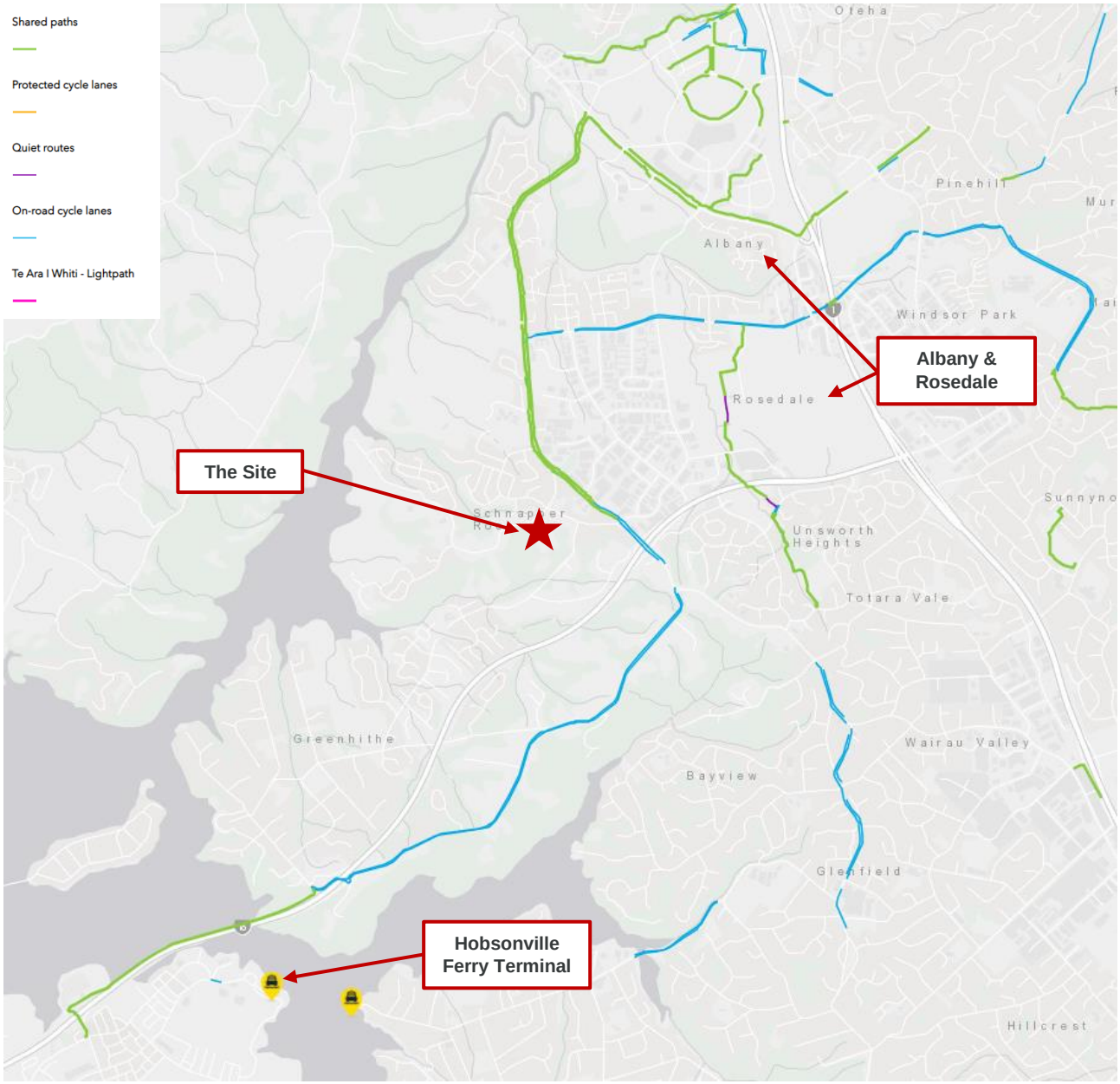


Figure 3.8 Cycling routes near the subject site

3.6 Public Transport Modes and Accessibility

The site has one bus stop along its frontage, two more are located approximately 20m and 100m from the site. These bus stops are served by Bus Route 883 operating between Constellation and Schnapper Rock area. Buses arrive every 30mins and run from 6am to 9pm every day. Constellation is a key interchange on the north shore with bus services running to the city, Albany, Takapuna, and many other services. The bus route is shown in **Figure 3.9**.

A new interchange station is proposed in Rosedale. This will connect to the existing interchanges both at Albany and Constellation. This will overall improve the site's accessibility to public transport. Both Albany station and Constellation station have park and ride facilities.

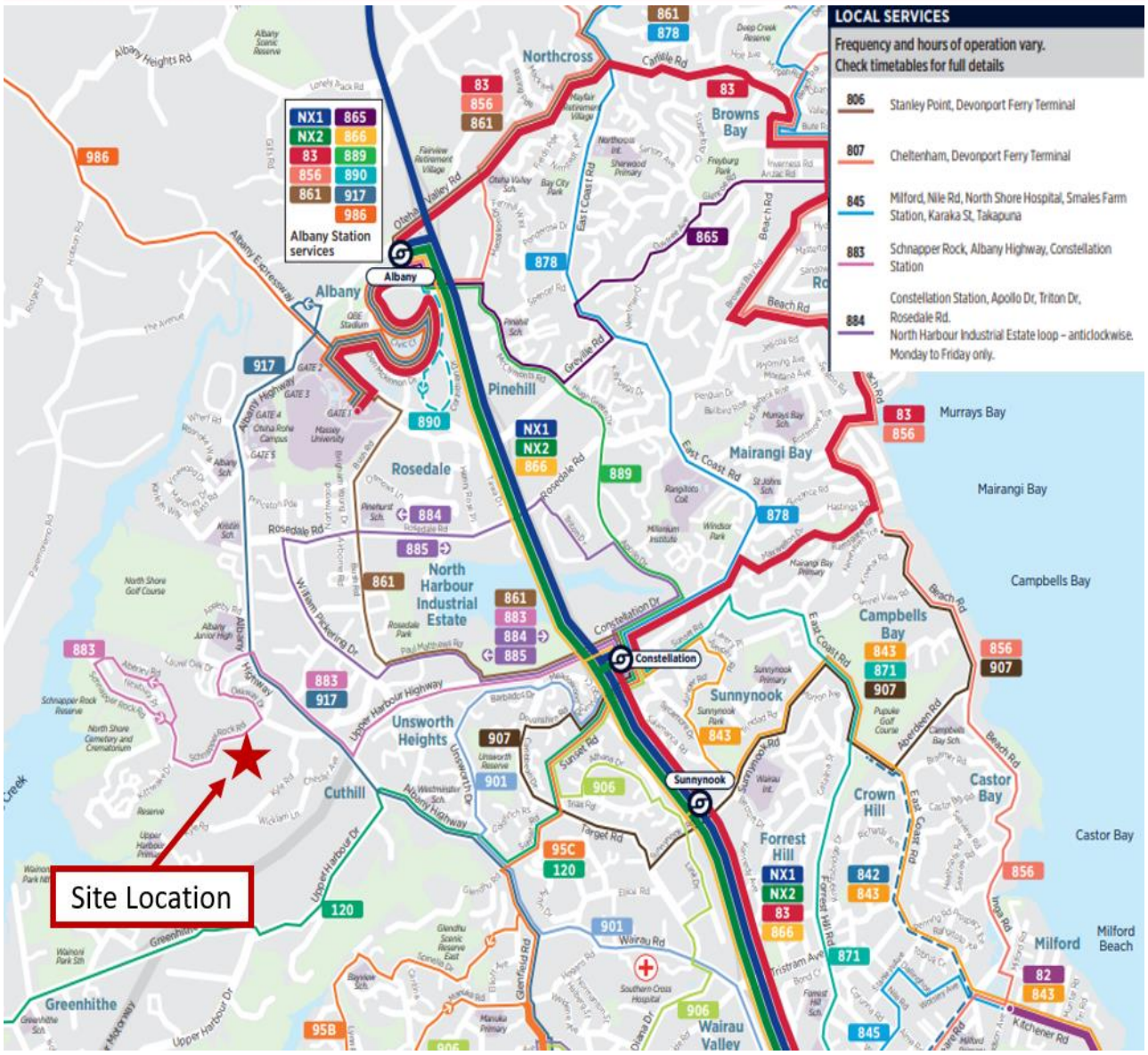


Figure 3.9 Bus routes near the vicinity of the site

3.7 Road Safety

Crash Records

A search of the NZ Transport Agency Crash Analysis System (CAS) database for the period of 2016 to 2020 (inclusive), identified 28 crashes in the vicinity of the site. The crashes are shown in the CAS crash diagram in Appendix A with totals summarised in **Table 3.2**. The search area included:

- Intersection of Schnapper Rock Road and Albany Highway
- Intersection of Schnapper Rock Road, Albany Highway and Bush Road
- Intersection of Schnapper Rock Road and Oakway Drive.
- Schnapper Rock Road between Oakway Drive and Kylie Road
- Schnapper Rock Road between Oakway Drive and 117 Schnapper Rock Road

Table 3.2 Crash Records

Location	Fatal	Serious	Minor	Injury Total	Non-injury	Total
Intersection of Schnapper Rock Road and Albany Highway	0	0	0	0	1	1
Intersection of Schnapper Rock Road, Albany Highway and Bush Road	0	0	2	2	18	20
Intersection of Schnapper Rock Road and Oakway Drive.	0	0	0	0	2	2
Schnapper Rock Road between Oakway Drive and Kylie Road	0	0	1	1	4	5
Schnapper Rock Road between Oakway Drive and 117 Schnapper Rock Road	0	0	0	0	0	0

The crash record shows that crashes are concentrated at the intersection of Schnapper Rock Road, Albany Highway and Bush Road. This is due to higher volumes of traffic than the other intersections combined with all movements of traffic being permitted. No strong correlation can be found at this intersection that shows the main cause of the crashes with the most common being rear-end crashes, which is typical at signalised intersections with high traffic volumes. All at this intersection the crashes occurred at low speeds which have resulted in no sever or fatal accidents.

Overall, there is no indication of any underlying safety issues with the surrounding roads along the frontage of the site and at the nearby intersections.

Risk Maps

The Waka Kotahi Safer Journeys Risk Assessment Tool as part of the Speed Management Framework 2020 is used to analyse the road safety of road corridors. The two types of risk metrics are summarised as follows:

- Collective Risk is a measure of the total estimated death and serious injury (DSi) casualty equivalents for a site. It is effectively a measure of the number of deaths and serious injuries that can be expected at a site over the next analysis period (typically five years). At a corridor level, Collective Risk is the total estimated DSi casualty equivalents derived from the intersection and midblock components divided by the length of the corridor. It is expressed as estimated DSi / km. This is shown in **Figure 3.10**.
- Personal Risk is a measure of the risk of an individual dying or being seriously injured at a site. It is calculated by dividing Collective Risk by a measure of traffic volume exposure. This is shown in **Figure 3.11**.

The risk rating will identify if there are any underlying safety issues along any of the corridors. These risk assessments are based upon crash data from 2015-2019.

Figure 3.10 Collective Risk for the surrounding road network

The collective risk maps shows that Schnapper Rock Road along the frontage of the site has either a low Collective Risk or a low-medium collective risk rating.

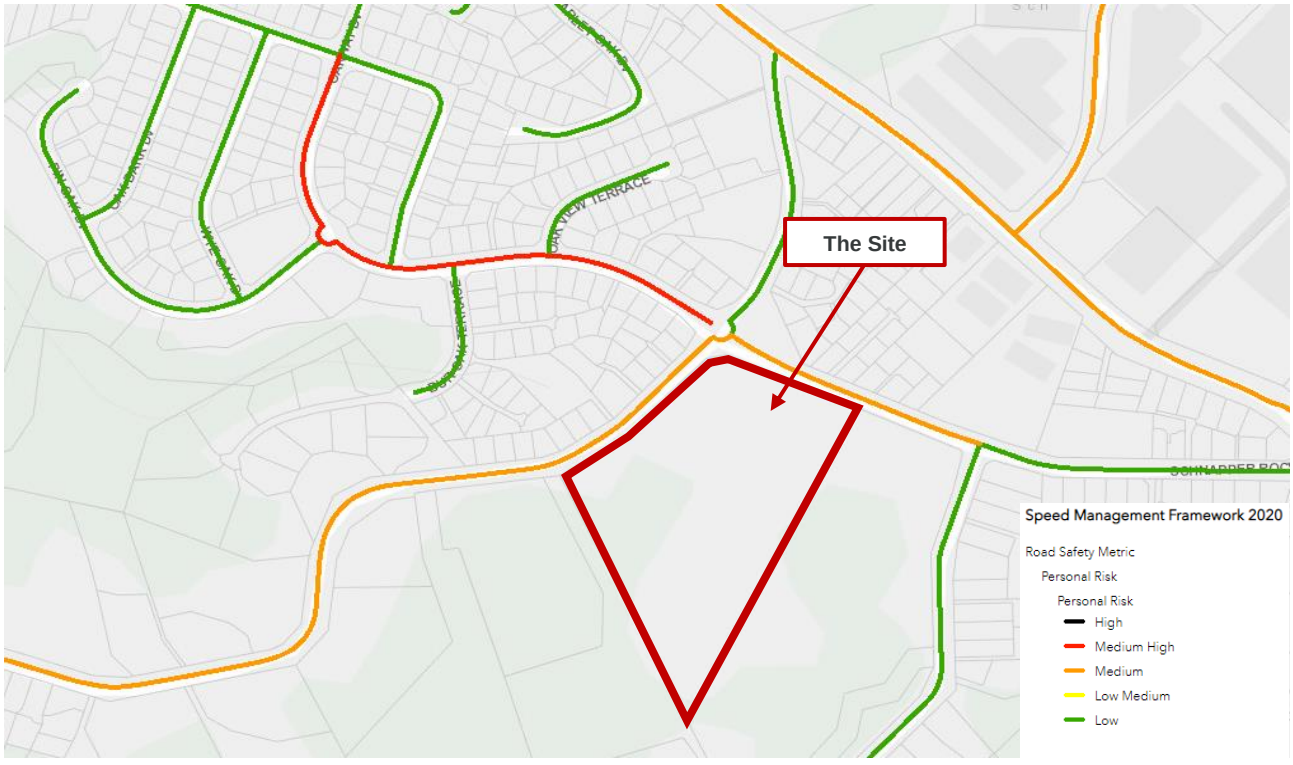


Figure 3.11 Personal Risk for the surrounding road network

The personal risk rating on Schnapper Rock Road is medium along the frontage of the site.

Overall, there is no indication of any underlying safety issues with the surrounding roads along the frontage of the site.

High Risk Intersections

Waka Kotahi's Mega Maps is a risk assessment tool which displays the location of the top 200 high-risk intersections based on Collective Risk using the estimated DSi casualty equivalents risk assessment process as used in the High-Risk Intersections Guide. There are no high-risk intersections near the site, with the nearest being 4.6km south of the site at the intersection of Glenfield Road and Kaipatiki Road.

4. Planned Future Upgrades

4.1 Future Infrastructure

Auckland Transport – Regional Land Transport Plan (2018-2028)

There are several projects planned in the vicinity of the site and included in the Auckland Transport – Regional Land Transport Plan (2018-2028) (RLTP). The RLTP sets out key projects and activities Auckland Transport is planning over the current 10-year period and how these will be funded. The following works are planned for this period:

- Extension of the Northern Busway to Albany Parkland – Ride, running in both directions alongside the motorway.
- Building on the existing busway from Constellation Drive to the city centre.
- A new bus station is proposed at Rosedale.
- Albany Station Park and Ride Extension
- Extension of the Northern Busway to Albany
- Northern Corridor Improvements – completion of the final section of the Western Ring Route providing a continuous Motorway link between the Northern and Upper Harbour motorways.
- 7km of shared walking and cycling path alongside SH1 and SH18.

Most of the projects listed are part of the Northern Corridor Improvements (NCI), expected to be completed by 2022. This is shown in **Figure 4.1**. No future cycling or pedestrian improvements are proposed near the vicinity of the site.

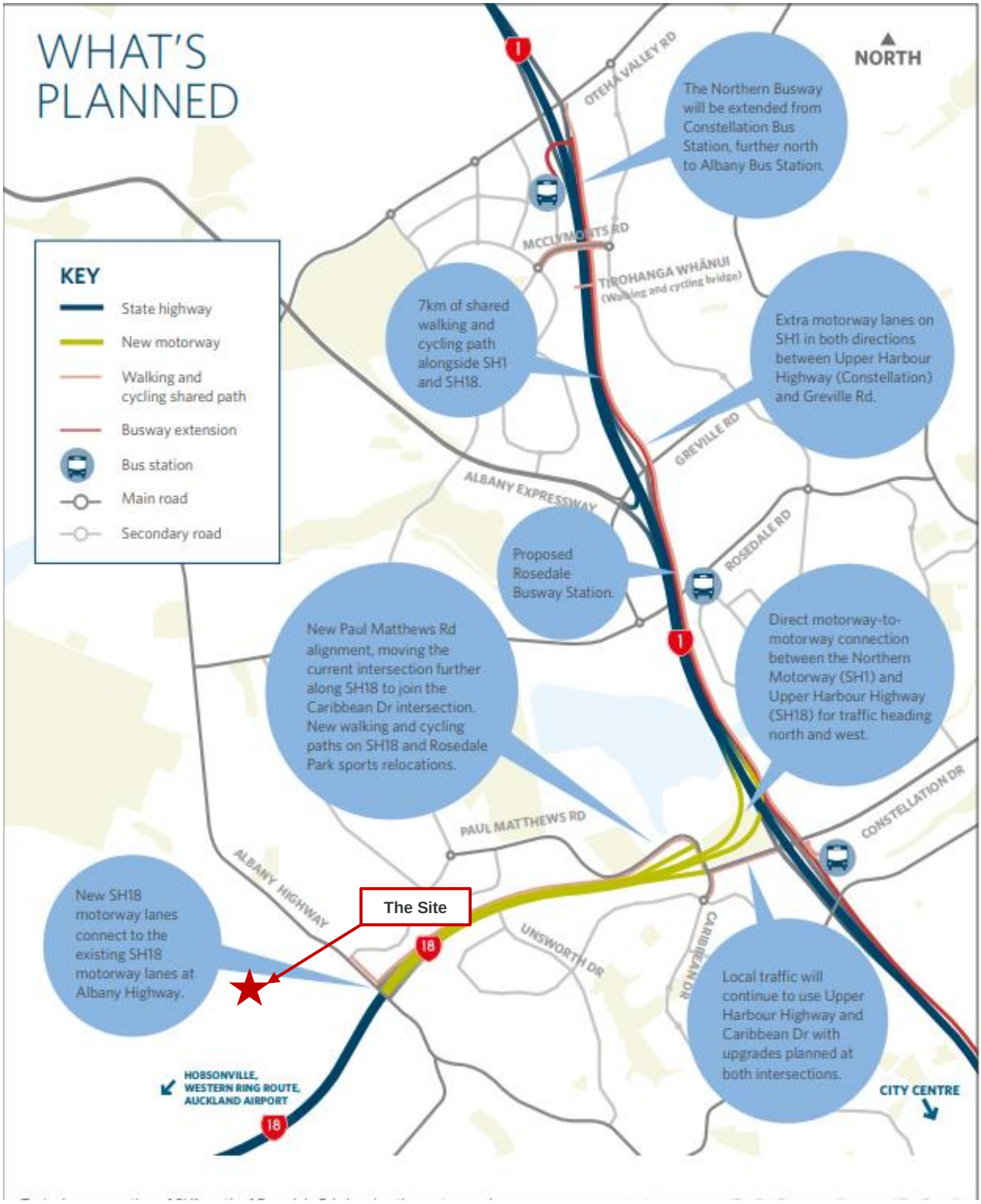


Figure 4.1 Northern Corridor Improvements Overview

Recent Cycling and Walking upgrades

A 3.8 km stretch of Albany Highway has been recently upgraded extending from Schnapper Rock Road/Bush Road intersection in the south to the Albany Expressway in the north. A view of this section is shown in **Figure 4.2** with a typical cross section shown in **Figure 4.3**.

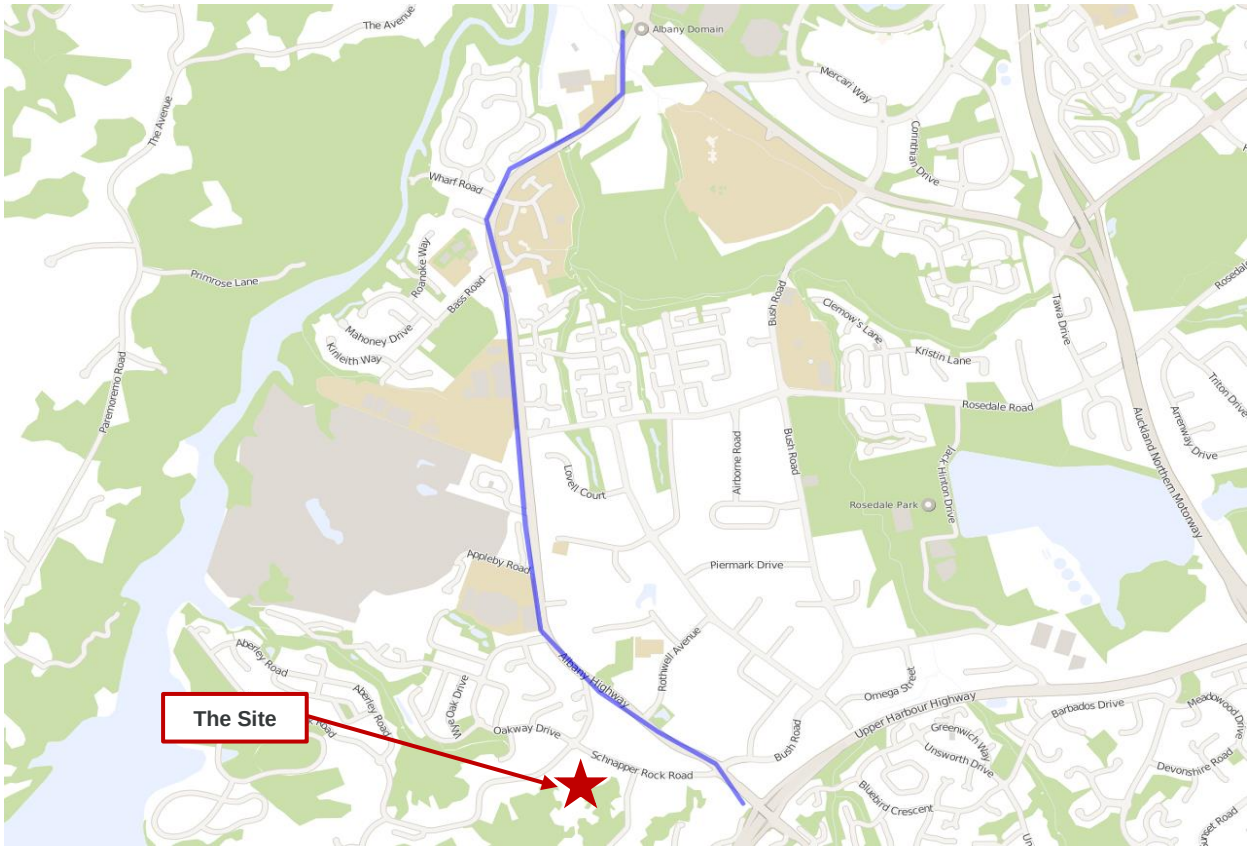


Figure 4.2 Upgrade extending from Schnapper Rock Road / Bush Road intersection to Albany Domain

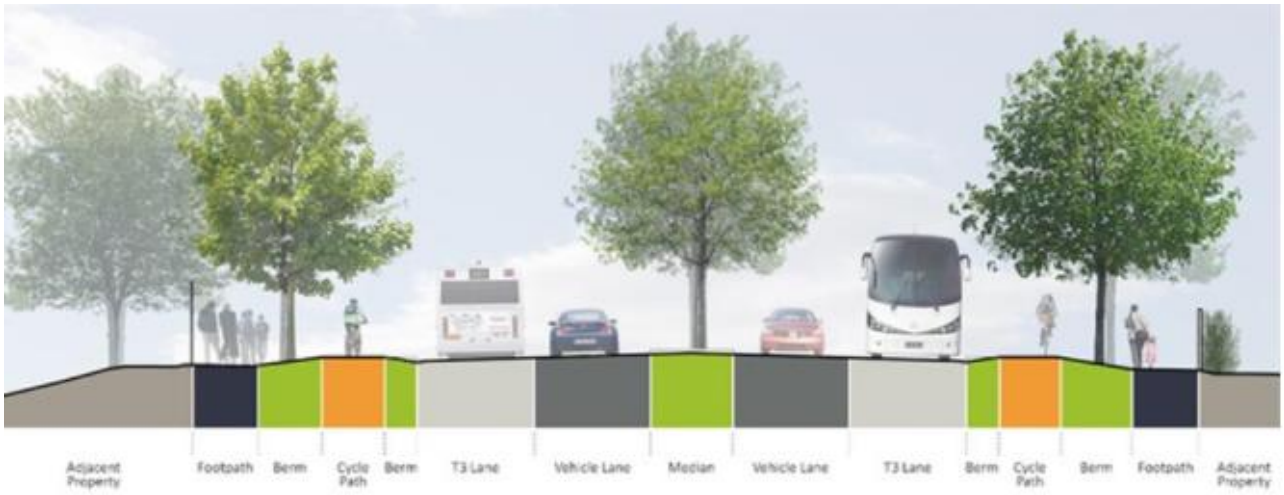


Figure 4.3 Typical cross section for the Albany Highway upgrade

Auckland Plan – Transport and Access (2050)

The Auckland Plan for Transport and Access aims to better connect people, places, goods and services. An overall strategic transport network has been proposed to outline key public transport and road network routes, this is shown in **Figure 4.4**. The site is positioned well for both motorway and key public transport routes.

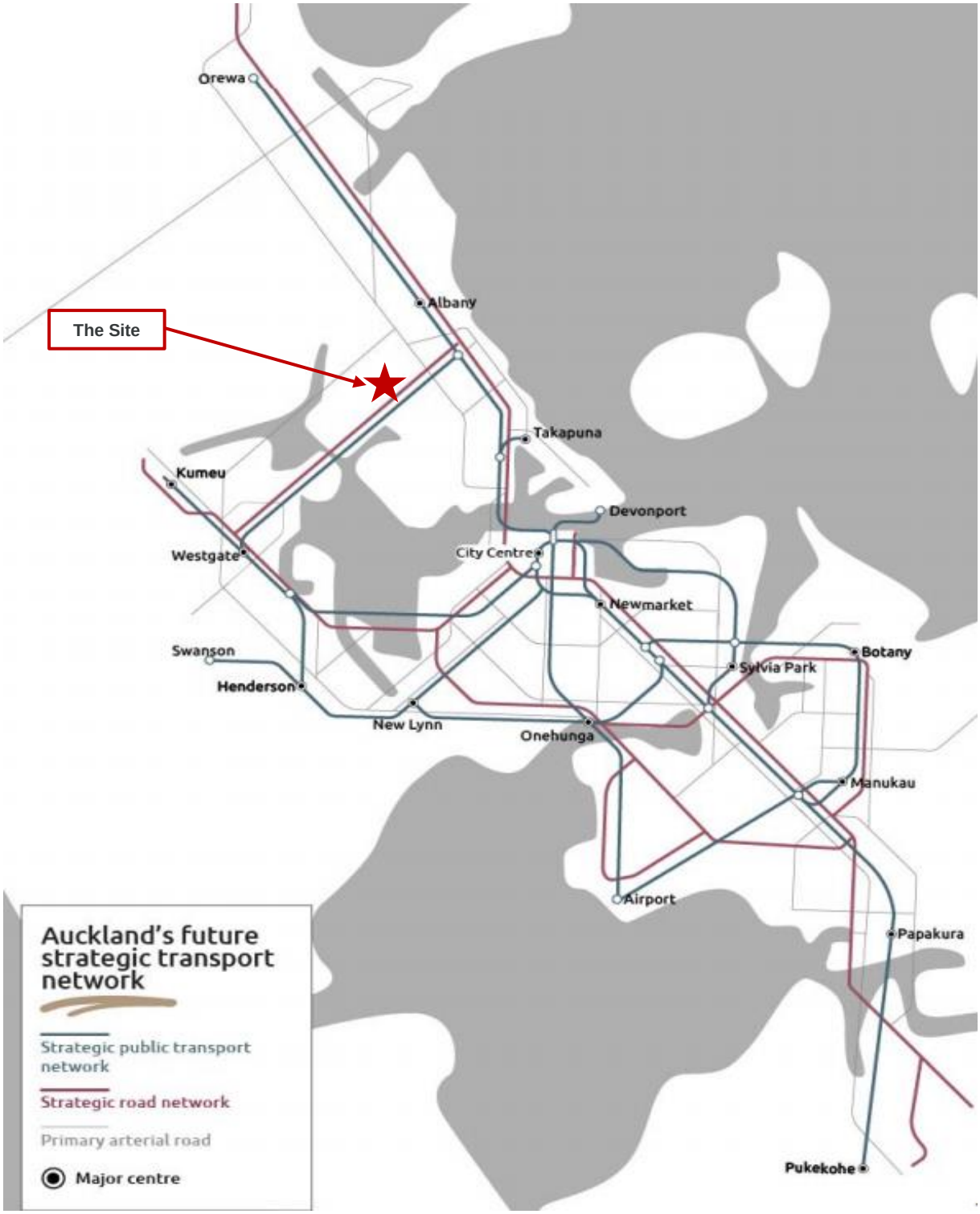


Figure 4.4 Auckland's future strategic transport network

The plan also discusses the need to expand Auckland's rapid transit network to accommodate a growing population. This plan is shown in **Figure 4.5**, the site is positioned well in relation to the potential future rapid transit network and has bus services that provide access to Constellation station.

Figure 4.5 Regional Future Rapid Transit Network

5. The Proposal

The proposal is to rezone the Residential – Large Lot Zone within the subject site to comprise a mixture of Residential - Mixed Housing Suburban Zone and Residential – Single House Zone. The intention of this proposal is to enable between 90-110 dwellings to be established as part of future subdivision and land use resource consents.

Figure 5.1 shows the Proposed Zoning Plan and an indicative location of a future public road that will connect to the existing road network. It is intended that the terrace housing will gain access to the proposed future public road via one or more private accessways (JOALs). The other dwellings may access the road network either via the proposed public road or, where safe and practical, via direct access onto Schnapper Rock Road where permitted or consented.

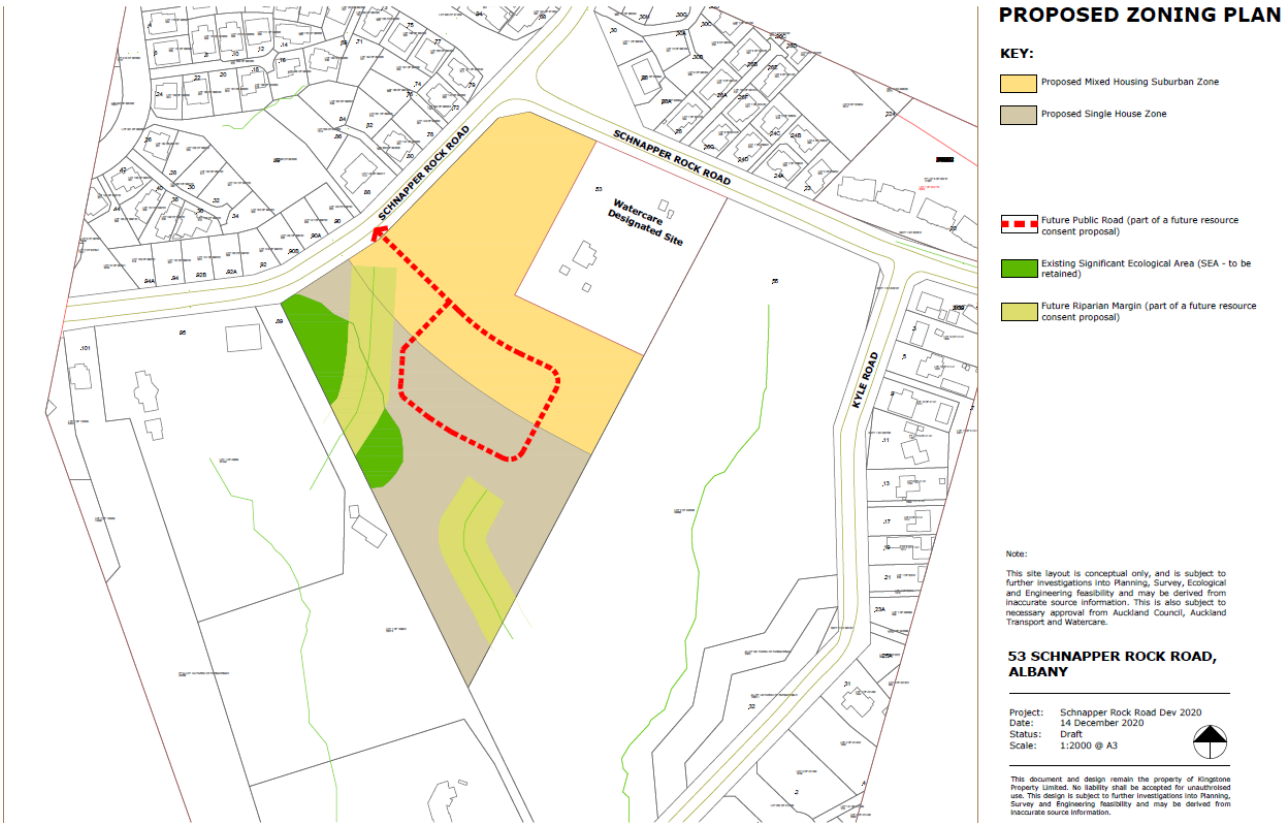


Figure 5.1 Proposed Zoning Plan

An indicative typical road cross section for the future public road is shown in **Figure 5.2**. The proposed public road will most likely function as a local road. The road will likely support low traffic volumes and speeds and provide connectivity suited for residential access and walking and cycling. The proposed public road will connect to Schnapper Rock Road, which preserves its function to connect the Schnapper Rock suburb to Albany Highway and other key arterial roads. This cross-section allows for a single traffic lane in each direction, 1.8m footpaths, and intermittent indented parking bays.

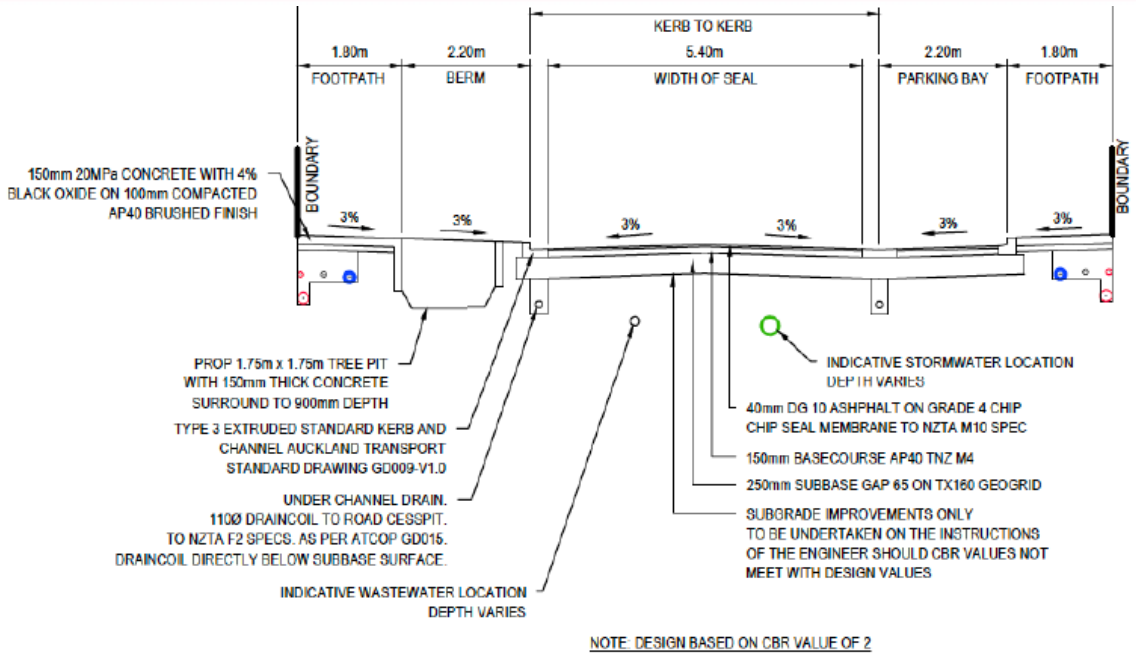


Figure 5.2 Typical Street Section

5.1 Intersection location

The site will be connected to Schnapper Rock Road by a new public road that will form an intersection with Schnapper Rock Road. When determining an appropriate location for a new intersection, sight distances are a key consideration. Austroads *AGRD04A Guide to Road Design – Unsignalised and Signalised Intersections* outlines safe intersection sight distances for various design speeds.

In accordance with Austroads (Part 4A), Safe Intersection Sight Distance (SISD) should be provided on the major road at any intersection. The calculation of SISD requires the 85th percentile speed (operating speed).

We have gathered additional data regarding the operating speed on Schnapper Rock Road; on Thursday 15 April 2021 we gathered readings during off-peak hours for a conservative assessment of operating speed, using a speed gun. We gathered 120 readings (60 in each direction) on the section of Schnapper Rock Road shown in **Figure 5.3**. The mean speed readings were 50 km/h, with the 85th percentile operating speed being 56km/h in the eastbound direction and 53km/h in the westbound direction. Note that the location of measurements is likely to be when drivers are travelling at the fastest (at the lowest section between two slight to moderate slopes).

Figure 5.3 Location of driver speed observations

The SISD calculations are outlined below.

- *D_T = decision time (observation time 3s + reaction time 1.5s) = 4.5s*
- *V = operating speed (km/h) = 56 (eastbound); 53 (westbound)*
- *d = coefficient of deceleration = 0.36 (urban)*
- *a = longitudinal grade. Varies from approximately 5% further west around the corner from the site to approximately flat at our indicated potential access location. We have taken -3% (downgrade) as a working factor.*

$$SISD = \frac{D_T \times V}{3.6} + \frac{V^2}{254 \times (d + 0.01 \times a)}$$

  - *SISD (eastbound) = 107m*
  - *SISD (westbound) = 100m*

We have considered how 107m (eastbound) and 100m (westbound) sight distance would look for various potential access locations along the site's frontage. We have used four potential access locations as case studies. Location A is the access point indicated in concept plans, with locations B and C further west along Schnapper Rock Road. Location Z has been considered as an alternative nearer to the Oakway Drive intersection. These four locations and the sight distance along the westbound lane (100m) are shown in **Figure 5.4**. Sight distance measurements have been measured from aerial photography, noting from our site visit that the gentle downgrade does not present any challenges for vertical sightlines (such as a crest) from either direction.

Figure 5.4 Potential access locations and westbound lane sight distance (100m)

The assessment of sight distance for the westbound lane to a potential access point (Z, A, B or C) shows that SISD would not be plausible for an access point at location Z however given the relatively straight alignment (and lack of vertical crests) along this section of Schnapper Rock Road, there is adequate sight distance for the westbound lane for locations A, B and C. Generally, we consider that any location 100m or further away from the roundabout limit line has adequate sight distance for the westbound lane.

For the eastbound lane, we have considered locations A, B and C (Z having been ruled out based on westbound sight distance).

For an intersection at site A, the 107m sightlines are shown in **Figure 5.5**.

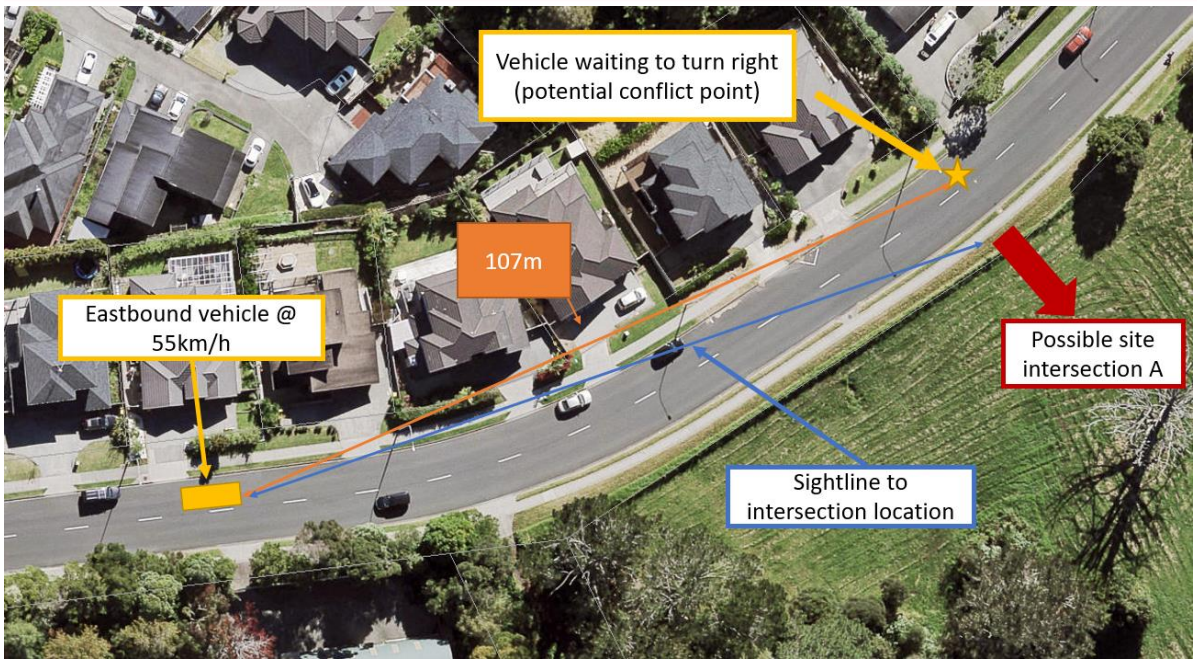


Figure 5.5 Illustration of 107m sightline for the Eastbound Lane of Schnapper Rock Road toward indicative intersection location A

For an intersection at the indicative location A, 107m of sight distance for eastbound traffic on Schnapper Rock Road is partly obstructed by a hedge of approximately 1.3m to 1.5m in height. However, due to the topography of Schnapper Rock Road, drivers are able to see over the top of this hedge from much further than 107m away, as illustrated in **Figure 5.6** below (noting that the Streetview capture is from the opposite lane and 2.5m height so is not an exact reflection of a driver's view). Vehicles can be clearly seen parked on the northern side of Schnapper Rock Road and drivers have plentiful opportunity to become aware of any potential conflicts at this location well in advance as they would be able to see into the access road itself. Furthermore, we consider that the sightline to the intersection itself (where a vehicle would be waiting to turn out of the site) is in practice more useful in anticipating a conflict before it occurs, and there is a fully clear sightline for greater than 107m in that regard. Therefore, we consider that there is adequate sight distance to warn drivers of any potential intersection conflicts that could arise at this location based on current operating speeds.

Figure 5.6 Eastbound view toward indicative intersection location (Streetview)

For an intersection at indicative location B, shown in **Figure 5.7**, the 107m sightline for the eastbound lane passes through the same hedge as per location A; similarly, drivers are able to see over the top of that hedge such that any potential conflicts are visible from upstream. For Location B, eastbound drivers would be able to see the access from a higher vantage point compared to Location A. There is also clear sight distance of the intersection itself for greater than 107m on approach, therefore any potential conflicts will be able to be anticipated before they occur.

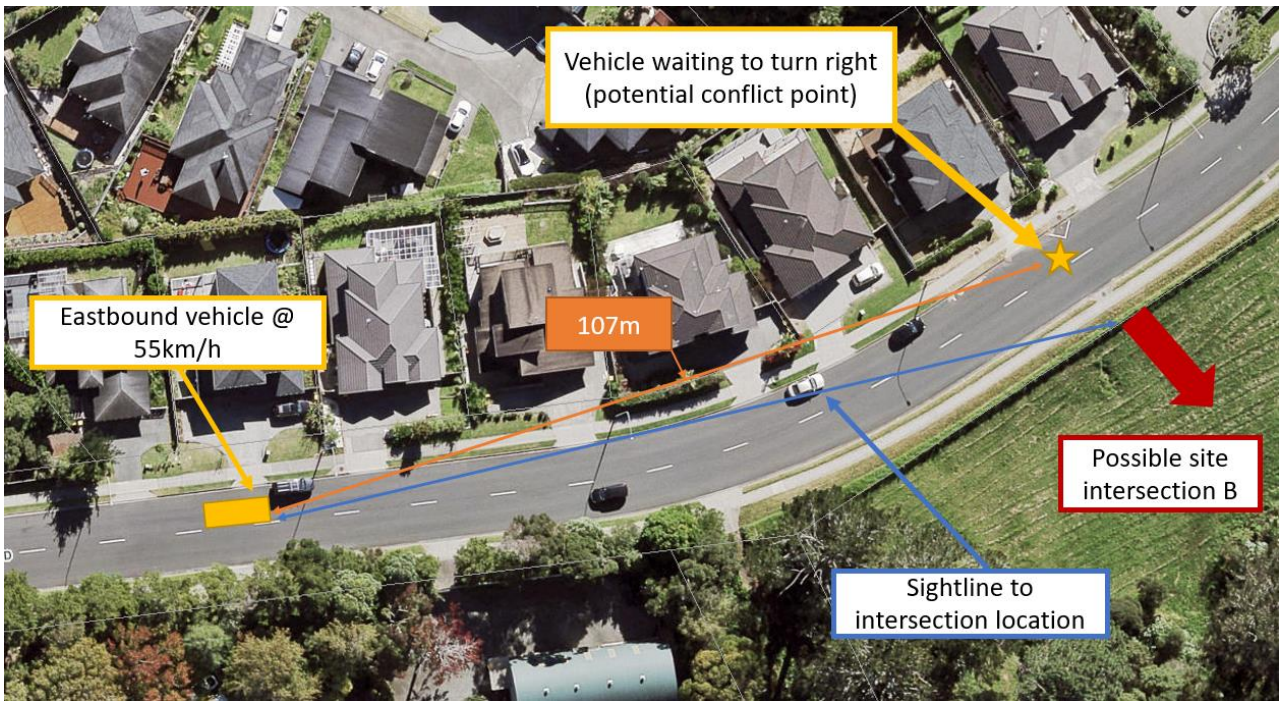


Figure 5.7 Illustration of 107m sightline for the Eastbound Lane of Schnapper Rock Road toward indicative intersection location B

For an intersection at indicative location C, the 107m sightline is uninterrupted as shown in **Figure 5.8**.

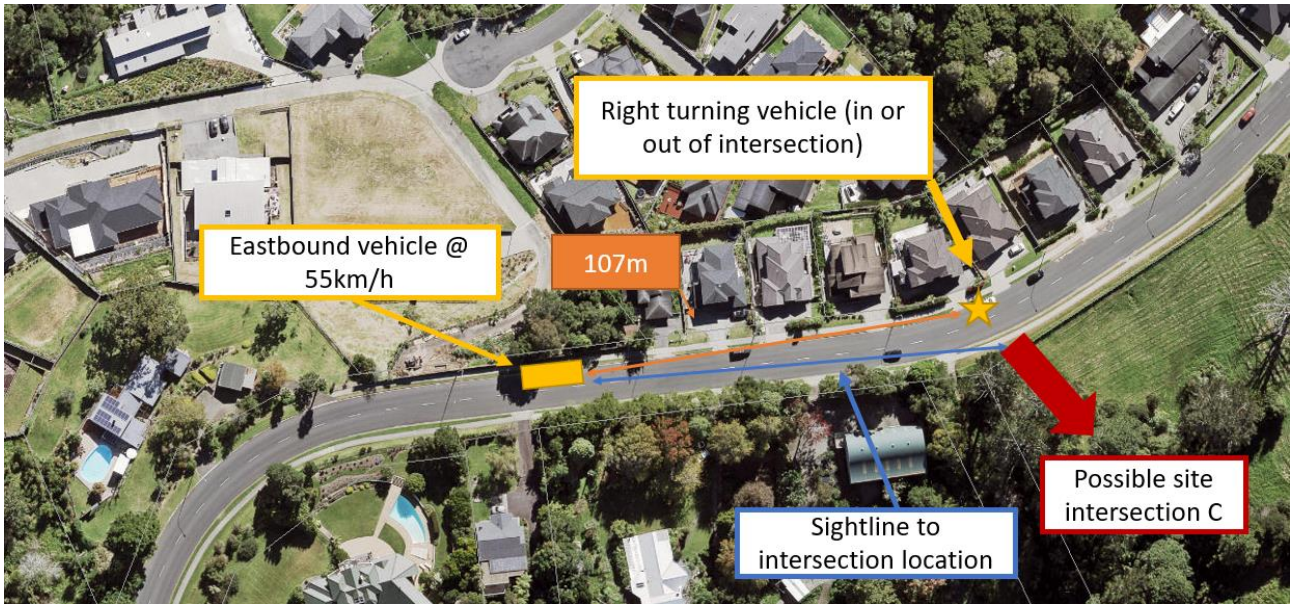


Figure 5.8 Illustration of 107m sightline for the Eastbound Lane of Schnapper Rock Road toward indicative intersection location C

On balance, we conclude the following in regard to the sight distance requirements for an access road into the proposal site:

- Based on the sight distance to a potential conflict point in the westbound lane of Schnapper Rock Road, an access road should be located no closer than 100m to the limit line of the Oakway Drive / Schnapper Rock Road roundabout intersection. In other words, it should be located approximately in the position of location A or further west.
- Based on the sight distance to a potential conflict point in the eastbound lane of Schnapper Rock Road, there is adequate sight distance (due to the vertical and horizontal geometry of Schnapper Rock Road) such that any conflicts are able to be anticipated from 107m away or further should an access road be located at location A or further west.

Therefore, we consider that an access road can safely be located along the north-western frontage to Schnapper Rock Road at any location no closer than 100m to the Oakway Drive / Schnapper Rock Road roundabout.

Note that due to the short distance between the Watercare site and the roundabout, we do not recommend an access road be located on the north-eastern frontage of the subject site.

5.2 Accessibility

Accessibility Metrics

Statistics New Zealand has recently updated their commuter maps to show the destinations that people are travelling to from a selected area. This map is shown in **Figure 5.9** Schnapper Rock suburb shown in green.

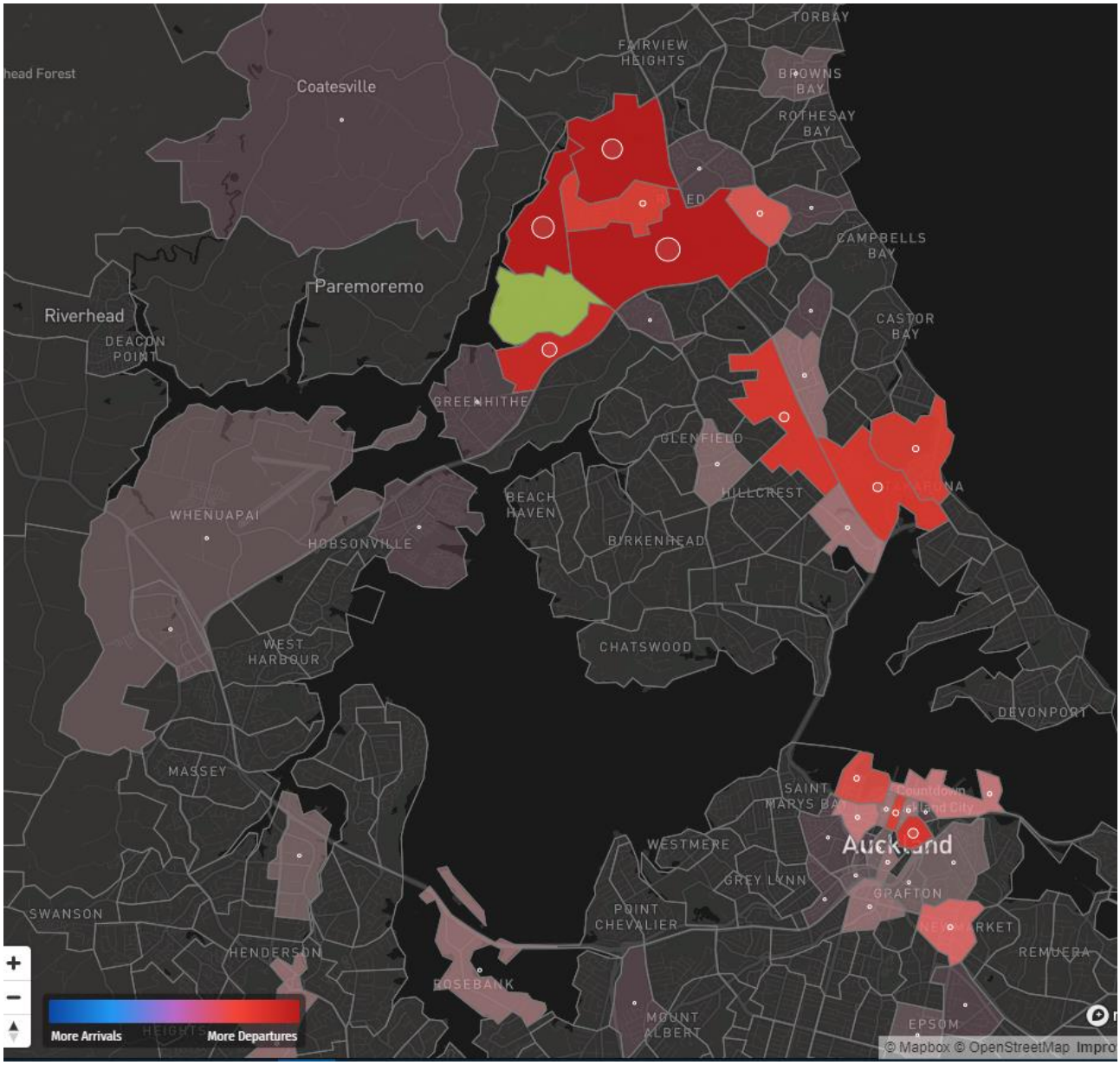


Figure 5.9 Schnapper Rock suburb departure destinations. Source: Stats NZ

The primary areas that residents from Schnapper Rock are travelling to are:

- Albany area (24%),
- North Harbour (13%),
- Remain in Schnapper Rock (12.2%)
- Greenhithe East (7.13%),
- Central City and University (8.37%), and
- Takapuna (6.4%).

The accessibility to these areas via different travel options is shown for the morning (AM) and evening (PM) commuter peaks is shown in **Table 5.1** (apart from people staying in Schnapper Rock).

Table 5.1 Travel times to/from popular travel destinations from Schnapper Rock

	Albany/ Schnapper Rock	North Harbour/ Schnapper Rock	Greenhithe E/ Schnapper Rock	Central City and University / Schnapper Rock	Takapuna / Schnapper Rock
Private Vehicle – AM peak	6-12mins to Albany	3-7mins to North Harbour	5-12mins to Greenhithe E	24-55mins to Central City	14 – 44mins to Takapuna
Private Vehicle – PM peak	6-12mins to Schnapper Rock	5-9mins to Schnapper Rock	4-8mins to Schnapper Rock	24mins – 1 hr 5mins to Schnapper Rock	16-40mins to Schnapper Rock
Public Transport – AM peak	17mins to Albany	20mins walk recommended	25mins walk recommended	53mins to Central City	45mins to Takapuna
Public Transport – PM peak	17mins to Schnapper Rock	22mins walk recommended	28mins walk recommended	48mins to Schnapper Rock	43mins to Schnapper Rock
Cycling – AM peak	12mins to Albany	5mins to North Harbour	10mins to Greenhithe E	55mins to Central City (route includes a ferry)	38mins to Takapuna
Cycling – PM peak	16 mins to Schnapper Rock	9 mins to Schnapper Rock	13mins to Schnapper Rock	1hr 17mins to Schnapper Rock (route includes a ferry)	37mins to Schnapper Rock

Overall, there are similar travel times between Schnapper Rock and popular commuter destinations using different modes of transport. There is a large range of vehicle travel times for most of the destinations especially the larger the distance between your origin and destination. This could lead commuters to opt for public transport or cycling as their desired commute due to the reliable journey times.

In summary, Schnapper Rock is considered to be generally well connected to the surrounding road, cycling and public transport network.

Pedestrian and Cycle Access

At the time of writing it is understood that there are no proposed dedicated cycling and walking infrastructure upgrades in Schnapper Rock. Footpaths are being provided as part of the Kyle Road subdivision to the southeast that will partially complete the nearby footpath network. As assessed in the existing pedestrian and cycling chapters of this report, the site is well connected to the surrounding cycling and pedestrian network. We recommend that the footpath be extended along the northeast frontage to complete the connection along Schnapper Rock Road and that internal pedestrian connectivity be considered at the subdivision design stage, including connections to the Kyle Road subdivision.

Public Transport Access

Th established bus route between Schnapper Rock and Constellation is considered unlikely to change in future. However, there may be changes when the Rosedale bus interchange is established. Auckland Transport reviews its bus network regularly to ensure best performance of their network. At the time of writing, it is understood that there are no proposed bus route changes in Schnapper Rock.

6. Travel Characteristics and Trip Generation

6.1 Trip Generation

The eventual land use composition of the site is likely to comprise between 90 to 110 low to medium density dwellings; 110 is considered an upper limit and therefore conservative. Trip rates can be calculated using existing trip rate estimates and past surveys. A summary of the most recent trip rates for residential dwellings is shown in **Table 6.1**. A peak hour trip rate of 0.9 two-way trips per dwelling is chosen as a conservatively high figure, hence the proposed residential development of 90 – 110 dwellings is conservatively estimated to generate 81- 99 additional trips in the peak hour. A conservative approach has been undertaken in that the maximum number of dwellings (110) has been used to estimate trip generation. In practice we anticipate that vehicular trip generation will be lower as there is good access to public transport and there are schools and other facilities within walking and cycling distance.

Table 6.1 Trip Rate Comparison

Source	Daily (vehicles per day)	Peak Hour (vehicles per hour)	Daily Rate Applied to Site	Peak Hour Rate Applied to Site
Trips Database Bureau	8.2/dwelling	0.9/dwelling	902	99
RTA	9.0/dwelling	0.85/dwelling	990	93.5
Average	**8.6/dwelling**	**0.875/dwelling**	**946**	**96.25**

6.2 Trip Distribution

The peak hour trips generated by the dwellings have been distributed using Statistics New Zealand Journey to Work (JTW) data from the 2018 Census (https://www.stats.govt.nz/tools/commuter-waka-2018-census-data-visualisation).

The JTW data indicates that most traffic travels away from Schnapper Rock for work or education. In fact, the JTW data did not capture any trips entering Schnapper Rock for work or education. It is therefore suitable to assume a heavily skewed inbound/outbound split. The following splits have therefore been assumed:

- 80% outbound and 20% inbound in the AM peak;
- 20% outbound and 80% inbound in the PM peak.

To determine the direction of travel, the JTW data was used to divide destinations into three broad regions:

- Local & East of Schnapper Rock, including the Albany Central, Albany South, North Harbour, Windsor Park and Pinehill Statistical Area 2 (SA2);
- North of Schnapper Rock, including SA2s in Albany West, Browns Bay, Orewa and Rodney Ward; and,
- South & West of Schnapper Rock, including SA2s in Greenhithe, the lower North Shore, West Auckland, Auckland CBD and beyond.

It was found that traffic to and from the North region can be assumed to use Albany Highway (N) exclusively, while the South & West region can be assumed to use Albany Highway (S) exclusively.

For the areas in the Local & East region, it was found that several possible routes existed for traffic to use. The traffic distribution was therefore calculated individually for each of these SA2 areas. Four primary routes were identified: Albany Highway (N), Rothwell Avenue, Bush Road and Albany Highway (S). The proportion of traffic using each route was gravity weighted based on peak hour travel times obtained from Google Maps. Outbound trips have used travel times in the AM peak and inbound trips have used those in the PM peak.

The overall directionality of trips has been calculated based on these assumptions and weighted using the trip numbers from the JTW data. The outbound and inbound trip directionality, respectively, for each of these areas and for the overall development is summarized in **Table 6.2** and **Table 6.3**. Note that around 12% of respondents in the WC data listed their

origin and destination both within Schnapper Rock. For the purposes of calculating the expected external trip distributions these internal trips have been excluded.

Table 6.2 Outbound trip distribution

Area	JTW trips	Albany Hwy N	Rothwell Ave	Bush Rd	Albany Hwy S
Albany Central	252	48%	23%	29%	0%
Albany South	51	44%	25%	31%	0%
North Harbour	309	29%	29%	41%	0%
Windsor Park	42	32%	24%	28%	15%
Pinehill	6	37%	24%	30%	9%
North	333	100%	--	--	--
South & West	1149	--	--	--	100%
Weighted Total	**2142**	**27.2%**	**8.1%**	**10.8%**	**54.0%**

Table 6.3 Inbound trip distribution

Area	JTW trips	Albany Hwy N	Rothwell Ave	Bush Rd	Albany Hwy S
Albany Central	252	38%	31%	31%	0%
Albany South	51	33%	33%	33%	0%
North Harbour	309	30%	30%	40%	0%
Windsor Park	42	25%	25%	25%	25%
Pinehill	6	27%	27%	27%	19%
North	333	100%	--	--	--
South & West	1149	--	--	--	100%
Weighted Total	**2142**	**25.7%**	**9.3%**	**10.8%**	**54.2%**

Based on the trip distribution, development movements were added to the following three intersections:

- Schnapper Rock Road / Oakway Drive roundabout
- Schnapper Rock Road / Albany Highway / Bush Road signalised intersection
- Oakway Drive / Albany Highway signalised intersection.

It was assumed that the movements made by trips using each route would be as follows:

- Albany Highway North: Outbound via left-turn at Schnapper Rock Road left-in left-out (LILO) and inbound via right-turn at Oakway Drive signalised intersection.
- Rothwell Avenue: Outbound via left-turn at Schnapper Rock Road / Albany Highway / Bush Road signalised intersection and inbound via left-turn at Schnapper Road LILO.
- Bush Avenue: Outbound and inbound via straight-ahead movements through Schnapper Rock Road / Bush Road signalised intersection.
- Albany Highway South: Outbound via right turn at Schnapper Rock Road / Albany Highway / Bush Road signalised intersection and inbound via left-turn at the same intersection.

Additional data collection was undertaken to update the vehicle volumes used. The following additional data was used in the intersection analysis:

- Movement and speed survey at Schnapper Rock Rd / Oakway Dr roundabout on 15 April 2021
- Lane split and movement survey at the Schnapper Rock Rd approach of Schnapper Rock Rd / Albany Highway / Bush Rd on 15 April 2021
- SCATS detector flows were obtained from ATOC for the signalised intersections at Albany Highway / Oakway Dr and Schnapper Rock Rd / Albany Highway / Bush Rd. This extract covers that dates of:
  - Albany Highway / Oakway Dr from 12 to 18 April 2021
  - Schnapper Rock Rd / Albany Highway / Bush Rd from 15 to 18 March 2021
- SCATS phase diagrams and phase timings for Schnapper Rock Rd / Albany Highway / Bush Rd from 16 to 18 March 2021.
- Schnapper Rock Road / Oakway Drive roundabout: Traffic survey undertaken on Thursday 15 April 2021.

The additional morning and evening peak trips occurring due to the development are shown in **Figure 6.1** and **Figure 6.2** for the key intersections with Albany Highway.

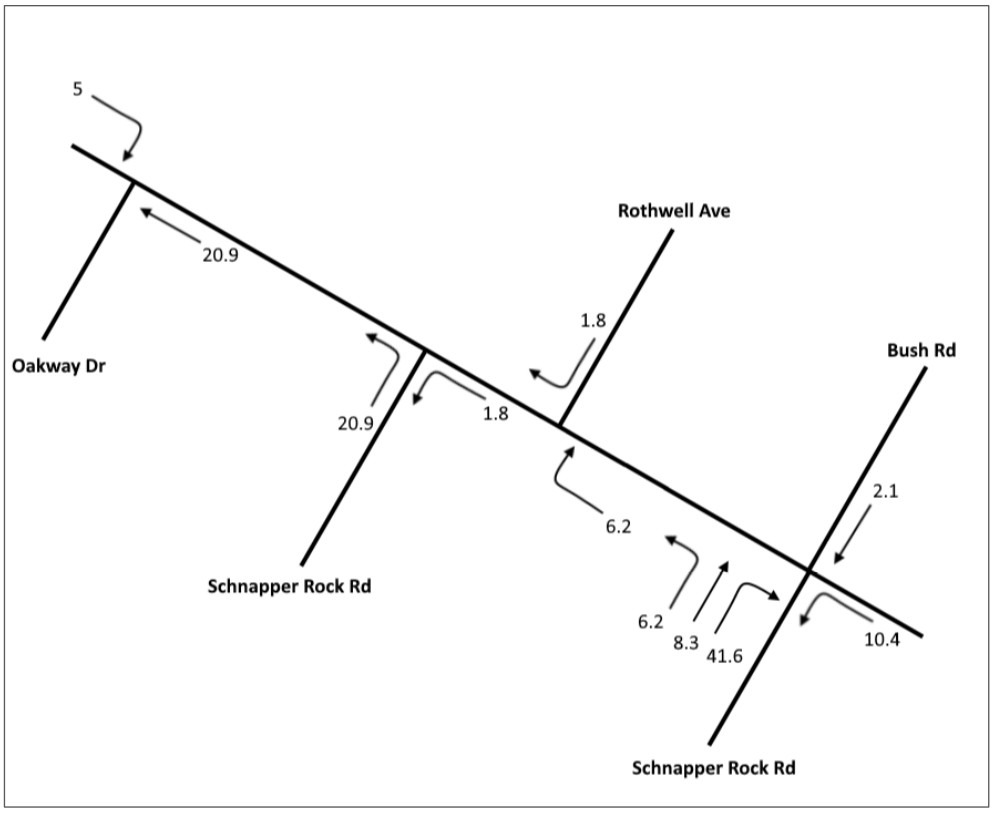


Figure 6.1 Morning peak development trip distribution at Albany Hwy

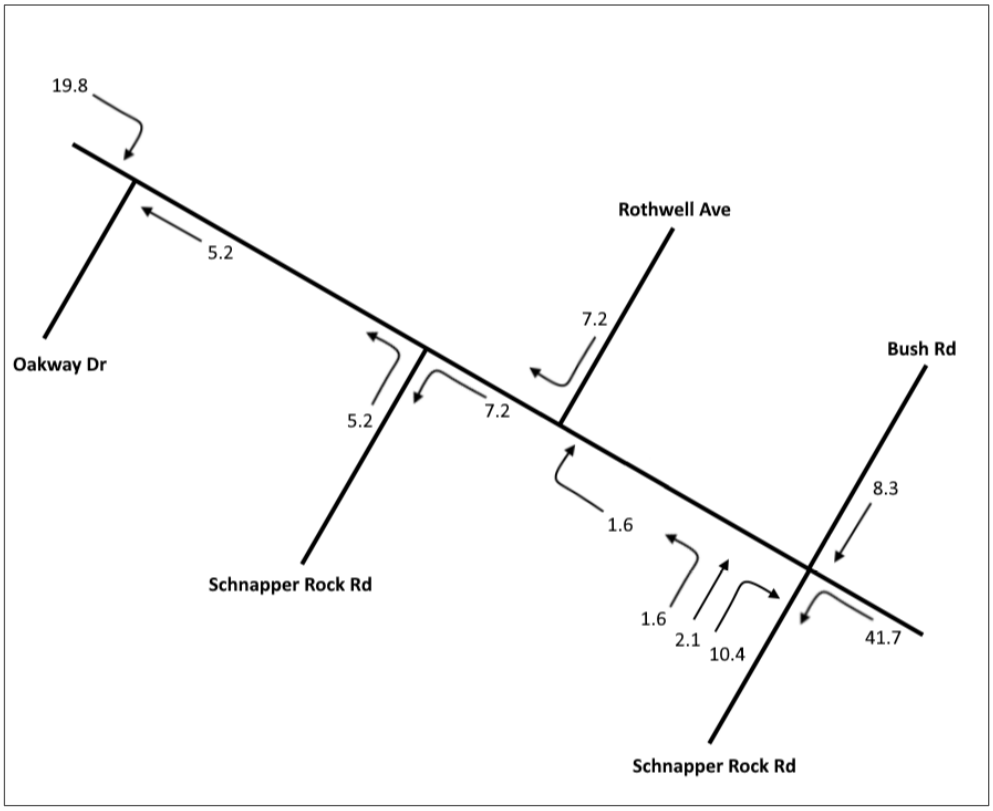


Figure 6.2 Evening peak development trip distribution at Albany Hwy

6.3 Parking Supply and Demand

Car parking for the Plan Change area will be provided on site within each lot. Vehicle access and parking layouts of the proposal will be designed to comply with District Plan requirements and will be detailed at resource consenting stages.

7. Impacts on Transport Network

7.1 Traffic Impacts of Proposal

An assessment of the number of traffic movements along key routes that will connect the site to the road network has been carried out. Generally, a capacity ratio lower than 0.77 is a Level of Service (LoS) of A, B or C [2]. **Table 7.1** shows what general traffic flow description this correlates to.

Table 7.1 Level of Service (LoS) relationship with Capacity Ratio (V/C)

Level of Service Band	General Traffic Flow Description	Capacity Ratio (V/C)
LOS A	Primarily free-flow operation	Below 0.6
LOS B	Reasonably unimpeded operation	0.61- 0.70
LOS C	Stable operation	0.71- 0.80
LOS D	A less stable condition in which small increases in flow may cause substantial increases in delay and decreases in travel speed	0.81 – 0.90
LOS E	Characterised by unstable operation and significant delay	0.91 – 1.00
LOS F	Characterised by flow at extremely low speed. Congestion is likely occurring at the boundary intersections, as indicated by high delay	Greater than 1.0

Generally, any LOS greater than LOS D is considered “quite congested”.

7.2 Operation of Schnapper Rock Rd / Oakway Dr Roundabout

SIDRA modelling has been undertaken, utilising the survey data collected on 15 April 2021. Lanes were configured as currently installed and incorporates conservative assumptions in terms of the entry radius (15m, reduced from 20m default) and the entry angle (40 degrees, increased from 30 degrees default). The intersection performs well in all periods and scenarios and no approach drops below LOS A in any of the tested scenarios. The distribution of the additional traffic generated by the development is shown in **Table 7.2**. The current operation of the intersection is shown in **Table 7.3** and **Table 7.4** for the morning and evening peak periods, respectively.

Table 7.2 Distribution of Development Traffic

Road	Movement	AM Development Trips	PM Development Trips
Schnapper Rock (S)	L		
	T	20.9	5.2
	R	56.1	14.1
Schnapper Rock (E)	L	12.5	50
	T		
	R		
Schnapper Rock (N)	L		
	T	1.8	7.2
	R		
Oakway (W)	L		
	T		

[2] https://www.nzta.govt.nz/assets/resources/research/reports/489/docs/489.pdf

Road	Movement	AM Development Trips	PM Development Trips
	R	5	19.8
Overall		96.3	96.3

Table 7.3 Schnapper Rock Rd / Oakway Dr intersection performance, 2021 morning peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay	LOS	95%Q	Vol	Deg Satn	Delay	LOS	95%Q
Schnapper Rock (S)	L	37	0.274	4.3	A	12.3	37	0.343	4.4	A	16.6
	T	121	0.274	4.4	A	12.3	143	0.343	4.4	A	16.6
	R	140	0.274	8.3	A	12.3	199	0.343	8.4	A	16.6
Schnapper Rock (E)	L	84	0.186	3.5	A	9.3	97	0.2	3.5	A	10.1
	T	91	0.186	3.5	A	9.3	91	0.2	3.6	A	10.1
	R	63	0.186	7.5	A	9.3	63	0.2	7.5	A	10.1
Schnapper Rock (N)	L	25	0.046	6.2	A	1.9	25	0.052	6.7	A	2.1
	T	6	0.046	6.2	A	1.9	8	0.052	6.8	A	2.1
	R	4	0.046	10.1	A	1.9	4	0.052	10.7	A	2.1
Oakway (W)	L	20	0.339	6.1	A	16.3	20	0.375	6.9	A	18.4
	T	236	0.339	6.1	A	16.3	236	0.375	6.9	A	18.4
	R	40	0.339	10	A	16.3	45	0.375	10.9	A	18.4
Overall		867	0.339	5.9	A	16.3	968	0.375	6.3	A	18.4

Table 7.4 Schnapper Rock Rd / Oakway Dr intersection performance, 2021 evening peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay	LOS	95%Q	Vol	Deg Satn	Delay	LOS	95%Q
Schnapper Rock (S)	L	9	0.14	4.2	A	5.8	9	0.161	4.3	A	6.8
	T	51	0.14	4.2	A	5.8	56	0.161	4.3	A	6.8
	R	86	0.14	8.2	A	5.8	101	0.161	8.2	A	6.8
Schnapper Rock (E)	L	155	0.284	4.4	A	14.4	207	0.345	4.8	A	18.4
	T	97	0.284	4.4	A	14.4	97	0.345	4.8	A	18.4
	R	56	0.284	8.4	A	14.4	56	0.345	8.7	A	18.4
Schnapper Rock (N)	L	24	0.059	5.8	A	2.5	24	0.071	6.1	A	3
	T	18	0.059	5.8	A	2.5	25	0.071	6.1	A	3
	R	7	0.059	9.7	A	2.5	7	0.071	10.1	A	3
Oakway (W)	L	17	0.284	4.8	A	13.5	17	0.313	5	A	15.1
	T	152	0.284	4.8	A	13.5	152	0.313	5	A	15.1
	R	121	0.284	8.7	A	13.5	142	0.313	8.9	A	15.1
Overall		793	0.284	5.9	A	14.4	893	0.345	6.2	A	18.4

This demonstrates that there is sufficient capacity at the Schnapper Rock / Oakway Dr intersection to accommodate the development traffic. There are no operational or queue length concerns to highlight.

7.3 Operation of Oakway Dr / Albany Highway Signalised Intersection

SIDRA modelling for this intersection has been undertaken, utilising the SCATS detector flows obtained for 12 – 18 April 2021. Lanes were configured as currently installed, including T2 lanes along Albany Highway to the north and south. The layout used in the 2021 modelling is shown in **Figure 7.1**, note that the western approach is currently disabled in SCATS as the property utilising it is unoccupied.

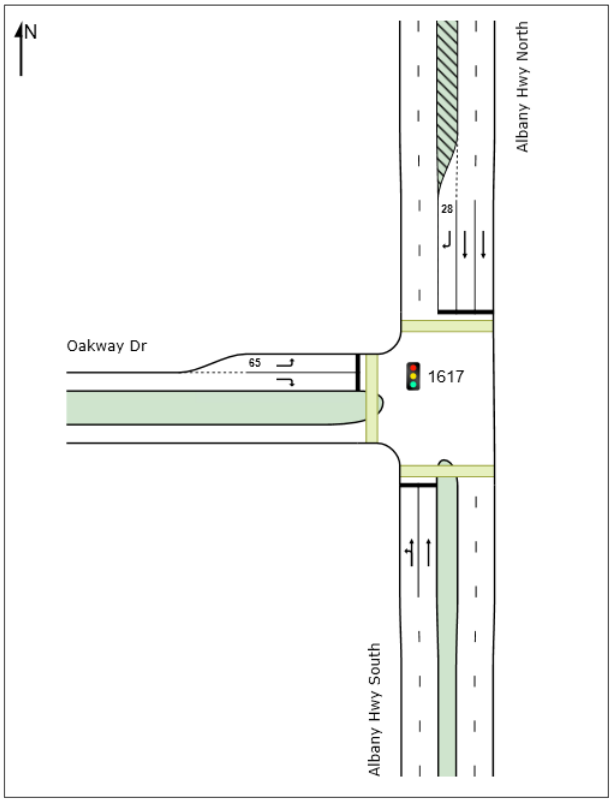


Figure 7.1 2021 intersection configuration at Albany Highway / Oakway Dr

The lane utilisation for the through lanes was calculated using the ratio of SCATS detections for each lane and period, the factors used were kept constant in the 2031 analysis and are shown in **Table 7.5**.

Table 7.5 Lane utilisation ratio of kerbside Albany Highway T2 lane

	Southbound	Northbound
Morning Peak	0.54	0.91
Evening Peak	0.88	0.51

Using the SCATS phasing provided by ATOC, the SIDRA results show that the performance of the intersection in the peak periods is busy, but not overly congested. The overall level of service is LOS C in both periods, queues generally contained within available capacity, and a worst movement degree of saturation of 0.531 in the morning peak and 0.765 in the evening peak.

The addition of development traffic in line with **Figure 6.1** and **Figure 6.2** shows only minor increase in delay of less than one second in the evening peak, and no impact on delay in the morning peak. Intersection performance for the 2021 year without and with development is shown in **Table 7.6** for the morning peak and **Table 7.7** for the evening peak.

Table 7.6 Albany Highway / Oakway Dr intersection performance, 2021 morning peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay	LOS	95%Q	Vol	Deg Satn	Delay	LOS	95%Q
Albany (S)	L	99	0.483	22.2	C	94.6	99	0.494	22.3	C	97.9
	T	833	0.531	17.9	B	110.1	855	0.543	18	B	114.1
Albany (N)	T	519	0.421	19.8	B	78.6	519	0.423	19.7	B	78.4
	R	159	0.512	45.5	D	55.9	164	0.545	45.6	D	57.9
Oakway (W)	L	252	0.332	29.8	C	70.9	252	0.332	29.8	C	70.9
	R	109	0.482	58.8	E	44.2	109	0.482	58.8	E	44.2
Overall		1971	0.531	24.6	C	110.1	1998	0.545	24.6	C	114.1

Table 7.7 Albany Highway / Oakway Dr intersection performance, 2021 evening peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay	LOS	95%Q	Vol	Deg Satn	Delay	LOS	95%Q
Albany (S)	L	63	0.386	32.4	C	70.3	63	0.397	33.4	C	72.5
	T	735	0.756	31.8	C	180.7	741	0.779	33.5	C	189.5
Albany (N)	T	755	0.512	18.7	B	116.1	755	0.517	18.7	B	117.6
	R	335	0.765	29.1	C	87.8	356	0.777	29.2	C	93.9
Oakway (W)	L	91	0.093	19.1	B	18.3	91	0.092	18.5	B	17.9
	R	22	0.097	55.4	E	8.4	22	0.097	55.4	E	8.4
Overall		2001	0.765	26.1	C	180.7	2028	0.779	26.8	C	189.5

7.4 Operation of Schnapper Rock Rd / Albany Highway / Bush Rd Signalised Intersection

SIDRA modelling has been undertaken for this intersection, utilising SCATS detector flows and phase timings obtained for the period 16 – 18 March 2021. Lane configurations were set as currently installed and phasing utilises average peak hour timings obtained from the SCATS data. One assumption has been made regarding the northern approach right turn from Albany Highway into Schnapper Rock Rd, this is controlled by a variable phase combined with the southern approach right turn but has very low volumes, less than one vehicle every four or five cycles on average. To simplify the phasing within SIDRA the northern approach right turn has been set to filter in phase F2 in the morning peak, removing the variable phasing arrangement.

The phasing arrangement modelled is shown in **Figure 7.2**. Note, phases C and F2 only run in the morning peak, phase F1 only runs in the evening peak. The average cycle time obtained from the SCATS data is 150s for both periods.

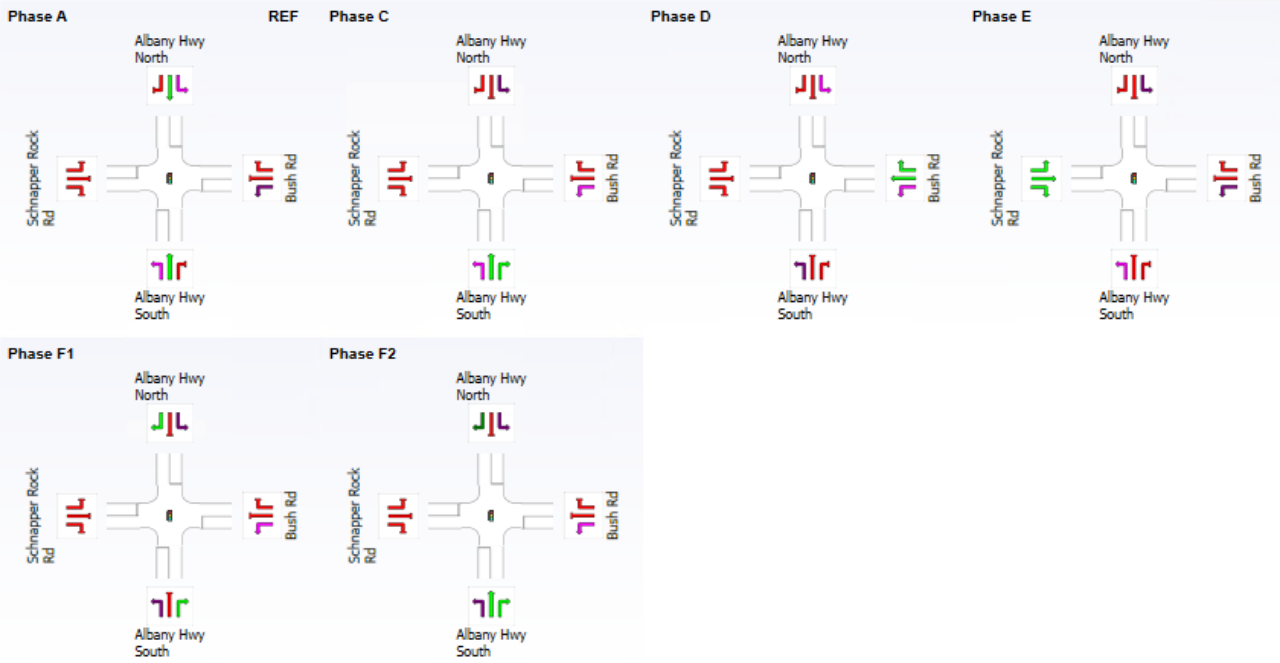


Figure 7.2 Phasing arrangement for Schnapper Rock Rd / Albany Highway / Bush Rd

The western approach, Schnapper Rock Rd, is comprised of a shared left/through/right kerbside lane, and a right turn only median lane. The share of movements in each lane was surveyed on 15 April 2021 and these movement proportions have been used to inform the proportion of vehicles undertaking each movement in the peak hours.

As noted in the request above, there is significant queueing along Albany Highway in the peak periods, especially at the southern exit and along Bush Rd on the eastern approach in the evening peak. The intersection performance has been calibrated to this congestion by reducing the exit speeds on affected movements:

- Left turn from Bush Rd to Albany Highway
- Right turn from Schnapper Rock Rd to Albany Highway
- Through movement from Albany Highway, north to south. This has been altered to a lesser extent than the turns above, as there will remain some amount of coordination along Albany Highway.

The resulting extent of the queueing along each approach has been visually calibrated using the typical congestion extents from the Google Maps traffic layer and is generally consistent.

The intersection performance using the SCATS phasing and timings are shown in **Table 7.8** and **Table 7.9** for the morning and evening peaks, respectively.

Table 7.8 Schnapper Rock Rd / Albany Highway / Bush Rd intersection performance, 2021 morning peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay	LOS	95%Q	Vol	Deg Satn	Delay	LOS	95%Q
Albany (S)	L	146	0.104	4.9	A	4.5	157	0.11	5	A	5.4
	T	1129	0.581	18.6	B	149.2	1129	0.55	16	B	131.8
	R	693	0.885	51.5	D	123.1	693	0.804	34.7	C	103.7
Bush (E)	L	188	0.195	10.6	B	28.6	188	0.191	11.5	B	30.5
	T	36	0.458	75.2	E	29.8	38	0.799	85.8	F	34

	R	21	0.458	79.8	E	29.8	21	0.799	90.4	F	34
Albany (N)	L	45	0.045	11.4	B	6.9	45	0.048	10.5	B	6.4
	T	471	0.615	56.7	E	116.1	471	0.799	68.9	E	130.5
	R	8	0.156	87.3	F	4.5	8	0.126	81.3	F	4.4
Schnapper Rock (W)	L	9	0.7	51.2	D	93.5	16	0.805	57.9	E	116.7
	T	165	0.7	46.6	D	93.5	173	0.805	53.3	D	116.7
	R	262	0.7	51.4	D	93.5	306	0.805	58.1	E	116.7
Overall		3173	0.885	35.7	D	149.2	3245	0.805	34.4	C	131.8

Table 7.9 Schnapper Rock Rd / Albany Highway / Bush Rd intersection performance, 2021 evening peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay	LOS	95%Q	Vol	Deg Satn	Delay	LOS	95%Q
Albany (S)	L	352	0.234	5.8	A	24.5	396	0.265	5.9	A	28.5
	T	771	0.432	22.3	C	100.9	771	0.495	30.3	C	123.2
	R	228	0.736	80.8	F	61.2	228	0.736	80.8	F	61.2
Bush (E)	L	568	0.855	48.4	D	280.6	568	0.825	45.2	D	256.1
	T	120	0.581	66.9	E	72.7	129	0.513	62.7	E	74.5
	R	24	0.581	71.5	E	72.7	24	0.513	67.3	E	74.5
Albany (N)	L	17	0.011	5.8	A	1.1	17	0.012	5.8	A	1.1
	T	1262	0.722	35.1	D	258.8	1262	0.827	45.2	D	297.6
	R	15	0.095	73.8	E	7.3	15	0.095	73.8	E	7.3
Schnapper Rock (W)	L	15	0.945	99	F	96.8	16	0.81	71.8	E	84.2
	T	41	0.945	94.4	F	96.8	43	0.81	67.2	E	84.2
	R	255	0.945	101.5	F	96.8	266	0.81	74.3	E	84.2
Overall		3668	0.945	41.3	D	280.6	3735	0.827	43.3	D	297.6

Using the SCATS-derived phase times without development traffic shows that the intersection is significantly congested in both peak periods, especially during the evening peak. In the morning peak the worst movement level of service is LOS F on the low volume right turn from Albany Highway into Schnapper Rock Rd. Overall, the intersection operates at LOS D with all queues able to be contained within the current storage capacity.

In the evening peak the Schnapper Rock Rd approach operates at LOS F, with a degree of saturation of 0.945. This indicates that this approach is operating very close to saturation and unstable queues and delays would be expected in peak periods. The western approach experiences significant queueing on the approach to the left turn from Bush Rd onto Albany Highway south, with the queue extending back 250-300m. Although this queue can be contained without blocking any nearby intersections, it will impact the ability of vehicles to access the through and right movements at the signals.

In the morning peak, adding the traffic resulting from the development results in some additional delay for the western and northern approaches. A small reallocation in green time improves the flow from the southern approach and the overall level of service remains at LOS C for the intersection. All queues are still contained within available storage space and no individual movement experiences significantly more delay.

With the development traffic included in the evening peak the small reallocation of green time improves the level of service on the western approach from LOS F to LOS E. All other movements remain at the same level of service and the critical queues on the southern approach are still within the available storage space.

Although congested, the Schnapper Rock Rd / Albany Highway / Bush Rd is expected to continue operating at the current level of service with the addition of the development traffic. This is considered conservative, as the development is unlikely to generate significant traffic movements before the completion of the NCI works.

7.5 Future Operation of Key Albany Highway Intersections

The future operation of the Albany Highway intersections has been analysed for the future year of 2031.

The Northern Corridor Improvements Assessment of Transport Effects produced by Flow Transportation Specialists for Waka Kotahi NZ Transport Agency and dated 2 December 2016 has been used to calculate background traffic growth for the area. This report used the Upper Harbour SATURN model to determine the traffic impacts of the Northern Corridor Improvements project which is currently under construction and is in the general vicinity of the development site.

To calculate the growth, predicted actual flows were taken from Appendix E of the report for the following sites:

- Albany Highway (south of Rosedale Rd)
- Albany Highway (south of Upper Harbour Dr)
- Bush Road (north of Piermark Dr)

The representativeness of these sites was assessed by interpolating the 2015 and 2031 reference case volumes to determine a 2021 reference case and comparing it the collected SCATS and survey data. This showed that the modelled volumes on Albany Highway were comparable to the counts but that the volumes on Bush Road (which is more distant from the site) were not as applicable.

The change from the 2021 reference case to the 2031 project case (i.e. that in which the Northern Corridor Improvements has been constructed) has calculated for each of these sites and applied to the movements on Albany Highway and Bush Road with weighting for their representativeness. As the Schnapper Rock suburb does not permit through traffic, it was assumed that traffic volumes entering and exiting the suburb would not change between 2021 and 2031 so these movements were held constant. The movements at the Schnapper Rock Road / Oakway Drive roundabout are hence the same in 2021 and 2031.

The change in flow at each intersection is shown in **Table 7.10** and **Table 7.11** for the morning and evening peaks, respectively. Changes by movement for each intersection are attached as Appendix C.

Table 7.10 Morning peak future growth by intersection

	2021 Movements	21-31 Growth	NCI Impact	2031 Movements
Albany / Oakway	1873	10.0%	-20.1%	1647
Albany / Bush / Schnapper Rock	3014	10.7%	-22.1%	2598
Schnapper Rock / Oakway RAB	824	0.0%	0.0%	824

Table 7.11 Evening peak future growth by intersection

	2021 Movements	21-31 Growth	NCI Impact	2031 Movements
Albany / Oakway	1901	9.4%	-19.4%	1675
Albany / Bush / Schnapper Rock	3484	9.5%	-19.8%	3060
Schnapper Rock / Oakway RAB	753	0.0%	0.0%	753

Oakway Dr / Albany Highway Signalised Intersection

Updating the flows to those expected in 2031, after the completion of the NCI works, shows similar performance to the current level of service. It has been assumed that by 2031 the western approach will be active, even if only infrequently, and this change reduces the available green time available to allocate to the higher volume movements. Again, the addition of the development traffic does not markedly affect the operation of the intersection with less than one second of additional delay in the evening peak and no change in average delay in the morning peak. Intersection performance for the 2031 year without and with development is shown in **Table 7.12** for the morning peak and **Table 7.13** for the evening peak.

Table 7.12 Albany Highway / Oakway Dr intersection performance, 2031 morning peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay	LOS	95%Q	Vol	Deg Satn	Delay	LOS	95%Q
Albany (S)	L	99	0.438	24.7	C	83.8	99	0.434	23.1	C	82.1
	T	686	0.481	20.4	C	96.7	708	0.477	18.8	B	94.9
Albany (N)	T	427	0.367	21.8	C	67.7	427	0.354	20.5	C	65.4
	R	159	0.404	42.7	D	53.9	164	0.479	44.7	D	57.2
Oakway (W)	L	252	0.354	27.6	C	67.9	252	0.369	29.1	C	70.1
	R	109	0.482	58.8	E	44.2	109	0.482	58.8	E	44.2
Overall		1735	0.482	26.6	C	96.7	1762	0.482	25.9	C	94.9

Table 7.13 Albany Highway / Oakway Dr intersection performance, 2031 evening peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay	LOS	95%Q	Vol	Deg Satn	Delay	LOS	95%Q
Albany (S)	L	63	0.353	34.7	C	61.7	63	0.365	35.8	D	63.7
	T	618	0.693	33.6	C	151.1	623	0.716	34.8	C	156.2
Albany (N)	T	635	0.652	33.7	C	128.7	635	0.677	34.8	C	132.6
	R	335	0.706	35.7	D	108.2	356	0.727	35.9	D	116.3
Oakway (W)	L	91	0.1	17.9	B	17.5	91	0.098	17.4	B	17.1
	R	22	0.097	55.4	E	8.4	22	0.097	55.4	E	8.4
Overall		1767	0.706	33.6	C	151.1	1793	0.727	34.5	C	156.2

This analysis demonstrates that the Albany Highway / Oakway Dr intersection operates satisfactorily in the peak hours currently and is expected to continue to do so in the future. The impact of additional development traffic is minimal and is not expected to introduce any operational issues at the intersection.

Schnapper Rock Rd / Albany Highway / Bush Rd Signalised Intersection

Updating the traffic volumes to those forecast for the 2031 year reduces the demands through the intersection by 10-15%, as shown in **Table 7.10** and **Table 7.11**. Most of this demand is along Albany Highway, which means that there may be further opportunities for re-optimisation of the Albany Highway Interchange and the relationship with the Schnapper Rock Rd / Albany Highway / Bush Rd intersection. This analysis has conservatively assumed that this optimisation does not alter the cycle time, and that there is still congestion at the southern exit of the Schnapper Rock Rd / Albany Highway / Bush Rd intersection in the evening peak. Even with these conservative assumptions the intersection performance is

slightly improved in both periods compared to the 2021 modelling. No individual movement is significantly worse, and most are improved by several seconds on average.

The 2031 intersection performance is shown in **Table 7.14** and **Table 7.15** for the morning and evening peaks, respectively.

Table 7.14 Schnapper Rock Rd / Albany Highway / Bush Rd intersection performance, 2031 morning peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay	LOS	95%Q	Vol	Deg Satn	Delay	LOS	95%Q
Albany (S)	L	146	0.104	5	A	4.5	157	0.111	5	A	4.8
	T	930	0.457	15.6	B	99.9	930	0.487	19.4	B	115.9
	R	579	0.681	30.6	C	77.2	579	0.733	34.2	C	85.6
Bush (E)	L	157	0.149	9.5	A	21.1	157	0.155	10.1	B	22.4
	T	36	0.618	81	F	29.5	38	0.643	81.3	F	30.8
	R	17	0.618	85.6	F	29.5	17	0.643	85.9	F	30.8
Albany (N)	L	38	0.037	9.1	A	4.7	38	0.038	9.3	A	4.8
	T	388	0.673	64.5	E	101.3	388	0.736	68.3	E	105
	R	8	0.094	74	E	4.1	8	0.107	77.5	E	4.2
Schnapper Rock (W)	L	9	0.688	50.4	D	92.7	16	0.717	47.7	D	103.2
	T	165	0.688	45.8	D	92.7	173	0.717	43.1	D	103.2
	R	262	0.688	50.6	D	92.7	306	0.717	47.8	D	103.2
Overall		2735	0.688	31.5	C	101.3	2807	0.736	33.9	C	115.9

Table 7.15 Schnapper Rock Rd / Albany Highway / Bush Rd intersection performance, 2031 evening peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay (sec)	LOS	95%Q (m)	Vol	Deg Satn	Delay (Sec)	LOS	95%Q (m)
Albany (S)	L	352	0.234	5.8	A	24.4	396	0.264	5.9	A	28.4
	T	648	0.403	27.3	C	93.6	648	0.416	29.1	C	97.6
	R	195	0.68	80.7	F	51.9	195	0.68	80.7	F	51.9
Bush (E)	L	485	0.682	29.6	C	175.8	485	0.695	30.2	C	177.7
	T	120	0.566	66.8	E	70.7	129	0.572	66	E	74.8
	R	21	0.566	71.3	E	70.7	21	0.572	70.5	E	74.8
Albany (N)	L	14	0.01	5.6	A	0.8	14	0.01	5.6	A	0.8
	T	1060	0.674	38.4	D	219.3	1060	0.696	40.1	D	224.5
	R	15	0.103	75.1	E	7.4	15	0.103	75.1	E	7.4
Schnapper Rock (W)	L	15	0.681	62.4	E	73	16	0.7	62.1	D	76.6
	T	41	0.681	57.8	E	73	43	0.7	57.5	D	76.6
	R	255	0.681	64.8	E	73	266	0.7	64.6	E	76.6
Overall		3221	0.682	37.6	D	219.3	3288	0.7	38.3	D	224.5

7.6 Summary of Intersection Performance

The analysis of the current performance of the key intersections along Albany Highway show that there is existing congestion during peak periods, especially at the southern intersection of Schnapper Rock Rd / Albany Highway / Bush Rd. The analysis also demonstrates that there remains sufficient capacity such that the additional traffic generated by the Schnapper Rock development does not significantly impact the operation of the intersections.

There also remains the possibility that the operation of the Albany Highway Interchange and the Schnapper Rock Rd / Albany Highway / Bush Rd intersections may be able to be optimised after the completion of the Northern Corridor Improvement works which are currently under construction. However, it should be noted that this analysis does not rely on extensive corridor optimisation and that acceptable performance is obtained in all scenarios.

The overall intersection performance for each intersection is shown in **Table 7.16** and **Table 7.17** for the 2021 year and 2031 year, respectively.

Table 7.16 Intersection performance summary, 2021. Note: Deg Satn and 95%Q are for the worst movement

Intersection	Per	No Development					With Development				
		Vol	Deg Satn	Delay	LOS	95%Q	Vol	Deg Satn	Delay	LOS	95%Q
Schnapper Rock / Oakway	AM	867	0.339	5.9	A	16.3	968	0.375	6.3	A	18.4
	PM	793	0.284	5.9	A	14.4	893	0.345	6.2	A	18.4
Albany / Oakway	AM	1971	0.531	24.6	C	110.1	1998	0.545	24.6	C	114.1
	PM	2001	0.765	26.1	C	180.7	2028	0.779	26.8	C	189.5
Schnapper Rock / Albany / Bush	AM	3173	0.885	35.7	D	149.2	3245	0.805	34.4	C	131.8
	PM	3668	0.945	41.3	D	280.6	3735	0.827	43.3	D	297.6

Table 7.17 Intersection performance summary, 2031. Note: Deg Satn and 95%Q are for the worst movement

Intersection	Per	No Development					With Development				
		Vol	Deg Satn	Delay	LOS	95%Q	Vol	Deg Satn	Delay	LOS	95%Q
Schnapper Rock / Oakway	AM	867	0.339	5.9	A	16.3	968	0.375	6.3	A	18.4
	PM	793	0.284	5.9	A	14.4	893	0.345	6.2	A	18.4
Albany / Oakway	AM	1735	0.482	26.6	C	96.7	1762	0.482	25.9	C	94.9
	PM	1767	0.706	33.6	C	151.1	1793	0.727	34.5	C	156.2
Schnapper Rock / Albany / Bush	AM	2735	0.688	31.5	C	101.3	2807	0.736	33.9	C	115.9
	PM	3221	0.682	37.6	D	219.3	3288	0.700	38.3	D	224.5

8. Strategic Planning Framework

Regional Land Transport Plan

The Regional Land Transport Plan (2018-2028) lists Auckland's directions and focus areas to support the growth of Auckland over 10 years.

The primary directions are as follows:

- Better connected people, places, goods, and services.
- Increase genuine travel choices for a healthy, vibrant and equitable Auckland.
- Maximise safety and environmental protection.

The primary focus areas are as follows:

- Make better use of existing transport networks
- Target new transport investment to the most significant challenges
- Maximise the benefits from transport technology
- Better integrate land use and transport decisions
- Move to a safe transport network, free from death and serious injury
- Develop a sustainable and resilient transport system
- Make walking, cycling and public transport preferred choices for many more Aucklanders

The Plan Change will facilitate a development that will not give rise to adverse effects on the strategic transport network and does not require any new roading links. The site is located within proximity to public transport services and will therefore provide for a choice of travel modes and make walking, cycling and public transport a great choice for the future residents of the area. Therefore, the Plan Change is considered to be consistent with the direction and focus of the RLTP.

8.1 Local Policy

Auckland Unitary Plan (Operative in Part)– Objectives and Policies

An assessment of the proposed Plan Change against the relevant transport related objectives and applicable policies in the AUPOP Chapter E27 Transport is included in **Table 8.1**.

Table 8.1 AUPOP Objectives and Policies

Objectives and Policies	Assessment	Comments
Objective 1 Land use and all modes of transport are integrated in a manner that enables: (a) the benefits of an integrated transport network to be realised; and (b) the adverse effects of traffic generation on the transport network to be managed.	**Consistent**	The Plan Change will form a new public road within the site to connect to the wider road network vis Schnapper Rock Road. The nature of the new proposed road enables for the development to safety access the surrounding road network and the traffic generation of the site is expected to cause unnoticeable traffic generation to the wider network.
Objective 2 An integrated transport network including public transport, walking, cycling, private vehicles and freight, is provided for.	**Consistent**	The Plan Change is located such that there is good access to public transport and to facilities and amenities within walking and cycling distance. Improved walking connections are able to be considered as part of a future subdivision resource consent application.

Objective 3 Parking and loading supports urban growth and the quality compact urban form	**Consistent**	The Plan Change supports a more compact residential layout and more efficient use of urban space.
Objective 4 The provision of safe and efficient parking, loading and access is commensurate with the character, scale and intensity of the zone.	**Consistent**	Parking provision will be determined at the subdivision and land use stages and is expected to be commensurate with the proposed zoning.
Objective 5 Pedestrian safety and amenity along public footpaths is prioritised.	**Consistent**	Public footpaths will be provided as part of a new public road within the subject site, and we recommend that additional connections be included as part of future subdivision designs.
Policy 1 Require subdivision, use and development which: (a) generate trips resulting in potentially more than minor adverse effects on the safe, efficient and effective operation of the transport network; to manage adverse effects on and integrate with the transport network by measures such as travel planning, providing alternatives to private vehicle trips, staging development or undertaking improvements to the local transport network.	**Consistent**	Trip generation has been considered and we conclude that the proposal will have a minimal effect on the function of the surrounding road network. There is good public transport access around the site, and with further work on Constellation, Albany and the new Rosedale bus stations, public transport is anticipated to improve further in the future.
Policy 7 Require all other subdivision, use and development to provide a minimum level of on-site parking in recognition of the more limited alternatives to private vehicle travel.	**Can Comply**	The minimum level of on-site parking is expected to be provided in accordance with the AUPOP rules.
Policy 13 Support increased cycling and walking by: (a) requiring larger developments to provide bicycle parking; (c) providing for off-road pedestrian and bicycle facilities to complement facilities located within the road network	**Can Comply**	Bicycle parking is recommended to be provided as part of the subdivision and land use resource consent applications. We also recommend that new footpath connections be explored as part of the subdivision stage as follows: - A connection to the northeast frontage near the Watercare designation - The completion of the footpath on the northeast frontage if not already proposed as part of other projects - A connection to the Kyle Road subdivision to the southeast.
Policy 17 Require parking and loading areas to be designed so that reverse manoeuvring of vehicles onto or off the road does not occur in situations which will compromise [safety]	**Can Comply**	We recommend that future subdivision and land use layouts be designed such that vehicles do not have to reverse manoeuvre into or out of the public roadway.

Policy 19 Require vehicle crossings and associated access to be designed and located to provide for safe, effective and efficient movement to and from sites and minimise potential conflicts between vehicles, pedestrians, and cyclists on the adjacent road network.	**Can Comply**	The future public road will intersect with Schnapper Rock Road at a location demonstrated to provide adequate intersection sight distance. Vehicle crossings will be minimised by the use of at least one JOAL to provide access to terrace houses, while crossings to access detached dwellings are expected to comply with AUPOP provisions and be placed to avoid potential conflict.
Policy 20 Restrict or manage vehicle access to and from sites adjacent to intersections, adjacent motorway interchanges, and on arterial roads	**Consistent**	The future public road is to be located with sufficient distance from intersections. Schnapper Rock Road is not an arterial road.

District Plan Rules

It is anticipated that at resource consent stage of any development, the transport related District Plan Rules set out in E27.6. Standards will form an appropriate basis for the design and layout of the internal site. However, it is also envisaged that there may be occasional departures from these since, to achieve the optimum urban design outcome, non-compliances may arise, and any effects of these non-compliances would be assessed accordingly as part of the resource consent application.

On balance, the proposed Plan Change is considered to be consistent with the relevant transport-related objectives and policies of the AUPOP and enables a future subdivision that upholds the objectives, policies and rules therein.

9. Conclusions and Recommendations

9.1 Conclusions

Overall, the proposed Plan Change is intended to facilitate the future establishment of between 90-110 dwellings at 57 & 57A Schnapper Rock Road, Schnapper Rock. We have reviewed the existing transport network and found that it is generally able to support a future residential development at this location in terms of accessibility, safety, public transport service and facilities and amenities within walking and cycling distance. The proposal is considered to align well with the strategy and policy frameworks for Auckland.

In terms of infrastructure, the proposed Plan Change results in the following needs:

- A future road will be required to be established within the site to connect the internal future subdivision to the road network. This will create a new intersection with Schnapper Rock Road.
- The footpath network on Schnapper Rock Road along the site's frontage should be completed.
- Internal footpaths within the site should allow for ease of access to both frontages on Schnapper Rock Road.

These infrastructure needs are addressed in our recommendations.

Based on our analysis of the trip generation of the proposal and its potential effects on the current and future transport network, we conclude that the vehicle trips generated by the proposal will be able to be accommodated and there is no indication that they will significantly impact the operation of any of the studied intersections.

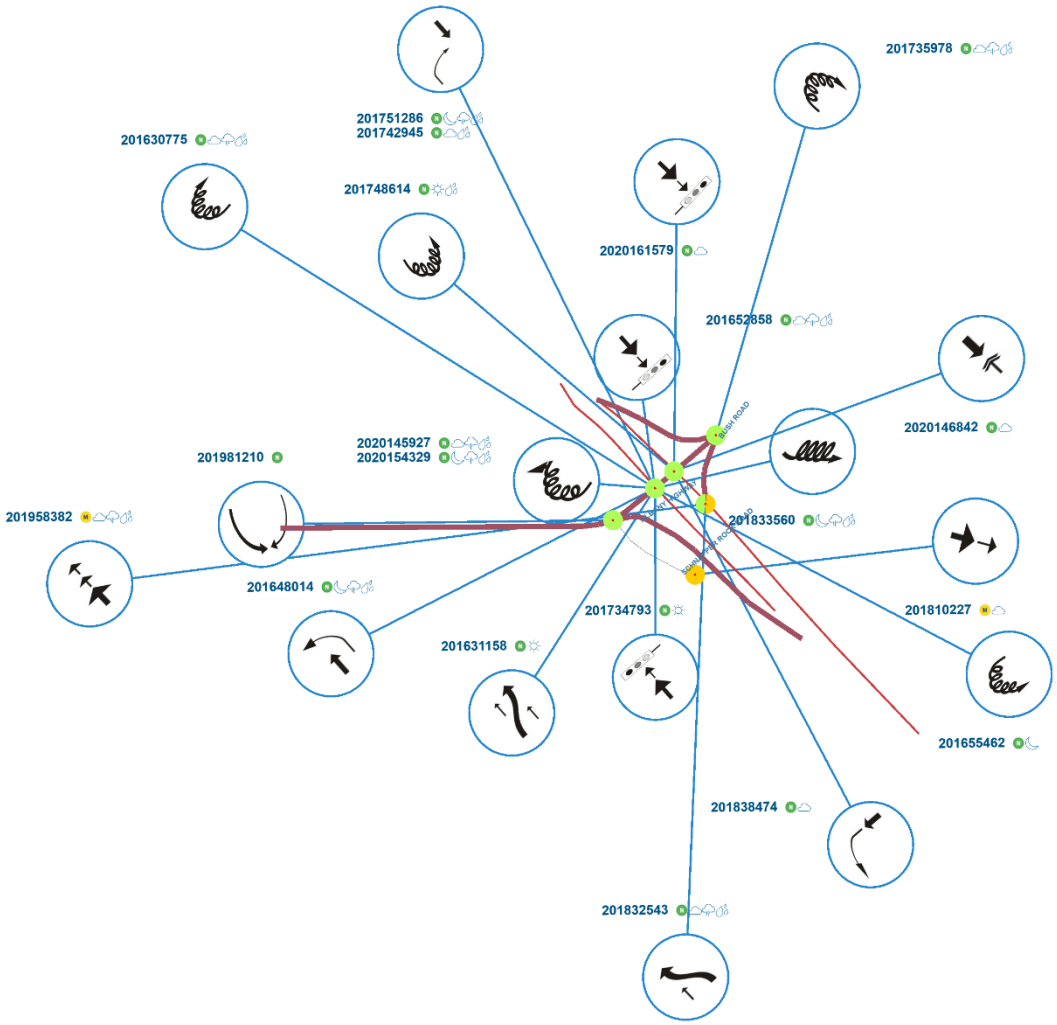
On balance, the proposed Plan Change is considered acceptable from a transport planning perspective.

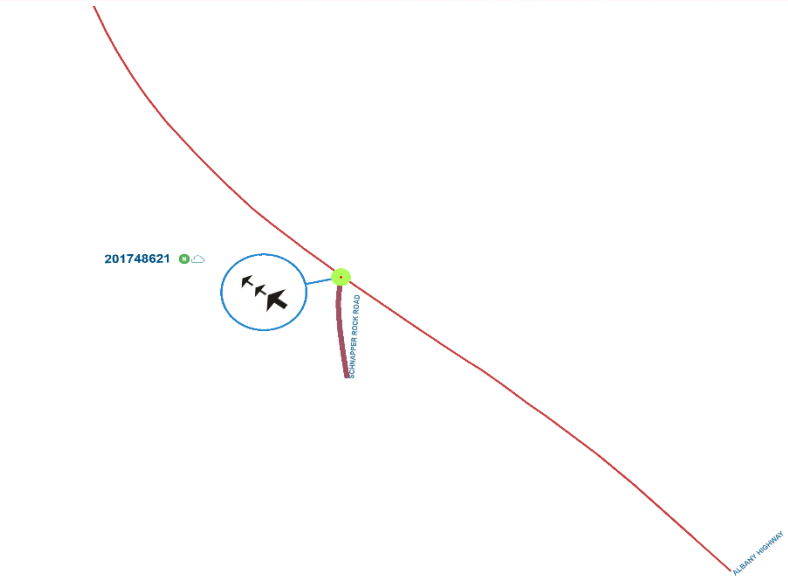
9.2 Recommendations

Below is a list of recommendations for the development of future subdivision and land use plans based on the provisions of the AUPOP and our considerations to date:

- We recommend that the future public road be located in such a manner that it forms an intersection with Schnapper Rock Road on the northwest frontage of the proposal site (not the northeast frontage), and is located a minimum of 97m from the Oakway Drive / Schnapper Rock Road roundabout.
- An internal footpath should be provided to connect the site to the eastern frontage (near the Watercare designation) to ensure pedestrians do not have to walk around the long way if travelling east.
- A footpath connection to the Kyle Road subdivision to the south should be investigated to improve connectivity and integration with this development.
- Car parking and bicycle parking should be provided in accordance with the requirements of the AUPOP, at a minimum.
- Vehicle crossings and accessways shall be designed to avoid the need for vehicles to reverse when entering or exiting onto a public road, except where this is expressly permitted.
- It is recommended that a footpath is to be provided along the northeast boundary of the site (including in front of the Watercare designation) to connect with the surrounding walking network.
- Pedestrian crossing facilities and traffic calming measures are recommended to be investigated on Schnapper Rock Road along the northeast frontage of the site and at the Schnapper Rock Road / Oakway Drive roundabout.

Appendix A – Collision Diagrams

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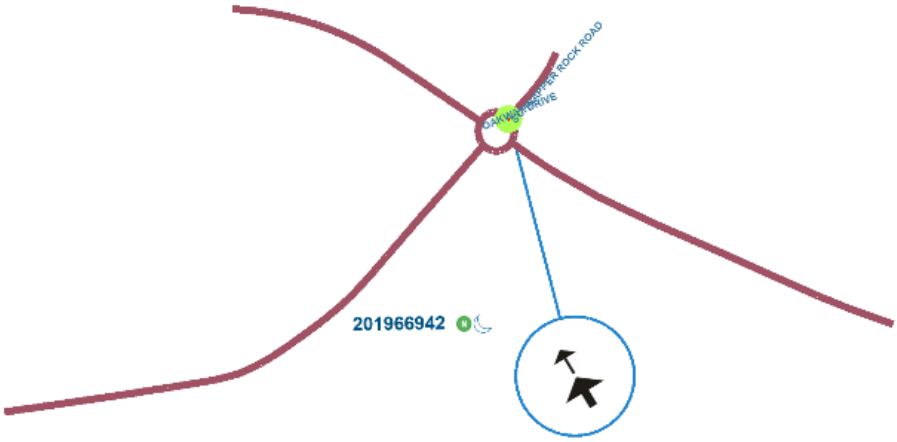
SCHNAPPER ROCK ROAD
ALBANY HIGHWAY


SCHNAPPER ROCK ROAD
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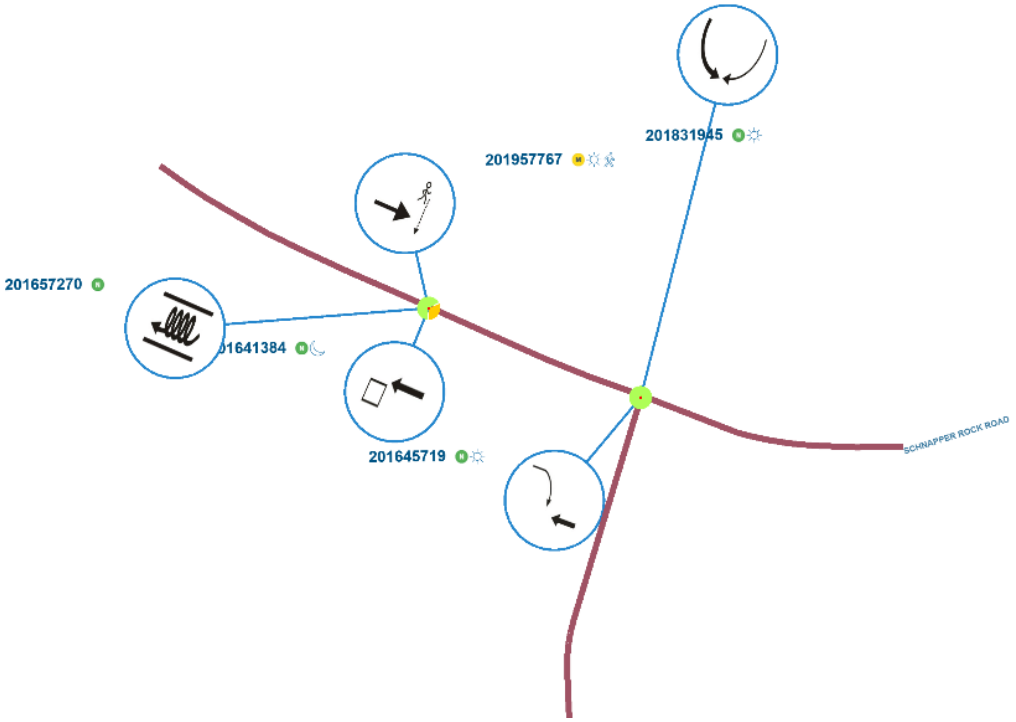
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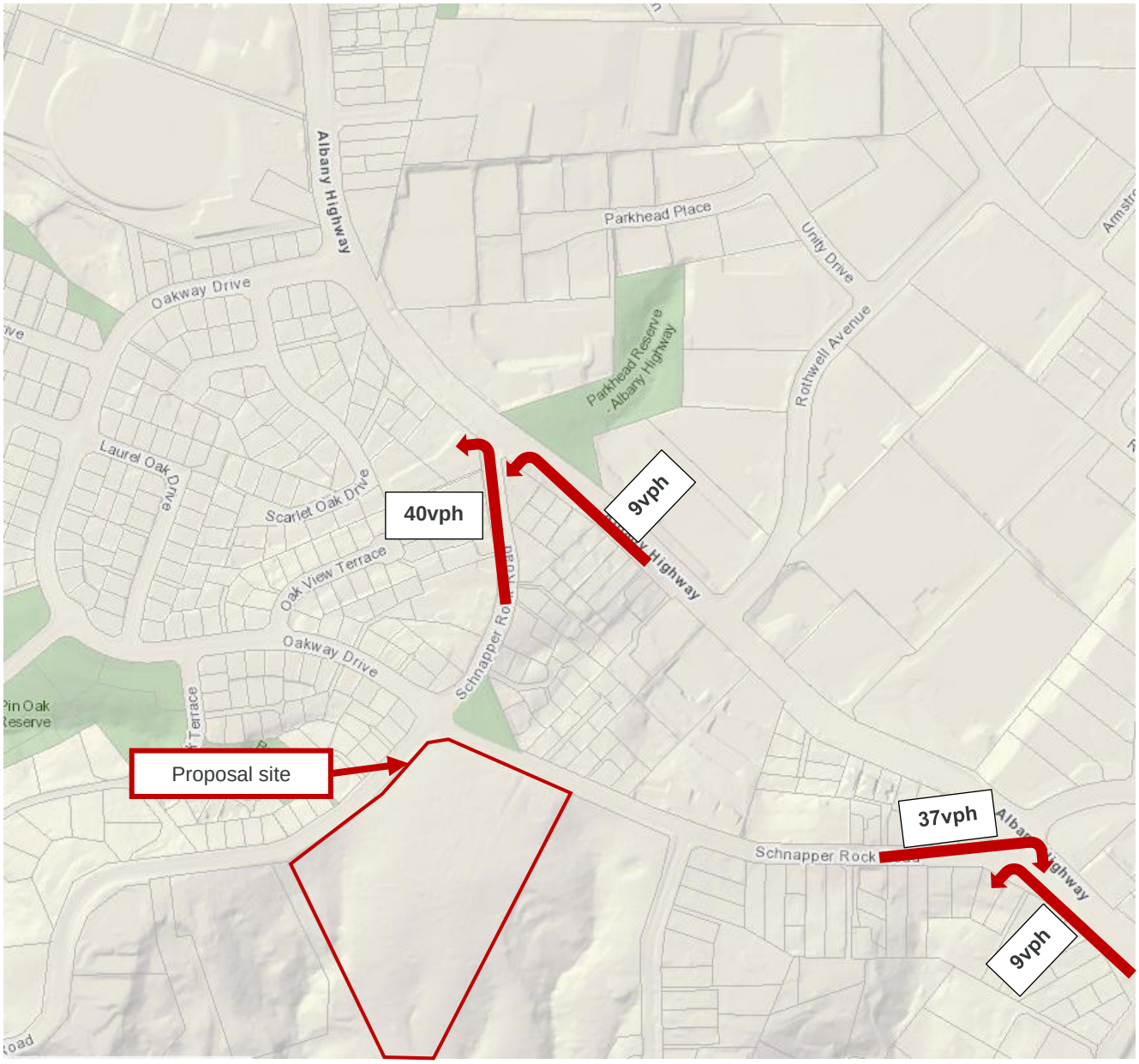
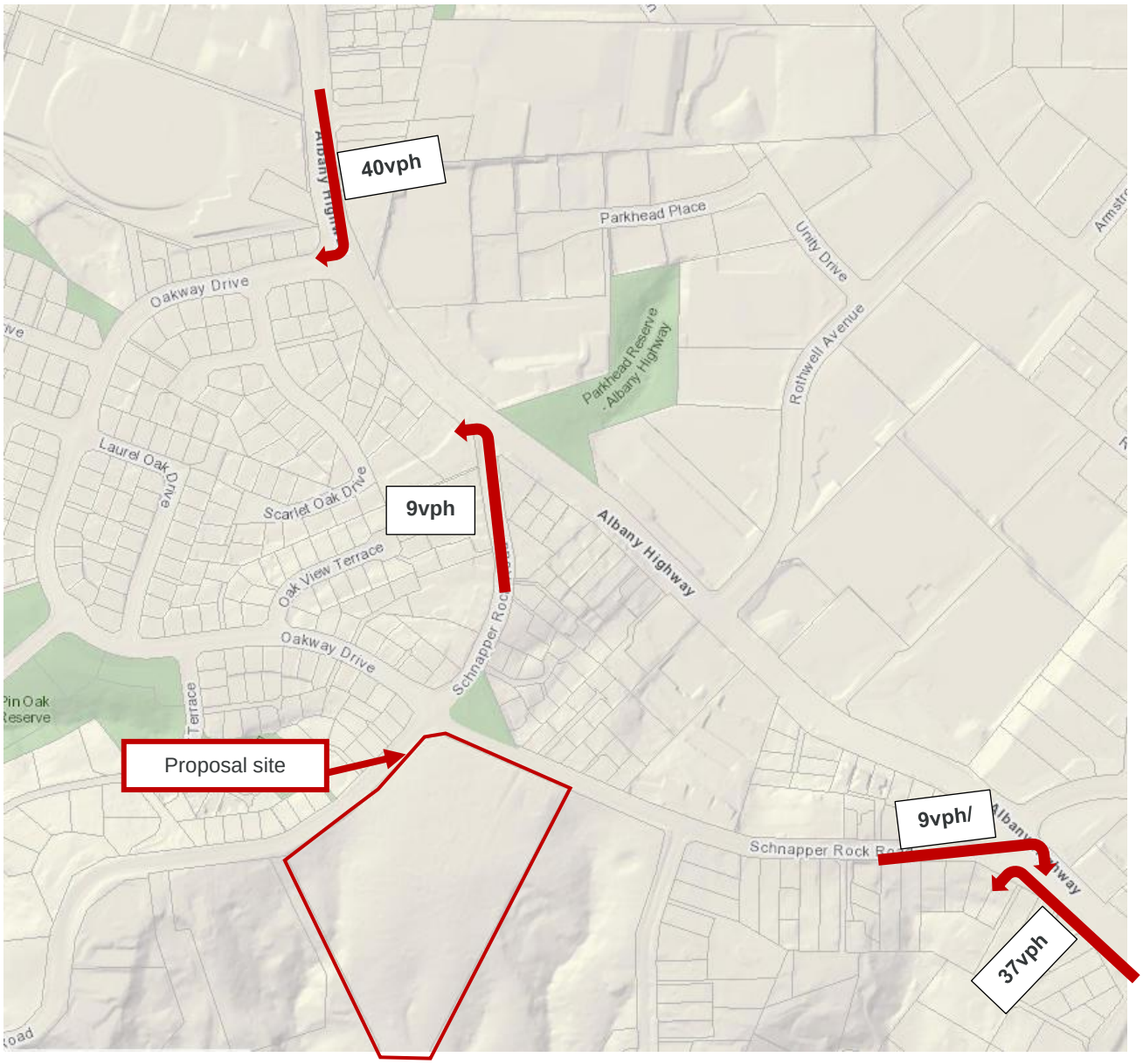
201957767
201657270
01641384
201645719
SCHNAPPER ROCK ROAD

Appendix B
Trip Distribution Diagram

AM Peak



PM Peak


40vph
Parkhead Place
Unity Drive
Oakway Drive
Parkhead Reserve - Albany Highway
Rotwell Avenue
Laurel Oak Drive
Scarlet Oak Drive
9vph
Albany Highway
Oak View Terrace
Oakway Drive
Schnapper Rock
Terrace
Proposal site
9vph/
Schnapper Rock Road
37vph

Appendix C

Future Trip Growth by Movement

		AM								PM							
		Ref 2021	Uplift to 2031	Ref 2031	NCI Adj.	NCI w/o Dev.	Dev.	Ref 2021 w/ Dev.	NCI w/ Dev.	Ref 2021	Uplift to 2031	Ref 2031	NCI Adj.	NCI w/o Dev.	Dev.	Ref 2021 w/ Dev.	NCI w/ Dev.
Albany Hwy / Oakway Dr																	
Albany Hwy S	Thru	791.2	14.6%	906.4	-17.6%	651.9	20.9	812.1	672.8	698.4	12.6%	786.4	-15.9%	587	5.2	703.6	592.2
Albany Hwy S	Left	94.2		94.2		94.2		94.2	94.2	59.4		59.4		59.4		59.4	59.4
Albany Hwy N	Right	151.2		151.2		151.2	5	156.2	156.2	318.4		318.4		318.4	19.8	338.2	338.2
Albany Hwy N	Thru	492.8	14.6%	564.5	-17.6%	406		492.8	406	717.6	12.6%	808	-15.9%	603.1		717.6	603.1
Oakway Dr	Left	239.2		239.2		239.2		239.2	239.2	86		86		86		86	86
Oakway Dr	Right	104		104		104		104	104	21		21		21		21	21
		1872.6		**2059.5**		**1646.5**	**25.9**	**1898.5**	**1672.4**	**1900.8**		**2079.2**		**1674.9**	**25**	**1925.8**	**1699.9**
Albany Hwy / Bush Rd / Schnapp		**Ref 2021**	**Uplift to 2031**	**Ref 2031**	**NCI Adj.**	**NCI w/o Dev.**	**Dev.**	**Ref 2021 w/ Dev.**	**NCI w/ Dev.**	**Ref 2021**	**Uplift to 2031**	**Ref 2031**	**NCI Adj.**	**NCI w/o Dev.**	**Dev.**	**Ref 2021 w/ Dev.**	**NCI w/ Dev.**
Albany Hwy N	Left	42.8	11.3%	47.7	-16.5%	35.8		42.8	35.8	16	11.2%	17.8	-14.6%	13.7		16	13.7
Albany Hwy N	Thru	447.3	14.6%	512.4	-17.6%	368.5		447.3	368.5	1198.5	12.6%	1349.5	-15.9%	1007.3		1198.5	1007.3
Albany Hwy N	Right	7.8		7.8		7.8		7.8	7.8	14		14		14		14	14
Bush Rd	Left	178.4	11.3%	198.6	-16.5%	149		178.4	149	539.7	11.2%	600.3	-14.6%	460.8		539.7	460.8
Bush Rd	Thru	34.1		34.1		34.1	2.1	36.2	36.2	114.4		114.4		114.4	8.3	122.7	122.7
Bush Rd	Right	19.9	11.3%	22.2	-16.5%	16.6		19.9	16.6	22.9	11.2%	25.5	-14.6%	19.6		22.9	19.6
Albany Hwy S	Left	138.5		138.5		138.5	10.4	148.9	148.9	334.3		334.3		334.3	41.7	376	376
Albany Hwy S	Thru	1072.5	14.6%	1228.6	-17.6%	883.6		1072.5	883.6	732.3	12.6%	824.6	-15.9%	615.5		732.3	615.5
Albany Hwy S	Right	658.3	11.3%	732.9	-16.5%	549.9		658.3	549.9	216.8	11.2%	241.1	-14.6%	185.1		216.8	185.1
Schnapper Rock Rd	Left	9		9		9	6.2	15.2	15.2	14		14		14	1.6	15.6	15.6
Schnapper Rock Rd	Thru	156.5		156.5		156.5	8.3	164.8	164.8	39.1		39.1		39.1	2.1	41.2	41.2
Schnapper Rock Rd	Right	248.9		248.9		248.9	41.6	290.5	290.5	241.9		241.9		241.9	10.4	252.3	252.3
		3014		**3337.2**		**2598.2**	**68.6**	**3082.6**	**2666.8**	**3483.9**		**3816.5**		**3059.7**	**64.1**	**3548**	**3123.8**
Schnapper Rock Rd / Oakway Dr		**Ref 2021**	**Uplift to 2031**	**Ref 2031**	**NCI Adj.**	**NCI w/o Dev.**	**Dev.**	**Ref 2021 w/ Dev.**	**NCI w/ Dev.**	**Ref 2021**	**Uplift to 2031**	**Ref 2031**	**NCI Adj.**	**NCI w/o Dev.**	**Dev.**	**Ref 2021 w/ Dev.**	**NCI w/ Dev.**
Schnapper Rock Rd N	Left	24		24		24		24	24	23		23		23		23	23
Schnapper Rock Rd N	Thru	6		6		6	1.8	7.8	7.8	17		17		17	7.2	24.2	24.2
Schnapper Rock Rd N	Right	4		4		4		4	4	7		7		7		7	7
Schnapper Rock Rd E	Left	80		80		80	12.5	92.5	92.5	147		147		147	50	197	197
Schnapper Rock Rd E	Thru	86		86		86		86	86	92		92		92		92	92
Schnapper Rock Rd E	Right	60		60		60		60	60	53		53		53		53	53
Schnapper Rock Rd S	Left	35		35		35		35	35	9		9		9		9	9
Schnapper Rock Rd S	Thru	115		115		115	20.9	135.9	135.9	48		48		48	5.2	53.2	53.2
Schnapper Rock Rd S	Right	133		133		133	56.1	189.1	189.1	82		82		82	14.1	96.1	96.1
Oakway Dr	Left	19		19		19		19	19	16		16		16		16	16
Oakway Dr	Thru	224		224		224		224	224	144		144		144		144	144
Oakway Dr	Right	38		38		38	5	43	43	115		115		115	19.8	134.8	134.8
		824		**824**		**824**	**96.3**	**920.3**	**920.3**	**753**		**753**		**753**	**96.3**	**849.3**	**849.3**

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Transport + Location Intelligence

57 & 57A Schnapper Rock Road

Private Plan Change

Transport RFI response

Prepared for: KBS Design Limited

Job Number: KSPL-J003

Issue Date: 9 August 2021

Prepared by: Shane Ingley, Senior Transportation Engineer

Chris Blackmore, Senior Transportation Planner

Reviewed by: Dave Smith, Technical Director - Transport Planning

1. Background

KBS Design Limited submitted an application to Auckland Council for a proposed Private Plan Change for the purposes of a future residential development at 57 & 57A Schnapper Rock Road (previously referred to as 53 Schnapper Rock Road). Abley Limited (Abley) prepared a Transport Assessment (TA) report to support this application, dated 26 February 2021. Auckland Council (Council) have provided a series of requests for further information (RFI) under Clause 23 of Schedule 1 of the RMA (dated 29 March 2021), and Auckland Transport (AT) have also provided feedback for consideration (dated 11 March 2021). This correspondence and Abley's responses are outlined in this technical note – these elements have also been updated in our revised TA dated 28 April 2021 (Revision B).

2. Item T1 – Sight distances

Council request and reasoning:

Provide information about the sight distances available at the proposed intersection location and the operating speed of traffic at that location.

It needs to be demonstrated that there is at least one practical and workable access solution available.

The transportation assessment states the minimum sight distance for a speed of 50km/h, but the actual operating speed of traffic at this location (which is typically about 15% higher than the posted speed limit) is not stated. The assessment suggests that more than 97m of sight distance is available, but the actual sight distances (measured as per Austroads guidelines) are not stated. This should include sightlines in both directions to traffic turning right into the new road in addition to sightlines for vehicles exiting the new road.

Abley's response:

In accordance with Austroads (Part 4A), Safe Intersection Sight Distance (SISD) should be provided on the major road at any intersection. The calculation of SISD requires the 85th percentile speed (operating speed).

We have gathered additional data regarding the operating speed on Schnapper Rock Road; on Thursday 15 April 2021 we gathered readings during off-peak hours for a conservative assessment of operating speed, using a speed gun. We gathered 120 readings (60 in each direction) on the section of Schnapper Rock Road shown in **Figure 2.1**. The mean speed readings were 50 km/h, with the 85th percentile operating speed being 56km/h in the eastbound direction and

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53km/h in the westbound direction. Note that the location of measurements is likely to be when drivers are travelling at the fastest (at the lowest section between two slight to moderate slopes).

Figure 2.1 Location of driver speed observations

The SISD calculations are outlined below.

- *D_T = decision time (observation time 3s + reaction time 1.5s) = 4.5s*
- *V = operating speed (km/h) = 56 (eastbound); 53 (westbound)*
- *d = coefficient of deceleration = 0.36 (urban)*
- *a = longitudinal grade. Varies from approximately 5% further west around the corner from the site to approximately flat at our indicated potential access location. We have taken -3% (downgrade) as a working factor.*

$$SISD = \frac{D_T \times V}{3.6} + \frac{V^2}{254 \times (d + 0.01 \times a)}$$

  - *SISD (eastbound) = 107m*
  - *SISD (westbound) = 100m*

We have considered how 107m (eastbound) and 100m (westbound) sight distance would look for various potential access locations along the site's frontage. We have used four potential access locations as case studies. Location A is the access point indicated in concept plans, with locations B and C further west along Schnapper Rock Road. Location Z has been considered as an alternative nearer to the Oakway Drive intersection. These four locations and the sight distance along the westbound lane (100m) are shown in **Figure 2.2**. These sight distance measurements have been measured from aerial photography, noting from our site visit that the gentle downgrade does not present any challenges for vertical sightlines (such as a crest) from either direction.

Figure 2.2 Potential access locations and westbound lane sight distance (100m)

The assessment of sight distance for the westbound lane to a potential access point (Z, A, B or C) shows that SISD would not be plausible for an access point at location Z however given the relatively straight alignment (and lack of vertical crests) along this section of Schnapper Rock Road, there is adequate sight distance for the westbound lane for locations A, B and C. Generally, we consider that any location 100m or further away from the roundabout limit line has adequate sight distance for the westbound lane.

For the eastbound lane, we have considered locations A, B and C (Z having been ruled out based on westbound sight distance).

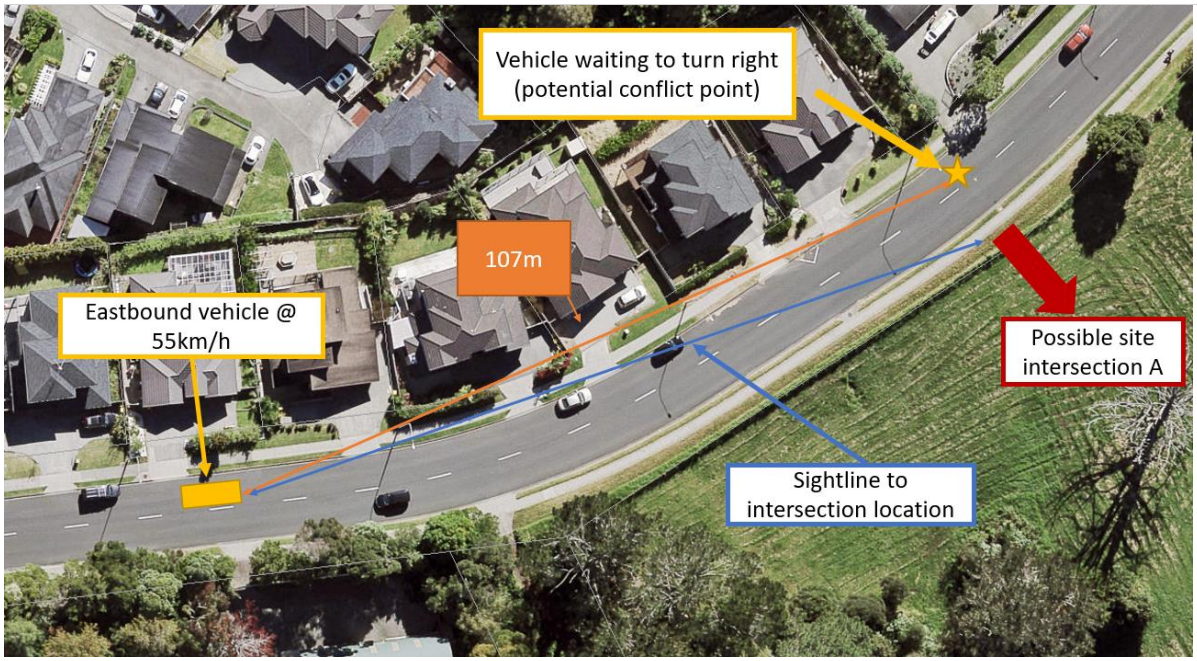

Figure 2.3 Illustration of 107m sightline for the Eastbound Lane of Schnapper Rock Road toward indicative intersection location A

For an intersection at the indicative location A, 107m of sight distance for eastbound traffic on Schnapper Rock Road is partly obstructed by a hedge of approximately 1.3m to 1.5m in height. However, due to the topography of Schnapper Rock Road, drivers are able to see over the top of this hedge from much further than 107m away, as illustrated in **Figure 2.4** below (noting that the Streetview capture is from the opposite lane and 2.5m height so is not an exact reflection of a driver's view). Vehicles can be clearly seen parked on the northern side of Schnapper Rock Road and drivers have plentiful opportunity to become aware of any potential conflicts at this location well in advance as they would be able to see into the access road itself. Furthermore, we consider that the sightline to the intersection itself (where a vehicle would be waiting to turn out of the site) is in practice more useful in anticipating a conflict before it occurs, and there is a fully clear sightline for greater than 107m in that regard. Therefore, we consider that there is adequate sight distance to warn drivers of any potential intersection conflicts that could arise at this location based on current operating speeds.

Figure 2.4 Eastbound view toward indicative intersection location (Streetview)

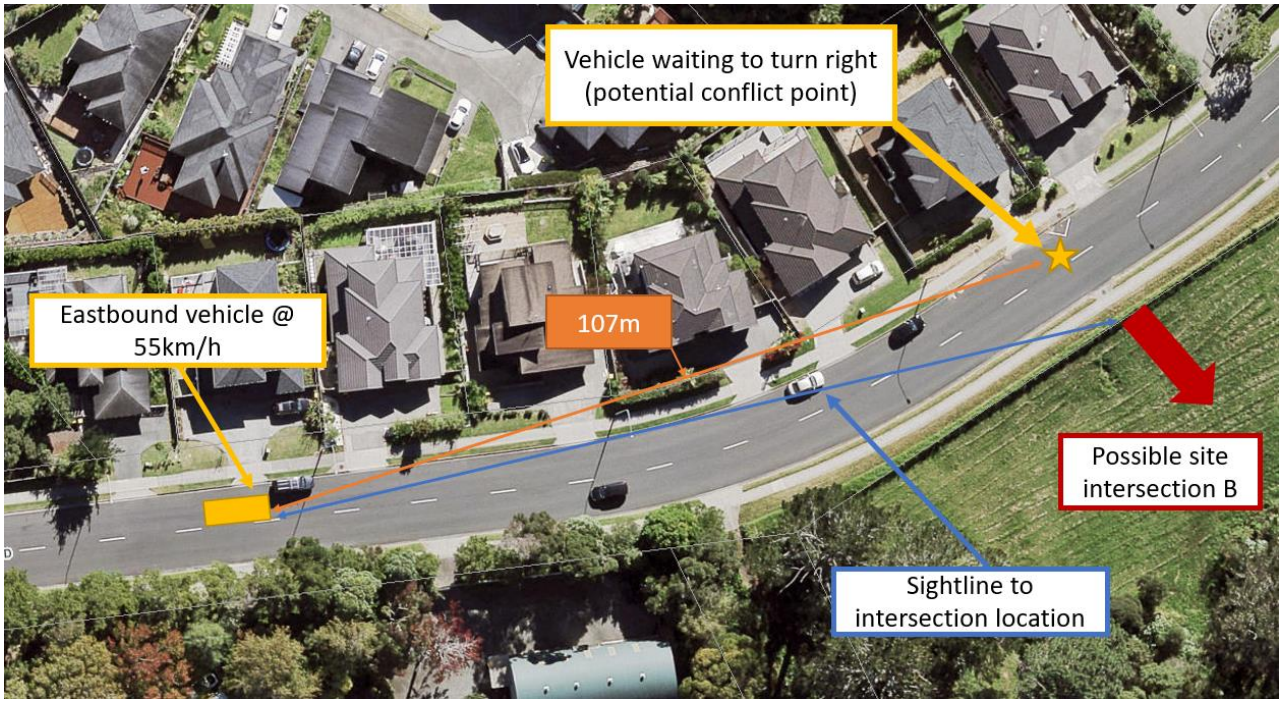

Figure 2.5 Illustration of 107m sightline for the Eastbound Lane of Schnapper Rock Road toward indicative intersection location B

For an intersection at indicative location B, the 107m sightline for the eastbound lane passes through the same hedge as per location A; similarly, drivers are able to see over the top of that hedge such that any potential conflicts are visible from upstream. For Location B, eastbound drivers would be able to see the access from a higher vantage point compared to Location A. There is also clear sight distance of the intersection itself for greater than 107m on approach, therefore any potential conflicts will be able to be anticipated before they occur.

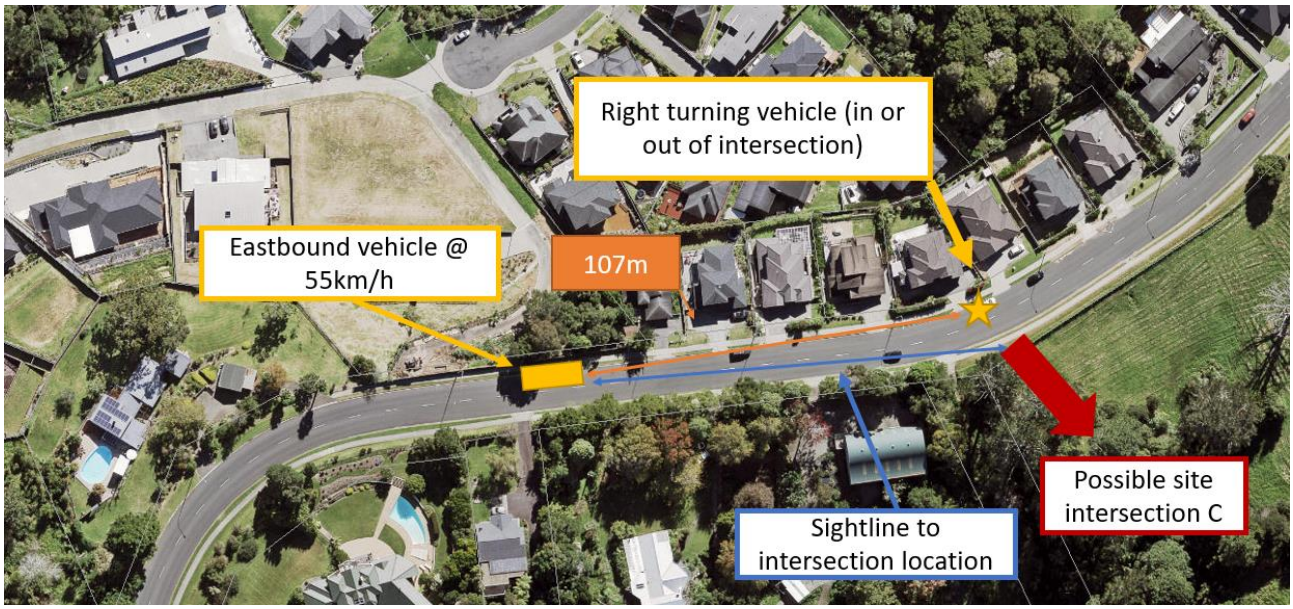

Figure 2.6 Illustration of 107m sightline for the Eastbound Lane of Schnapper Rock Road toward indicative intersection location C

For an intersection at indicative location C, the 107m sightline is uninterrupted.

On balance, we conclude the following in regard to the sight distance requirements for an access road into the proposal site:

- Based on the sight distance to a potential conflict point in the westbound lane of Schnapper Rock Road, an access road should be located no closer than 100m to the limit line of the Oakway Drive / Schnapper Rock Road roundabout intersection. In other words, it should be located approximately in the position of location A or further west.
- Based on the sight distance to a potential conflict point in the eastbound lane of Schnapper Rock Road, there is adequate sight distance (due to the vertical and horizontal geometry of Schnapper Rock Road) such that any conflicts are able to be anticipated from 107m away or further should an access road be located at location A or further west.

Therefore, we consider that an access road can safely be located along the north-western frontage to Schnapper Rock Road at any location no closer than 100m to the Oakway Drive / Schnapper Rock Road roundabout.

Note that due to the short distance between the Watercare site and the roundabout, we do not recommend an access road be located on the north-eastern frontage of the subject site.

3. Item T2 – Trip assignment

Council request and reasoning:

Provide a rationale for the adopted trip assignment, or provide an updated assignment.

The Census trip data includes a significant proportion (13%) of trips to North Harbour, and other destinations that would logically be assigned to Bush Road or other roads in the area (such as Rothwell Ave). The report assigns no traffic to those roads and presumes all North Harbour (and other) traffic would travel north along Albany Highway.

Routes most likely to be used by commuters using SH1 south of Constellation, and to destinations such as Windsor Park should also be re-considered as a number of these users may use Bush Road in preference to the Albany Highway Interchange.

Abley's response:

The peak hour trips generated by the dwellings have been distributed using Statistics New Zealand Travel to Work and Education (Commuter Waka) data from the 2018 Census (https://www.stats.govt.nz/tools/commuter-waka-2018-census-data-visualisation).

The data indicates that most traffic travels away from Schnapper Rock for work or education. In fact, the Commuter Waka data did not capture any trips entering Schnapper Rock for work or education. It is therefore suitable to assume a heavily skewed inbound/outbound split. The following splits have therefore been assumed:

- 80% outbound and 20% inbound in the AM peak;
- 20% outbound and 80% inbound in the PM peak.

To determine the direction of travel, the Waka Commuter data was used to divide destinations into three broad regions:

- Local & East of Schnapper Rock, including the Albany Central, Albany South, North Harbour, Windsor Park and Pinehill Statistical Area 2 (SA2);
- North of Schnapper Rock, including SA2s in Albany West, Browns Bay, Orewa and Rodney Ward; and,
- South & West of Schnapper Rock, including SA2s in Greenhithe, the lower North Shore, West Auckland, Auckland CBD and beyond.

It was found that traffic to and from the North region can be assumed to use Albany Highway (N) exclusively, while the South & West region can be assumed to use Albany Highway (S) exclusively.

For the areas in the Local & East region, it was found that several possible routes existed for traffic to use. The traffic distribution was therefore calculated individually for each of these SA2 areas. Four primary routes were identified: Albany Highway (N), Rothwell Avenue, Bush Road and Albany Highway (S). The proportion of traffic using each route was gravity weighted based on peak hour travel times obtained from Google Maps. Outbound trips have used travel times in the AM peak and inbound trips have used those in the PM peak.

The overall directionality of trips has been calculated based on these assumptions and weighted using the trip numbers from the Waka Commuter (WC) data. The outbound and inbound trip directionality, respectively, for each of these areas and for the overall development is summarized in **Table 3.1** and **Table 3.2**. Note that around 12% of respondents in the WC data listed their origin and destination both within Schnapper Rock. For the purposes of calculating the expected external trip distributions these internal trips have been excluded.

Table 3.1 Outbound trip distribution

Area	WC trips	Albany Hwy N	Rothwell Ave	Bush Rd	Albany Hwy S
Albany Central	252	48%	23%	29%	0%
Albany South	51	44%	25%	31%	0%
North Harbour	309	29%	29%	41%	0%
Windsor Park	42	32%	24%	28%	15%
Pinehill	6	37%	24%	30%	9%
North	333	100%	--	--	--
South & West	1149	--	--	--	100%
Weighted Total	**2142**	**27.2%**	**8.1%**	**10.8%**	**54.0%**

Table 3.2 Inbound trip distribution

Area	WC trips	Albany Hwy N	Rothwell Ave	Bush Rd	Albany Hwy S
Albany Central	252	38%	31%	31%	0%
Albany South	51	33%	33%	33%	0%
North Harbour	309	30%	30%	40%	0%
Windsor Park	42	25%	25%	25%	25%
Pinehill	6	27%	27%	27%	19%
North	333	100%	--	--	--
South & West	1149	--	--	--	100%
Weighted Total	**2142**	**25.7%**	**9.3%**	**10.8%**	**54.2%**

Based on the trip distribution, development movements were added to the following three intersections:

- Schnapper Rock Road / Oakway Drive roundabout
- Schnapper Rock Road / Albany Highway / Bush Road signalised intersection
- Oakway Drive / Albany Highway signalised intersection.

It was assumed that the movements made by trips using each route would be as follows:

- Albany Highway North: Outbound via left-turn at Schnapper Rock Road left-in left-out (LILO) and inbound via right-turn at Oakway Drive signalised intersection.
- Rothwell Avenue: Outbound via left-turn at Schnapper Rock Road / Albany Highway / Bush Road signalised intersection and inbound via left-turn at Schnapper Road LILO.
- Bush Avenue: Outbound and inbound via straight-ahead movements through Schnapper Rock Road / Bush Road signalised intersection.
- Albany Highway South: Outbound via right turn at Schnapper Rock Road / Albany Highway / Bush Road signalised intersection and inbound via left-turn at the same intersection.

Base 2021 flows for the three intersections under investigated were obtained from the following sources:

- Schnapper Rock Road / Albany Highway / Bush Road signalised intersection: SCATS output for the period Monday 15 March 2021 to Thursday 18 March 2021;
- Oakway Drive / Albany Highway signalised intersection: SCATS output for the week of 12 to 18 April 2021; and,
- Schnapper Rock Road / Oakway Drive roundabout: Traffic survey undertaken on Thursday 15 April 2021.

The additional morning and evening peak trips occurring due to the development are shown in **Figure 3.1** and **Figure 3.2** for the key intersections with Albany Highway.

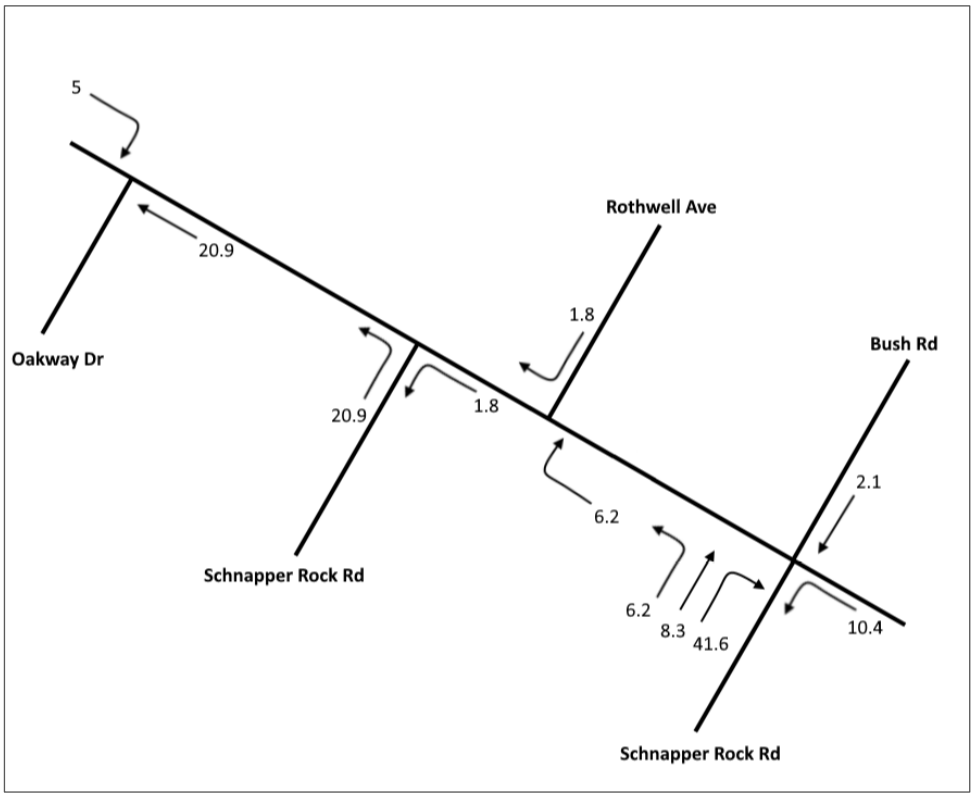

Figure 3.1 Morning peak development trip distribution at Albany Hwy

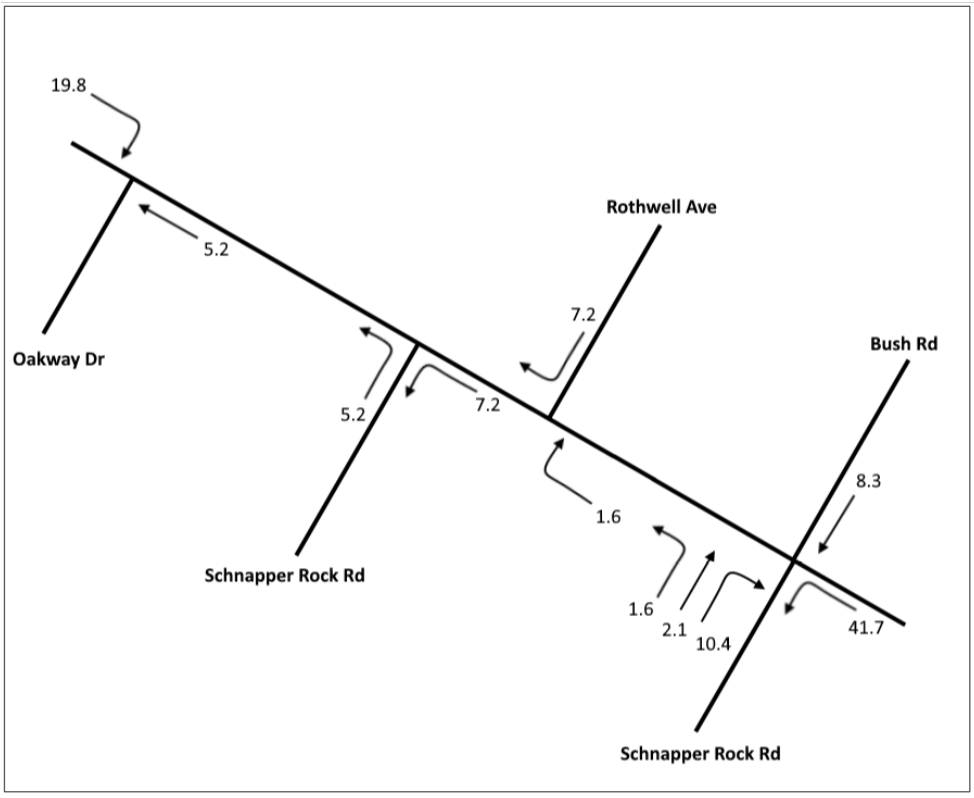

Figure 3.2 Evening peak development trip distribution at Albany Hwy

4. Item T3 – Traffic counts

Council request and reasoning:

Provide information about the future transport environment.

The transportation assessment provides rather dated traffic volumes on the network and a description of planned improvements, but no information on current traffic volumes, expected traffic growth, or future (e.g. 2030) traffic volumes on the nearby road network. The exact locations of the traffic counts referred to in section 3.3 are not clear.

The existing traffic counts used in section 3.3 of the assessment are dated with some from 2014. It is likely that traffic volumes in the Schnapper Rock area have increased since 2014 due to growth and development. Given the age of the AT traffic counts referenced in section 3.3 of the assessment, it is recommended that automated tube counts be undertaken as a minimum, and it is recommended that these are supplemented with peak-hour turning counts at key intersections. It is recommended that the existing traffic counts for the three intersections listed in section 3.2 should be the focus of the assessment.

Abley's response:

Additional data collection was undertaken to update the vehicle volumes used. The following additional data was used in the intersection analysis:

- Movement and speed survey at Schnapper Rock Rd / Oakway Dr roundabout on 15 April 2021
- Lane split and movement survey at the Schnapper Rock Rd approach of Albany Highway / Bush Rd / Schnapper Rock Rd on 15 April 2021
- SCATS detector flows were obtained from ATOC for the signalised intersections at Albany Highway / Oakway Dr and Albany Highway / Bush Rd / Schnapper Rock Rd. This extract covers that dates of:

  - Albany Highway / Oakway Dr from 12 to 18 April 2021
  - Albany Highway / Bush Rd / Schnapper Rock Rd from 15 to 18 March 2021
- SCATS phase diagrams and phase timings for Albany Highway / Bush Rd / Schnapper Rock Rd from 16 to 18 March 2021.

The Northern Corridor Improvements Assessment of Transport Effects produced by Flow Transportation Specialists for Waka Kotahi NZ Transport Agency and dated 2 December 2016 has been used to calculate background traffic growth for the area. This report used the Upper Harbour SATURN model to determine the traffic impacts of the Northern Corridor Improvements project which is currently under construction and is in the general vicinity of the development site.

To calculate the growth, predicted actual flows were taken from Appendix E of the report for the following sites:

- Albany Highway (south of Rosedale Rd)
- Albany Highway (south of Upper Harbour Dr)
- Bush Road (north of Piermark Dr)

The representativeness of these sites was assessed by interpolating the 2015 and 2031 reference case volumes to determine a 2021 reference case and comparing it with the SCATS and survey data collected in 2021. This showed that the modelled volumes on Albany Highway were comparable to the counts but that the volumes on Bush Road (which is more distant from the site) were not as applicable.

The change from the 2021 reference case to the 2031 project case (i.e. that in which the Northern Corridor Improvements has been constructed) has been calculated for each of these sites and applied to the movements on Albany Highway and Bush Road with weighting for their representativeness. As the Schnapper Rock suburb does not permit through traffic, it was assumed that traffic volumes entering and exiting the suburb would not change between 2021 and 2031 so these movements were held constant. The movements at the Schnapper Rock Road / Oakway Drive roundabout are hence the same in 2021 and 2031.

The change in flow at each intersection is shown in **Table 4.1** and **Table 4.2** for the morning and evening peaks, respectively. Changes by movement for each intersection are attached as Appendix B.

Table 4.1 Morning peak future growth by intersection

	2021 Movements	21-31 Growth	NCI Impact	2031 Movements
Albany / Oakway	1873	10.0%	-20.1%	1647
Albany / Bush / Schnapper Rock	3014	10.7%	-22.1%	2598
Schnapper Rock / Bush	824	0.0%	0.0%	824

Table 4.2 Evening peak future growth by intersection

	2021 Movements	21-31 Growth	NCI Impact	2031 Movements
Albany / Oakway	1901	9.4%	-19.4%	1675
Albany / Bush / Schnapper Rock	3484	9.5%	-19.8%	3060
Schnapper Rock / Bush	753	0.0%	0.0%	753

5. Item T4 – Intersection Assessment

Council request and reasoning:

Provide an assessment of the Oakway Drive / Albany Highway intersection.

As noted in transportation assessment, a significant proportion of traffic generated by the site would use this intersection. Auckland Transport notes that the intersection of Schnapper Rock Road and Oakway Drive is particularly important, as all vehicles entering and exiting the site will need to use this intersection to connect to the wider road network. Areas of Schnapper Rock are already completely reliant on this intersection to connect to the wider road network. Given the importance of Schnapper Rock Road in connecting Schnapper Rock to the wider road network, the road is classified as a collector in AT's Future Connect portal.

The operation of this intersection is not described. The assessment does not provide any data to inform an assessment including if this intersection has any issues (such as poor LOS, high delay, extensive queueing) for the existing or future expected (e.g. 2030) traffic conditions.

It is recommended that data on the operation of the signals is obtained, for example from the SCATS traffic control centre, to indicate how the signals perform currently. If the intersection is expected to have any issues in the future, then a detailed assessment of the impact of the proposal is likely to be warranted.

Abley's response:

SIDRA modelling for this intersection has been undertaken, utilising the SCATS detector flows obtained for 12 – 18 April 2021. Lanes were configured as currently installed, including T2 lanes along Albany Highway to the north and south. The layout used in the 2021 modelling is shown in **Figure 5.1**, note that the western approach is currently disabled in SCATS as the property utilising it is unoccupied.

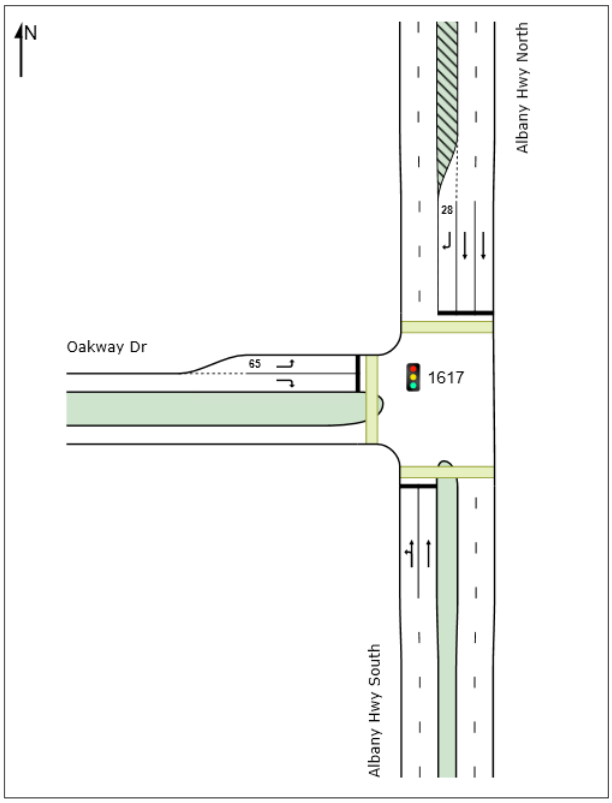

Figure 5.1 2021 intersection configuration at Albany Highway / Oakway Dr

The lane utilisation for the through lanes was calculated using the ratio of SCATS detections for each lane and period, the factors used were kept constant in the 2031 analysis and are shown in **Table 5.1**.

Table 5.1 Lane utilisation ratio of kerbside Albany Highway T2 lane

	Southbound	Northbound
Morning Peak	0.54	0.91
Evening Peak	0.88	0.51

Using the SCATS phasing provided by ATOC, the SIDRA results show that the performance of the intersection in the peak periods is busy, but not overly congested. The overall level of service is LOS C in both periods, queues generally contained within available capacity, and a worst movement degree of saturation of 0.531 in the morning peak and 0.765 in the evening peak.

The addition of development traffic in line with **Figure 3.1** and **Figure 3.2** shows only a minor increase in delay of less than one second in the evening peak, and no impact on delay in the morning peak. Intersection performance for the 2021 year without and with development is shown in **Table 5.2** for the morning peak and **Table 5.3** for the evening peak.

Table 5.2 Albany Highway / Oakway Dr intersection performance, 2021 morning peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay (sec)	LOS	95%Q (m)	Vol	Deg Satn	Delay (Sec)	LOS	95%Q (m)
Albany (S)	L	99	0.483	22.2	C	94.6	99	0.494	22.3	C	97.9
	T	833	0.531	17.9	B	110.1	855	0.543	18	B	114.1
Albany (N)	T	519	0.421	19.8	B	78.6	519	0.423	19.7	B	78.4
	R	159	0.512	45.5	D	55.9	164	0.545	45.6	D	57.9
Oakway (W)	L	252	0.332	29.8	C	70.9	252	0.332	29.8	C	70.9
	R	109	0.482	58.8	E	44.2	109	0.482	58.8	E	44.2
Overall		1971	0.531	24.6	C	110.1	1998	0.545	24.6	C	114.1

Table 5.3 Albany Highway / Oakway Dr intersection performance, 2021 evening peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay (sec)	LOS	95%Q (m)	Vol	Deg Satn	Delay (Sec)	LOS	95%Q (m)
Albany (S)	L	63	0.386	32.4	C	70.3	63	0.397	33.4	C	72.5
	T	735	0.756	31.8	C	180.7	741	0.779	33.5	C	189.5
Albany (N)	T	755	0.512	18.7	B	116.1	755	0.517	18.7	B	117.6
	R	335	0.765	29.1	C	87.8	356	0.777	29.2	C	93.9
Oakway (W)	L	91	0.093	19.1	B	18.3	91	0.092	18.5	B	17.9
	R	22	0.097	55.4	E	8.4	22	0.097	55.4	E	8.4
Overall		2001	0.765	26.1	C	180.7	2028	0.779	26.8	C	189.5

Updating the flows to those expected in 2031, after the completion of the NCI works, shows similar performance to the current level of service. It has been assumed that by 2031 the western approach will be active, even if only infrequently, and this change reduces the available green time available to allocate to the higher volume movements. Again, the addition of the development traffic does not markedly affect the operation of the intersection with less than one second of additional delay in the evening peak and no change in average delay in the morning peak. Intersection performance for the 2031 year without and with development is shown in **Table 5.4** for the morning peak and **Table 5.5** for the evening peak.

Table 5.4 Albany Highway / Oakway Dr intersection performance, 2031 morning peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay (sec)	LOS	95%Q (m)	Vol	Deg Satn	Delay (Sec)	LOS	95%Q (m)
Albany (S)	L	99	0.438	24.7	C	83.8	99	0.434	23.1	C	82.1
	T	686	0.481	20.4	C	96.7	708	0.477	18.8	B	94.9
Albany (N)	T	427	0.367	21.8	C	67.7	427	0.354	20.5	C	65.4
	R	159	0.404	42.7	D	53.9	164	0.479	44.7	D	57.2
Oakway (W)	L	252	0.354	27.6	C	67.9	252	0.369	29.1	C	70.1
	R	109	0.482	58.8	E	44.2	109	0.482	58.8	E	44.2
Overall		1735	0.482	26.6	C	96.7	1762	0.482	25.9	C	94.9

Table 5.5 Albany Highway / Oakway Dr intersection performance, 2031 evening peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay (sec)	LOS	95%Q (m)	Vol	Deg Satn	Delay (Sec)	LOS	95%Q (m)
Albany (S)	L	63	0.353	34.7	C	61.7	63	0.365	35.8	D	63.7
	T	618	0.693	33.6	C	151.1	623	0.716	34.8	C	156.2
Albany (N)	T	635	0.652	33.7	C	128.7	635	0.677	34.8	C	132.6
	R	335	0.706	35.7	D	108.2	356	0.727	35.9	D	116.3
Oakway (W)	L	91	0.1	17.9	B	17.5	91	0.098	17.4	B	17.1
	R	22	0.097	55.4	E	8.4	22	0.097	55.4	E	8.4
Overall		1767	0.706	33.6	C	151.1	1793	0.727	34.5	C	156.2

This analysis demonstrates that the Albany Highway / Oakway Dr intersection operates satisfactorily in the peak hours currently and is expected to continue to do so in the future. The impact of additional development traffic is minimal and is not expected to induce any operational issues at the intersection.

6. Item T5 – Intersection assessment

Council request and reasoning:

Provide an assessment of the Schnapper Rock Road / Albany Highway / Bush Road intersection.

As noted in transportation assessment, a significant proportion of traffic generated by the site would use this intersection. The current operation of this intersection is not described. Our casual observations of this area indicate there is likely to

be significant queueing and delay at this intersection during peak periods. The assessment report posits a more detailed assessment including modelling is not warranted as the increase in traffic flow is relatively minor compared to the existing movement volumes (despite no movement volumes being provided). While the increase in flow may be minor, if an intersection (or movement) is near or beyond its capacity, and the movement is a critical one, any increase in flow can have an inordinate impact on the operation of the whole intersection (and potentially nearby intersections such as the SH18 Interchange).

As noted in our initial transport comments, this intersection in conjunction with the nearby Albany Highway SH 18 Interchange, appears to have significant issues with congestion, queuing, and delay during peak periods. The assessment does not provide any data to allow an alternative view to be formed and does not provide any information on how these intersections may operate under future conditions. For example, what are the delays and queue lengths on Schnapper Rock Road now, how might those change over the next 10 years without the plan change, and what effect would the plan change have. If the intersection is expected to have any issues now or in the future, then a detailed assessment of the impact of the proposal, including traffic modelling, would be warranted.

A key matter for Council to consider when rezoning land is if there is sufficient infrastructure to support the development of the land, and how sufficient infrastructure might be funded and provided. The future operation of this intersection is relevant to that consideration.

Abley's response:

SIDRA modelling has been undertaken for this intersection, utilising SCATS detector flows and phase timings obtained for the period 16 – 18 March 2021. Lane configurations were set as currently installed and phasing utilises average peak hour timings obtained from the SCATS data. One assumption has been made regarding the northern approach right turn from Albany Highway into Schnapper Rock Rd, this is controlled by a variable phase combined with the southern approach right turn but has very low volumes, less than one vehicle every four or five cycles on average. To simplify the phasing within SIDRA the northern approach right turn has been set to filter in phase F2 in the morning peak, removing the variable phasing arrangement.

The phasing arrangement modelled is shown in **Figure 6.1**. Note, phases C and F2 only run in the morning peak, phase F1 only runs in the evening peak. The average cycle time obtained from the SCATS data is 150s for both periods.

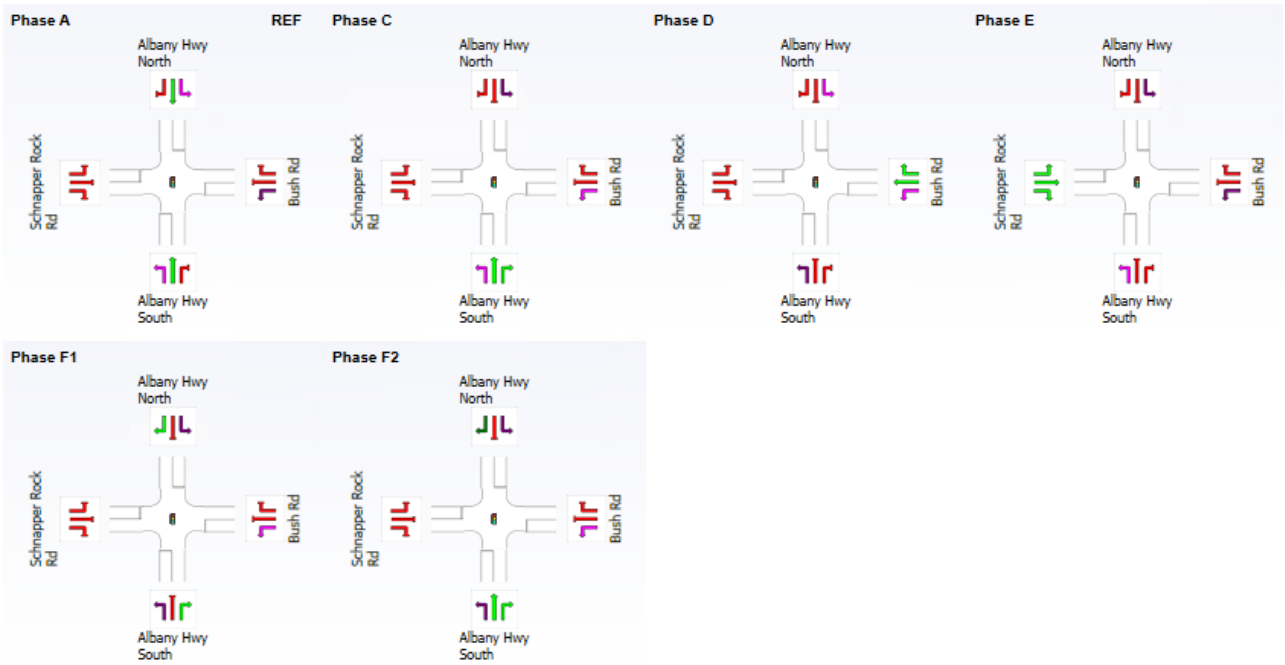

Figure 6.1 Phasing arrangement for Albany Highway / Bush Rd / Schnapper Rock Rd

The western approach, Schnapper Rock Rd, is comprised of a shared left/through/right kerbside lane, and a right turn only median lane. The share of movements in each lane was surveyed on 15 April 2021 and these movement proportions have been used to inform the proportion of vehicles undertaking each movement in the peak hours.

As noted in the request above, there is significant queueing along Albany Highway in the peak periods, especially at the southern exit and along Bush Rd on the eastern approach in the evening peak. The intersection performance has been calibrated to this congestion by reducing the exit speeds on affected movements:

- Left turn from Bush Rd to Albany Highway
- Right turn from Schnapper Rock Rd to Albany Highway
- Through movement from Albany Highway, north to south. This has been altered to a lesser extent than the turns above, as there will remain some amount of coordination along Albany Highway.

The resulting extent of the queueing along each approach has been visually calibrated using the typical congestion extents from the Google Maps traffic layer and is generally consistent.

The intersection performance using the SCATS phasing and timings are shown in **Table 6.1** and **Table 6.2** for the morning and evening peaks, respectively.

Table 6.1 Albany Highway / Bush Rd / Schnapper Rock Rd intersection performance, 2021 morning peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay (sec)	LOS	95%Q (m)	Vol	Deg Satn	Delay (Sec)	LOS	95%Q (m)
Albany (S)	L	146	0.104	4.9	A	4.5	157	0.11	5	A	5.4
	T	1129	0.581	18.6	B	149.2	1129	0.55	16	B	131.8
	R	693	0.885	51.5	D	123.1	693	0.804	34.7	C	103.7
Bush (E)	L	188	0.195	10.6	B	28.6	188	0.191	11.5	B	30.5
	T	36	0.458	75.2	E	29.8	38	0.799	85.8	F	34
	R	21	0.458	79.8	E	29.8	21	0.799	90.4	F	34
Albany (N)	L	45	0.045	11.4	B	6.9	45	0.048	10.5	B	6.4
	T	471	0.615	56.7	E	116.1	471	0.799	68.9	E	130.5
	R	8	0.156	87.3	F	4.5	8	0.126	81.3	F	4.4
Schnapper Rock (W)	L	9	0.7	51.2	D	93.5	16	0.805	57.9	E	116.7
	T	165	0.7	46.6	D	93.5	173	0.805	53.3	D	116.7
	R	262	0.7	51.4	D	93.5	306	0.805	58.1	E	116.7
Overall		3173	0.885	35.7	D	149.2	3245	0.805	34.4	C	131.8

Table 6.2 Albany Highway / Bush Rd / Schnapper Rock Rd intersection performance, 2021 evening peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay (sec)	LOS	95%Q (m)	Vol	Deg Satn	Delay (Sec)	LOS	95%Q (m)
Albany (S)	L	352	0.234	5.8	A	24.5	396	0.265	5.9	A	28.5
	T	771	0.432	22.3	C	100.9	771	0.495	30.3	C	123.2
	R	228	0.736	80.8	F	61.2	228	0.736	80.8	F	61.2

Road	Mvmt	No Development					With Development				
Bush (E)	L	568	0.855	48.4	D	280.6	568	0.825	45.2	D	256.1
	T	120	0.581	66.9	E	72.7	129	0.513	62.7	E	74.5
	R	24	0.581	71.5	E	72.7	24	0.513	67.3	E	74.5
Albany (N)	L	17	0.011	5.8	A	1.1	17	0.012	5.8	A	1.1
	T	1262	0.722	35.1	D	258.8	1262	0.827	45.2	D	297.6
	R	15	0.095	73.8	E	7.3	15	0.095	73.8	E	7.3
Schnapper Rock (W)	L	15	0.945	99	F	96.8	16	0.81	71.8	E	84.2
	T	41	0.945	94.4	F	96.8	43	0.81	67.2	E	84.2
	R	255	0.945	101.5	F	96.8	266	0.81	74.3	E	84.2
Overall		3668	0.945	41.3	D	280.6	3735	0.827	43.3	D	297.6

Using the SCATS-derived phase times without development traffic shows that the intersection is congested in both peak periods, especially during the evening peak. In the morning peak the worst movement level of service is LOS F on the low volume right turn from Albany Highway into Schnapper Rock Rd. Overall, the intersection operates at LOS D with all queues able to be contained within the current storage capacity.

In the evening peak the Schnapper Rock Rd approach operates at LOS F, with a degree of saturation of 0.945. This indicates that this approach is operating very close to saturation and unstable queues and delays would be expected in peak periods. The western approach experiences significant queueing on the approach to the left turn from Bush Rd onto Albany Highway south, with the queue extending back 250-300m. Although this queue can be contained without blocking any nearby intersections, it will impact the ability of vehicles to access the through and right movements at the signals.

In the morning peak, adding the traffic resulting from the development results in some additional delay for the western and northern approaches. A small reallocation in green time improves the flow from the southern approach and the overall level of service remains at LOS C for the intersection. All queues are still contained within available storage space and no individual movement experiences significantly more delay.

In the evening peak the small reallocation of green time improves the level of service on the western approach from LOS F to LOS E. All other movements remain at the same level of service and the critical queues on the southern approach are still within the available storage space.

Although congested, the Albany Highway / Bush Rd / Schnapper Rock Rd is expected to continue operating at the current level of service with the addition of the development traffic. This is considered conservative, as the development is unlikely to generate significant traffic movements before the completion of the NCI works.

Updating the traffic volumes to those forecast for the 2031 year reduces the demands through the intersection by 10-15%, as shown in **Table 4.1** and **Table 4.2**. Most of this demand is along Albany Highway, which means that there may be further opportunities for re-optimisation of the Albany Highway Interchange and the relationship with the Albany Highway / Bush Rd / Schnapper Rock Rd intersection. This analysis has conservatively assumed that this optimisation does not alter the cycle time, and that there is still congestion at the southern exit of the Albany Highway / Bush Rd / Schnapper Rock Rd intersection in the evening peak. Even with these conservative assumptions the intersection performance is slightly improved in both periods compared to the 2021 modelling. No individual movement is significantly worse, and most are improved by several seconds on average.

The 2031 intersection performance is shown in **Table 6.3** and **Table 6.4** for the morning and evening peaks, respectively.

Table 6.3 Albany Highway / Bush Rd / Schnapper Rock Rd intersection performance, 2031 morning peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay (sec)	LOS	95%Q (m)	Vol	Deg Satn	Delay (Sec)	LOS	95%Q (m)
Albany (S)	L	146	0.104	5	A	4.5	157	0.111	5	A	4.8
	T	930	0.457	15.6	B	99.9	930	0.487	19.4	B	115.9
	R	579	0.681	30.6	C	77.2	579	0.733	34.2	C	85.6
Bush (E)	L	157	0.149	9.5	A	21.1	157	0.155	10.1	B	22.4
	T	36	0.618	81	F	29.5	38	0.643	81.3	F	30.8
	R	17	0.618	85.6	F	29.5	17	0.643	85.9	F	30.8
Albany (N)	L	38	0.037	9.1	A	4.7	38	0.038	9.3	A	4.8
	T	388	0.673	64.5	E	101.3	388	0.736	68.3	E	105
	R	8	0.094	74	E	4.1	8	0.107	77.5	E	4.2
Schnapper Rock (W)	L	9	0.688	50.4	D	92.7	16	0.717	47.7	D	103.2
	T	165	0.688	45.8	D	92.7	173	0.717	43.1	D	103.2
	R	262	0.688	50.6	D	92.7	306	0.717	47.8	D	103.2
Overall		2735	0.688	31.5	C	101.3	2807	0.736	33.9	C	115.9

Table 6.4 Albany Highway / Bush Rd / Schnapper Rock Rd intersection performance, 2031 evening peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay (sec)	LOS	95%Q (m)	Vol	Deg Satn	Delay (Sec)	LOS	95%Q (m)
Albany (S)	L	352	0.234	5.8	A	24.4	396	0.264	5.9	A	28.4
	T	648	0.403	27.3	C	93.6	648	0.416	29.1	C	97.6
	R	195	0.68	80.7	F	51.9	195	0.68	80.7	F	51.9
Bush (E)	L	485	0.682	29.6	C	175.8	485	0.695	30.2	C	177.7
	T	120	0.566	66.8	E	70.7	129	0.572	66	E	74.8
	R	21	0.566	71.3	E	70.7	21	0.572	70.5	E	74.8
Albany (N)	L	14	0.01	5.6	A	0.8	14	0.01	5.6	A	0.8
	T	1060	0.674	38.4	D	219.3	1060	0.696	40.1	D	224.5
	R	15	0.103	75.1	E	7.4	15	0.103	75.1	E	7.4
Schnapper Rock (W)	L	15	0.681	62.4	E	73	16	0.7	62.1	D	76.6
	T	41	0.681	57.8	E	73	43	0.7	57.5	D	76.6
	R	255	0.681	64.8	E	73	266	0.7	64.6	E	76.6
Overall		3221	0.682	37.6	D	219.3	3288	0.7	38.3	D	224.5

The analysis of the current performance of the key intersections along Albany Highway show that there is existing congestion during peak periods, especially at the southern intersection of Schnapper Rock Rd / Albany Highway / Bush Rd. The analysis also demonstrates that there remains sufficient capacity such that the additional traffic generated by the Schnapper Rock development does not significantly impact the operation of any of the intersections studied.

There also remains the possibility that the operation of the Albany Highway Interchange and the Schnapper Rock Rd / Albany Highway / Bush Rd intersections may be able to be optimised after the completion of the Northern Corridor Improvement works which are currently under construction. However, it should be noted that this analysis does not rely on extensive corridor optimisation and that acceptable performance is obtained in all scenarios.

7. Item T6 – Trip generation

Council request and reasoning:

Please update Table 6.1 to correct the number of average daily additional vehicle movements to 946.

Table 6.1 of the transportation assessment erroneously lists the average daily additional vehicle movements as 1,892. This number should be 946.

Abley's response:

This has been noted and corrected in the TA Revision B and the correct values used in the RFI response items above.

8. Auckland Transport Comments

Auckland Transport issued a memorandum dated 11 March 2021. The table below briefly summarises the correspondence and Abley's comments.

Auckland Transport Comment	Abley Comments
Section 3.2 Intersection Arrangements *The intersection of Schnapper Rock Road and Oakway Drive is particularly important, as all vehicles entering and exiting the site will need to use this intersection to connect to the wider road network. Furthermore, areas of Schnapper Rock are already completely reliant on this intersection to connect to the wider road network (see image below).* *While section 3.2 appears to assess safety and access in relation to these three intersections, the effects of increased traffic volumes from the development on Schnapper Rock Road have not been addressed. This is particularly important in relation to the Schnapper Rock Road / Oakway Drive intersection for the reasons outlined earlier.*	We have assessed this intersection in Section 8.1 below, in addition to the two intersections assessed as a part of our response to Council's information requests above.

Auckland Transport Comment	Abley Comments
Section 3.3 Existing traffic volumes *It is unclear exactly where the existing traffic counts in section 3.3 of the transportation assessment were undertaken and whether these are relevant. The transportation assessment should include a plan that clearly indicates the location of these traffic counts.* *The existing traffic counts used in section 3.3 are dated. Some of the counts used occurred in 2014. Traffic volumes in the Schnapper Rock area is likely to have increased since 2014 due to growth and development.* *The existing traffic counts for the three intersections listed in section 3.2 should be the focus of this transportation assessment.*	As a part of our response to Auckland Council's information requests above we have undertaken traffic count surveys to gather current data.
Section 3.5 Cycling facilities *Section 3.5 notes "The site is located approximately 35mins from Hobsonville Point Ferry Terminal that will connect to the CBD, dedicated cycling facilities are provided for most of the way". It is unclear how feasible this would be for future residents.*	Abley agrees - this is not likely to be a convenient distance for a majority of cyclists. This does not influence our evaluation of the proposal as a whole however we hope this clarifies our meaning. Overall, the site is considered moderately well connected to cycling facilities, particularly routes to Rosedale.
Section 6.1 Trip Generation *Note that Table 6.1 erroneously lists the average daily additional vehicle movements as 1,892. This number should be 946.*	The correct values have been used in the further information response items above.
Section 7.1 Traffic Impacts of the Proposal *Section 7.1 contrasts the existing traffic counts with the assumed additional trips at each of the traffic count locations outlined in section 3.3. However, it is unclear how additional trip generation was distributed between the different traffic count locations in Table 7.2 based on the explanation provided in section 6.2.* *• Given that it is unclear where the exact locations of the traffic counts are, it is unclear how relevant the LOS analysis is in Table 7.2.* *• The analysis in Section 7.1 is based on the existing traffic counts and does not reflect the likely future traffic volumes when the site is fully developed (e.g. consented development on the adjacent site).*	As part of our response to Council's further information requests we have undertaken a more detailed assessment including updated traffic counts, a clarified trip generation methodology and consideration of future development scenarios. These assessments are outlined in the sections above.

Auckland Transport Comment	Abley Comments
Section 9.0 Conclusions and Recommendations *Section 9.0 concludes that "the proposed Plan Change is considered acceptable from a transport planning perspective". However, as highlighted above, the transportation assessment needs to take into account the effects of additional vehicle movements associated with the development on the three intersections described in section 3.2.* *• AT supports the recommendations outlined in section 9.2 being implemented as part of future subdivision consent and engineering plan approval stages. However, the recommendations may be insufficient, given that there is not a clear understanding of the effects of additional vehicle movements associated with the development on the three intersections described in section 3.2.* *• In addition to the recommendations outlined in section 9.2, the applicant could consider the following at future subdivision consent and engineering plan approval stages: o Treatments at the Schnapper Rock Road / Oakway Drive intersection, which lower traffic speeds and create safer crossing points for active mode users.* *o Traffic calming measures on the north-western section of Schnapper Rock Road near the entrance to the site to create a safer environment for active mode users.* *• Note that the recommendations listed above and in section 9.3 will need to be consistent with AT's Transport Design Manual.*	This response includes the detailed assessment of the three intersections highlighted. The consideration of treatments at the Oakway Drive / Schnapper Rock Road intersection at subdivision stage appear reasonable; the specifics of these should be assessed as part of the subdivision design however it is recommended that these be noted formally as advice notes such that the recommendations are not overlooked.

8.1 Intersection Assessment of Schnapper Rock / Oakway RAB

SIDRA modelling has been undertaken, utilising the survey data collected on 15 April 2021. Lanes were configured as currently installed and incorporates conservative assumptions in terms of the entry radius (15m, reduced from 20m default) and the entry angle (40 degrees, increased from 30 degrees default). The intersection performs well in all periods and scenarios and no approach drops below LOS A in any of the tested scenarios. The distribution of the additional traffic generated by the development is shown in **Table 8.5**. The current operation of the intersection is shown in **Table 8.6** and **Table 8.7** for the morning and evening peak periods, respectively.

Table 8.5 Distribution of Development Traffic

Road	Movement	AM Development Trips	PM Development Trips
Schnapper Rock (S)	L		
	T	20.9	5.2
	R	56.1	14.1
Schnapper Rock (E)	L	12.5	50
	T		
	R		
Schnapper Rock (N)	L		
	T	1.8	7.2
	R		
Oakway (W)	L		

Road	Movement	AM Development Trips	PM Development Trips
	T		
	R	5	19.8
Overall		96.3	96.3

Table 8.6 Schnapper Rock Rd / Oakway Dr intersection performance, 2021 morning peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay	LOS	95%Q	Vol	Deg Satn	Delay	LOS	95%Q
Schnapper Rock (S)	L	37	0.274	4.3	A	12.3	37	0.343	4.4	A	16.6
	T	121	0.274	4.4	A	12.3	143	0.343	4.4	A	16.6
	R	140	0.274	8.3	A	12.3	199	0.343	8.4	A	16.6
Schnapper Rock (E)	L	84	0.186	3.5	A	9.3	97	0.2	3.5	A	10.1
	T	91	0.186	3.5	A	9.3	91	0.2	3.6	A	10.1
	R	63	0.186	7.5	A	9.3	63	0.2	7.5	A	10.1
Schnapper Rock (N)	L	25	0.046	6.2	A	1.9	25	0.052	6.7	A	2.1
	T	6	0.046	6.2	A	1.9	8	0.052	6.8	A	2.1
	R	4	0.046	10.1	A	1.9	4	0.052	10.7	A	2.1
Oakway (W)	L	20	0.339	6.1	A	16.3	20	0.375	6.9	A	18.4
	T	236	0.339	6.1	A	16.3	236	0.375	6.9	A	18.4
	R	40	0.339	10	A	16.3	45	0.375	10.9	A	18.4
Overall		867	0.339	5.9	A	16.3	968	0.375	6.3	A	18.4

Table 8.7 Schnapper Rock Rd / Oakway Dr intersection performance, 2021 evening peak

Road	Mvmt	No Development					With Development				
		Vol	Deg Satn	Delay	LOS	95%Q	Vol	Deg Satn	Delay	LOS	95%Q
Schnapper Rock (S)	L	9	0.14	4.2	A	5.8	9	0.161	4.3	A	6.8
	T	51	0.14	4.2	A	5.8	56	0.161	4.3	A	6.8
	R	86	0.14	8.2	A	5.8	101	0.161	8.2	A	6.8
Schnapper Rock (E)	L	155	0.284	4.4	A	14.4	207	0.345	4.8	A	18.4
	T	97	0.284	4.4	A	14.4	97	0.345	4.8	A	18.4
	R	56	0.284	8.4	A	14.4	56	0.345	8.7	A	18.4
Schnapper Rock (N)	L	24	0.059	5.8	A	2.5	24	0.071	6.1	A	3
	T	18	0.059	5.8	A	2.5	25	0.071	6.1	A	3
	R	7	0.059	9.7	A	2.5	7	0.071	10.1	A	3
Oakway (W)	L	17	0.284	4.8	A	13.5	17	0.313	5	A	15.1
	T	152	0.284	4.8	A	13.5	152	0.313	5	A	15.1

	R	121	0.284	8.7	A	13.5	142	0.313	8.9	A	15.1
Overall		793	0.284	5.9	A	14.4	893	0.345	6.2	A	18.4

This demonstrates that there is sufficient capacity at the Schnapper Rock / Oakway Dr intersection to accommodate the development traffic. There are no operational or queue length concerns to highlight.

9. Summary and conclusions

Based on our analysis of the trip generation of the proposal and its potential effects on the current and future transport network, summarised at a high level in **Table 9.1** we conclude that the vehicle trips generated by the proposal will be able to be accommodated and there is no indication that they will significantly impact the operation of any of the studied intersections.

Table 9.1 High level summary of SIDRA results

	Level of Service - AM		Level of Service - PM	
	No development	With development	No development	With development
Albany Highway / Oakway Drive	2021: C 2031: C	2021: C 2031: C	2021: C 2031: C	2021: C 2031: C
Oakway Drive / Schnapper Rock Road	2021: A 2031: A	2021: A 2031: A	2021: A 2031: A	2021: A 2031: A
Schnapper Rock Road / Albany Highway / Bush Road	2021: D 2031: C	2021: C 2031: C	2021: D 2031: D	2021: D 2031: D

On balance, the proposed Plan Change is considered acceptable from a transport planning perspective.

Below is an updated list of recommendations for the development of future subdivision and land use plans based on the provisions of the AUPOP and our considerations to date:

- We recommend that the future public road be located in such a manner that it forms an intersection with Schnapper Rock Road on the northwest frontage of the proposal site (not the northeast frontage), and is located a minimum of 97m from the Oakway Drive / Schnapper Rock Road roundabout.
- An internal footpath should be provided to connect the site to the eastern frontage (near the Watercare designation) to ensure pedestrians do not have to walk around the long way if travelling east.
- A footpath connection to the Kyle Road subdivision to the south should be investigated to improve connectivity and integration with this development.
- Car parking and bicycle parking should be provided in accordance with the requirements of the AUPOP, at a minimum.
- Vehicle crossings and accessways shall be designed to avoid the need for vehicles to reverse when entering or exiting onto a public road, except where this is expressly permitted.
- It is recommended that a footpath is to be provided along the northeast boundary of the site (including in front of the Watercare designation) to connect with the surrounding walking network.
- Pedestrian crossing facilities and traffic calming measures are recommended to be investigated on Schnapper Rock Road along the northeast frontage of the site and at the Schnapper Rock Road / Oakway Drive roundabout.

10. Appendix A – Correspondence

Abley to Wes Edwards, 16 April 2021

From: Shane Ingley <shane.ingley@abley.com>
Sent: Friday, 16 April 2021 9:17 AM
To: wes@arrive.nz
Cc: Dave Smith <dave.smith@abley.com>; Abu Hoque <abu.hoque@hobsongreen.co.nz>
Subject: 57 Schnapper Rock PC - Transport response update

Hi Wes,

Over the phone we discussed a 'Plan A' for the Schnapper Rock / Albany Highway / Bush Road intersection assessment of obtaining some modelling files or outputs for the NCI project particularly as there are a number of elements of the project yet to be completed (including the Eastbound ramp due to open very shortly).

Having corresponded with Flow, it looks like Plan A is off the table as it seems the model files and data are either not ready for release or the holders do not wish to share it at this time. Flow have provided the SCATS data for this intersection, though we will still need to obtain this for the other signalised intersection up the road (Oakway / Albany Highway) separately.

With that in mind, Dave and I have developed a Plan B which while not as idyllic as Plan A we believe will be more than sufficient given the relative scale of our Plan Change project in the context of the rather large infrastructure upgrades that are imminent:

Plan B

- Use available SCATS data supplemented with on-site measurements of turning splits (for shared movement lanes) and queue length observations (we are in progress collecting these today, as it happens). This will be in order to understand the current conditions.

- With reference to the published ITA for the NCI project, make use of projected changes in traffic volumes (Appendix E) and v/c ratios (Appendix F/G) to make some inferences about the future performance (2031 scenario). Based on the report (and in line with the purpose of the NCI project) the future performance is expected to be better than current conditions with reduced volumes on Albany Highway and improved v/c ratio (<1) on Schnapper Rock Road approach to the intersection.

https://www.nzta.govt.nz/assets/projects/auckland-northern-corridor/EPA/Assessment-of-Environmental-Effects/Assessment-of-Transport-Effects.pdf

Hopefully this approach will be the way forward. Can you please let us know if you have any further suggestions – our client would like us to provide a full response by Friday 23rd April to meet Council's timeframes for notification.

Shane

Shane Ingley

BE(Hons)

Senior Transportation Engineer

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www.abley.com Disclaimer

Wes Edwards reply to Abley, 16 April 2021

From: wes@arrive.nz <wes@arrive.nz>
Sent: Friday, 16 April 2021 9:57 AM
To: Shane Ingley <shane.ingley@abley.com>
Cc: Dave Smith <dave.smith@abley.com>; 'Abu Hoque' <abu.hoque@hobsongreen.co.nz>
Subject: RE: 57 Schnapper Rock PC - Transport response update

Hi Shane

Thanks for the update. It's unfortunate that the NCI SATURN model isn't available.

Thanks for providing the link to the NCI ITA. Looking at Appendix F v/c ratios for Schnapper Rock Rd:

2015 base 93% AM and 102% PM

2031 reference 102% AM and 101% PM.

2031 project 97% AM and 89% PM (other approaches at 91, 98%).

Despite the significant reductions in flows expected in 2031 this intersection would still be operating fairly poorly during the peaks, including worse than 2015 in the AM) so I think it is still important to provide everyone with a reasonably good understanding of how the performance is likely to change because of the plan change, although perhaps not as important as it would have been without the predicted reductions in volume expected from the NCI project.

Can I suggest an intermediate methodology? If you can't get the actual SATURN model to use, I think the next-best option would be to see if you can obtain the flow plots from the 2031 NCI SATURN model as used for the ITA – ideally the intersection turning movement plots, but if not those, then at least the link volumes and use the SCATS counts to estimate the turning proportions from the link flows. I didn't see these plots in my quick skim through the NCI ITA (only difference plots), but the forecasting centre/ NZTA/ Flow may be prepared to release some more detailed plots.

The SATURN movements could then be input into SIDRA as the base case, then your traffic added to SIDRA for the proposed case. I think that approach is more likely to produce better 2031 flows than taking existing or historic SCATS volumes and adjusting them manually to 2031.

If the SATURN data isn't available then I guess the only option left would be to use existing turning movement counts and then adjusting those to match the predicted link flows in the NCI ITA (eg Table E8), but that would provide a far poorer estimate and probably take longer. Alternatively you may be able to use the 2015 link flows in the model validation report and the difference plots to derive the 2031 link flows?

If you are having trouble obtaining the SATURN plots perhaps I could make contact with Flow or the forecasting centre?

Regards

Wes

Abley to Wes Edwards, 20 April 2021

From: Shane Ingley <shane.ingley@abley.com>
Sent: Tuesday, 20 April 2021 3:40 PM
To: wes@arrive.nz
Cc: Dave Smith <dave.smith@abley.com>; 'Abu Hoque' <abu.hoque@hobsongreen.co.nz>; Kate Brill <kate.brill@abley.com>
Subject: RE: 57 Schnapper Rock PC - Transport response update

Hi Wes,

Thanks again for your guidance on these matters. Further to our correspondence regarding this project and our endeavours to address the s92 queries raised, we have been in contact with the Forecasting Centre over the last few days and they have advised us the following:

- That the SATURN model used for the NCI is not likely to provide us additional accuracy. This was because as a large scale model with our intersection near the edge of the model it was not likely to be highly accurate for our purposes. Essentially, they could pull the data (with time) but they did not recommend its usage for our particular intersection.
- That getting the Flow Plots would take the same time/cost as obtaining the model itself which, as the model is archived, pushes us out to next week at the earliest and at this stage would push out our project beyond our timeframe, for a marginal gain.

We also did try to obtain the data via FLOW however they were not able to assist (possibly meeting the same constraints with the archived data as the FC reported). So overall I would say it was definitely worth asking the questions however it doesn't work out for our purposes unless we had another few weeks to obtain and analyse the model, which the Forecasting Centre have indicated might not help us in this instance as much as it might normally.

In good news, ATOC have provided the SCATS data for both signalled intersections and we have completed some on-site surveys at the Bush Road intersection to observe turning splits and queue lengths. We do have to use a prior week's data for the Bush Road intersection as last week's detector readings were corrupt. We believe that this data combined with the NCI ITA and some engineering sense will allow us to prepare a response that is appropriate and sufficient for the scale of development proposed. Hopefully it is appreciated that we have endeavoured to take the best course of action.

We are aiming at the end of this week to deliver a formal response.

Regards

Shane

Shane Ingley

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Wes Edwards reply to Abley, 20 April 2021

From: wes@arrive.nz <wes@arrive.nz>
Sent: Tuesday, 20 April 2021 3:47 PM
To: Shane Ingley <Shane.Ingley@abley.com>
Cc: Dave Smith <dave.smith@abley.com>; 'Abu Hoque' <abu.hoque@hobsongreen.co.nz>; Kate Brill <kate.brill@abley.com>; 'Emily Ip' <emily.ip@aucklandcouncil.govt.nz>
Subject: RE: 57 Schnapper Rock PC - Transport response update

Hi Shane

Thank you for the update. You have obviously made a good effort to obtain the model data, but as that is not going to be a workable option your methodology sounds like a reasonable one in the circumstances. I look forward to receiving your work to review.

Regards

Wes

Abley response to AT queries 28 May 2021

Hi Abu,

Please see below response re: the modelling of the roundabout, and attached Transport Assessment with minor table correction (and corrected table numbering which appeared to have gotten out of order on the previous version).

Regards

Shane

"The transportation assessment assumes traffic movements between 2021 and 2031 will remain constant for the Schnapper Rock / Oakway Drive roundabout, as Schnapper Rock does not allow for through-traffic. While it is true that the suburb does not allow for through-traffic, it is not realistic to assume that there will be no growth in vehicle movements over the next 10 years, given that further development is likely to occur. "

Stats NZ Medium Population growth projections sit at around 4.6% in the next 10 years for Schnapper Rock.

There are only select remaining development opportunities in the Schnapper Rock area so it is considered unlikely that large-scale redevelopment will occur in preference to other nearby greenfield sites.

To be conservative the roundabout has been tested with 10% additional traffic.

It should also be noted that the roundabout geometry has been configured to also be conservative, meaning modelled delays should also tend to be slightly higher than expected in reality.

The results are attached below, the roundabout is still expected to perform without issue, giving LOS A in both the AM and PM peak.

Queueing is still contained within the available space, with a 95% maximum queue of ~22m on the western approach in the AM and ~21m on the eastern approach in the PM.

For context, for the intersection to reach LOS B traffic growth of >50% in the AM and >75% in the PM would need to occur.

In this case, 95% maximum queues of around 65m would occur with an average delay of around 10s per vehicle. This would still be considered an acceptable level of performance.

MOVEMENT SUMMARY

Site: 101 [Schnapper Rock Oakway AM (Site Folder: Base With Development - Future)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Schnapper S														
1	L2	35	3.0	41	3.0	0.384	4.6	LOS A	2.7	19.3	0.49	0.60	0.49	45.3
2	T1	136	3.0	157	3.0	0.384	4.6	LOS A	2.7	19.3	0.49	0.60	0.49	46.1
3	R2	189	3.0	219	3.0	0.384	8.5	LOS A	2.7	19.3	0.49	0.60	0.49	46.1
Approach		360	3.0	417	3.0	0.384	6.7	LOS A	2.7	19.3	0.49	0.60	0.49	46.0
East: Schnapper E														
4	L2	93	3.0	107	3.0	0.221	3.6	LOS A	1.6	11.5	0.29	0.47	0.29	46.3
5	T1	86	3.0	100	3.0	0.221	3.6	LOS A	1.6	11.5	0.29	0.47	0.29	47.2
6	R2	60	3.0	69	3.0	0.221	7.6	LOS A	1.6	11.5	0.29	0.47	0.29	47.2
Approach		239	3.0	276	3.0	0.221	4.6	LOS A	1.6	11.5	0.29	0.47	0.29	46.8
North: Schnapper N														
7	L2	24	3.0	28	3.0	0.060	7.2	LOS A	0.4	2.5	0.68	0.66	0.68	45.0
8	T1	8	3.0	9	3.0	0.060	7.3	LOS A	0.4	2.5	0.68	0.66	0.68	45.8
9	R2	4	3.0	5	3.0	0.060	11.2	LOS B	0.4	2.5	0.68	0.66	0.68	45.8
Approach		36	3.0	41	3.0	0.060	7.7	LOS A	0.4	2.5	0.68	0.66	0.68	45.2
West: Oakway														
10	L2	19	3.0	22	3.0	0.430	7.5	LOS A	3.0	21.9	0.76	0.77	0.76	44.8
11	T1	224	3.0	259	3.0	0.430	7.5	LOS A	3.0	21.9	0.76	0.77	0.76	45.6
12	R2	43	3.0	50	3.0	0.430	11.4	LOS B	3.0	21.9	0.76	0.77	0.76	45.6
Approach		286	3.0	331	3.0	0.430	8.1	LOS A	3.0	21.9	0.76	0.77	0.76	45.5
All Vehicles		920	3.0	1066	3.0	0.430	6.6	LOS A	3.0	21.9	0.53	0.62	0.53	46.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akcelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Schnapper Rock Oakway PM (Site Folder: Base With Development - Future)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Schnapper S														
1	L2	9	3.0	10	3.0	0.180	4.4	LOS A	1.1	7.8	0.43	0.58	0.43	45.2
2	T1	53	3.0	62	3.0	0.180	4.4	LOS A	1.1	7.8	0.43	0.58	0.43	46.1
3	R2	96	3.0	111	3.0	0.180	8.3	LOS A	1.1	7.8	0.43	0.58	0.43	46.0
Approach		158	3.0	183	3.0	0.180	6.8	LOS A	1.1	7.8	0.43	0.58	0.43	46.0
East: Schnapper E														
4	L2	197	3.0	228	3.0	0.387	5.0	LOS A	3.0	21.4	0.57	0.59	0.57	45.9
5	T1	92	3.0	107	3.0	0.387	5.0	LOS A	3.0	21.4	0.57	0.59	0.57	46.7
6	R2	53	3.0	61	3.0	0.387	9.0	LOS A	3.0	21.4	0.57	0.59	0.57	46.7
Approach		342	3.0	396	3.0	0.387	5.6	LOS A	3.0	21.4	0.57	0.59	0.57	46.2
North: Schnapper N														
7	L2	23	3.0	27	3.0	0.082	6.4	LOS A	0.5	3.5	0.63	0.63	0.63	45.3
8	T1	24	3.0	28	3.0	0.082	6.5	LOS A	0.5	3.5	0.63	0.63	0.63	46.2
9	R2	7	3.0	8	3.0	0.082	10.4	LOS B	0.5	3.5	0.63	0.63	0.63	46.2
Approach		54	3.0	63	3.0	0.082	7.0	LOS A	0.5	3.5	0.63	0.63	0.63	45.8
West: Oakway														
10	L2	16	3.0	19	3.0	0.352	5.3	LOS A	2.4	17.5	0.57	0.63	0.57	45.1
11	T1	144	3.0	167	3.0	0.352	5.3	LOS A	2.4	17.5	0.57	0.63	0.57	45.9
12	R2	135	3.0	156	3.0	0.352	9.2	LOS A	2.4	17.5	0.57	0.63	0.57	45.9
Approach		295	3.0	341	3.0	0.352	7.1	LOS A	2.4	17.5	0.57	0.63	0.57	45.9
All Vehicles		849	3.0	983	3.0	0.387	6.4	LOS A	3.0	21.4	0.54	0.60	0.54	46.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akcelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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11. Appendix B – Future Trip Growth by Movement

		AM								PM							
		Ref 2021	Uplift to 2031	Ref 2031	NCI Adj.	NCI w/o Dev.	Dev.	Ref 2021 w/ Dev.	NCI w/ Dev.	Ref 2021	Uplift to 2031	Ref 2031	NCI Adj.	NCI w/o Dev.	Dev.	Ref 2021 w/ Dev.	NCI w/ Dev.
Albany Hwy / Oakway Dr																	
Albany Hwy S	Thru	791.2	14.6%	906.4	-17.6%	651.9	20.9	812.1	672.8	698.4	12.6%	786.4	-15.9%	587	5.2	703.6	592.2
Albany Hwy S	Left	94.2		94.2		94.2		94.2	94.2	59.4		59.4		59.4		59.4	59.4
Albany Hwy N	Right	151.2		151.2		151.2	5	156.2	156.2	318.4		318.4		318.4	19.8	338.2	338.2
Albany Hwy N	Thru	492.8	14.6%	564.5	-17.6%	406		492.8	406	717.6	12.6%	808	-15.9%	603.1		717.6	603.1
Oakway Dr	Left	239.2		239.2		239.2		239.2	239.2	86		86		86		86	86
Oakway Dr	Right	104		104		104		104	104	21		21		21		21	21
		1872.6		**2059.5**		**1646.5**	**25.9**	**1898.5**	**1672.4**	**1900.8**		**2079.2**		**1674.9**	**25**	**1925.8**	**1699.9**
Albany Hwy / Bush Rd / Schnapp		**Ref 2021**	**Uplift to 2031**	**Ref 2031**	**NCI Adj.**	**NCI w/o Dev.**	**Dev.**	**Ref 2021 w/ Dev.**	**NCI w/ Dev.**	**Ref 2021**	**Uplift to 2031**	**Ref 2031**	**NCI Adj.**	**NCI w/o Dev.**	**Dev.**	**Ref 2021 w/ Dev.**	**NCI w/ Dev.**
Albany Hwy N	Left	42.8	11.3%	47.7	-16.5%	35.8		42.8	35.8	16	11.2%	17.8	-14.6%	13.7		16	13.7
Albany Hwy N	Thru	447.3	14.6%	512.4	-17.6%	368.5		447.3	368.5	1198.5	12.6%	1349.5	-15.9%	1007.3		1198.5	1007.3
Albany Hwy N	Right	7.8		7.8		7.8		7.8	7.8	14		14		14		14	14
Bush Rd	Left	178.4	11.3%	198.6	-16.5%	149		178.4	149	539.7	11.2%	600.3	-14.6%	460.8		539.7	460.8
Bush Rd	Thru	34.1		34.1		34.1	2.1	36.2	36.2	114.4		114.4		114.4	8.3	122.7	122.7
Bush Rd	Right	19.9	11.3%	22.2	-16.5%	16.6		19.9	16.6	22.9	11.2%	25.5	-14.6%	19.6		22.9	19.6
Albany Hwy S	Left	138.5		138.5		138.5	10.4	148.9	148.9	334.3		334.3		334.3	41.7	376	376
Albany Hwy S	Thru	1072.5	14.6%	1228.6	-17.6%	883.6		1072.5	883.6	732.3	12.6%	824.6	-15.9%	615.5		732.3	615.5
Albany Hwy S	Right	658.3	11.3%	732.9	-16.5%	549.9		658.3	549.9	216.8	11.2%	241.1	-14.6%	185.1		216.8	185.1
Schnapper Rock Rd	Left	9		9		9	6.2	15.2	15.2	14		14		14	1.6	15.6	15.6
Schnapper Rock Rd	Thru	156.5		156.5		156.5	8.3	164.8	164.8	39.1		39.1		39.1	2.1	41.2	41.2
Schnapper Rock Rd	Right	248.9		248.9		248.9	41.6	290.5	290.5	241.9		241.9		241.9	10.4	252.3	252.3
		3014		**3337.2**		**2598.2**	**68.6**	**3082.6**	**2666.8**	**3483.9**		**3816.5**		**3059.7**	**64.1**	**3548**	**3123.8**
Schnapper Rock Rd / Oakway Dr		**Ref 2021**	**Uplift to 2031**	**Ref 2031**	**NCI Adj.**	**NCI w/o Dev.**	**Dev.**	**Ref 2021 w/ Dev.**	**NCI w/ Dev.**	**Ref 2021**	**Uplift to 2031**	**Ref 2031**	**NCI Adj.**	**NCI w/o Dev.**	**Dev.**	**Ref 2021 w/ Dev.**	**NCI w/ Dev.**
Schnapper Rock Rd N	Left	24		24		24		24	24	23		23		23		23	23
Schnapper Rock Rd N	Thru	6		6		6	1.8	7.8	7.8	17		17		17	7.2	24.2	24.2
Schnapper Rock Rd N	Right	4		4		4		4	4	7		7		7		7	7
Schnapper Rock Rd E	Left	80		80		80	12.5	92.5	92.5	147		147		147	50	197	197
Schnapper Rock Rd E	Thru	86		86		86		86	86	92		92		92		92	92
Schnapper Rock Rd E	Right	60		60		60		60	60	53		53		53		53	53
Schnapper Rock Rd S	Left	35		35		35		35	35	9		9		9		9	9
Schnapper Rock Rd S	Thru	115		115		115	20.9	135.9	135.9	48		48		48	5.2	53.2	53.2
Schnapper Rock Rd S	Right	133		133		133	56.1	189.1	189.1	82		82		82	14.1	96.1	96.1
Oakway Dr	Left	19		19		19		19	19	16		16		16		16	16
Oakway Dr	Thru	224		224		224		224	224	144		144		144		144	144
Oakway Dr	Right	38		38		38	5	43	43	115		115		115	19.8	134.8	134.8
		824		**824**		**824**	**96.3**	**920.3**	**920.3**	**753**		**753**		**753**	**96.3**	**849.3**	**849.3**