PROPOSED 21 LOT INDUSTRIAL SUBDIVISION

155, 157,151 BRIGHAM CREEK ROAD & 69, 71 TRIG ROAD WHENUAPAI

INTEGRATED TRANSPORT ASSESSMENT

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Project: PROPOSED 21 LOT INDUSTRIAL SUBDIVISION

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Reviewed by:

Revisions:

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7/07/2021	Draft	Eric Hebner	
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1 INTRODUCTION

This report discusses the traffic-related implications of an application to subdivide 21 industrial lots on a site accessible from Brigham Creek Road in Whenuapai.

The Industrial lots are to be accessible via a proposed signalised intersection on Brigham Creek Road plus three proposed industrial collector roads (identified on the proposed roading plan as Road 1, Road 2 and Road 3.)

The Section of land being developed is located on the southern side of Brigham Creek Road and it is within the Whenuapai Proposed Plan Change 5 (PPC5) Zone.

Layout of the proposed signalised intersection and industrial collector roads is consistent with the indicative roading network identified in PPC5 – Whenuapai 3 Precinct Plan.

The site and existing surrounding road network plus key traffic engineering considerations are identified on the following aerial photo.

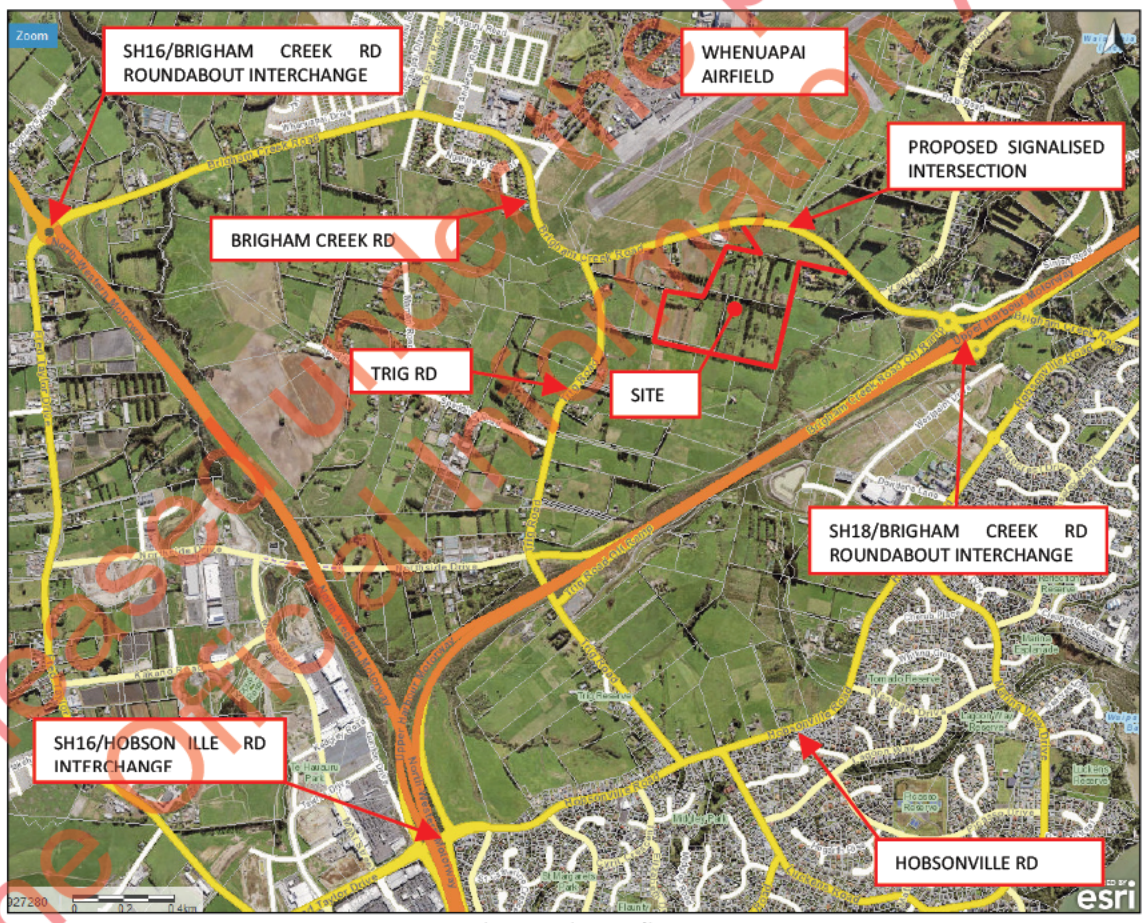


Figure 1: Site Locality

The proposed subdivision layout is shown by the following illustration.

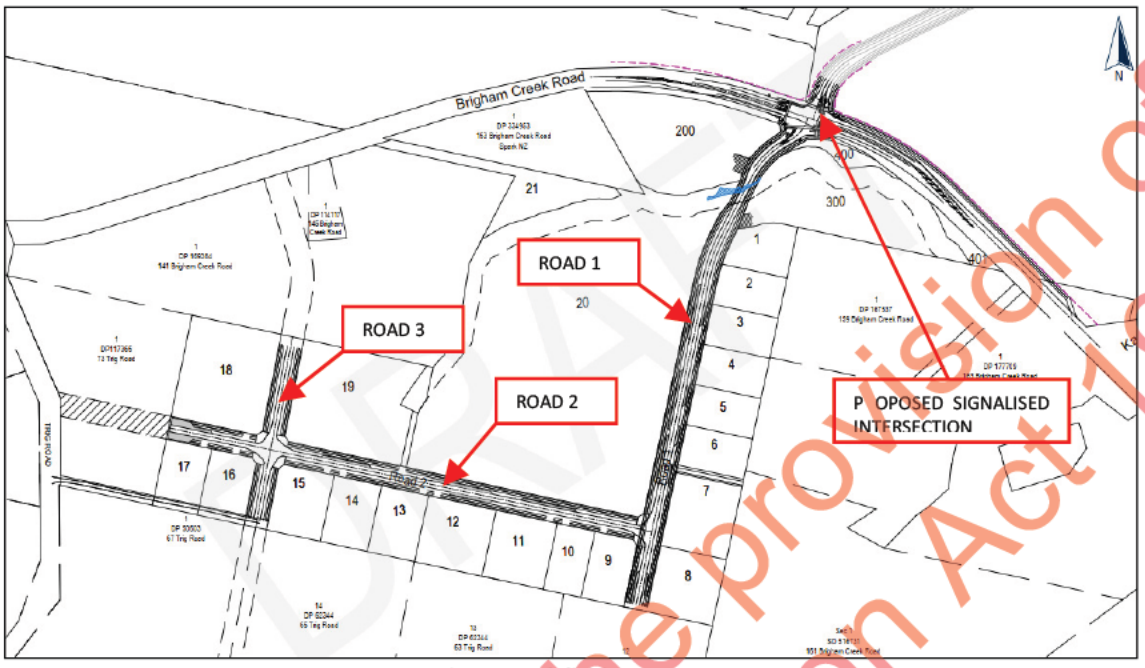


Figure 2: Subdivision Layout

As can be seen in the previous illustration, Road 1 is to connect o Brigham Creek Road at a new signalised intersection. All three roads proposed are to terminate at the site's boundaries, where it is intended for the roads to be extended into adjacent properties when these adjacent properties are subdivided in accordance with PPC5 emporary turning heads are to be formed where the roads terminate so that large rigid trucks and semitrailers a e able to turn around.

The alignment of the proposed roads is consis ent with PPC5, as identified on the following PPC5 indicative roading network plan.

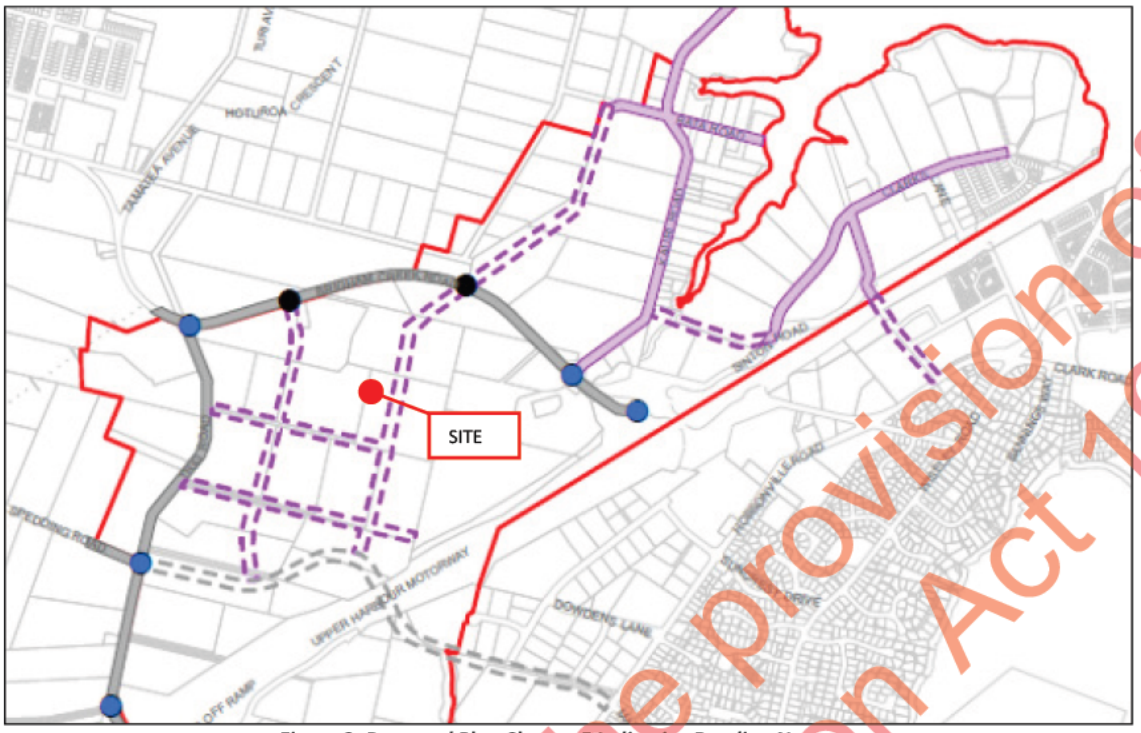


Figure 3: Proposed Plan Change 5 Indicative Roading Networ

The proposed Brigham Creek Road signalised intersection includes a fourth leg to the north in accordance with the PPC5 roading plan.

At the concept design stage of the proposed subdivi ion an alternative Brigham Creek Road intersection design was also investigated due to design constraints with the current four leg intersection proposed. The constra nts consist of the New Zealand Defence Force land to the north and a stream to the south. These constraints require the proposed intersection to have the southern leg (subject subdivision's access leg) at an acute ngle (Road 1), and the northern leg to have a tight corner (northern corner). The alternative intersection design investigated is two separate signalised intersections that can operate as a coord nated staggered intersection. A comparison of these two intersection designs is ncluded in this report.

The proposed intersection and oad designs have been undertaken in consideration of the future intended use which for Brigham Creek Road is a high traffic volume arterial and the internal roads are industrial collector roads.

The proposed roading designs align with the Building Code's NZS4404 Land Development and Subdivision Infrastructure standard, The New Zealand Transport Agency's Manual of Traffic Sign & Marking, Austroads Guide to Road Design as well as Auckland Transport's Roads & Streets Framework document nd their Transport Design Manual.

Fur her design guidance was taken from a recently installed intersection on Brigham Creek Road (Totara Road) and roads recently established in the Hobsonville industrial precinct (Dowdens Lane). Consultation with Auckland Council, Supporting Growth Alliance and Auckland Transport has also taken place to understand other transportation requirements such as cycling and connectivity to surrounding amenities. Identified future amenities include sports fields to the east of the site and a bus interchange to the south of the site (near to the Trig Road motorway interchange).

2 DEVELOPMENT DETAILS

The proposed 21 industrial lots range is size between 2,990m^2 and 71,932m^2. The fully established proposal increases the industrial land available for development by 19 Hectares. From this it is estimated that 90,060m^2 of industrial gross floor area can be established. There are a further two balance lots that are adjacent to Brighams Creek Road that are zoned residential in PPC5, however these lots are not proposed for further subdivision at this stage. Access to these future resident al lots are expected to be via new public roads or privates lanes from the main new industrial colle tor road proposed (Road 1).

The site is to be accessible via a proposed signalised intersection on Brigham C eek Road plus new collector industrial roads (Roads 1, 2 & 3). These new roads are intended to ultimately have fur h r connections at Trig Road and back to Brigham Creek Road in accordance w th he PPC5 indicative roading plan.

The operation and capacity of the proposed Brigham Creek Road signalised intersection has been analysed using SIDRA intersection simulation software, and the analysis confirms the inte section has capacity to accommodate the anticipated future traffic volumes with acceptable queuing and delays. The future traffic volumes are based on the predicted 2028 traffic volumes as used by Flow Transportation Specialists Ltd (Flow) in their PPC5 technical assessments. The Flow 2028 base traffic volumes have been adjusted to account for the proposed subdivi ion's future anticipated industrial development and future connections.

The proposed new industrial collector roads (Roads 1, 2 & 3) have road reserve widths of 24 metres, which are to contain one traffic lane in each direction, eces ed parking bays on both sides and separated footpath plus cycle path on both sides.

All traffic lane widths are 3.5 me res wide and the collector roads have an additional 500mm of road shoulder so that the total carriageway width s suited for the intended industrial traffic (an eight metre carriageway width). This carr ageway width has proven to be appropriate for industrial traffic at the traffic levels predicted, as evidenced at the recently established Hobsonville industrial precinct (Dowdens Lane comparison). The proposed carriageway width also provides the ability to retrofit a 2.5 metre wide flush median, or bus stops into the carriageway should this be found to be a desirable treatment in the f ture.

No-stopping markings are proposed on all new collector roads to ensure the traffic lanes remain clear of parked vehicles.

All proposed industr al lots have indicative vehicle crossing positions identified to confirm that each industrial lot is able to achieve suitable access with acceptable sight distances and gradients etc.

The internal intersections have been designed as Give-way priority controlled intersections that can accommodate industrial traffic, namely the RTS18's semi-trailer design truck.

3 SITE LOCATION AND TRANSPORT CONNECTIVITY

3.1 Existing Road Network Characteristics

The existing wider traffic environment in the vicinity of the site consists mainly of Brigham Creek Road, which is currently formed to a rural standard with one traffic lane in each direction. The speed limit is currently 80 km/hr and the daily traffic volume as recorded by a 2014 traffic count is 7,828 vehicles. The predicted 2028 year traffic volume has been used in this report for assessment purposes

The existing bus routes in the vicinity of the site are identified on the following bus route map. A future bus interchange is anticipated to be located near to the Trig Road motorway interchange (SH18).

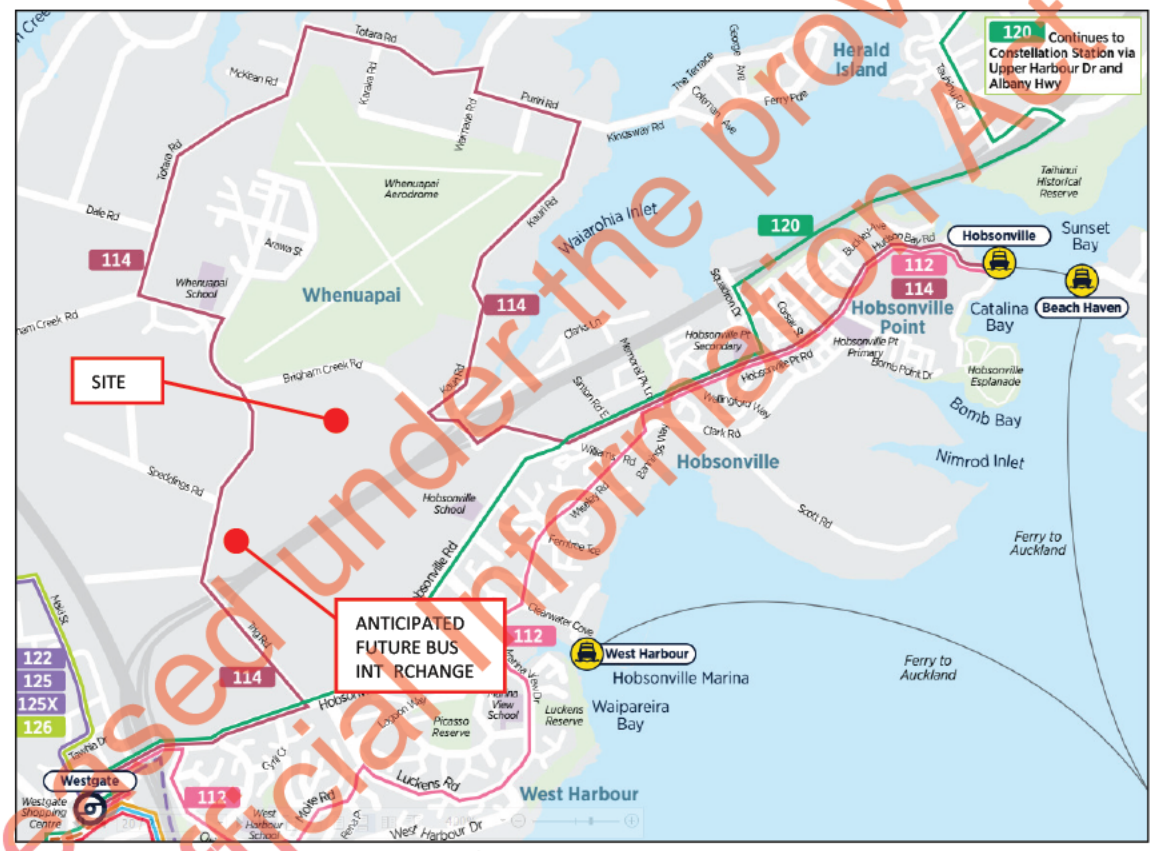


Figure 4: Bus Route Map

3.2 Future Road Network Characteristics

The future traffic lane arrangements for Brigham Creek Road are envisaged to consist of two traffic lanes in each direction together with cycle lanes/paths and footpaths. The 2028 year daily traffic volume used in the Flow PPC5 technical assessments is 24,000 vehicles, which equates to a growth rate of 8.25% as extrapolated from 2014 traffic count data. This traffic growth rate reflects the development planned to go ahead in the immediate and surrounding wider areas that use Brigham Creek Road to travel between the northwest and eastern regions of Auckland. As a result of the increasing traffic demands, at some stage the upgraded Brigham Creek Road will become

saturated with traffic and to relieve traffic demand a new motorway connection that connects State Highway 16 (north) to State Highway 18 is anticipated via Northside Drive and Trig Road.

The future speed limit for Brigham Creek Road is expected to be reduced from its current 80km/hr limit to 60km/hr.

The signalised Brigham Creek Road intersection that is proposed to access the subject subdivision is shown below and it includes additional turning lanes, footpaths and cycle lanes/paths that are envisaged in PPC5, and a similar layout has been assessed by Flow in their PPC5 technical reviews. The performance of the proposed intersection from a capacity perspective is technically greater than the Flow model because the proposed layout includes a 'free left' turn for traffic inbound to the proposed subdivision. The free left turn better caters for the dominant inbound morning peak period for the proposed industrial lots and is a recommended addition.

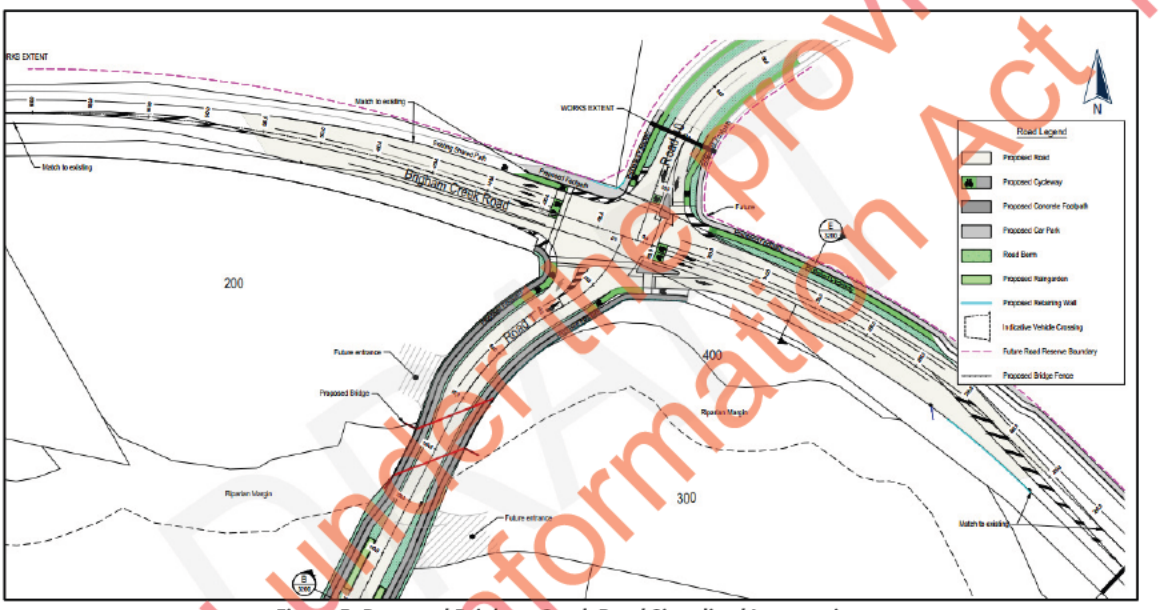


Figure 5: Proposed Brigh m Creek Road Signalised Intersection

Apart from he f ee left turn the proposed intersection layout is comparable to the recently established Brigham Creek Road T tara Road intersection that is located 1.7km to the west and shown in the following aerial photo

Figure 6: Brigham C eek Road/Totara Road Inter ection (comparable intersection design)

An alternative intersection layout has also been considered, which is shown below. This intersection has less capacity compared to the proposed intersection, but it is not constrained by the New Zealand Defence Force land o the stre m, like the proposed intersection. On balance, the proposed cross intersection s the preferred intersection.

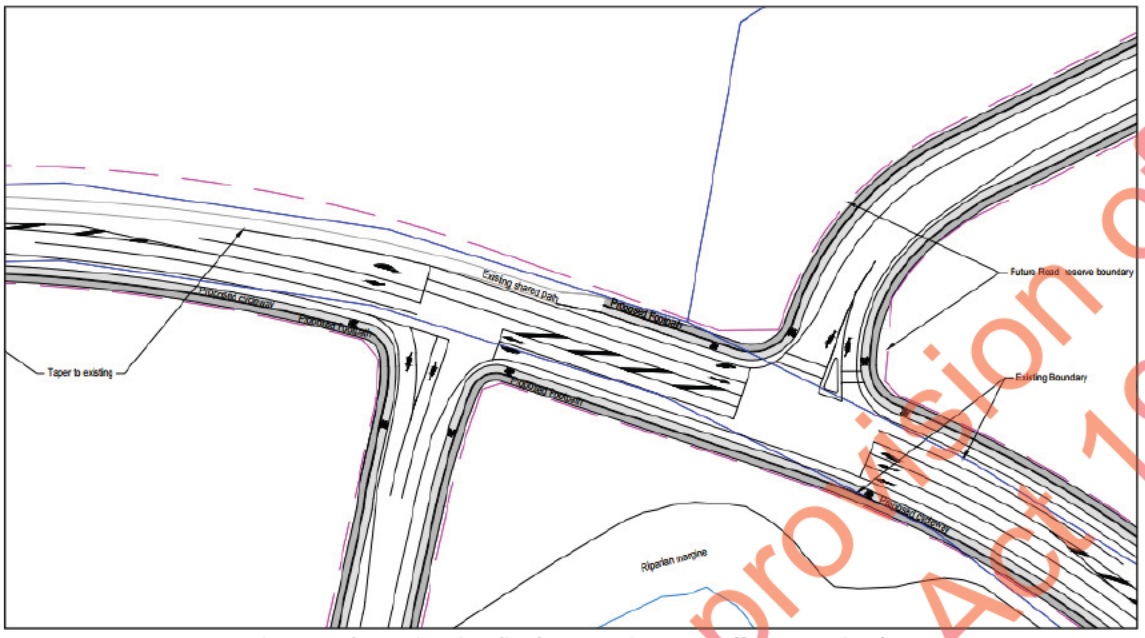


Figure 7: Alternative Signalised Intersection Design (fo comparison)

The proposed collector roads have been designed to be suitable for industrial use and also provide pedestrian and cycling connectivity between th subdivision and the fu ure roading network that is envisaged to include a bus interchange located to the southwest of the site.

To confirm that the proposed carriageway width is appropriate for an industrial collector road comparison was made with a main access road in the recently established Hobsonville industrial precinct (Dowdens Lane), which is shown in the following aerial photo. The eight metre carriageway provides for two traffic lanes that are comfortable for slow speed heavy vehicle traffic (50km/hr speed zone).

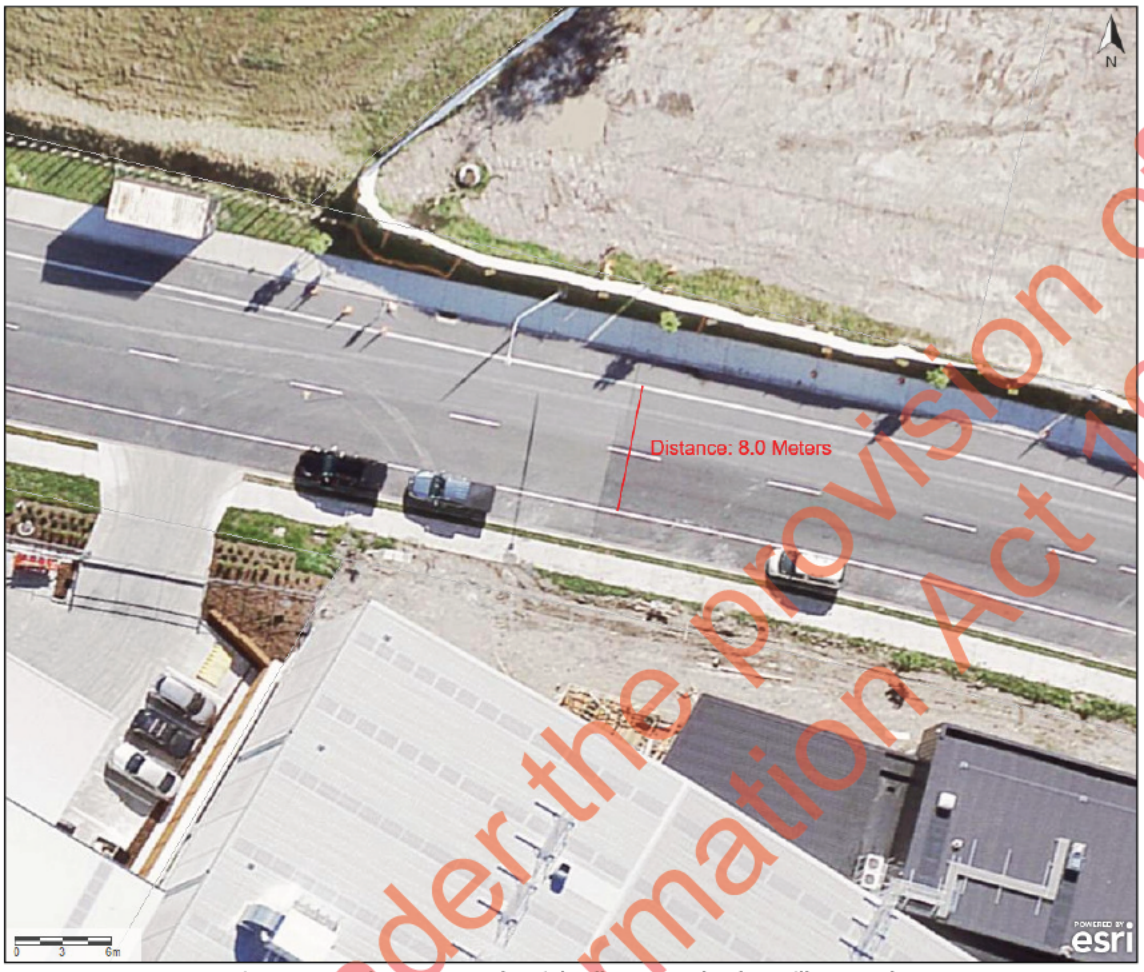


Figure 8: Dowd ns Lane – Industrial Collector Road Hobsonville Example

4 TRAFFIC IMPACTS OF THE PROPOSAL

4.1 Traffic Generation

The raffic generation for the development is expected to be comparable to recognised rates for light industrial and warehousing developments[1], which are 5 and 1.4 trips per 100m^2 GFA respectively per hour in the peak hours. With it expected that the development is split evenly between light industry and warehousing the proposed peak hour traffic generated by the proposal is 2,933 trips.

It is noted that one arrival and one departure is equivalent to two trips, namely the arrival trip and the departure trip.

The majority of this traffic is expected to travel through the proposed Brigham Creek Road signalised intersection until further roading connections are established when the surrounding area develops.

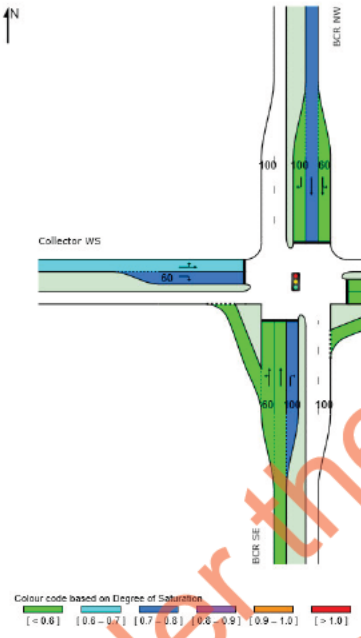
[1] Trips & Parking Related to Land Use, Table C.1 'New Zealand trip generation and parking demand'. Residential outer suburban.

The calculated traffic generation is reflective of the traffic volumes used by Flow in their traffic model that considers surrounding development and other roading connections having been established.

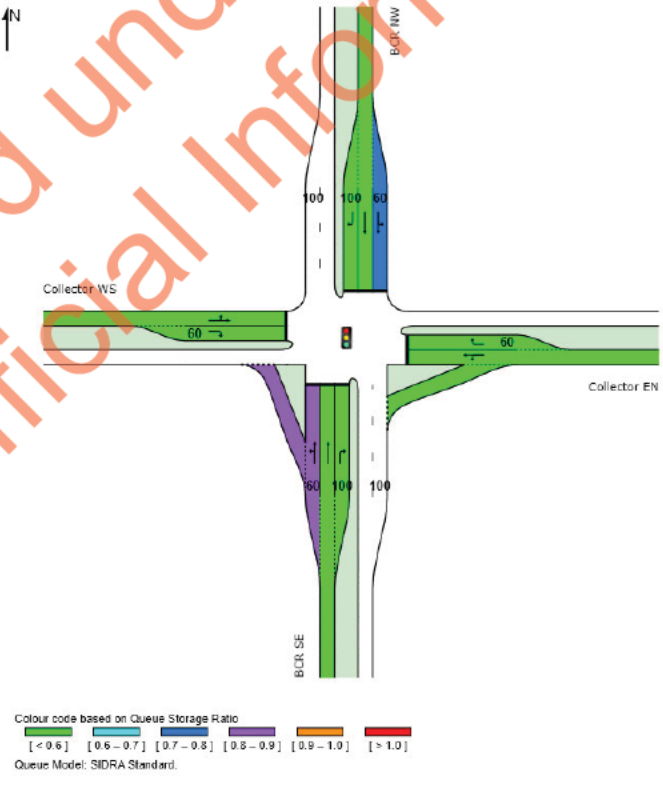
The following SIDRA model output graphs quantify the proposed intersection performance for the year 2028.

Morning Peak Period

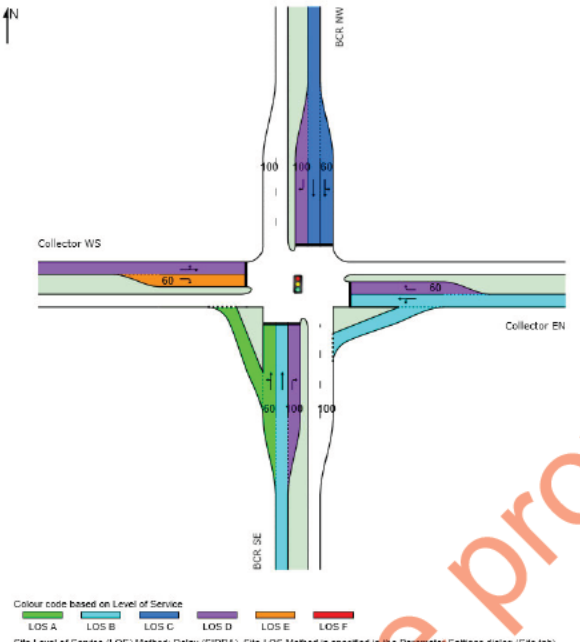
Degree of Saturation



Queue Storage Ratio

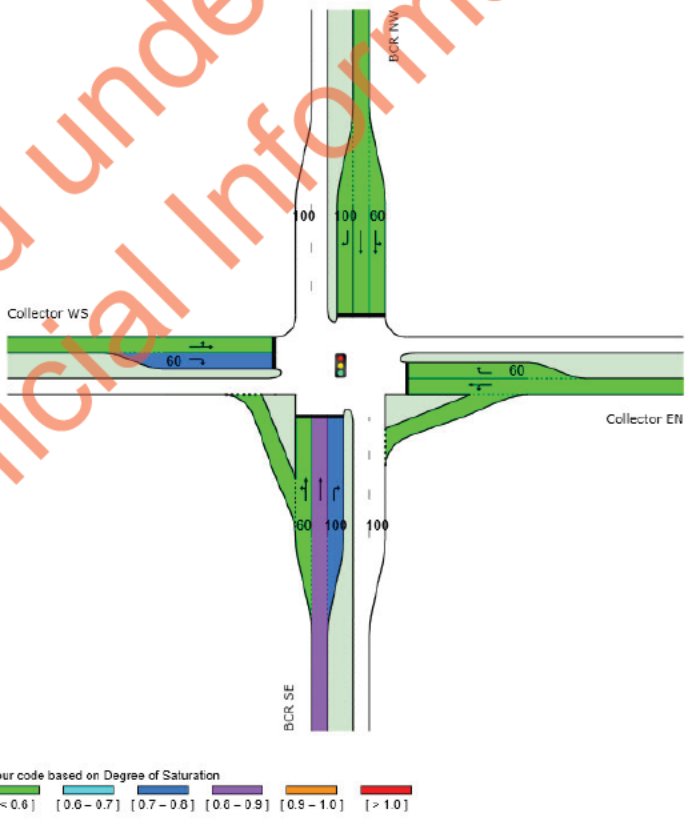


Level of Service

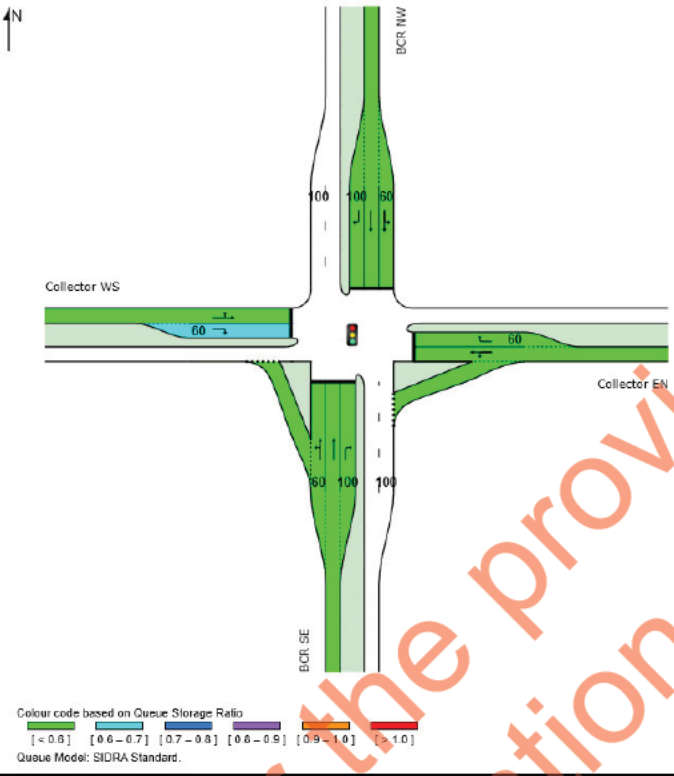


Afternoon Peak Period

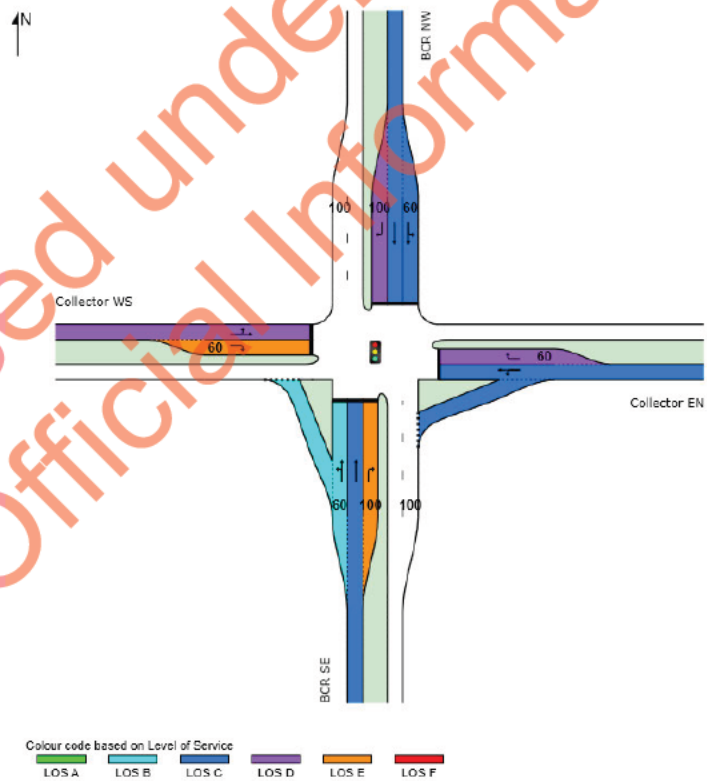
Degree of Saturation



Queue Storage Ratio



Level of Service



As detailed in the previous SIDRA output graphs the performance of the proposed intersection operates with acceptable performance at peak times for the year 2028.

Overall, the traffic model confirms that the forecast traffic growth can be accommodated at an acceptable level of service by the proposed Brigham Creek Road signalised intersection.

4.2 Brigham Creek Road Signalised Intersection Design

The proposed Brigham Creek Road signalised intersection has separate turning and through traffic lanes. Off-street cycle lanes that merge into on street cycle lanes are proposed in accordance with recognised cycle lane design criteria. Footpaths with crossing phases on each leg area proposed.

The intersection approach sight distances (ASD), and safe intersection sight di tances (SISD) exceed the AUSTROADS sight distance criteria of 64 metres and 114 metres respectively for the future envisaged 60km/hr speed limit environment. There is in excess of 130 metres of av ilab e sight distance in all directions from the intersection.

The following tracking curve plan demonstrates the swept path of the RST18's semi-trailer truck undertaking all turns at the intersection while remainin within the assigned traff c lanes.

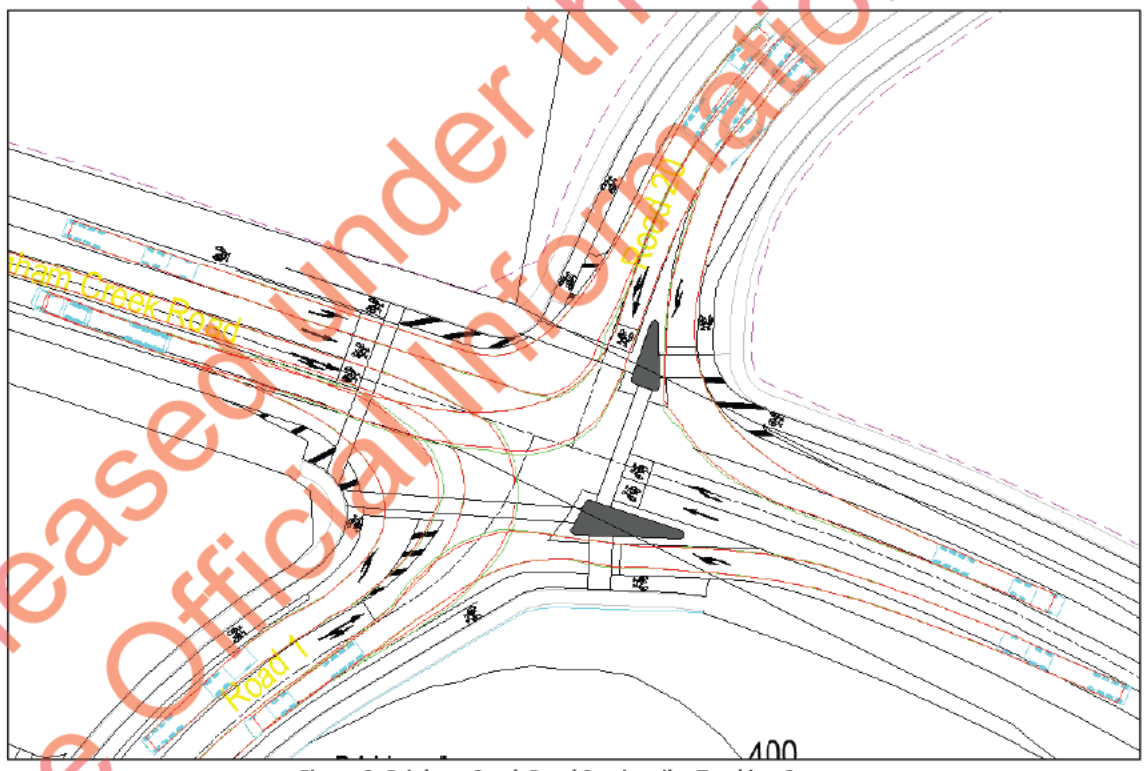


Figure 9: Brigham Creek Road Semi-trailer Tracking Curves

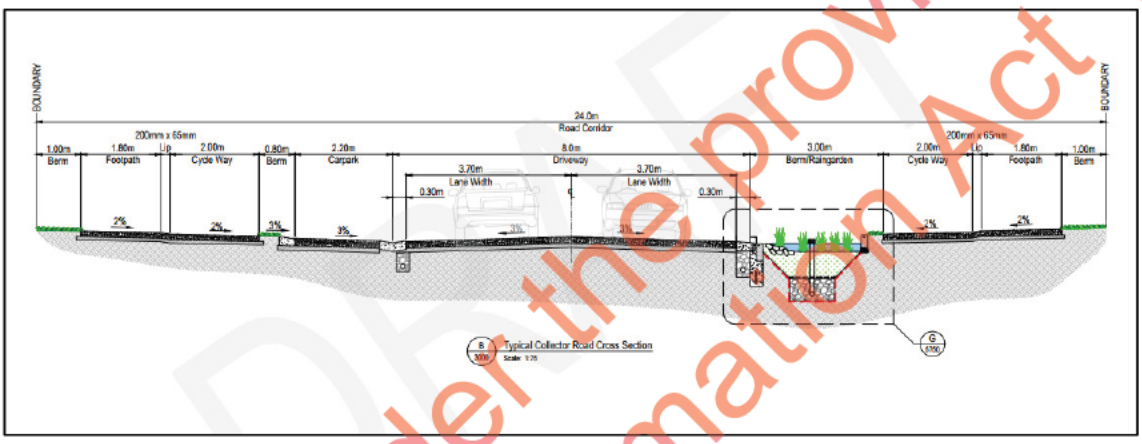
All traffic lane widths are an acceptable minimum of 3.2 metres wide. The off-street cycle paths are an acceptable two metres wide and the footpaths are 1.8 metres wide. The extra turning lanes proposed on Brigham Creek Road diverge and merge within 70 to 100 metres from the intersection,

which is comparable to the recently constructed existing Brigham Creek Road/Totara Road intersection.

4.3 Industrial Collector Road Design

The proposed industrial collector roads have been designed to be suitable for industrial use and also provide pedestrian and cycling connectivity that is envisaged to ultimately have connections to a bus interchange located to the southwest of the site, and with connected cycle paths on Brigham Creek Road.

The following cross-section details the proposed widths of the traffic lanes, recessed parking bays, cycle path, footpath and berms.



igure 10: Collector Road Cross section

The proposed cross-section aligns with recognised roading guidelines and standards. The proposed eight metre wide carriageway provides two traffic lanes that are comfortable for slow speed heavy vehicle traffic (50km/hr speed zone), and allow for a retrofit of a flush median or bus stops if desired in the future. Eight metres is also cons stent with the 3.5 metre wide freight traffic lanes prescribed by Auckland Transport's Traffic Design Manual TDM, plus include an additional 500mm shoulder in accordance w th the Manual of Traff c Signs & Markings (MOTSAM).

The co ector road intersections are to be Give-way priority controlled and the kerbs have been desig ed in accordance with he TDM and MOTSAM with tapers and corner radii that are the minimum requ red to accommodate an RTS18 semi-trailer design truck, refer to the following tracking curve plans demonstrat ng this.

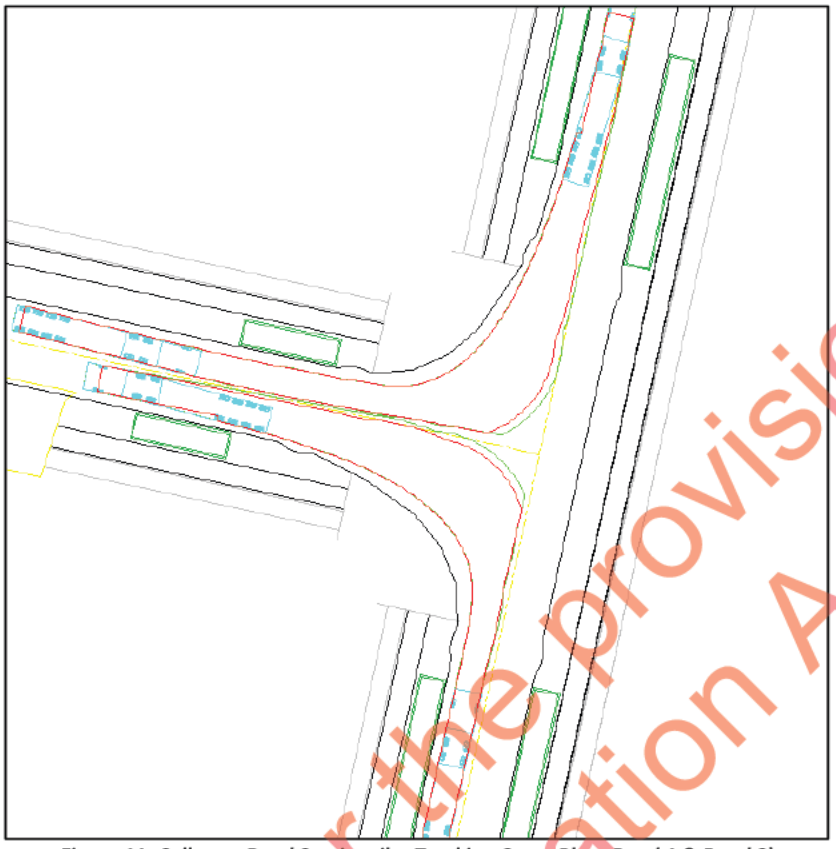


Figure 11: Collector Road Semi trailer Tracking Curve Plan (Road 1 & Road 2)

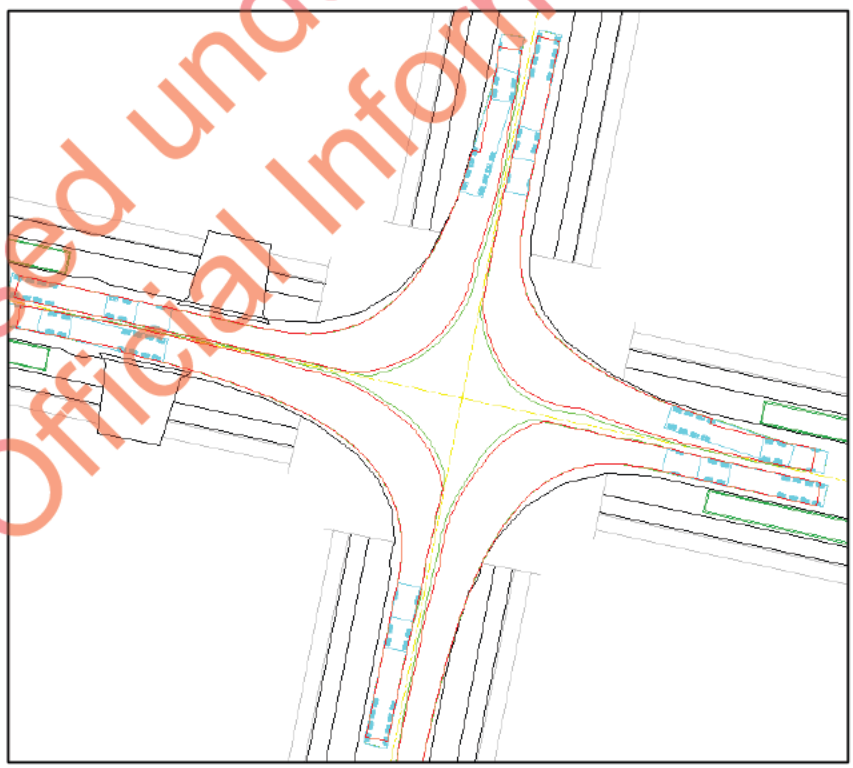


Figure 12: Collector Road Semi-trailer Tracking Curve Plan (Road 2 & Road 3)

The collector road intersections are to have Give-way priority controls as detailed in the following civil engineering plans.

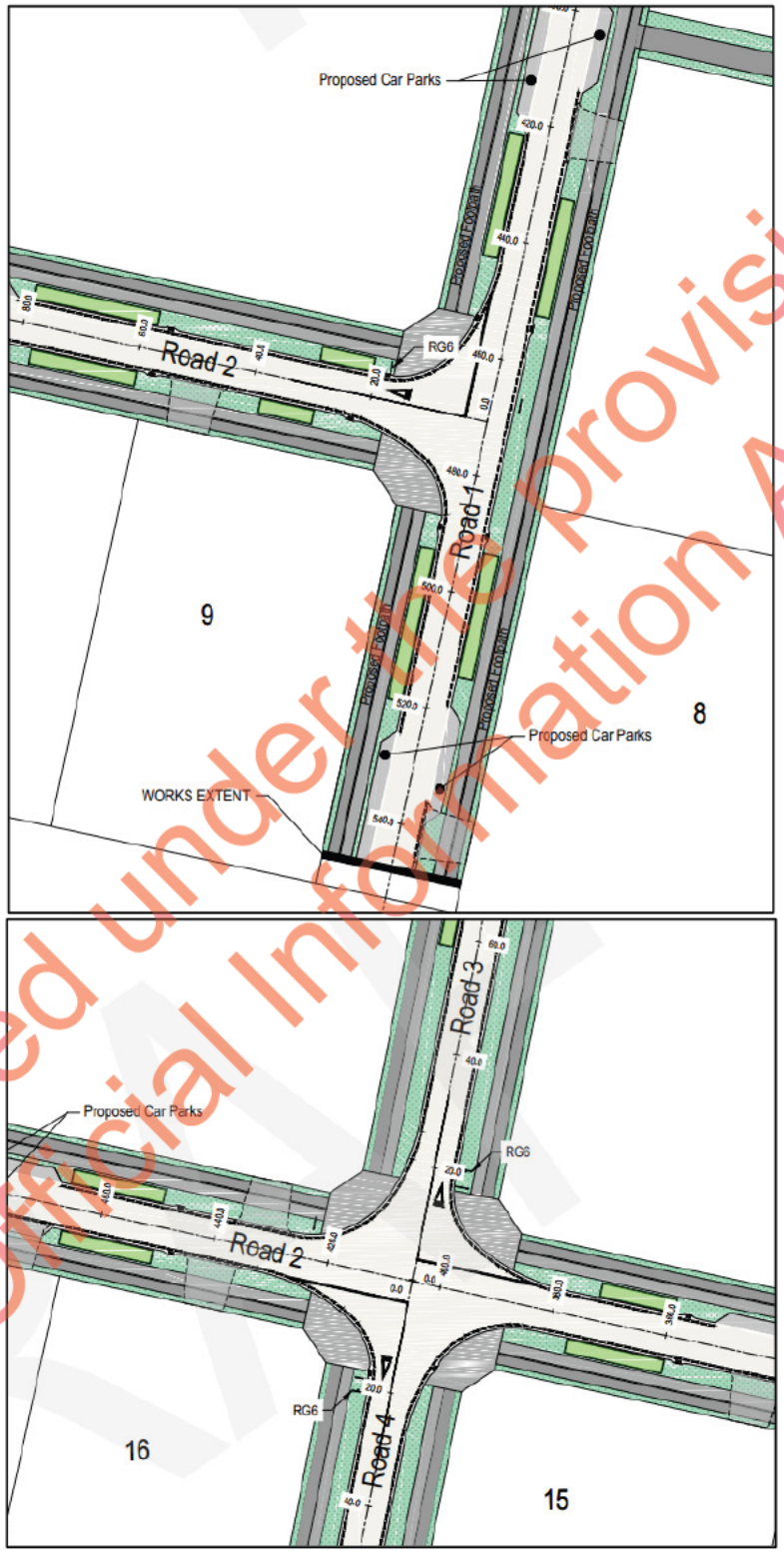


Figure 13: Collector Road Give-way Priority Controls

Street parking in the form of recessed parking bays are proposed so that they assist with parking supply for the industrial development's parking demand. The temporary termination of the roads at the property boundaries are to be provided with a suitable temporary turning areas to allow large rigid trucks and semi-trailer trucks to turn around, refer to the following tracking curve plan that demonstrates this.

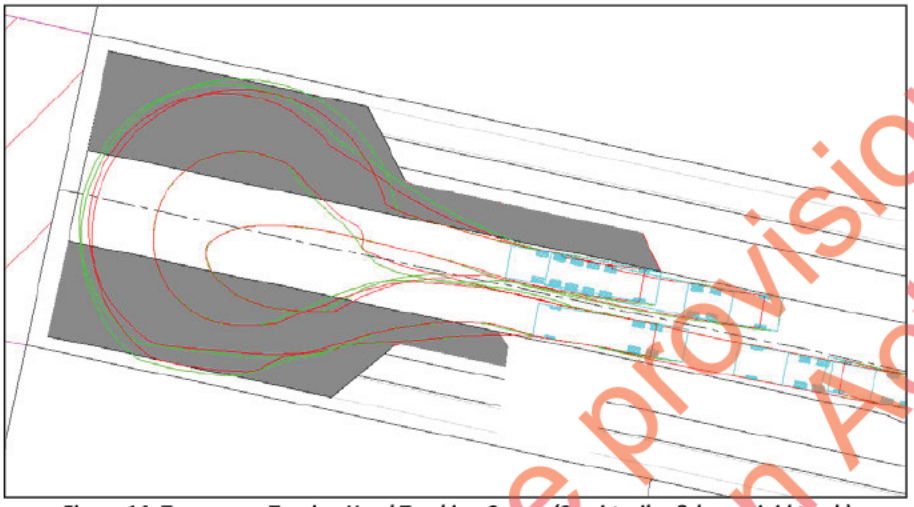


Figure 14: Temporary Turning Head Tracking Cur es (S mi-trailer & large rigid truck)

No-stopping markings are proposed on both sides of all collector roads and temporary turning heads to ensure traffic lanes are kept clear.

There are no steep gradients along the proposed roads with the maximum gradient being an acceptable 8% (1 vertical by 12.5 ho izontal). The proposed lots are also proposed to have sufficient earthworks so that access gradien s are also acceptably flat.

A bridge is proposed on Road 1 to cross a tream and the vertical curvature of the bridge does not restrict sightlines for safe access to any lots, including the adjacent balance lots identified for residential subdivision.

Guard rails are understood to be propos d for the bridge to ensure errant motorists are protected from culvert ends

Overall the p oposed roading design is appropriate for the intended industrial environment.

4.4 Pedestrian & Cycling Access

Pedestrian provisions are provided through a network of 1.8 metre wide footpaths located on both sides of all proposed collector roads (Roads 1, 2 & 3) and on the northern side of the Brigham Creek Road upgrade that includes a signalised intersection with full pedestrian crossing movements.

Street footpaths are offset by a minimum of one metre from lot boundaries, which assists with inter-visibility between a pedestrian on the street footpath and motorist on the lot access driveways

Two metre wide off-street cycle lanes are to be provided next to all proposed footpaths p oviding a high quality pedestrian and cyclist environment within an industrial area.

In summary, there is adequate pedestrian and cycling amenity provided within the development, and adequate connectivity for pedestrians and cyclists' external of the development planned for the future.

5 CONCLUSION

The proposed 21 industrial lot subdivision has been assessed in regard to its traffic impact, which includes consideration of roading network, t affic generation, parking and pedestrian/cyclist amenity.

In considering each one of these aspects th re are no adverse impacts highlighted that are cause for concern from a traffic engineering perspective.

A proposed signalised intersection on Brigham Creek Road that is to be established as part of the development works has been analysed with SIDRA simulation software to accommodate future traffic volumes at an acceptable level of service and safety.

The internal road have been designed to recognised industrial standards and can accommodate the intended level and type of industrial traffic including pedestrians and cyclists.

Street parking provisions al gn with recognised industrial street design standards and do not compromise traffic movement beyond that of a level envisaged for the environment.

The proposed roading layout aligns with Plan Change 5 and allows for future connections to the wider roading network as identified in the plan change.

The proposed ro ding and intersection designs satisfy standard traffic engineering design criteria for vehicular, pedestrian and cyclist connectivity.

Ove all, the proposed industrial subdivision is acceptable from a traffic engineering perspective and is congruent with the intentions of the Whenuapai Plan Change 5 documentation and technical reviews.