

# ***Harrison Transportation***

Te Puna Industrial Ltd  
Yard-Based Industrial Development  
Te Puna Station Road Te Puna

Transportation Assessment Report  
September 2023

PO Box 11557  
Palm Beach  
Papamoa 3151

Reference: 461 TA v5

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## 1. Introduction

Te Puna Industrial Ltd propose to develop the site at 297 Te Puna Station Road, Te Puna, for yard-based industrial activities. The development of the site will require earthworks. This report has been prepared, at the request of Momentum Planning and Design, to assess the expected transportation effects of the industrial activities.

This report provides an update of the previous reports to reflect the potential closure of Te Puna Station Road east of the site.

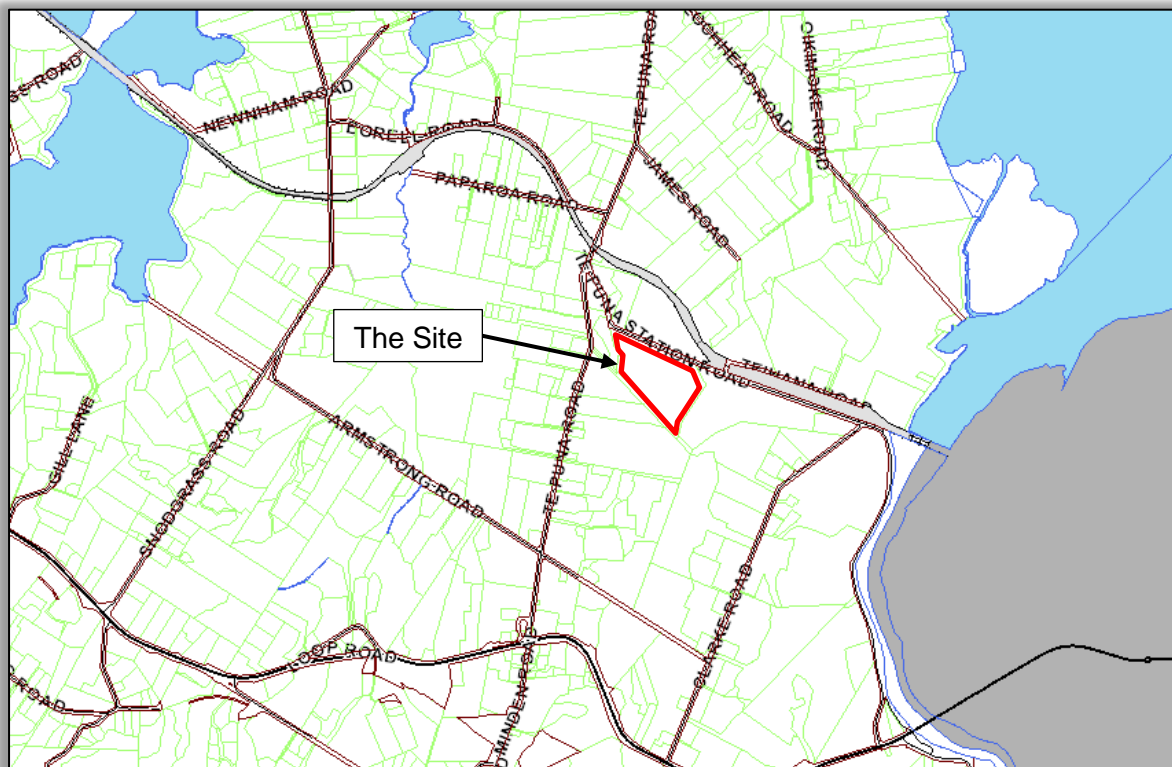
The key transportation issues associated with the proposed activities are:

- The level of traffic expected to be generated by the industrial activities and the effect that this will have on the adjacent road network.
- The provision of suitable access to and manoeuvring within the site.
- The effects of earthworks related vehicle movements.

These issues are discussed in this report. By way of a summary, it is concluded that the proposed industrial activities and associated earthworks can be readily accommodated within the local transportation environment.

## 2. The Site

The site is located on the southern side of Te Puna Station Road, approximately 500 m east of Te Puna Road and 1.0 km west of Clarke Road. The location of the site is shown on Figure 1.



**Figure 1: Site Location**

The site is zoned Industrial in the Western Bay of Plenty District Plan, with the proposed industrial activities understood to be Permitted Activities.

The site is presently used for farming. Photograph 1 shows the site, viewed from Te Puna Station Road.



**Photograph 1: The Site, Viewed From Te Puna Station Road**

Adjacent activities are predominantly rural, however with some yard based industrial activities on adjacent sites.

### **3. Transportation Environment**

#### **3.1. Existing Road Network**

Te Puna Station Road is classified in the District Plan as a Local Road. It provides access to the local rural area as well as an alternative route between Te Puna Road and SH2. Adjacent to the site it has a 7.1 m wide carriageway marked with a centreline and edge lines to provide a 3.1 m wide traffic lane in each direction with a 0.3 m wide eastbound and 0.6 m wide westbound shoulder.

It is noted that the road classification given in the District Plan has not been updated for many years. A more recent road classification is given in the NZTA *“One Road Network”* classification. This classifies the full length of Te Puna Station Road as a Primary Collector Road.

Photograph 2 shows Te Puna Station Road looking to the east while Photograph 3 shows Te Puna Station Road looking to the west.



**Photograph 2: Te Puna Station Road Looking East**



**Photograph 3: Te Puna Station Road Looking West**

The intersection of Te Puna Station Road with SH2 is a tee-intersection with Give Way control on the Te Puna Station Road approach. Both a right turn bay and a left turn slip lane are provided on SH2.

The intersection of Te Puna Station Road and Te Puna Road is a tee-intersection with Stop control on the Te Puna Station Road approach. Separate left and right turn lanes are provided on the Te Puna Station Road approach, together with a left turn slip lane on the Te Puna Road northern approach.

Te Puna Station Road between Clarke Road and Te Puna Road has an 80 km/h speed limit, which took effect in March 2021. East of Clarke Rd, Te Puna Station Road has a 60 km/h speed limit.

The East Coast Main Trunk Railway is located immediately to the north of Te Puna Station Road. While railway sidings are provided, there is no formal railway station.

### 3.2. Future Road Network – Local Roads

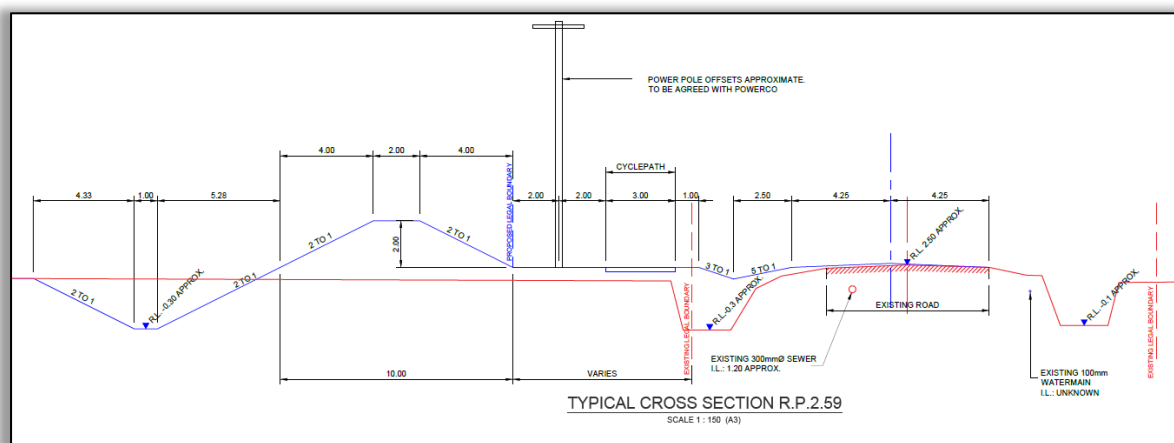
A recent slip on Te Puna Station Road has resulted in the temporary closure of the road between Teihana Road and the Waipuna Hospice. At the time of writing, Council is considering options for the future of the road, including either a partial or full closure of the road:

- The partial closure, referred to as Scenario 1 in this report, will restrict only the north-westbound movement of vehicles.
- The full closure, referred to as Scenario 2 in this report, will restrict the movement of vehicles in both directions.

The cycleway is presently open and is expected to remain open.

Prior to the slip, Council had signalled an intention to widen the existing Te Puna Station Road carriageway from 7.2 m to 8.5 m and to construct a 3.0 m wide cycle path along the southern side of the road.

The proposed cross-section of the road is shown on the following figure.



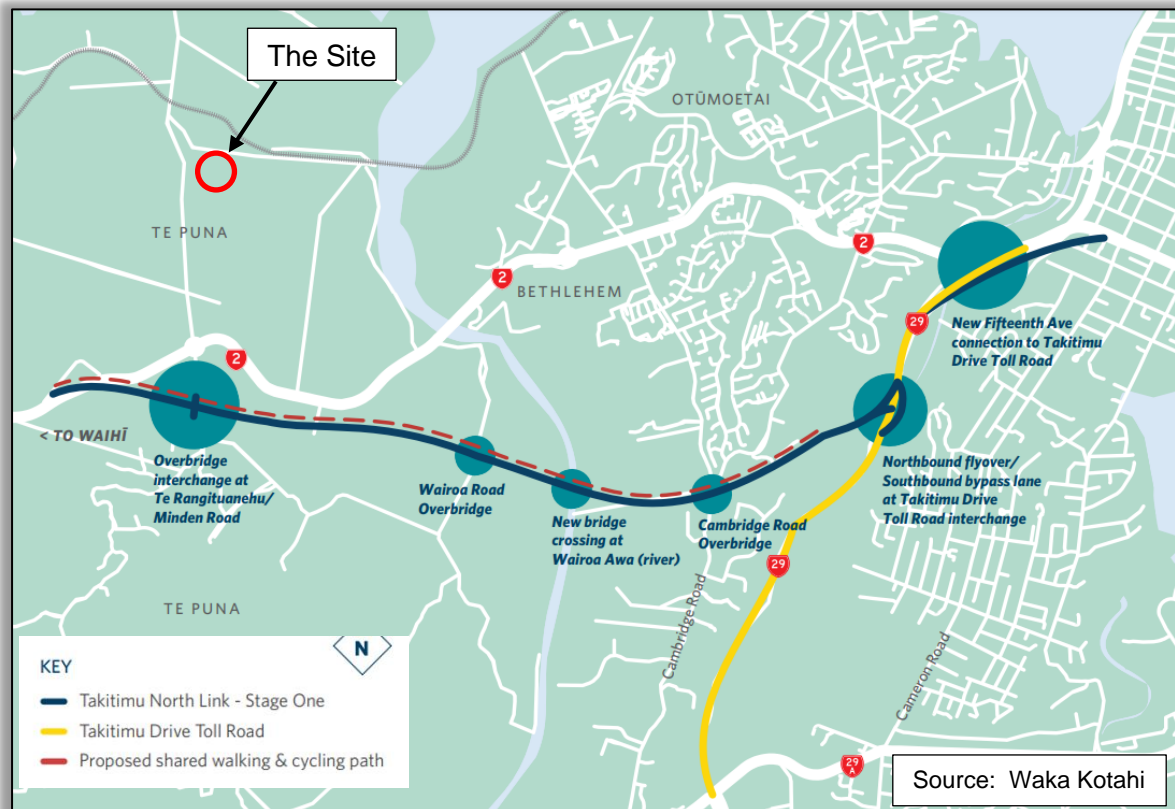
**Figure 2: Proposed Cross Section of Te Puna Station Road**

The timing of this work is not yet known.

### 3.3. Future Road Network – State Highways

Waka Kotahi NZTA has recently commenced construction of Stage 1 of the Takitimu North Link (TNL). This consists of a new 6.8 km long, four-lane highway, extending from Takitimu Drive (SH29) through to SH2 west of Te Puna Road. Construction is expected to be completed in 2026. A single interchange will be provided at Minden Road, there will be no connection at Wairoa Road. The posted speed limit of the new highway is not yet known.

The proposed route of the TNL is shown on Figure 3.

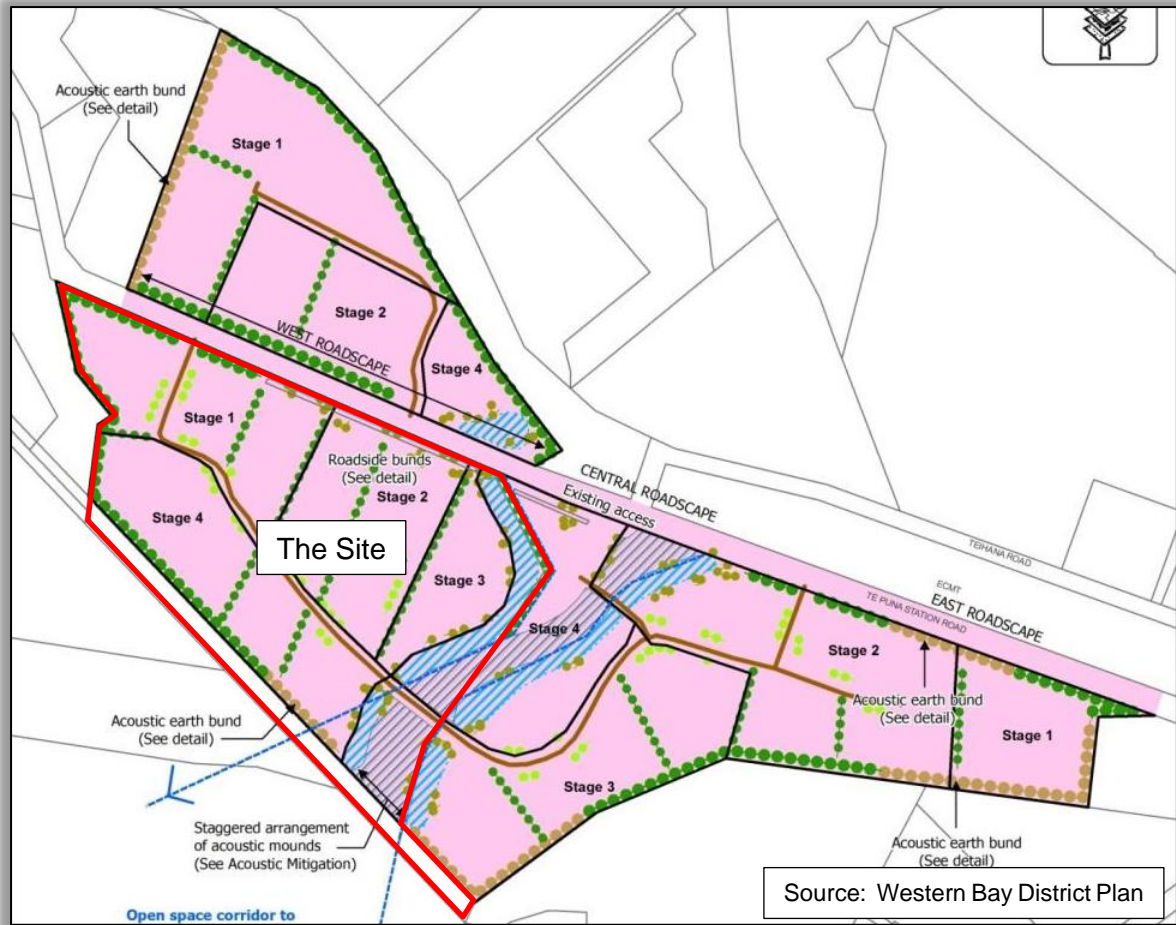


**Figure 3: Takitimu North Link**

While the distance between Tauranga City and the site will be approximately 3.5 km longer using the new highway, a higher speed limit and lower congestion levels are expected to negate the additional distance, giving comparable travel times.

## 4. Te Puna Business Park Structure Plan

The site is located within the Te Puna Business Park Structure Plan area. The Structure Plan is shown on the following Figure 4.



**Figure 4: Te Puna Business Park Structure Plan**

The figure shows that the Structure Plan area is divided into a number of stages, with an internal loop road providing access to the area. The Structure Plan requires the following road upgrading works to be carried out:

Location	Description	Completed?
Te Puna Road / SH2 Intersection	Upgrade to a roundabout	Yes
Te Puna Station Road / SH2 Intersection	Widening for left turn movements onto SH2	No
Te Puna Road / Te Puna Station Road Intersection	Provision for left and right turn movements or similar traffic management alternatives	Yes
Clarke Road	Minimum of two traffic calming thresholds installed at the northern end	Yes
Access onto Te Puna Station Road	NZTA Planning Policy Manual Diagram D	Proposed

**Table 1: Structure Plan Upgrading Works**

Table 1 shows that the upgrade of the intersection of Te Puna Station Road with SH2 has not yet been carried out. It is understood that there are presently no proposals to upgrade this intersection.

At the intersection of Te Puna Road and Te Puna Station Road, a left turn lane has been provided on Te Puna Road, but not a right turn lane. Separate left and right turn lanes have



also been provided on Te Puna Station Road. It is understood that these improvements were carried out in accordance with the requirements of the Structure Plan.

The access to Te Puna Station Road is a requirement for the development of the site and is proposed as part of this development. It is understood that, since the Structure Plan was prepared, the naming of the NZTA Planning Policy Manual (PPM) diagrams has changed and that the relevant diagram is now Diagram E.

The Structure Plan specifies a maximum traffic generation of 2,600 veh/day prior to the completion of the TNL route.

## 5. Traffic Data

### 5.1. Mid-Block Traffic Data

A traffic count has been carried out on Te Puna Station Road adjacent to the business park, while additional traffic count data has also been obtained from Council. These counts were recorded:

- Te Puna Station Road, east number 245, between 27 June and 4 July 2022.
- Te Puna Road, north of Te Puna Station Road, between 11 and 17 October 2021.
- Te Puna Road, south of Te Puna Station Road, between 11 and 17 October 2021.
- Clarke Road, north of SH2, between 22 and 28 February 2021.

The average daily traffic (ADT) volumes from these counts are given in the following table.

Road	Period	North-Westbound	South-Eastbound	Two-Way ADT
Te Puna Station Road Adjacent Site	5-Day	1,233	1,831	3,064
	7-Day	1,200	1,665	2,865
Te Puna Road (North of Te Puna Station Rd)	5-Day	-	-	3,959
	7-Day	-	-	3,833
Te Puna Road (South of Te Puna Station Rd)	5-Day	1,176	976	2,152
	7-Day	1,126	934	2,061
Clarke Road	5-Day	159	135	294
	7-Day	151	124	275

**Table 2: Daily Traffic Count Data (veh/day)**

Table 2 shows low to moderate daily traffic volumes. On Te Puna Station Road there is a bias of more vehicles travelling south-eastbound than north-westbound, while on Te Puna Road (south of Te Puna Station Road) there is a bias of more vehicles travelling northbound than southbound.

The traffic volumes on Te Puna Road north of Te Puna Station Road are higher than the volumes south of Te Puna Station Road. It is understood that this is due to Te Puna Station Road being used as a more direct route to and from SH2.

The recorded peak hour volumes are given in the following table.

Location	Period	North-Westbound	South-Eastbound	Two-Way
Te Puna Station Road Adjacent Site	AM Peak	95	365	460
	PM Peak	134	121	255
Te Puna Road (North of Te Puna Station Rd)	AM Peak	-	-	323
	PM Peak	-	-	343
Te Puna Road (South of Te Puna Station Rd)	AM Peak	125	77	202
	PM Peak	131	83	214
Clarke Road	AM Peak	9	38	47
	PM Peak	22	16	38

**Table 3: Peak Hour Traffic Count Data (veh/h)**

The morning peaks generally occurred between 8.00am and 9.00am, with evening peaks between 4.00pm and 5.00pm. On Te Puna Road however, the morning peaks occurred later, between 10.00am and 12.00pm, while the evening peaks occurred earlier, between 3.00pm and 5.00pm.

Table 3 again shows a bias on Te Puna Station Road of more vehicles travelling south-eastbound than north-westbound, particularly during the morning peak.

The passenger car equivalent (PCE) daily traffic volumes have been assessed using the recorded percentage of heavy vehicles together with the PCE factors given in the Development Code. Where the traffic count has not recorded heavy vehicles, this has been taken from the Mobile Road data. The resulting PCE ADT volumes are given in the following table.

Location	7-Day ADT (veh/day)	Truck	Truck & Trailer	PCE ADT (veh/day)
Te Puna Station Road Adjacent Site	2,865	8.1%	0.6%	4,154
Te Puna Road (North of Te Puna Station Rd)	3,833	4.0%	1.0%	4,945
Te Puna Road (South of Te Puna Station Rd)	2,061	8.0%	0.4%	2,960
Clarke Road	275	2.9%	0.3%	322

**Table 4: PCE Daily Traffic Volumes**

Table 4 shows a PCE ADT on Te Puna Station Road adjacent to the Business Park of 4,154 veh/day. The PCE ADT volumes on Te Puna Road north and south of Te Puna Station Road are 4,945 veh/day and 2,960 veh/day respectively.

The traffic count on Te Puna Station Road adjacent to the Business Park recorded 85<sup>th</sup> percentile vehicle speeds of 95 km/h westbound and 91 km/h eastbound.

## 5.2. Latest Traffic Count Data

Since the above traffic counts were recorded, a slip on Te Puna Station Road east of Clarke Road has restricted vehicle movements to and from the east. Council has undertaken new traffic counts on Te Puna Road and Clarke Road, after the slip occurred. The count for Te Puna Road was recorded 110 m south of Te Puna Station Road. Both counts were recorded between 11 May and 17 May 2023. The daily traffic count data is summarised in the following table.

Road	Period	North-Westbound	South-Eastbound	Two-Way ADT
Te Puna Road (South of Te Puna Station Rd)	5-Day	2,216	1,938	4,154
	7-Day	2,048	1,844	3,892
Clarke Road	5-Day	212	1,004	1,216
	7-Day	192	764	956

**Table 5: Latest Daily Traffic Count Data (veh/day)**

Table 5 shows a 7-day ADT on Te Puna Road, south of Te Puna Station Road, of 3,892 veh/day. This is an increase of 1,831 veh/day when compared to the previous count. Similarly, the 7-day ADT on Clarke Road of 956 veh/day is an increase of 681 veh/day when compared to the previous count.

The available data therefore suggests that the closure of Te Puna Station Road has resulted in a diversion of traffic as follows:

- From Te Puna Station Road onto Te Puna Road (south of Te Puna Station Road) of approximately 1,831 veh/day.
- From Te Puna Station Road (east of the business park) onto Clarke Road of approximately 681 veh/day.

The latest peak hour traffic count data is summarised in the following table.

Location	Period	North-Westbound	South-Eastbound	Two-Way
Te Puna Road (South of Te Puna Station Rd)	AM Peak	262	149	411
	PM Peak	239	227	466
Clarke Road	AM Peak	13	278	291
	PM Peak	24	157	181

**Table 6: Latest Peak Hour Traffic Count Data (veh/h)**

Table 6 shows that the peak hour volumes on both roads have increased.

Using the recorded traffic count data given in the above tables, gives estimated daily and peak hour traffic volumes on Te Puna Station Road, inclusive of Clarke Road traffic, as given in the following table.

Road / Count	ADT (veh/day)		Peak Hour Traffic (veh/h)	
	5-Day	7-Day	AM Peak	PM Peak
Te Puna Road (South of Te Puna Station Road), 2021	2,152	2,061	202	214
Te Puna Road (South of Te Puna Station Road), 2023	4,154	3,892	411	466
<b>Increase on Te Puna Road</b>	<b>2,002</b>	<b>1,831</b>	<b>209</b>	<b>252</b>
Te Puna Station Road 2021	3,064	2,865	460	255
<b>Te Puna Station Road less Increase on Te Puna Road</b>	<b>1,062</b>	<b>1,034</b>	<b>251</b>	<b>3</b>

**Table 7: Estimated Traffic Volumes on Te Puna Station Road**

Table 7 shows that the morning peak hour traffic volume on Te Puna Station Road is expected to decrease to 251 veh/h while the evening peak hour traffic is expected to decrease to 3 veh/h.

There is naturally some variation between traffic counts taken at different times of the year, in different years, and in slightly different locations. In this case, the estimated evening peak hour volume on Te Puna Station Road of 3 veh/h, as given in the above table, is not considered to be a realistic estimate of the current volume.

The traffic volumes on Te Puna Station Road have also been estimated using an alternative methodology as follows:

- The surveys of the existing business park activities, as identified in Section 8.1 of this report.
- The base traffic on Clarke Road that is expected to also travel along Te Puna Station Road. It is expected that approximately half of the traffic generated by the Clarke Road activities will travel south to SH2 and the other half north to Te Puna Station Road. The Clarke Road traffic using Te Puna Station Road is therefore estimated at 50% of the base 2021 volume.
- The increase in traffic on Clarke Road as given in the above tables, as the majority of this increase in traffic is expected to travel along Te Puna Station Road.
- The Mobile Road data for Teihana Road, as most of this traffic is also expected to use Te Puna Station Road.

The resulting estimate of the daily traffic volume on Te Puna Station Road is given in the following table.

Road / Count	Eastbound	Westbound	Total
Existing Business Park	78	78	156
Base from Clarke Rd	68	80	147
Increase on Clarke Rd	869	212	1,081
From Teihana Road	50	50	100
<b>Total</b>	<b>1,065</b>	<b>420</b>	<b>1,484</b>

**Table 8: Estimated Daily Traffic Volumes on Te Puna Station Road (veh/day)**

An estimate of the peak hour volumes on Te Puna Station Road is given in the following table.

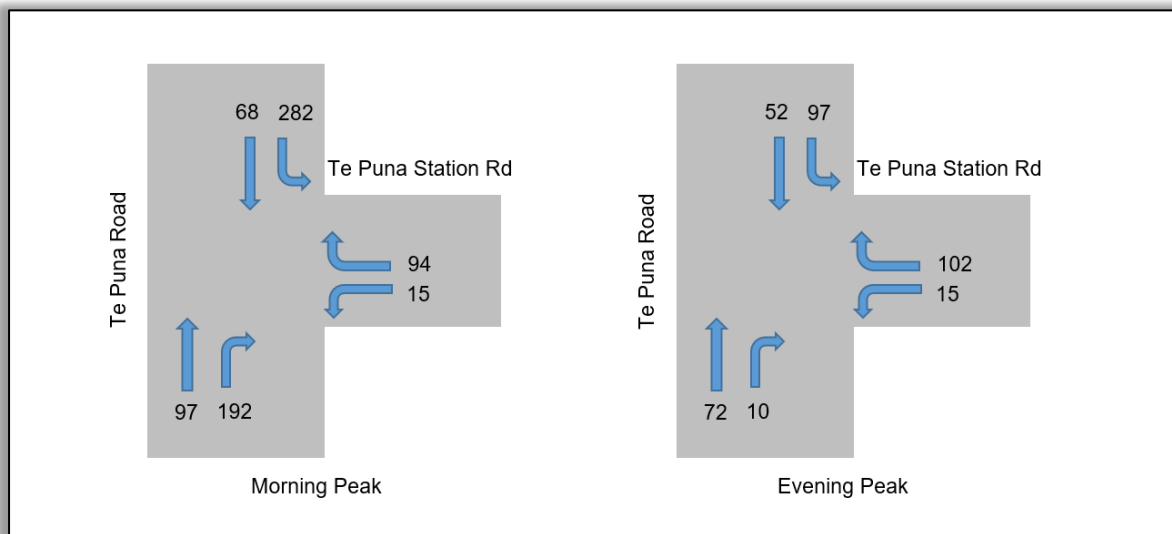
Activity	AM Peak			PM Peak		
	Eastbound	Westbound	Total	Eastbound	Westbound	Total
Existing Business Park	8	6	14	6	11	17
Base from Clarke Rd	19	5	24	8	11	19
Increase on Clarke Rd	240	4	244	141	2	143
From Teihana Road	5	5	10	5	5	10
<b>Total</b>	<b>272</b>	<b>20</b>	<b>292</b>	<b>160</b>	<b>29</b>	<b>189</b>

**Table 9: Expected Peak Hour Traffic Volumes on Te Puna Station Road (veh/h)**

The estimated daily and peak hour traffic volumes on Te Puna Station Road, as given in Table 8 and Table 9 above, are higher than the volumes estimated earlier. To provide a conservative assessment, the higher volumes as given above have been adopted for this assessment.

### 5.3. Intersection Turning Movements

An intersection turning movement survey was carried out at the intersection of Te Puna Station Road and Te Puna Road on Thursday 19 May 2022. The turning movements are summarised on the following figure.

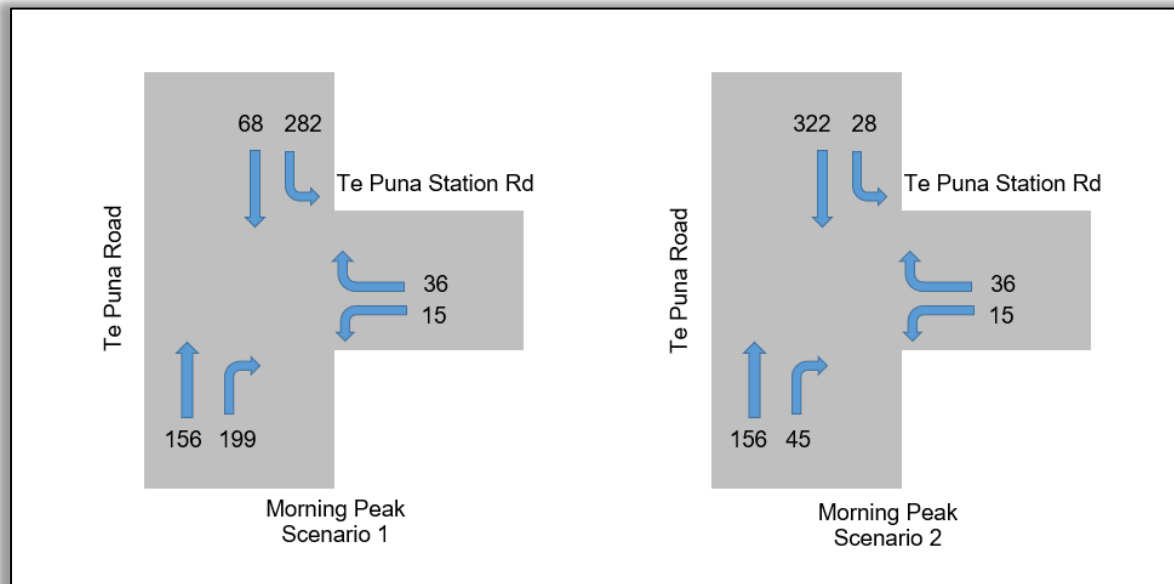


**Figure 5: Intersection Turning Movements (veh/h)**

Figure 5 shows, during the morning peak, a high number of vehicles turning left and right from Te Puna Road onto Te Puna Station Road. The evening peak does not show a significant number of vehicles undertaking the reverse movement indicating that, during the morning peak, Te Puna Station Road is being used as an alternative route to avoid congestion on SH2. The number of vehicles using Te Puna Station Road as an alternative route is expected to reduce after the opening of the TNL.

The above turning movement count was recorded prior to the recent slips on Te Puna Station Road. There have been no new counts undertaken. A review of the turning movements has been carried out by Traffic Planning Consultants (TPC) as part of the Environment Court Mediation. This has identified expected morning peak hour turning movements as given in

the following figure. Scenario 1 considers the partial (north-west bound) closure of Te Puna Station Road while Scenario 2 considers the full closure of Te Puna Station Road.



**Figure 6: Intersection Turning Movements with Closure of Te Puna Station Road**

Figure 6 shows that with Scenario 1, the partial closure of Te Puna Station Road, the volume of the left and right turn movements out of Te Puna Station Road reduces. With Scenario 2, the full closure of Te Puna Station Road, the volume of the left and right turn movements into Te Puna Station Road also reduce.

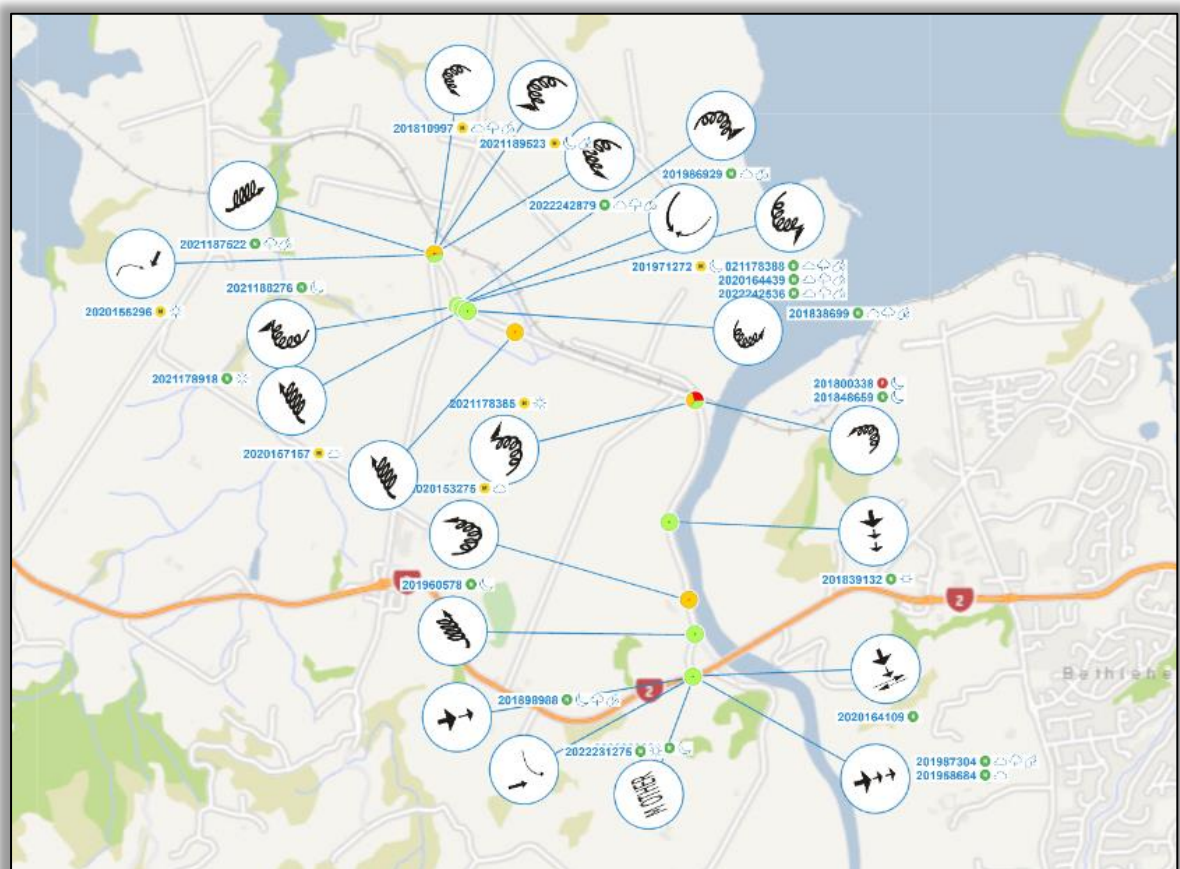
## 6. Crash History

A search of the NZTA Crash Analysis System (CAS) has been carried out to identify all reported crashes in the vicinity of the site during the five-year period 2018 to 2022. Available data for 2023 has also been included. The search area consisted of the full length of Te Puna Station Road, including the intersections with both SH2 and Te Puna Road. The search identified 26 crashes, as follows:

- Four crashes were recorded at the intersection of Te Puna Station Road and Te Puna Road:
  - Three involved vehicles losing control while turning left onto Te Puna Station Road. Two crashes resulted in a minor injury.
  - One involved a vehicle turning right into Te Puna Station Road failing to give way to a southbound vehicle on Te Puna Road. This also resulted in a minor injury.
- One crash was recorded at the intersection of Te Puna Station Road and Teihana Road, which involved a northbound vehicle on Te Puna Station Road losing control on the curve. This resulted in a minor injury.
- Four crashes were recorded at the intersection of Te Puna Station Road and SH2:
  - Two involved vehicles on SH2 hitting the rear of vehicles in a queue.
  - One involved a vehicle on Te Puna Station Road hitting the rear of a vehicle stopped for cross traffic.

- One involved a vehicle turning left onto SH2 failing to give way.
- 16 mid-block crashes were recorded on Te Puna Station Road:
  - One involved a vehicle cutting the corner and hitting another vehicle head-on, resulting in a minor injury.
  - Four involved vehicles losing control on a straight road, one of which resulted in a minor injury.
  - Nine involved vehicles losing control on a curve. One of these resulted in a minor injury while one resulted in a fatality.
  - One involved a southbound vehicle hitting the rear of a vehicle in a queue.
  - One involved a vehicle manoeuvring on the grass berm.
- One mid-block crash was recorded on SH2, which involved an eastbound vehicle hitting the rear of a slower vehicle.

The reported crashes are shown on Figure 7.



**Figure 7: Crash History**

Figure 7 shows clusters of crashes at the curve located to the west of the site, the curve located to the east of the site, and at the intersection with SH2. This is discussed further in Section 13 of this report.

## 7. The Proposed Development

Te Puna Industrial Ltd propose to develop the site at 297 Te Puna Station Road, Te Puna. The proposed development is to give effect to the Te Puna Business Park Structure Plan provisions that apply to the site. A total leasable land area of 8.72 ha will be available. Of this, 4.80 ha will be leased to Container Co for the storage, repair and distribution of shipping containers. The shipping containers will be available either for hire or for sale.

The remaining area of 3.92 ha will be leased for other yard-based industrial activities. Details of these potential activities are not yet known.

Access to the site is proposed via a new internal road, which will intersect with Te Puna Station Road to the east of the existing site access. Container Co propose that all heavy vehicles associated with their activity will be required to access the site to and from the west. This will be managed with the use of a Site Travel Management Plan (STMP).

The proposed site layout is shown on the site plan, prepared by Momentum Planning and Design, attached to this report.

## 8. Traffic Generation

### 8.1. Existing Business Park Traffic Generation

Surveys of the traffic generation of the existing activities within the Business Park were carried out during May 2022. These surveys recorded the total number of vehicles entering and exiting each individual site within the Business Park during both the morning and evening peak periods. The results of the surveys are summarised in the following table.

Vehicle Entrance	AM Peak (veh/h)			PM Peak (veh/h)			Estimated ADT (veh/day)
	In	Out	Total	In	Out	Total	
205	1	1	2	2	0	2	20
260	2	1	3	0	0	0	15
297	0	1	1	1	1	2	15
326	5	3	8	3	10	13	105
<b>Total</b>	<b>8</b>	<b>6</b>	<b>14</b>	<b>6</b>	<b>11</b>	<b>17</b>	<b>155</b>

**Table 10: Existing Traffic Generation**

Table 10 shows an estimated existing daily traffic generation of the Te Puna Business Park of 155 veh/day. The morning peak was recorded between 7.00am and 8.00am, which is earlier than the 8.00am to 9.00am peak on Te Puna Station Road. The evening peak was recorded between 4.00pm and 5.00pm which is consistent with the peak on Te Puna Station Road.

The surveys identified the following directional distribution:

- To and from the east: 75%.
- To and from the west: 25%.

The surveys identified that 88% of the existing traffic generation is light vehicles, with 12% heavy vehicles.



## 8.2. Proposed Traffic Generation

Traffic generation data for industrial activities is available in the following references:

- NZTA Research Report 453 *“Trips and Parking Related to Land Use”* (RR453).
- Roads and Traffic Authority of New South Wales *“Guide to Traffic Generating Developments”* (RTA) updated surveys.
- Institute of Transportation Engineers *“Trip Generation Manual”* (ITE).

The data in these references is based on the gross floor area (GFA) of buildings, rather than site area. There is no specific data available for the proposed yard based industrial activities. The available data is summarised in the following table.

Data Source	Activity	Traffic Generation Rates		
		Daily (veh/day/100m <sup>2</sup> )	AM Peak (veh/h/100m <sup>2</sup> )	PM Peak (veh/h/100m <sup>2</sup> )
RR453	Industrial Contractor	6.2	-	-
RTA	Business Park	7.83	0.70	0.78
ITE	Industrial Park	3.63	0.43	0.43

**Table 11: Expected Traffic Generation Rates**

Table 11 shows that the RR453 and RTA rates are approximately twice that of the ITE Rates. The reason for this is not known. The following points are noted:

- The RR453 data is based on surveys at seven sites, mainly in Christchurch, including automotive panel and paint, concrete cutters, steel fabrication and a construction company.
- The RTA describes a business park as typically including elements of industrial, manufacture, research, warehousing, office. retail, commercial, refreshment and recreational activity.
- The ITE describes an industrial park as containing a number of industrial or related facilities characterised by a mix of manufacturing, service and warehouse facilities.

It is assessed that none of the available data is directly comparable to the proposed yard based industrial activities. As the RR453 data is based on surveys carried out in New Zealand, rather than overseas, it has however been used as a base for developing appropriate traffic generation rates for the proposed industrial activities.

The RR453 data provides a daily traffic generation rate but not provide a peak hour rate. Of the RTA and ITE data, the peak hour rate is between 9% and 12 % of the daily rate. A peak hour rate of 10% of the daily rate has therefore been adopted.

Industrial activities typically have a site coverage of around 30%. To allow for the lower intensity of yard based industrial activities, the expected traffic generation has been assessed based on the equivalent of a building based industrial activity with a site coverage of 20%.

This gives yard-based traffic generation rates as follows:

- Daily: 124 veh/day/ha.
- Peak Hour: 12.4 veh/h/ha.

To determine the expected traffic generation of the Container Co activity, a traffic generation survey has been carried out at the Container Co site at 81 Jellicoe Road, Panmure, which is the most comparable (however not exactly the same) yard-based activity to that proposed. The survey was carried out on Thursday 2 June 2022. This site has an area of approximately 3.0 ha and recorded a daily traffic generation of 60 veh/day, with a morning peak of 16 veh/h and an evening peak of 8 veh/h. This gives the following traffic generation rates:

- Daily: 20 veh/day/ha.
- Morning peak: 5.3 veh/h/ha.
- Evening peak: 2.7 veh/h/ha.

The morning peak occurred between 8.00am and 9.00am which is consistent with the peak on Te Puna Station Road. The evening peak occurred between 4.30pm and 5.30pm, which is slightly later than the 4.00pm to 5.00pm peak on Te Puna Station Road. This difference is however assessed as insignificant.

The Container Co survey results give significantly lower traffic generation rates than for a yard-based activity based on the RR453 rates. To allow for a potential more intensive use of the Te Puna site than the Panmure site, the above surveyed rates have been conservatively increased by 200%. This provides a daily rate approximately half that of the other yard-based activities, but a slightly higher peak hour rate.

The expected traffic generation of the proposed industrial park, assessed using the above rates, is given in the following table.

Activity	Site Area (ha)	Traffic Generation Rates		Traffic Generation	
		Daily (veh/day/ha)	Peak Hour (veh/h/ha)	Daily (veh/day)	Peak Hour (veh/h)
Container Co	4.80	60	15.9	288	76
Other Industrial	3.92	124	12.4	486	49
<b>Total</b>	<b>8.72</b>	-	-	<b>774</b>	<b>125</b>

**Table 12: Expected Traffic Generation**

Table 12 shows, with the full development of the site, an expected daily traffic generation of 774 veh/day, with a peak hour traffic generation of 125 veh/h. It is noted that, at the time of writing, the only confirmed tenant is Container Co.

As the traffic generation surveys have identified only small differences between the peak hours of the industrial activities and the traffic on Te Puna Station Road, the assessments given in this report are based on the peaks occurring at the same time.

Two other resource consent applications for activities within the Te Puna Business Park are presently in progress. The expected traffic generation of these activities has been taken from the transportation assessment reports for each site. The combined daily traffic generation of the three sites is given in the following table.

Applicant	Address	Daily Traffic
Tinex Group Ltd	245 Te Puna Station Road	960
Overton	250 – 264 Te Puna Station Road	865
Te Puna Industrial Ltd	297 Te Puna Station Road	774
<b>Total</b>	-	<b>2,599</b>

**Table 13: Business Park Combined Daily Traffic Generation (veh/day)**

Table 13 shows that, together the three consent applications have a combined daily traffic generation of 2,599 veh/day, which is less than the maximum of 2,600 veh/day permitted by the Structure Plan, prior to the completion of the TNL bypassing Te Puna. The development of the three sites may therefore proceed prior to the completion of the TNL.

### 8.3. Passenger Car Equivalent Traffic Generation

When assessing the required carriageway widths of roads, the District Plan requires the use of PCE traffic volumes. Data from the ITE guide indicates that, at an industrial park, heavy vehicles are approximately 17% of the total vehicles.

The traffic count data for Te Puna Station Road identified that approximately two-thirds of heavy vehicles are single unit trucks and one-third are truck and trailers. Using this proportion, the PCE ADT traffic generation of the Te Puna Industrial Ltd development is as given in the following table.

Activity	Traffic Generation (veh/day)	Vehicle Type	Percentage	PCE Factor	PCE Daily Traffic (veh/day)
Te Puna Industrial Ltd	774	Light Vehicles	83	1	642
		Single Unit Truck	11.3	6	525
		Truck and Trailer	5.7	10	441
		<b>Total</b>	<b>100</b>	-	<b>1,609</b>

**Table 14: PCE Daily Traffic Generation**

Table 14 shows an expected PCE daily traffic generation of 1,609 veh/day.

The combined PCE daily traffic generation of the three sites is given in the following table.

Applicant	Address	PCE Daily Traffic (veh/day)
Tinex Group Ltd	245 Te Puna Station Road	1,995
Overton	250 – 264 Te Puna Station Road	1,797
Te Puna Industrial Ltd	297 Te Puna Station Road	1,609
<b>Total</b>	-	<b>5,401</b>

**Table 15: Business Park Combined PCE Daily Traffic Generation**

Table 15 shows that, together the three consent applications have a combined PCE daily traffic generation of 5,401 veh/day.

## 8.4. Traffic Distribution

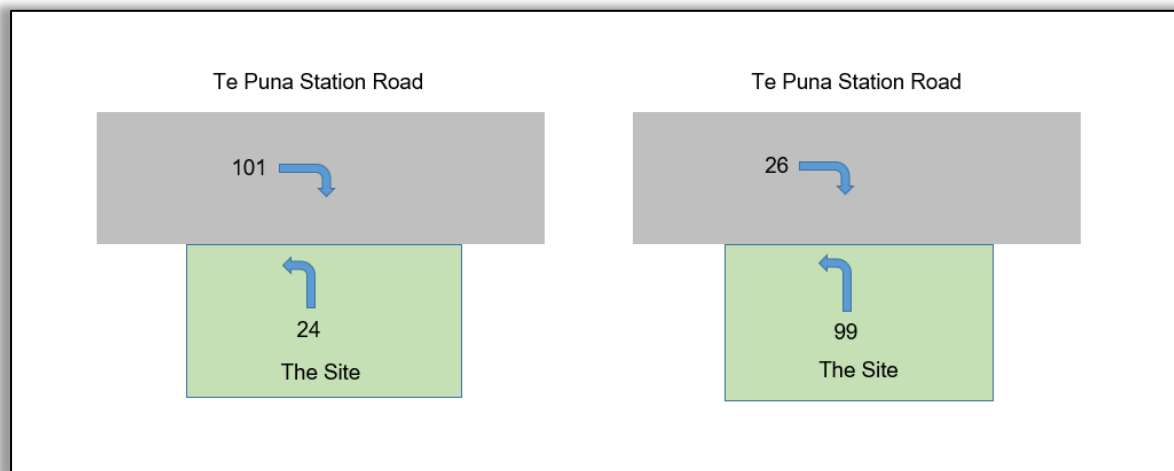
The survey of the existing business park traffic generation, as given in Section 8.1 of this report, has identified a directional distribution of 75% of traffic to and from the east, with the remaining 25% of traffic to and from the west.

Section 3.2 of this report has identified that a recent slip on Te Puna Station Road has resulted in the temporary closure of the road east of the site. Future options being considered by Council include a partial closure (Scenario 1) which would affect northbound vehicles only, and a full closure of the road (Scenario 2) which would affect all vehicles.

Container Co propose that all heavy vehicles will be required to access the site to and from the west, using Te Puna Road and either the existing SH2 route or the future TNL. This will be managed with the use of a Site Travel Management Plan (STMP).

While not presently proposed by Council, if Te Puna Station Road is re-opened to north-west bound vehicles, then Section 9.2 of this report recommends that all staff travelling to the site be required to use the Te Puna Road route rather than Te Puna Station Road. It is expected that similar travel management will be required for the other sites within the business park. A distribution with all vehicles accessing the site to and from the west has therefore been adopted for this assessment.

Data for the expected proportion of vehicles turning in and out of the site is available in the Institute of Transportation Engineers "*Trip Generation Manual*". The expected number of vehicles turning in and out of the site during both the morning and evening peaks is given in the following figure.



**Figure 8: Expected Turning Movements (veh/h)**

Figure 8 shows turning movements of 101 veh/h turning right into the site during the morning peak, with 99 veh/h turning left out of the site in the evening peak.

## 9. Traffic Effects

### 9.1. Te Puna Station Road Mid-Block Carriageway

The expected increase in PCE daily traffic on Te Puna Station Road is given in the following table. This table gives the expected increase in daily traffic for all three sites within the business park, with the ADT volumes on Te Puna Station Road prior to the slip.

Road	ADT	Location	Existing ADT	Increase	Expected ADT
Te Puna Station Road	ADT	East of Site	2,865	-	2,865
		West of Site	2,865	2,599	5,464
	PCE ADT	East of Site	4,154	-	4,154
		West of Site	4,154	5,401	9,555

**Table 16: Expected Increase in Daily Traffic (veh/day)**

Table 16 shows that, that with the development of the three sites, the ADT on Te Puna Station Road west of the business park is expected to increase to 5,464 veh/day, while the PCE ADT is expected to increase to 9,555 veh/day.

The expected increase in daily traffic on Te Puna Station Road, using the data following the slip, is given in the following table. This table gives the expected increase in daily traffic for the scenario where Te Puna Station Road remains closed at the slip. Again, the data includes all three sites within the business park.

Road	ADT	Location	Existing ADT	Increase	Expected ADT
Te Puna Station Road	ADT	East of Site	1,484	-	1,484
		West of Site	1,484	2,599	4,083
	PCE ADT	East of Site	2,152	-	2,152
		West of Site	2,152	5,401	7,553

**Table 17: Expected Increase in Daily Traffic (veh/day)**

Table 17 shows that, with continued closure of Te Puna Station Road and the full development of the three sites, the ADT on Te Puna Station Road west of the business park is expected to increase to 4,083 veh/day, while the PCE ADT is expected to increase to 7,553 veh/day.

The Structure Plan requires payment of a targeted financial contribution towards roading. This will allow for the widening of Te Puna Station Road in accordance with the required standards, as signalled by Council, should the works proceed.

For rural roads with a PCE ADT of over 2,500 veh/day, the Development Code specifies a specific design in accordance with the NZTA “*State Highway Geometric Design Manual*”. This manual has been superseded by the Austroads “*Guide to Road Design*” series of guides.

For rural roads with an ADT of over 3,000 veh/day, the Austroads “*Guide to Road Design Part 3: Geometric Design*” recommends two 3.5 m wide traffic lanes with 1.5 m wide sealed shoulders, giving a total seal width of 10.0 m. The existing 7.1 m wide carriageway is narrower than the recommended width.

Council has signalled an intention to widen the existing carriageway to 8.5 m. This will provide two 3.5 m wide traffic lanes with 0.75 m wide sealed shoulders. The proposed width is less than that recommended by the Austroads Guide.

The New Zealand “*Road to Zero*” Road Safety Strategy sets out a vision where no one is killed or seriously injured in road crashes.

The seven guiding principles in the road safety strategy are:

- Promote good choices but plan for mistakes.
- Design for human vulnerability.
- Strengthen all parts of the road transport system.
- Have a shared responsibility for improving road safety.
- Actions are grounded in evidence and evaluated.
- Road safety actions support health, wellbeing, and liveable places.
- Make safety a critical decision-making priority.

While the proposed carriageway width of 8.5 m is less than the recommended width of 10.0 m, it is noted that Council has also signalled an intention to construct a 3.0 m wide cycle path along the southern side of the road. With this path, cyclists will no longer need to use the road shoulders, removing the potential conflict with passing vehicles.

Given the expected increase in traffic on Te Puna Station Road and the increasing use of active transport modes such as cycles, then the potential widening of the carriageway with the provision of a separate path for cycles is assessed as appropriate and will contribute towards the Road to Zero safety strategy.

## 9.2. Intersection of Te Puna Station Road and SH2

The intersection of Te Puna Station Road and SH2 is a Give Way controlled Tee intersection. The Te Puna Station Road approach to the intersection is shown on the following photograph.



**Photograph 4: Te Puna Station Road Approach to SH2**

This intersection has a right turn bay on SH2 for vehicles turning right onto Te Puna Station Road, as well as a left turn slip lane for vehicles turning left onto Te Puna Station Road. The daily and peak hour traffic volumes on SH2 are high with, prior to the closure of Te Puna Station Road, significant queues during peak periods leading to delays for vehicles turning in and out of Te Puna Station Road.

The Structure Plan specifies that, to mitigate the impact on the state highway and prior to the commencement of any industrial or business activity:

- The intersection of Te Puna Road and SH2 must be upgraded to a roundabout and, in addition,
- The intersection of Te Puna Station Road and SH2 must be upgraded by widening for left turn traffic movements onto the State Highway (or similar traffic management alternatives).

While a roundabout has been constructed at the intersection of Te Puna Road and SH2, the intersection of Te Puna Station Road and SH2 has not yet been upgraded.

The Structure Plan goes on to require that monitoring be carried out to confirm that the capacity of the intersection of Te Puna Station Road and SH2 remains adequate, particularly in so far as the performance of the right turn bay onto Te Puna Station Road and the left hand turn from Te Puna Station Road are concerned.

The adequacy of the intersection performance is required to be assessed by reference to the outcome of monitoring in respect of the following matters (at a minimum):

- The duration of delays for all traffic movements at the intersection which shall be determined having regard to whether:
  - The 95<sup>th</sup> percentile of the measured queue lengths as a result of right turns from SH2 impedes the flow of through traffic on the State Highway i.e. the 95<sup>th</sup> percentile queue length must not exceed the storage length of the existing right turn bay.

And

  - Side road time delays for traffic in Te Puna Station Road during peak periods exceed an average of 50 seconds when measured over a maximum one-hour period or increase by more than 50% from the baseline monitoring (whichever is the greater).
- Crash rates, which shall be determined having regard to whether:
  - The crash rates at the intersection (including vehicles queuing or turning) exceed either five in any one year, or an average of three per annum over the previous five years (as at the date of assessment).

And

  - The injury crash rates at the intersection increase from the baseline monitoring by any statistically significant amount.

A survey of the existing intersection performance was carried out on 12 May 2022. This survey was prior to the recent closure of Te Puna Station Road. This identified queue lengths and delays as given in the following table.

Time Period	SH2 Right Turn Lane		Te Puna Station Road Approach	
	95% Queue (veh)	Average Delay (s)	95% Queue (veh)	Average Delay (s)
Morning Peak	2	135	49	>240
Evening Peak	5	>240	9	>240

**Table 18: Performance of the Intersection of Te Puna Station Road and SH2**

Table 18 shows:

- A 95<sup>th</sup> percentile queue for the right turn movement on SH2 of up to five vehicles. The existing right turn bay has a storage length of 41 m which is sufficient to accommodate approximately seven vehicles. The right turn bay is therefore able to accommodate the existing 95<sup>th</sup> percentile queue without impeding the flow of traffic on the highway.
- Delays on Te Puna Station Road of over two minutes during both the morning and evening peak periods. This exceeds the specified threshold of 50 seconds.

The Structure Plan requires both the right turn queue length and the side road delay conditions to be met for the intersection to be considered as not performing adequately. As only the side road delay condition is met, the intersection is presently operating adequately.

As noted, the above surveys were carried out prior to the recent closure of Te Puna Station Road due to the slip. If the road is re-opened, then the proposed industrial development will result in additional traffic using the intersection. As both the eastbound SH2 through movement and the southbound Te Puna Station Road movements are over saturated, the performance of the intersection is unable to be successfully modelled using traditional intersection modelling software.

To minimise any effects at the intersection, it is recommended that the STMP for the site also include, but not be limited to,

- A requirement that all heavy vehicles be required to use the SH2 – Te Puna Road – Te Puna Station Road route rather than the SH2 – Te Puna Station Road route.
- While it is understood that this scenario is not presently being considered by Council, if Te Puna Station Road is re-opened to north-west bound vehicles, then a requirement that all staff travelling to the site from Tauranga, along SH2, be required to use the SH2 – Te Puna Road – Te Puna Station Road route rather than the right turn bay onto Te Puna Station Road.

These requirements will minimise any additional vehicles using the SH2 right turn bay.

It is also recommended that the performance of the intersection continue to be monitored, in accordance with the requirements of the Structure Plan.

The proposed STMP is discussed further in Section 15 of this report.

An assessment of the crash rates at the intersection is given in Section 13 of this report.

### **9.3. Intersection of Te Puna Station Road and Te Puna Road**

The intersection of Te Puna Station Road and Te Puna Road is in the form of a Tee intersection with Stop control on the Te Puna Station Road approach. The Te Puna Station Road approach to the intersection is shown on the following photograph.





**Photograph 5: Te Puna Station Road Approach to Te Puna Road**

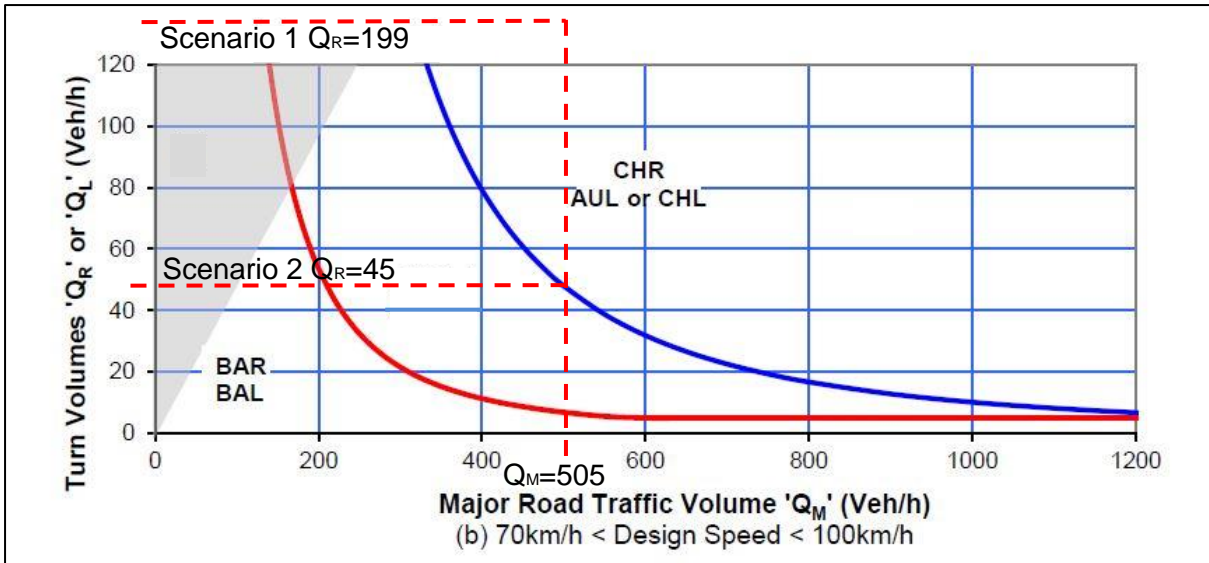
The Structure Plan specifies that, to mitigate the effects at the intersection of Te Puna Station Road and Te Puna Road:

- Prior to commencement of any industrial or business activity on the Te Puna Business Park land, the intersection of Te Puna Road and Te Puna Station Road must be upgraded to include provision for left turn and right turn movements or similar traffic management alternatives.
- Written evidence is to be provided to Council that the design and construction of the intersection upgrade, or similar traffic management alternatives, is to the satisfaction of the Council's Group Manager Infrastructure Services.

While an upgrade of the intersection has been carried out to provide separate left and right turn lanes on Te Puna Station Road, as well as a left turn lane on Te Puna Road, there is presently no right turn bay on Te Puna Road. It is understood that compliance with the above requirement has been confirmed to the satisfaction of Council's Group Manager Infrastructure Services in writing in 2020.

The recent closure of Te Puna Station Road due to the slips has resulted in a redistribution of traffic onto Te Puna Road, with the expected redistribution of turning movements in the morning peak given in Figure 6 of this report.

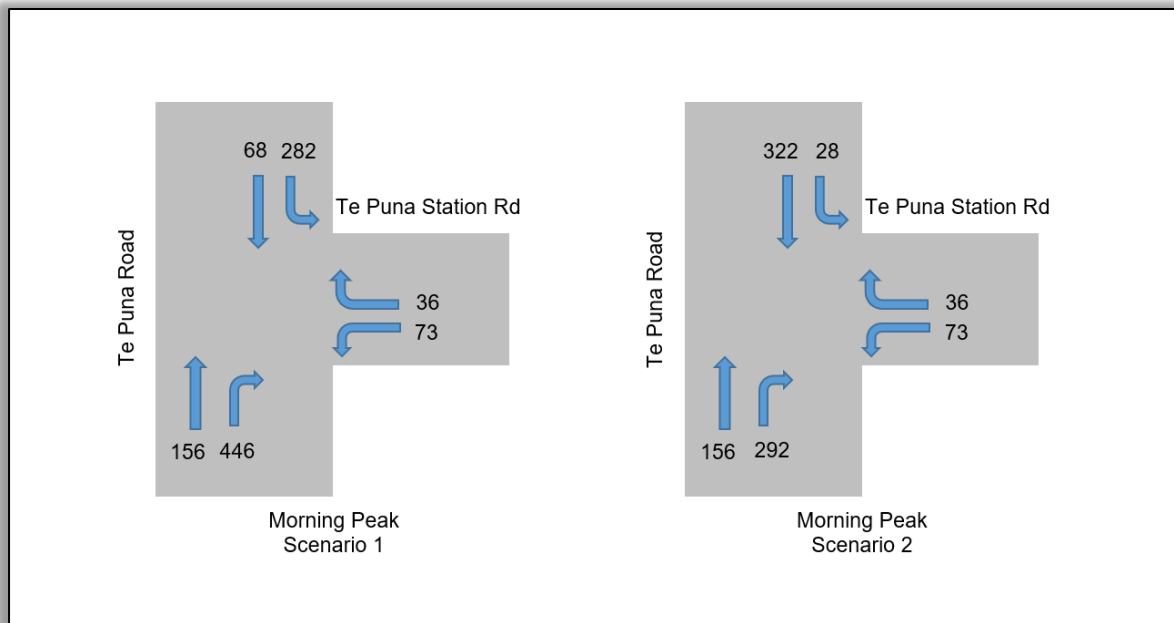
Recommendations for the provision of right turn bays at intersections are given in the Austroads "*Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings*". An assessment of the warrant for the provision of a right turn bay at the intersection during the morning peak, with existing traffic volumes for both Scenario 1, the partial closure of Te Puna Station Road, and Scenario 2, the full closure of Te Puna Station Road, is given in the following figure. In accordance with the Austroads Guide, this assessment has been carried out using the actual number of vehicle movements rather than PCE movements.



**Figure 9: Warrant for Auxiliary Right Turn Lane – Existing Volumes**

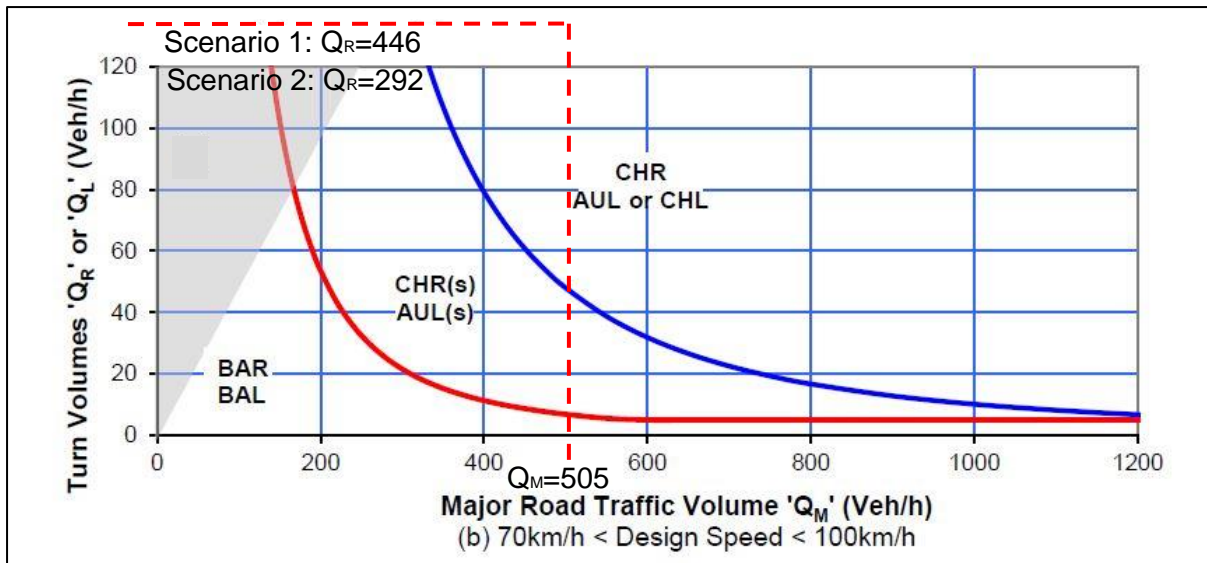
Figure 9 shows that, under both scenarios, the provision of a right turn bay is warranted during the morning peak.

The expected morning peak hour turning movements at the intersection, with the proposed development of all three sites, are given on Figure 10.



**Figure 10: Expected Morning Peak Hour Turning Movements (veh/h)**

An assessment of the warrant for the provision of a right turn bay at the intersection, during the morning peak, for both scenarios, is given in the following figure.



**Figure 11: Warrant for Auxiliary Right Turn Lane – With Development**

Figure 11 shows that the warrant criteria is met during the morning peak, for both scenarios.

An assessment of the expected operational performance of the intersection of Te Puna Station Road and Te Puna Road has been carried out, as given in the following table. This assessment is for the existing intersection layout, without a right turn bay.

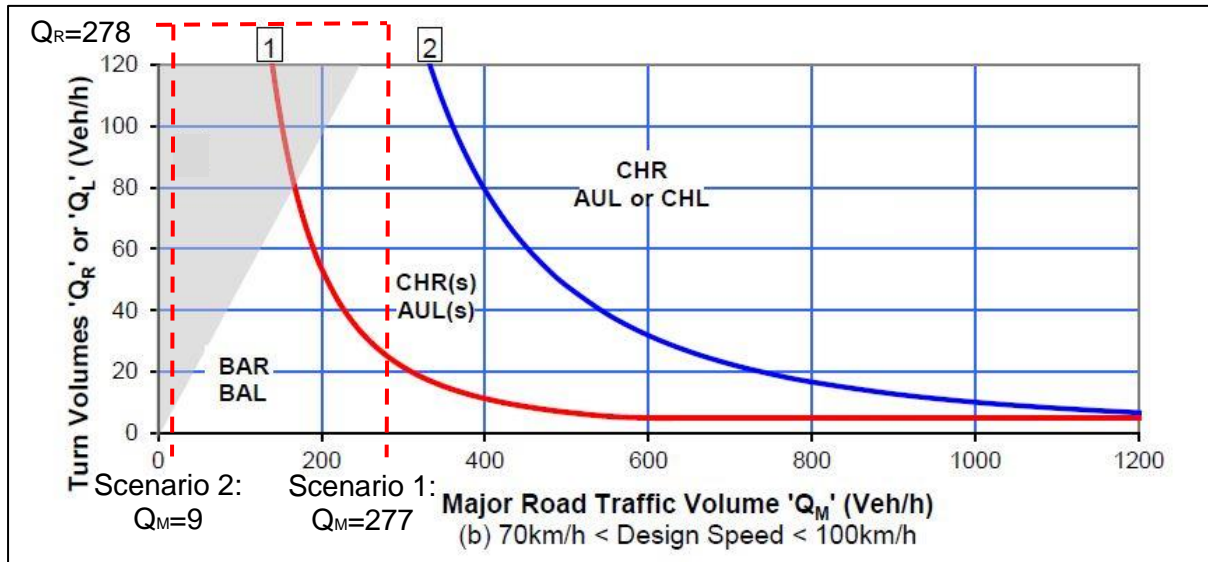
Peak Period	Approach	Movement	Degree of Saturation	Average Delay (s)	Level of Service	Queue (veh)
AM Peak Scenario 1	Te Puna Road South	Through	0.660	2.9	A	8.2
		Right	0.660	13.1	B	8.2
	Te Puna Station Road East	Left	0.063	8.4	A	0.3
		Right	0.200	27.5	D	0.6
	Te Puna Road North	Left	0.177	4.8	A	0.0
		Through	0.040	0.0	A	0.0
AM Peak Scenario 2	Te Puna Road South	Through	0.467	1.1	A	3.8
		Right	0.467	10.8	B	3.8
	Te Puna Station Road East	Left	0.090	24.4	B	0.3
		Right	0.176	4.7	C	0.5
	Te Puna Road North	Left	0.018	0.1	A	0.0
		Through	0.191	0.0	A	0.0

**Table 19: Intersection Operational Performance**

Table 19 shows that the intersection is expected to operate efficiently with low to moderate delays. The 85<sup>th</sup> percentile queue length on the Te Puna Road southern approach of 8.2 vehicles for Scenario 1 and 3.8 vehicles for Scenario 2 however indicates that, for safety, a right turn bay is required. This supports the assessments given above that the provision of a right turn bay is warranted.

#### 9.4. Intersection of Te Puna Station Road and Clarke Road

An assessment of the warrant for the provision of a right turn bay on Te Puna Station Road at the intersection with Clarke Road has also been carried out. This uses the latest traffic count data given in Section 5.2 of this report and again considers both Scenarios 1 and 2.



**Figure 12: Warrant for Auxiliary Right Turn Lane**

Figure 12 shows that for Scenario 1, due to the high number of vehicles turning right into Clarke Road, together with the continuation of eastbound vehicle movements along Te Puna Station Road, a right turn lane is warranted. It is however noted that this scenario involves the opening of Te Puna Station Road to eastbound traffic. This is expected to reduce the right turn movement into Clarke Road from 278 veh/h to around 19 veh/h which does not meet the warrant criteria.

An assessment of the expected operational performance of the intersection of Te Puna Station Road and Clarke Road has been carried out, as given in the following table.

Peak Period	Approach	Movement	Degree of Saturation	Average Delay (s)	Level of Service	Queue (veh)
AM Peak Scenario 1	Clarke Road	Left & Right	0.011	7.7	A	0.0
	Te Puna Station Road East	Left & Through	0.009	0.3	A	0.0
	Te Puna Station Road West	Through & Right	0.216	1.3	A	0.7
AM Peak Scenario 2	Clarke Road	Left & Right	0.019	7.6	A	0.1
	Te Puna Station Road East	Left & Through	0.009	0.3	A	0.0
	Te Puna Station Road West	Through & Right	0.075	3.8	A	0.4

**Table 20: Intersection Operational Performance**

Table 20 shows that the intersection is expected to operate efficiently with minimal delays, a high level of service and negligible queues.

## 9.5. Intersection of Te Puna Station Road and Teihana Road

The Mobile Road data gives an ADT on Teihana Road of 91 veh/day, with 7% heavy. The peak hour volume is estimated at 9 veh/h. With the closure of Te Puna Station Road east of the intersection, the turning movements are expected to be predominantly to and from the west. With both scenario 1 and 2, any vehicles turning right onto Teihana Road are expected to be negligible and insufficient to warrant the provision of a right turn lane.

## 10. Access to Te Puna Station Road

### 10.1. Intersection Location

As noted earlier in this report, the Te Puna Business Park Structure Plan specifies a new loop road to be constructed within the business park site. The indicative location for the western intersection of the loop road, as shown on the Structure Plan, is approximately 50 m to the west of the existing site access.

A new internal road is proposed, with the intersection on Te Puna Station Road located approximately 27 m to the east of the existing vehicle entrance, and 77 m to the east of the location specified in the Structure Plan. The proposed location will provide greater sight distance to the west than the indicative location shown on the Structure Plan.

The Development Code specifies a minimum separation distance between intersections on Local Roads of 60 m, measured to the centreline of the intersecting roads. Using the One Road Network classification of Te Puna Station Road as a Primary Collector Road, a minimum separation distance of 150 m is required. The approximate separation distances to the nearest existing intersections are as follows:

- East to Clarke Road: 1.1 km.
- West to Te Puna Road: 530 m.

The available separation distances exceed the specified minimum, so comply.

The Structure Plan specifies three intersections to service the Business Park zone, with a minimum separation distance of 200 m between each intersection. It is understood that the intersections to both the Overton and Tinex sites are proposed to be retained in the same location as the existing vehicle entrances. The available separation distance to the Overton entrance at 264 Te Puna Station Road will be approximately 132 m which is less than the required 200 m. The proposed location will however allow greater sight distance to be provided between the intersection and the curve located to the west.

Recommendations for the required offset between intersections are given in the Austroads "*Guide to Road Design Part 4: intersections and Crossings – General*". The Guide discusses a number of criteria to be considered when reviewing the available separation distance between intersections. These include:

- Stopping sight distance to allow a driver to clear the intersection and have at least stopping sight distance available to react to a potential conflict and come to a stop.
- Intersection sight distance to allow a driver to enter or cross a major roadway.
- Left turn conflict overlap occurs when the through driver must monitor more than one access at a time. Providing at least the stopping sight distance between access points will allow a through vehicle to avoid a collision with an entering vehicle.

- Influence distance, defined as the sum of the impact distance (the distance upstream where the brake lights of a following through vehicle are activated) plus the distance travelled during perception-reaction time of driver.
- Egress capacity, the ability of vehicles to exit from an access into the traffic stream.

The required separation distances for each of these methods is given in the following table.

Speed (km/h)	Stopping Sight Distance	Intersection Sight Distance	Left Turn Conflict Overlap	Influence Distance	Egress Capacity
90	126	231	105*	150	240*

\* Speed of 70 km/h

**Table 21: Intersection Spacing Methods**

Table 21 shows intersection spacing criteria of between 105 m and 240 m. The proposed intersection spacing of 132 m between the Te Puna Industrial Ltd site entrance and the Overton entrance at 264 Te Puna Station Road satisfies the stopping sight distance (SSD) left turn overlap criteria but not the intersection sight distance, influence distance and egress capacity criteria.

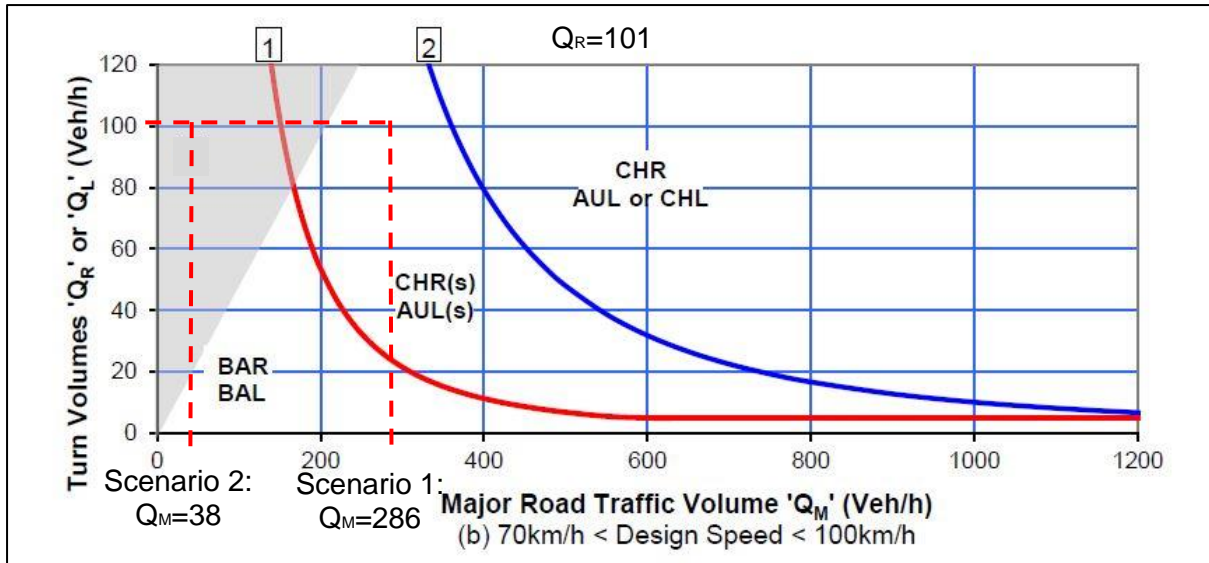
Given the alignment of Te Puna Station Road, with a curve located to the west of the site and the entrance to the Overton site located to the east of the site, compliance with all of the criteria is not possible. It is assessed that the most important of these criteria are:

- Intersection sight distance to the curve located to the west of the site. This is discussed in Section 10.4 of this report, which identifies that that adequate sight distance is available for the safe use of the intersection.
- Stopping sight distance to the Overton entrance located to the east of the site. The proposed separation distance of 132 m exceeds the required minimum stopping sight distance of 126 m.

It is assessed that the proposed intersection location is appropriate, maximising the relevant sight distances to the east and west.

## **10.2. Turning Movements**

The expected peak hour turning movements at the access intersection with Te Puna Station Road are given on Figure 8 of this report. An assessment of the warrant criteria for the provision of a right turn bay at the intersection during the morning peak, for both Scenarios 1 and 2, is given in the following figure.



**Figure 13: Warrant for Auxiliary Right Turn Lane**

Figure 13 shows that, for Scenario 1, with the partial closure of Te Puna Station Road, the warrant criteria for the provision of a right turn bay is met. For Scenario 2, with the full closure of Te Puna Station Road, the criteria for a right turn bay is not met. The provision of a right turn bay is however proposed.

An assessment of the expected operational performance of the intersection of the site access road with Te Puna Station Road is given in the following table.

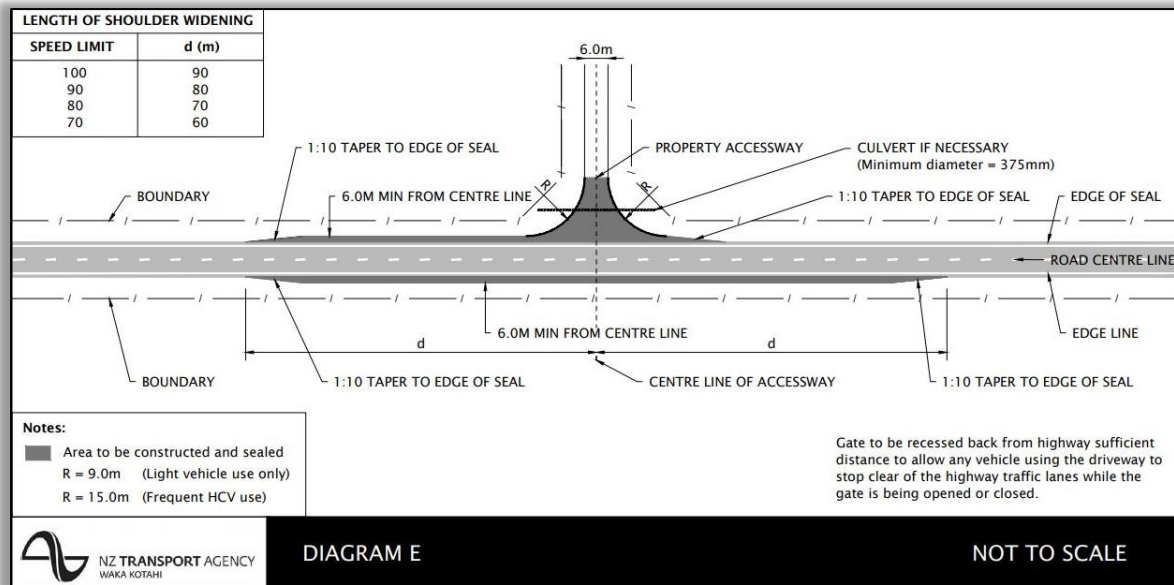
Peak Period	Approach	Movement	Degree of Saturation	Average Delay (s)	Level of Service	Queue (veh)
AM Peak Scenario 1	Site Access	Left	0.019	4.7	A	0.1
	Te Puna Station Road East	Through	0.009	0.0	A	0.0
	Te Puna Station Road West	Through	0.155	0.0	A	0.0
		Right	0.065	7.1	A	0.3
AM Peak Scenario 2	Site Access	Left	0.018	4.7	A	0.1
	Te Puna Station Road East	Through	0.009	0.0	A	0.0
	Te Puna Station Road West	Through	0.014	0.0	A	0.0
		Right	0.065	7.1	A	0.3

**Table 22: Intersection Operational Performance**

Table 22 shows that, under both scenarios, the intersection of the site access road with Te Puna Station Road is expected to operate efficiently with minimal delays, a high level of service and negligible queues.

### 10.3. Intersection Design

The Structure Plan requires any access any access to land within the Business Park to be formed in accordance with the NZTA “Planning Policy Manual” (PPM) Diagram D. It is understood that, since the Structure Plan was prepared, the naming of the NZTA PPM diagrams has changed and that the relevant requirement is now Diagram E. This standard is shown on the following figure.



**Figure 14: Required Access Standard**

Figure 14 shows that the access is required to be constructed with widening for the left turn into the site, a taper for the left turn movement out of the site, and with widening on the opposite side of the carriageway to allow through vehicles to pass to the left of a vehicle turning right into the site.

The Development Code, however, requires new intersections to be designed in accordance with the Austroads *“Guide to Traffic Engineering Practice, Part 5 Intersections at Grade”*. This has been replaced with the Austroads *“Guide to Road Design”* series of guides.

The proposed design of the access intersection is shown on the attached drawings prepared by WSP. The design provides:

- A full right turn bay designed in accordance with the Austroads guide, which exceeds the requirements of Diagram E.
- Additional seal widening for the left turn into the site, in accordance with Diagram E.

Neither NZTA Diagram E nor the Development Code require the provision of a central throat island on the side road. Given the relatively low turning movements, it is assessed that the provision of a throat island is not required.

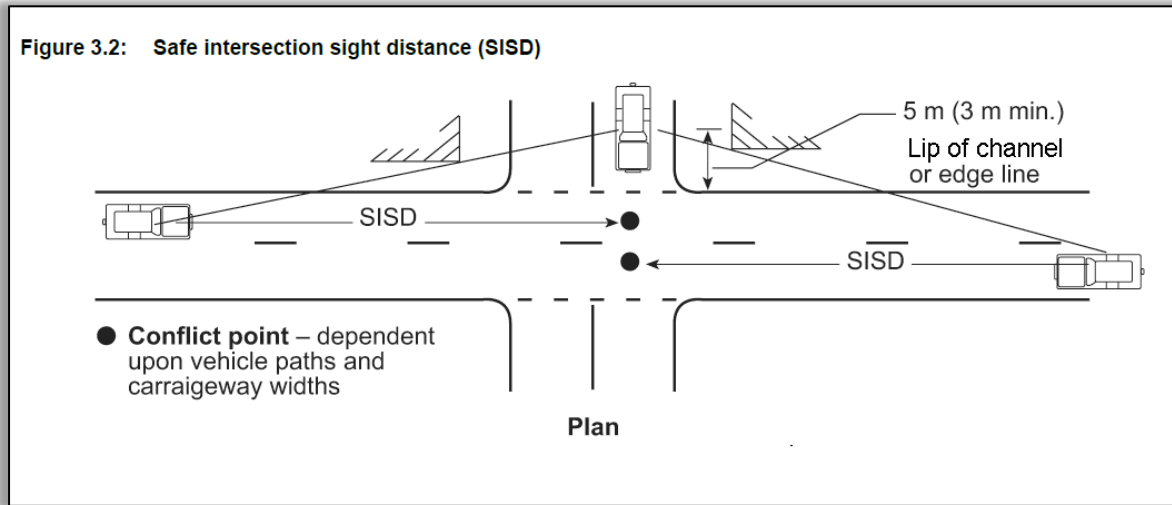
The tracking of the design 18 m long heavy vehicle is shown on WSP Drawing C301. This shows that the tracking of the design vehicle can be accommodated, without the vehicle being required to track over the centreline of Te Puna Station Road.

#### 10.4. Sight Distances

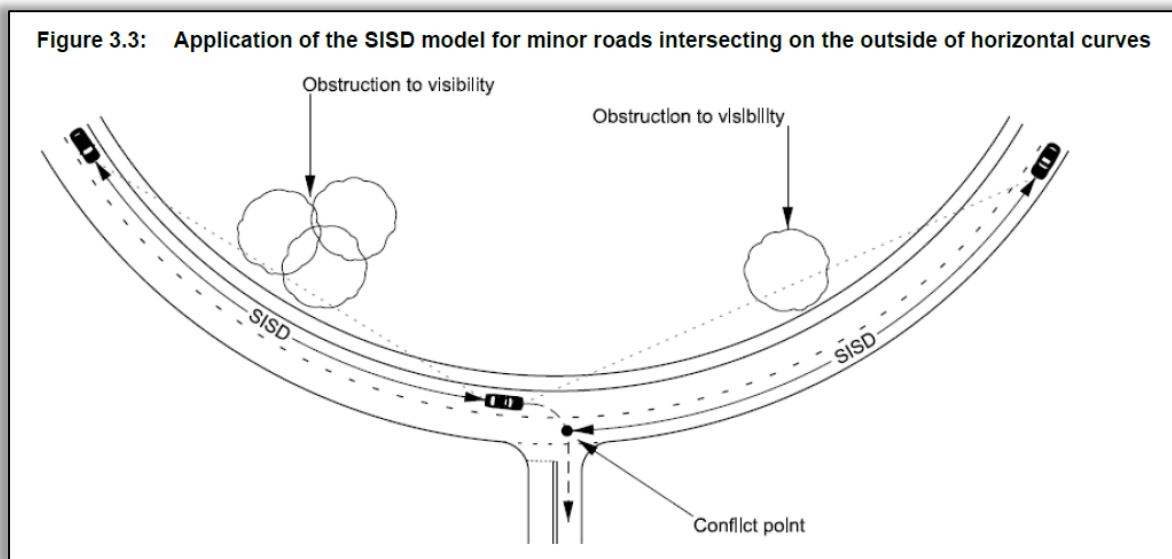
While the Development Code specifies the required sight distances at vehicle entrances, given that an intersection with an internal road is proposed, the Austroads Safe Intersection Sight Distance (SISD) requirements for a road intersection have been adopted for this assessment. As noted in Section 5.1 of this report, the traffic count data has identified an 85<sup>th</sup> percentile operating speeds, adjacent to the site, of 95 km/h westbound and 91 km/h eastbound. For this this assessment, a speed of 95 km/h has therefore been adopted.



The required lines of sight are required to be measured from both the side road and, when the side road is on the outside of a horizontal curve, from the centre of the traffic lanes. These requirements are shown on the following figures.



**Figure 15: Austroads Safe Intersection Sight Distance**



**Figure 16: Required Sight Distance on Curves**

The compliance of the available sight distances with these requirements is given in the following table.

Observation Point	Direction	Operating Speed (km/h)	Sight Distance (m)		Complies?
			Required	Available	
Side Road Approach	To the West	95	231	220	No
	To the East	95	231	>250	Yes
Main Road Traffic Lane	To the West	95	231	220	No
	To the East	95	231	>250	Yes

**Table 23: Sight Distances at the Site Access**

Table 23 shows that the available sight distances at the intersection, towards the west, do not comply with the minimum Austroads requirements.

The available sightlines are shown in the following photographs.



**Photograph 6: Sightline E-C to the East**



**Photograph 7: Sightline E-D to the West**



**Photograph 8: Sightline B-C to the East**



**Photograph 9: Sightline B-D to the West**

Photograph 7 and Photograph 9 show that the available sight distance to the west is restricted by the curve of the road and the vegetation located on the inside of the curve. The available sight distance of 220 m is suitable for a vehicle operating speed of 92 km/h, which exceeds the measured eastbound vehicle operating speed of 91 km/h.

Given the posted speed limit of 80 km/h and that, as development of the business park proceeds the operating speed of vehicles on Te Puna Station Road is likely to reduce, it is assessed that adequate sight distance is available for the safe use of the intersection.

## 11. Internal Road Design

It is proposed that internal road will have an 8.0 m wide carriageway located within a 20.0 m wide road reserve. The internal road will be constructed as a sealed road with feather edges rather than kerb and channel. This will allow a 3.5 m wide traffic lane in each direction, with 0.5 m wide shoulders. There will be no roadside parking provided, it is proposed that all parking be accommodated within the individual sites.

The District Plan requires industrial roads with a PCE ADT of over 1,000 veh/day to have a 13.0 m wide carriageway located in a 26.0 m wide reserve. The proposed widths are less than this requirement. The required carriageway width of 13.0 m is sufficient to accommodate a 3.5 m wide traffic lane in each direction, with a 3.0 m wide parking lane on each side of the road. Given that the road will have feather edges with no on-road parking provided, the proposed width is assessed as appropriate. The feather edges will allow the road to be widened in future, if required, to accommodate kerbside parking.

The Structure Plan shows a proposed connection between the Te Puna Industrial site at 297 Te Puna Station Road and the Tinex Group site at 245 Te Puna Station Road. It is understood that the roads are proposed to be constructed to different standards and that neither party propose to provide this connection at this stage. Given the proposed use of both sites for yard based industrial activities, it is expected that any internal movement between the two sites will be negligible and so any additional traffic on Te Puna Station Road associated with vehicles traveling between the two sites will be negligible.

A 30.0 m diameter turning head is proposed at the end of the internal road, which is consistent with the diameter specified in the Development Code.

## 12. Parking

### 12.1. Parking Requirements

The District Plan has a policy that activities should be established and operate in a manner which ensures safe and effective on-site and off-site vehicle parking. At the time of writing, details of the proposed on-site parking were not yet available. With the proposed activities being predominantly yard-based, the peak parking demand is expected to be minimal. In practice, it is expected that the individual lease areas will provide sufficient space for the provision of an appropriate level of on-site parking.

The New Zealand Standard (NZS) 4121:2001 "*Design for Access and Mobility – Buildings and Associated Facilities*" requires car parks with up to 20 spaces to provide not less than one accessible parking space. While no dedicated accessible space is proposed, ample space is available on each individual lease area for accessible parking to be provided on an as-required basis.

As, at the time of writing, details of the proposed on-site parking were not yet available, a review of the car park layout could not be carried out. It is however noted that ample space

will be available for the provision of car parking spaces in accordance with the dimensions specified in the District Plan.

The District Plan requires parking and loading areas in industrial zones to be sealed, while in rural zones the parking and loading areas may be metalled. While the site is in an industrial zone, given the rural location, metalled parking and loading areas are assessed as appropriate.

## **12.2. Loading and Servicing**

The District Plan requires all Permitted activities to provide one loading space. As the proposed activities are yard based, no dedicated loading spaces are proposed. It is assessed that ample space will be available on each of the lease areas for loading on an as-required basis.

## **12.3. On-Site Manoeuvring**

The District Plan requires on-site manoeuvring to be provided so that all vehicles can enter and exit the site without reversing onto of off the road. Again, while at the time of writing the layout of each individual lease area was not available, it is expected that ample space will be available on each of the lease areas for on-site manoeuvring in accordance with District Plan requirements.

## **12.4. Bicycle Parking**

The District Plan requires all activities to provide at least one bicycle parking space. Ample space will be available within each of the lease areas to provide bicycle parking on an as-required basis.

# **13. Road Safety**

Section 6 of this report has identified clusters of crashes at the curve located to the west of the site, the curve located to the east of the site and at the intersection of Te Puna Station Road with SH2.

Inappropriate speed was identified as a common contributing factor in the loss of control crashes on the curves. It is noted that, in March 2021, the speed limit on Te Puna Station Road was reduced from 100 km/h to 80 km/h. This is expected to reduce the number of speed related crashes.

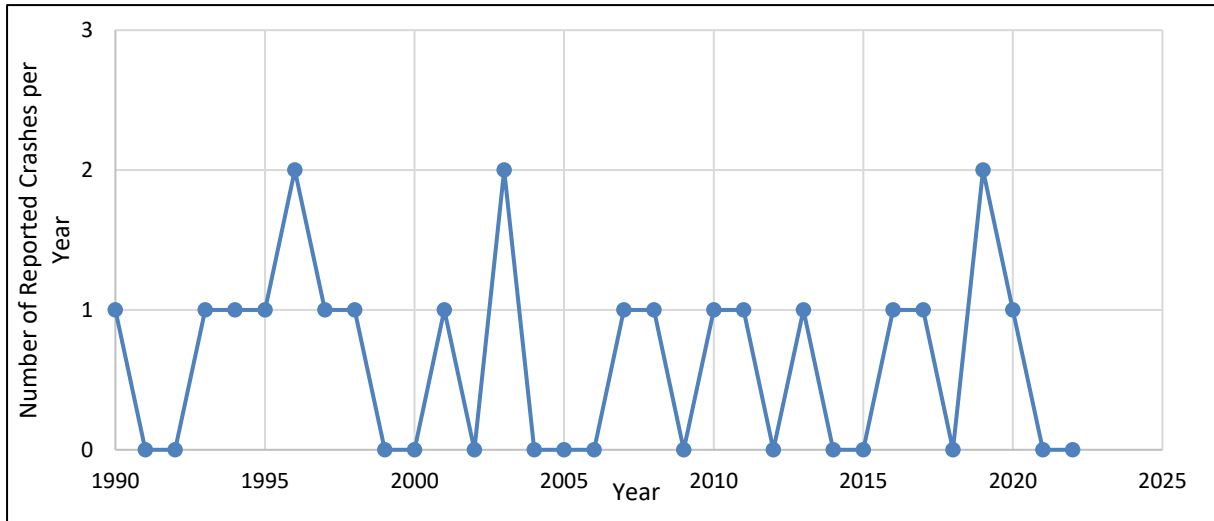
The Structure Plan requires that monitoring be carried out to confirm that the capacity of the intersection of Te Puna Station Road and SH2 remains adequate. This includes an assessment of the crash rates, which shall be determined having regard to whether:

- The crash rates at the intersection (including vehicles queuing or turning) exceed either five in any one year, or an average of three per annum over the previous five years (as at the date of assessment). And
- The injury crash rates at the intersection increase from the baseline monitoring by any statistically significant amount.

The crash history given in Section 6 of this report has identified four crashes at the intersection of Te Puna Station Road and SH2, in the last five years, inclusive of both injury and non-injury

crashes. Of these, there were a maximum of two in any one year (2019) with an average of one per year.

An assessment of the number of crashes per year over the past 30 years is shown on the following figure.



**Figure 17: Reported Crashes Per Year**

Figure 17 does not show any trend for an increase in the number of crashes at the intersection.

It is therefore assessed that the reported crash history at the intersection does not trigger the requirement for an upgrade of the intersection.

## 14. Earthworks

The proposed earthworks and geotechnical methodology for rendering the site suitable to accommodate yard-based industrial uses is detailed within the report prepared by Tetra Tech Coffey. The methodology includes importing of engineered fill material to ensure the lease areas and the internal road are suitable to accommodate frequent heavy vehicle movements. Such material would be imported by truck.

It is proposed to manage the intersection construction and maneuvering in and out of the site during earthworks by way of adherence to a Construction Traffic Management Plan. This plan will ensure that vehicle movements in and out of the site are marshalled so as to reduce the occurrence of safety or congestion risks to regular traffic on Te Puna Station Road. This can be secured by way of condition of consent, and subject to such a mitigation measure, any adverse safety or congestion effects attributable to earthworks-related movements are expected to be low and acceptable.

## 15. Site Travel Management Plan

Container Co propose that all heavy vehicles associated with their activity will be required to access the site to and from the west. This will be managed with the use of a Site Travel Management Plan (STMP). While not presently proposed by Council, if Te Puna Station Road

is re-opened to north-west bound vehicles, then Section 9.2 of this report recommends that all staff travelling to the site be required to use the Te Puna Station Road route rather than Te Puna Station Road.

Section 5.2 of this report has identified that, with the recent closure of Te Puna Station Road at the slip, the 7-day ADT on Clarke Road has increased to 956 veh/day, an increase of 681 veh/day when compared to the previous count prior to the closure. It is understood that options being considered by Council include a partial closure (Scenario 1) which would affect northbound vehicles only, and a full closure of the road (Scenario 2) which would affect all vehicles.

Scenario 1, the future partial closure of Te Puna Station Road, will involve re-opening the road to vehicles travelling in the south-east bound direction, which will alleviate the current use of Clarke Road by southbound vehicles, but not northbound vehicles.

Scenario 2, the continued full closure of Te Puna Station Road, is expected to lead to vehicles continuing to use Clarke Road in both directions.

To minimise the use of Clarke Road, it is recommended that the STMP also require that, under either of these scenarios, light vehicles are not to use Clarke Road while travelling to and from the site.

## 16. Conclusion

Te Puna Industrial Ltd propose to develop the site at 297 Te Puna Station Road, Te Puna for yard-based industrial activities. Access is proposed via a new internal road, located approximately 27 m east of the existing access.

With the full development of the site, the expected daily traffic generation of the proposed activities is assessed at 774 veh/day, with a peak hour traffic generation of 125 veh/h. The PCE daily traffic generation is assessed at 1,609 veh/day.

Together, the three sites within the Business Park have an expected combined daily traffic generation of 2,599 veh/day, which is less than the maximum permitted by the Structure Plan prior to the completion of the TNL bypassing Te Puna. The development of the three sites may therefore proceed prior to the completion of the TNL.

Surveys have identified an existing directional distribution of 75% to and from the east, with 25% to and from the west. A recent slip on Te Puna Station Road has however resulted in the temporary closure of Te Puna Station Road east of the site. Options being considered by Council include either Scenario 1, a partial closure which would affect northbound vehicles only, and Scenario 2, a full closure which would affect all vehicles.

It proposed that all heavy vehicles will be required to access the site to and from the west. This report recommends that, if Te Puna Station Road is re-opened to north-west bound vehicles, then all staff travelling to the site be required to use the Te Puna Road route rather than Te Puna Station Road. It is expected that similar travel management will be required for the other sites within the business park. A distribution with all vehicles accessing the site to and from the west has therefore been adopted for this assessment.

With the inclusion of daily traffic associated with all three sites within the business park and the continued closure of the Te Puna Station Road, the ADT on Te Puna Station Road west of the site is expected to increase to 4,083 veh/day, with a PCE ADT of 7,553 veh/day.

The Structure Plan requires payment of a targeted financial contribution towards roading, which will allow for the widening of Te Puna Station Road. Council has signalled an intention to widen the existing carriageway to 8.5 m and provide a separate 3.0 m wide cycle path. This is assessed as appropriate for the forecast traffic volumes and will contribute towards the Road to Zero safety strategy.

At the intersection of SH2 and Te Puna Station Road, prior to the closure of the road, there were significant queues during peak periods, leading to delays for vehicles turning in and out of Te Puna Station Road.

The Structure Plan specifies mitigation measures for this intersection however, a survey of the existing intersection performance has identified that the conditions required for the upgrade of this intersection have not yet been triggered. To manage the additional traffic using the intersection and to encourage vehicles to use the SH2 – Te Puna Road – Te Puna Station Road route, rather than queuing on the highway, it is recommended that the STMP be for the site require that, if Te Puna Station Road is re-opened to north-west bound vehicles, then all staff travelling to the site from Tauranga, along SH2, be required to use the Te Puna Road route rather than the right turn bay onto Te Puna Station Road. . It is also recommended that the performance of the intersection continue to be monitored, in accordance with the requirements of the Structure Plan.

While the intersection of Te Puna Road and Te Puna Station Road has separate left and right turn lanes on Te Puna Station Road, as well as a left turn lane on Te Puna Road, there is presently no right turn bay on Te Puna Road. It is understood that the provision of these turning lanes complies with the Structure Plan and that this has been confirmed to the satisfaction of Council's Group Manager Infrastructure Services.

An assessment of the warrant for the provision of a right turn bay shows that the warrant criteria is met during the morning peak, with existing traffic volumes, for both Scenario 1 and Scenario 2. With the proposed development of all three sites, the warrant criteria is again met, for both scenarios.

The intersection is expected to operate efficiently with low to moderate delays. The expected queue length on the Te Puna Road southern approach however indicates that, for safety, a right turn bay is required.

The intersections of Te Puna Station Road with Clarke Road and Teihana Road are expected to operate efficiently with minimal delays, a high level of service and negligible queues.

The intersection of the new internal road with Te Puna Station Road will be located to the east of the location specified in the Structure Plan. This will provide greater sight distance to the west than the indicative location shown on the Structure Plan.

The Structure Plan requires a minimum separation distance of 200 m between each intersection servicing the Business Park. The available separation distance to the Overton entrance at 264 Te Puna Station Road will be approximately 132 m which is less than the required 200 m. It is assessed that the proposed intersection location is appropriate, maximising the available safe intersection sight distance to the west, while achieving stopping sight distance to the Overton access to the east.

An assessment of the warrant criteria for the provision of a right turn bay at the proposed access intersection has identified that, for Scenario 1, with the partial closure of Te Puna Station Road, the warrant criteria for the provision of a right turn bay is met. For Scenario 2, with the full closure of Te Puna Station Road, the criteria for a right turn bay is not met. The



provision of a right turn bay is however proposed. The proposed design of the intersection is in accordance with Austroads requirements.

The available sight distance at the intersection, towards the west, provides sufficient sight distance for a vehicle operating speed of 92 km/h, which exceeds the measured eastbound operating speed of 91 km/h. Given that, as development of the business park proceeds the operating speed of vehicles on Te Puna Station Road is likely to reduce, it is assessed that adequate sight distance is available for the safe use of the intersection.

The proposed carriageway width of the internal road, at 8.0 m, is less than that required by the District Plan. Given that the road will have feather edges with no on-road parking provided, the proposed width is assessed as appropriate. The feather edges will allow the road to be widened in future, if required, to accommodate kerbside parking.

With the proposed activities being predominantly yard-based, the peak parking demand is expected to be minimal. The individual lease areas are expected to provide sufficient space for the provision of an appropriate level of on-site parking.

Given the rural location, metalled parking and loading areas are assessed as appropriate.

As the proposed activities are yard based, no dedicated loading spaces are proposed. Ample space will be available on the site for loading on an as-required basis.

A safety assessment has not identified any trend for an increase in the number of crashes at the SH2 intersection.

The recent closure of Te Puna Station Road has resulted in a significant increase in traffic on Clarke Road. It is recommended that the STMP require staff to not to use Clarke Road while travelling to and from the site.

In summary, it is recommended that:

- if Te Puna Station Road is re-opened to north-west bound vehicles, then all staff travelling to the site be required to use the Te Puna Road route rather than Te Puna Station Road.
- The performance of the intersection of Te Puna Station Road and SH2 continue to be monitored in accordance with the requirements of the Structure Plan.
- The STMP require staff to not to use Clarke Road while travelling to and from the site.

It is concluded that, with these recommendations, the proposed yard based industrial activities can be readily accommodated within the local transportation environment, with any adverse effects adequately mitigated.

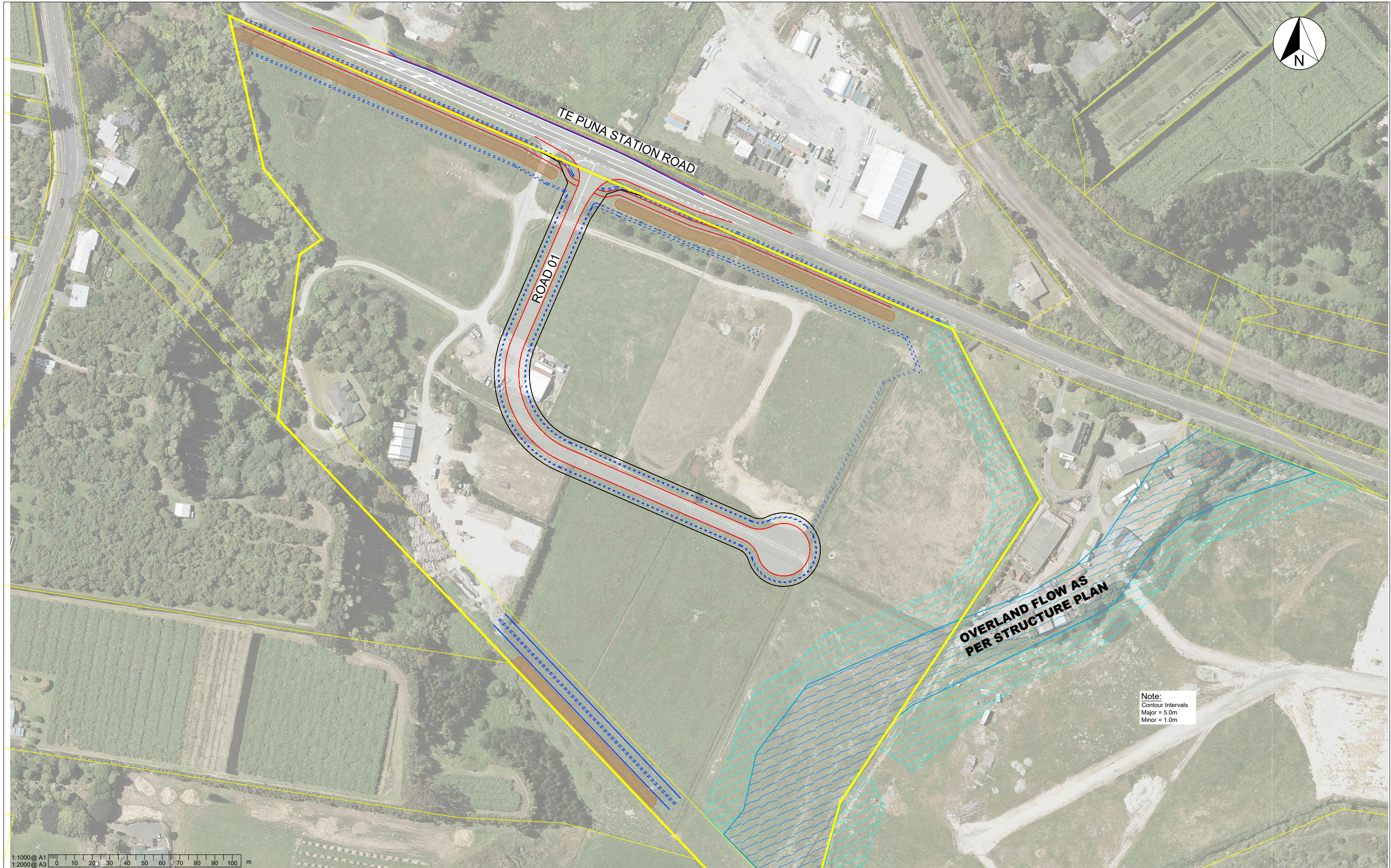
Report Prepared by:



Bruce Harrison  
**Harrison Transportation**

12 September 2023

Reference: 461 TA v5



Note:  
 Contour Intervals  
 Major = 5.0m  
 Minor = 1.0m

1:1000 @ A1  
 1:2000 @ A3

REVISION	AMENDMENT	APPROVED	DATE
A	Issued as draft for discussion	BCD	18/07/2022
B	Amendments to intersection layout	BCD	14/11/2022



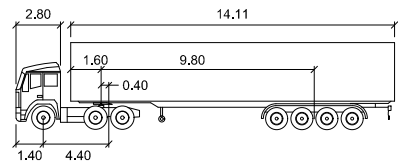
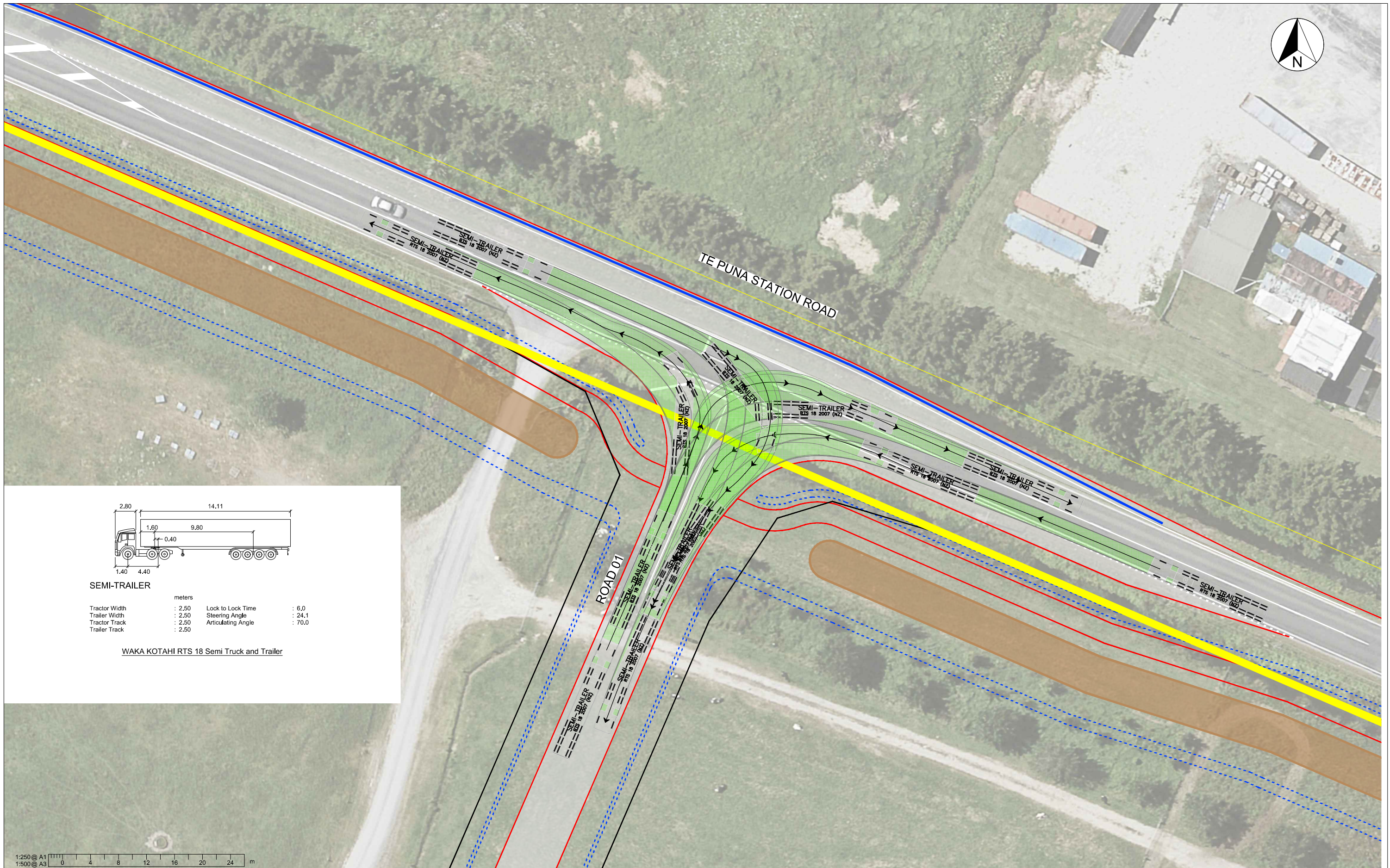
**wsp**  
 Rotorua Office  
 +64 7 343 1400  
 PO Box 1245  
 Rotorua 3040  
 New Zealand

CIVIL

SCALES	ORIGINAL SIZE
1:1000	A1
DRAWN	APPROVED
BCD	CA
DRAWING VERIFIED	APPROVED DATE
JM	YYYY-MM-DD

DRAFT

PROJECT	TITLE	WSP PROJECT NO.	PROJ-ORIG-VOL-LOC-TYPE	SHEET NO.	REVISION
CONTAINERCO TE PUNA STATION ROAD TAURANGA TE PUNA STATION ROAD CONTAINER PORT	SITE LAYOUT PLAN	2-9Z729.01		C300	B



**SEMI-TRAILER**

meters	
Tractor Width	: 2.50
Tractor Track	: 2.50
Trailer Width	: 2.50
Trailer Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 24.1
Articulating Angle	: 70.0

WAKA KOTAHI RTS 18 Semi Truck and Trailer

1:250 @ A1  
1:500 @ A3

REVISION	AMENDMENT	APPROVED	DATE
A	Issued as draft for discussion	BCD	28/10/2022
B	Amendments to intersection layout	BCD	14/11/2022
C	Issued for client approval	BCD	16/11/2022
D	Vehicle turning paths amended	BCD	20/03/2023



Rotorua Office  
+64 7 343 1400

PO Box 1245  
Rotorua 3040  
New Zealand

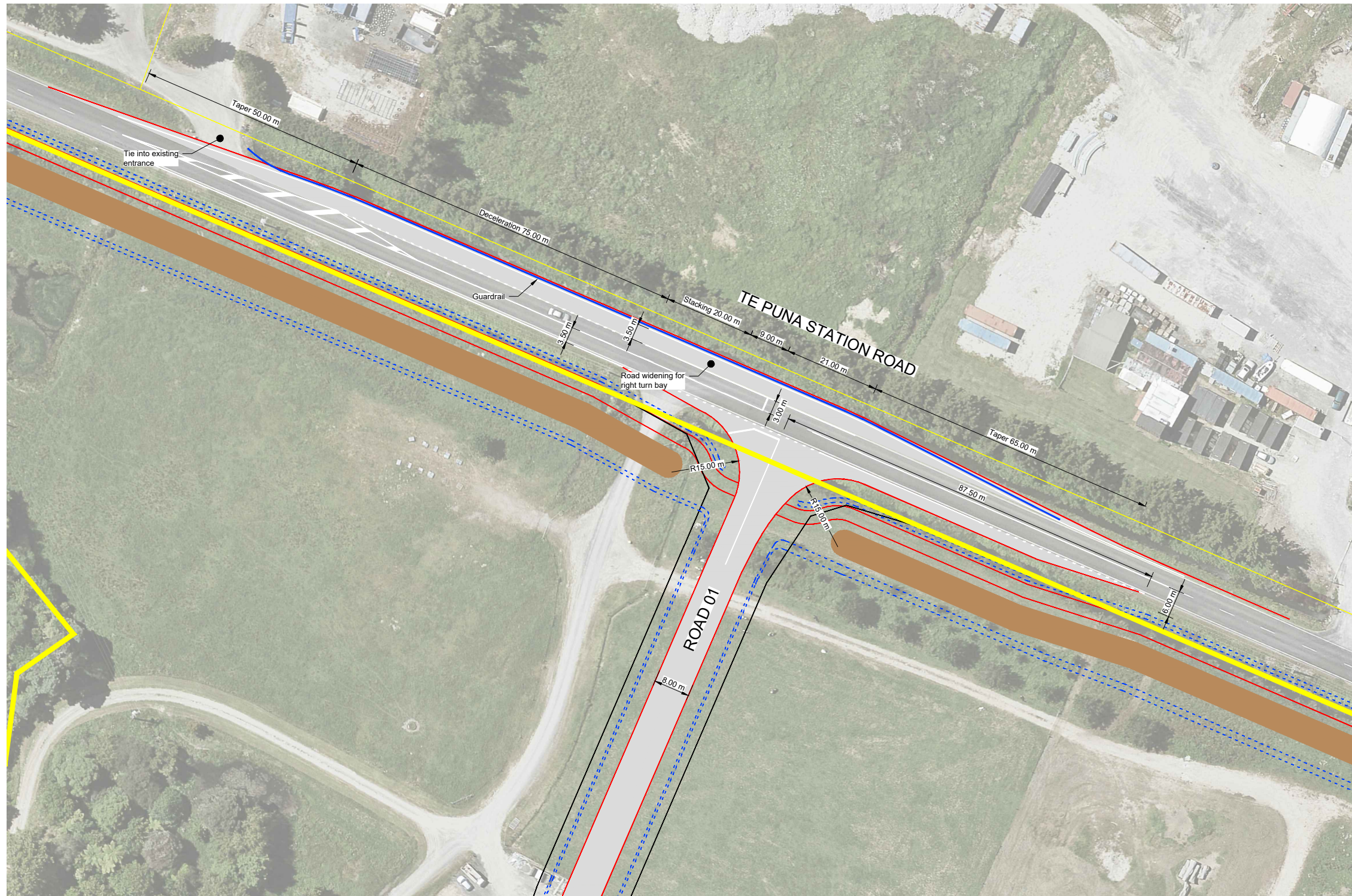
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SCALES	ORIGINAL SIZE
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DRAWN	APPROVED
BCD	CA
DRAWING VERIFIED	APPROVED DATE
JM	YYYY-MM-DD
<b>CLIENT APPROVAL</b>	

PROJECT	
CONTAINERCO TE PUNA STATION ROAD TAURANGA TE PUNA STATION ROAD CONTAINER PORT	
TITLE	
INTERSECTION LAYOUT AND VEHICLE TURNING PATHS PLAN	
WSP PROJECT NO.	PROJ-ORIG-VOL-LOC-TYPE
2-9Z729.01	C301
SHEET NO.	REVISION
C301	D



300 mm  
200  
100  
50  
0 10 mm



1:500 @ A1  
1:1000 @ A3

REVISION	AMENDMENT	APPROVED	DATE
A	Issued as draft for discussion	BCD	28/10/2022
B	Amendments to the intersection layout	BCD	14/11/2022



**wsp**  
Rotorua Office  
+64 7 343 1400  
PO Box 1245  
Rotorua 3040  
New Zealand

CIVIL

SCALES	ORIGINAL SIZE
1:500	A1
DRAWN	APPROVED
BCD	CA
DRAWING VERIFIED	APPROVED DATE
JM	YYYY-MM-DD

DRAFT

PROJECT	TITLE	WSP PROJECT NO.	PROJ-ORIG-VOL-LOC-TYPE	SHEET NO.	REVISION
CONTAINERCO TE PUNA STATION ROAD TAURANGA	INTERSECTION LAYOUT PLAN	2-9Z729.01		C302	B