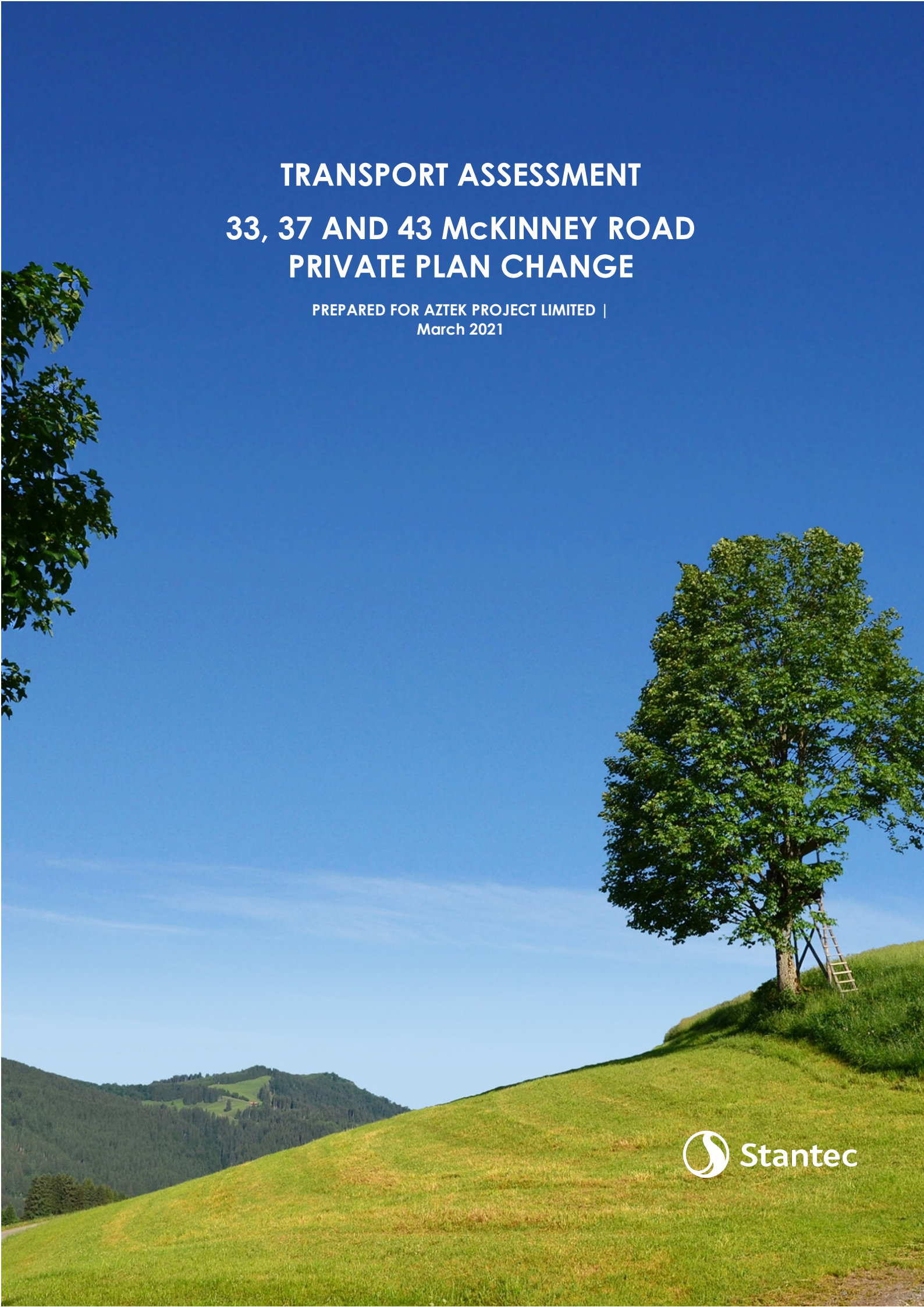
TRANSPORT ASSESSMENT

33, 37 AND 43 McKINNEY ROAD PRIVATE PLAN CHANGE

PREPARED FOR AZTEK PROJECT LIMITED |
March 2021



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1.0 INTRODUCTION

Aztek Projects Ltd are proposing a Private Plan Change (**PPC**) to rezone an area of around 7.5ha that is currently Future Urban Zone (FUZ). The site is located north of McKinney Road with its western boundary being around 140m from SH1.

Aztek Projects Ltd are seeking to rezone the FUZ area to Mixed Housing Suburban Zone. This report has been prepared on the basis of the rezoning of 33,37 and 43 McKinney Road (**the site**).

The proposed PPC will enable a higher density of residential development that will accommodate 150 dwellings (20 dwellings per hectare gross).

This Transport Assessment (**TA**) has been prepared by Stantec for Aztek Projects Ltd, to examine the traffic engineering and transportation planning related matters associated with the PPC.

The key transportation matters relevant to this proposal include:

- Existing and future transport context;
- An assessment on safety and suitability of the proposed site access arrangements from the existing road network;
- An assessment on traffic impacts of the development allowed by the PPC on the surrounding road network, including identification of any proposed mitigation measures; and
- Ability of the PPC to align with key national and regional transport policies;

The above points and other matters are discussed in detail within this report.

2.0 EXISTING TRANSPORT CONTEXT

2.1.1 Site Location

The site comprising around 7.5ha is located north of McKinney Road and to the southern boundary of Warkworth Town Centre.

Warkworth Town Centre is located around 2.5km north of the site. The proposed site in relation to the surrounding area is shown in **Figure 2-1**.

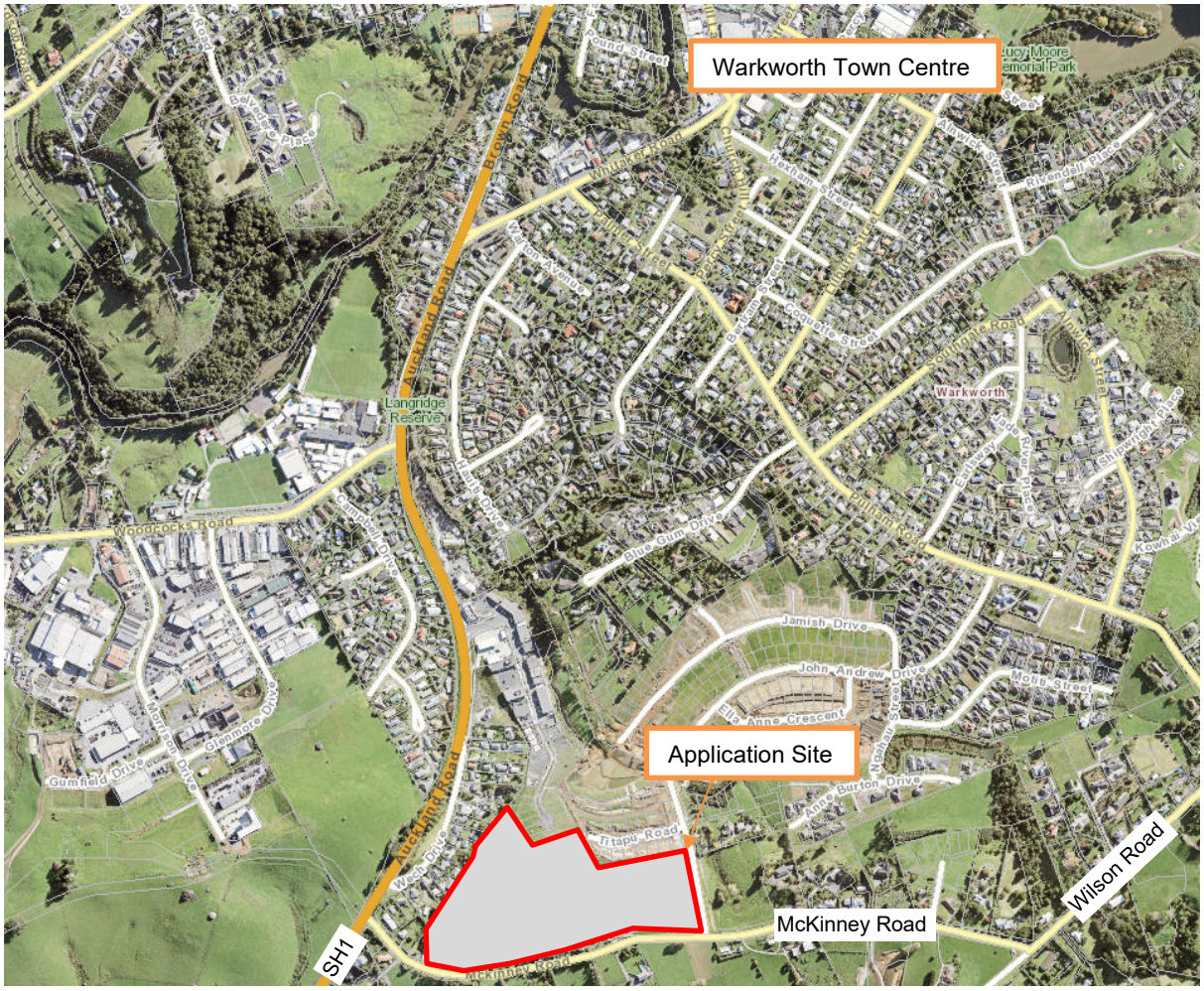

Figure 2-1: Site Location (site outlined in blue)

The site is currently zoned FUZ within the Auckland Unitary Plan Operative in Part updated 15 January 2021 (Unitary Plan) and is shown in **Figure 2-2**. The neighbouring sites are zoned Residential - Single House. Unitary Plan zoning in the vicinity of the site is also shown in **Figure 2-2**.

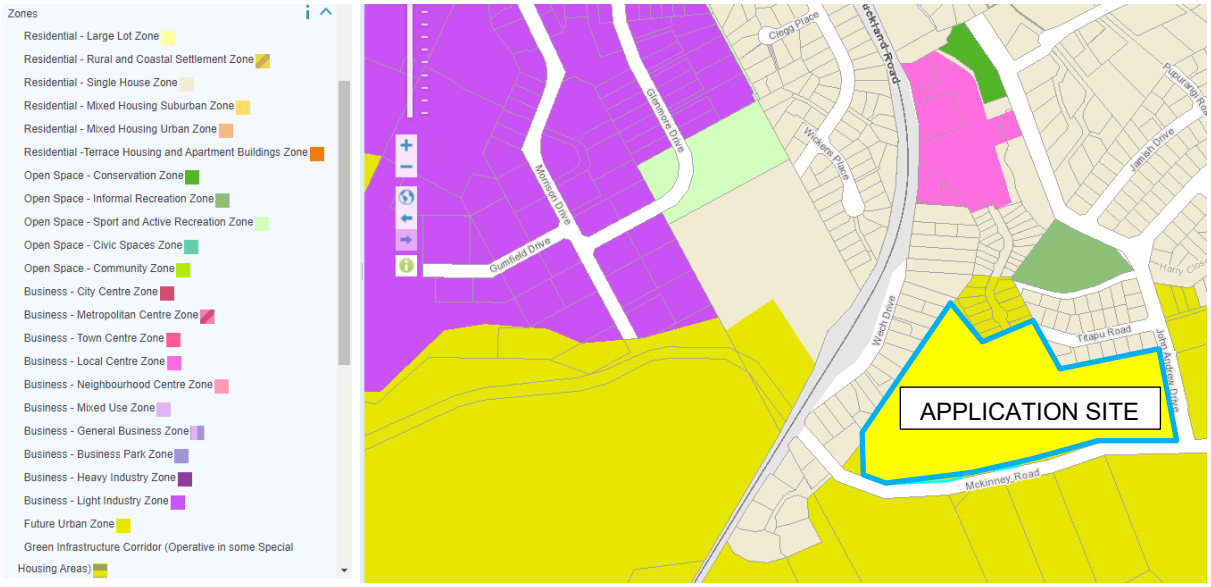

Figure 2-2: Unitary Plan Zoning

2.1.2 Existing Road Network

The site's only road frontage is McKinney Road along its southern boundary that connects with State Highway 1 (SH1) to the west and Wilson Road to the east. John Andrew Drive forms the eastern boundary of the site, whilst exiting residential development forms the northern boundary.

2.1.2.1 McKinney Road

Within the Unitary Plan, McKinney Road is unclassified. Based on its existing function within the road network it is considered that McKinney Road operates as a Collector road. A Collector Road is a moderate capacity road that serves to accommodate traffic between Local Roads to Arterial Roads. Collector Roads also act as local main roads, supplementing the primary network.

McKinney Road runs in a general west-east direction that intersects with State Highway 1 (**SH1**) and Wilson Road at its western and eastern ends respectively.

McKinney Road currently comprises a single lane carriageway in each direction with a 50 km/h posted. The carriageway is around 6m wide with unsealed shoulders. McKinney Road currently has no dedicated walking or cycling facilities.

The existing Mckinney Road configuration along the site frontage is shown in **Figure 2-3**.

Figure 2-3: Existing McKinney Road configuration along site boundary

2.1.2.2 State Highway 1 (SH1)

SH1 is classified as an Arterial Road in the Unitary Plan and is the main north to south spine road of Warkworth.

At its intersection with McKinney Road, SH1 is a two-way road with paved shoulders and painted double yellow centre line (no passing/overtaking line) in the vicinity of the intersection with McKinney Road. The carriageway is around 10.5m wide as measured 150m south of the SH1 / McKinney Road intersection.

SH1 is subject to a 60km/h posted speed limit immediately north and south of McKinney Road. The speed limit changes to 100km/h around 60m south of the SH1 / McKinney Road intersection. There are also no existing dedicated walking and cycling facilities on SH1 south of Wechs Drive. Although these is clear evidence of an existing pedestrian desire line between Wechs Drive and McKinney Road.

2.1.2.3 Wilson Road

Wilson Road is currently unclassified in the Unitary Plan, however, it can be classified as a Local road based on its function within the road network.

Wilson Road currently comprises a single lane carriageway in each direction with a 50 km/h posted. The carriageway is around 7m wide with unsealed shoulders. Wilson Road currently has no dedicated walking or cycling facilities.

2.1.2.4 John Andrew Drive

John Andrew Drive is unclassified in the Unitary Plan, however, can also be classified as a Local road based on its function within the road network. John Andrew Drive connects with McKinney Road around 230m east of the site providing access to the residential lots located north / east of the site.

John Andrew Drive comprises a single lane carriageway in each direction with a posted speed limit of 50km/h. The carriageway is around 5.5m wide with unsealed shoulders. John Andrew Drive currently has no dedicated walking or cycling facilities.

2.1.2.5 State Highway 1 / McKinney Road Intersection

The SH1 / McKinney Road intersection currently operates as a Stop-controlled priority T-intersection with SH1 as the major road. A right turn bay is provided on the SH1 southern approach, whilst McKinney Road westbound approach comprises a one lane approach with poor visibility towards the north for drivers exiting on to SH1. A view from McKinney Road off this intersection is shown in **Figure 2-4**.

Figure 2-4: State Highway 1 / McKinney Road Intersection

2.1.2.6 John Andrew Drive / McKinney Road Intersection

The John Andrew Drive / McKinney Road intersection operates under Give Way-control with McKinney Road as the major road. The northern John Andrew Drive approach comprises a one lane approach with a steep gradient at its intersection with McKinney Road.

2.1.2.7 Wilson Road / McKinney Road Intersection

The Wilson Road / McKinney Road intersection operates under Give Way-control with Wilson Road and Thomas Road to the south as the major road. The McKinney Road eastbound approach is around 30° off perpendicular and is a one lane approach. Sufficient visibility is provided in both directions.

2.1.3 Accessibility

2.1.3.1 Private Vehicles

Private vehicles primarily access the site from the wider Auckland Region via SH1 and McKinney Road. Journey times are around 5 minutes to travel to / from McKinney Road to Warkworth Town Centre during off-peak periods and can be around 10 minutes during the morning and afternoon/evening peak periods.

Auckland City is around 45 minutes (off-peak) to 1 hour 15 minutes (morning / afternoon / evening peak) drive from the site.

2.1.3.2 Public Transport

Bus route 995 provides a direct connection between Warkworth and Hibiscus Coast Station at Silverdale via SH1. There are currently no bus stops within walking distance from the site for this service. The closest bus stops are located on Whitaker Road around 1.3km north of the SH1 / McKinney Road intersection.

2.1.3.3 Walking and Cycling

Pedestrian / cycle journey time from Warkworth Town Centre to the site is around 30 minutes / 10 minutes via John Andrew Drive, Pulham Road and Percy Street. Currently, there no footpaths along McKinney Road and dedicated cycling infrastructure is not developed; therefore, cyclists have to share the carriageway with vehicles.

2.1.4 Future Transport Network

Auckland Council's strategic direction for growth in Auckland includes urbanisation of Future Urban zones (FUZ) in Warkworth. Supporting Growth Alliance (SGA) have identified a strategic transport network plan to support the planned growth including any future upgrades to the collector road network.

SGA's Integrated Transport Assessment (ITA) (Dated 2019) for Warkworth includes several future recommended upgrades in the vicinity of the site that include:

- McKinney Road (whole length) to urban standard with road cycle improvements – between 2028 – 2032; and
- Implementation of traffic signals at SH1 / McKinney Road intersection, including speed reduction to 50km/h in conjunction with the ongoing urbanisation by 2028. The layout of the traffic signal controlled intersection investigated in the SGA ITA is shown in **Figure 2-5**.

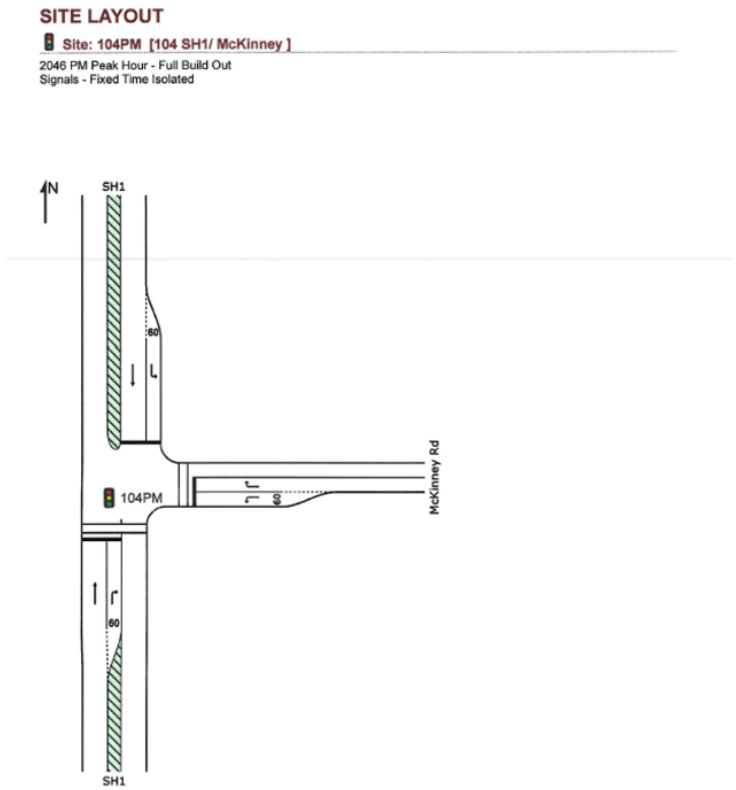

Figure 2-5: Initial Layout of the SGA Proposed SH1 / McKinney Road – Traffic signal controlled Intersection (Based on SIDRA analysis).

It is understood from SGA's ITA, the proposed network upgrades will be aligned with Stage 2 of the Warkworth land release as outlined in Auckland Council's Future Urban Land Supply Strategy (FULLS, July 2017). Stage 2 will be aligned with the land release in Warkworth South that is proposed development between 2028 to 2032.

A project of National Significance currently under construction in the wider area is Ara Tūhono – Pūhoi to Warkworth Road (P2Wk). Once complete P2WK will comprise a four-lane dual carriageway road connecting Pūhoi to Warkworth extending the existing four-lane Northern Motorway (SH1) from Johnstone's Hill tunnels to the north-west of Warkworth.

On completion the project provides a motorway standard route to the west of Warkworth that will separate regional through traffic and freight movements from local Warkworth movements by providing a bypass on the western side. Therefore, P2Wk is anticipated to remove a high volume of traffic from SH1 through Warkworth, thereby reducing pressure on the urban sections of SH1, including at the intersections.

The project is expected to be constructed by May 2022. The P2Wk Transportation and Traffic Assessment estimated that once operational half of existing SH1 traffic will divert to the new route . The assessment indicated that 2026 daily traffic volumes will be around 40% lower than they would have been without P2Wk.[1]

[1] NZ Transport Agency. Pūhoi to Warkworth Transportation and Traffic Assessment Report. August 2013.

3.0 TRAVEL PATTERNS

3.1 TRAFFIC VOLUMES

The latest traffic volumes available from Auckland Transport (**AT**) and Waka Kotahi are referred to in SGA's ITA for Warkworth[2]. Daily traffic volumes profile for SH1 to the south of McKinney Road is available in the Matakana Link Road Transport Assessment (Jacobs, 2018). The daily SH1 volumes south of McKinney Road are 23,800 vehicles per day in 2017, while average midweek and weekend peak hour volumes between 2014 and 2016 were 1,750 and 2,100 vehicles per hour respectively. The daily traffic volume on McKinney Road based on 2014 data are 1,000 vehicles per day.

The 2018 and 2026 (forecast) AM / PM peak SH1 volumes north of McKinney Road (by Wechs Drive) are available from Auckland Council's Macro Strategic Model (MSM). 2026 traffic volumes extracted from this model indicate substantial reductions from 2018 volumes, that can be attributed to the opening of P2Wk. The model also indicates that anticipated average annual traffic growth rate in the area is 5%. Existing and future traffic volumes based on the above data are shown in Table 3-1.

Table 3-1: Traffic Volumes for SH1 and McKinney Road

Road	Year	Traffic Volumes	Source
SH1 North of McKinney	2018	AM peak: 1,460 PM peak: 1,704	Auckland Council MSM
SH1 North of McKinney	2026	AM peak: 924 PM peak: 959	Auckland Council MSM

Traffic surveys have been undertaken on 10 February 2021 at the SH1 / McKinney Road intersection to determine existing volumes and intersection operation. The morning and evening peak hours are identified as being between 06:45 to 7:45am and 3:15 to 4:15pm respectively. A summary of the survey results are shown in **Figure 3-1**.

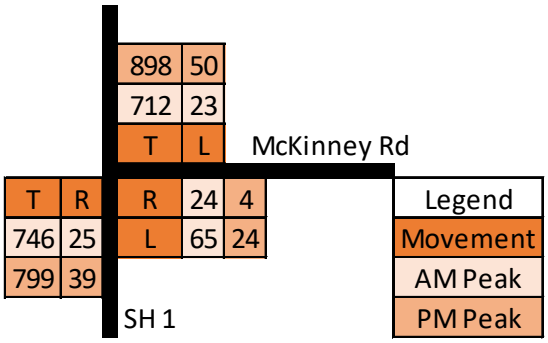

Figure 3-1: Traffic Volumes – AM and PM peak hour – 10/02/2021

In comparison to 2018 SH1 Traffic, the 2021 traffic surveys represent an average increase of around 3% during this three-year period, a 1% annual growth per year.

The 2021 traffic volumes represent total vehicle turning movements at the intersection including 11% heavy vehicles.

Existing traffic volumes in the vicinity of the site are considered typical for the rural environment adjacent to SH1, from a transportation perspective.

[2] Section 5.6 Table 1

3.2 ROAD SAFETY

A search of Waka Kotahi's Crash Analysis System has been completed to identify all reported crashes on McKinney Road between SH1 and John Andrew Drive, and a 50m radius from the SH1 / McKinney Road and John Andrew Drive / McKinney Road intersections. The crash search was undertaken for a full five-year period between 2016 to 2020 and all reported crashes in 2021.

Two crashes were reported in the defined study area all at the SH1 / McKinney Road intersection. These were rear end crashes, one resulting in a minor injury, whilst the other was a non-injury.

The minor injury crash was due to a driver failing to notice the vehicle in front slowing down when travelling along SH1 south, resulting in a collision with the car in front. The other crash involved a foreign driver unfamiliar with the roads and vehicle. The driver suddenly stopped at the SH1 travelling south leading to drivers in two cars behind not stopping in time, resulting in a three-vehicle collision.

The existing crash history does not indicate presence of any inherent safety issues with the road network. It is worth noting that there have been no crashes reported on McKinney Road or at its intersection with John Andrew Drive.

The proposed development trips are not anticipated to impact on general road safety of the site. Furthermore, the anticipated reduction in traffic along SH1 once the P2Wk motorway is operational (estimated to be completed by 2021) as well as the future speed limit reduction on SH1 are expected to further reduce the likelihood of accidents occurring.

4.0 PROPOSAL

The PPC proposes rezoning of around 7.5ha of rural land into a Mixed Housing Suburban Zone to accommodate a new subdivision comprising 150 dwellings. This represents an average dwelling density of around 20 dwellings per ha gross i.e. including roads, reserve, stream setbacks, stormwater pond etc..

A number of proposed internal roads will provide access to the new residential lots. It is proposed that a new collector road will provide a connection between McKinney Road and John Andrew Drive via Titapu Road. The PPC also proposed two secondary local road connections to the existing road network; one from the existing Fairwater Road connecting to the McKinney Road – Titapu Drive link and the other from John Andrew Drive also connecting to same link road.

The proposed concept roading network masterplan for the development is shown in **Figure 4-1.**

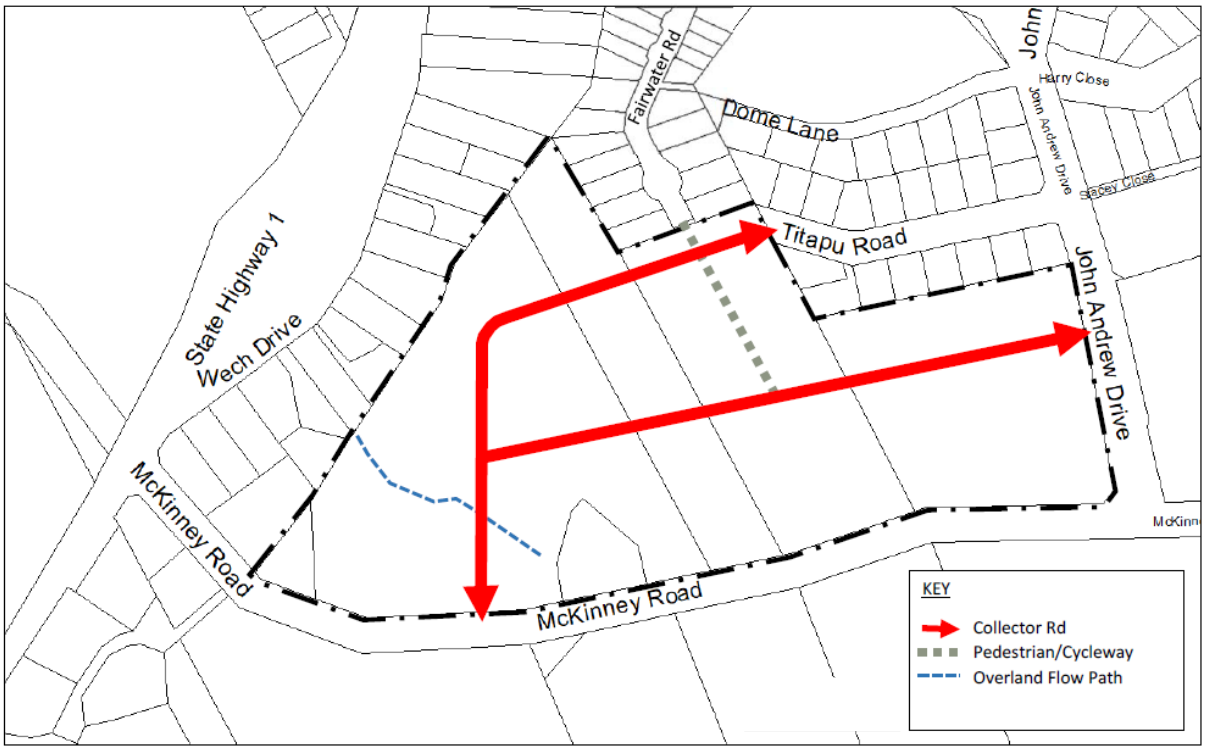

Figure 4-1: McKinney Road PPC Indicative Masterplan (Source: Flowpath Engineering Consultants)

All dwellings will have an internal garage and on street parking spaces available intermittently within the site. The proposed development access via the new road connecting with McKinney Road will be vested to Council.

The proposed residential dwellings will be constructed in stages, with a 2026 target date for completion. This is considered full development scenario for the basis of this report.

4.1 PROPOSED EXTERNAL CONNECTION

4.1.1 McKinney Road – Titapu Drive Connection (Proposed Neighbourhood Collector Road Link)

In association with the PPC, a new 'Give-Way' controlled intersection is proposed to link the development with the existing road network via McKinney Road.

The proposed McKinney Road connection will be around 265m east of SH1 and anticipated to operate as the main access to / from the development.

The proposed internal road will extend from McKinney Road through to Titapu Drive. This road will operate as a collector road and be designed for a 30 km//h operating speed.

The neighbourhood collector roads are proposed to incorporate:

- A two-way carriageway,
- Separated cycle facilities and pedestrian routes,
- Kerbing,
- On-street parking bays,
- Street lighting,
- Street trees,
- Stormwater treatment, and
- Sufficient space for services under the berm on both sides of the road.

4.1.2 Fairwater Road Connection

A pedestrian / cycle route will be connected to Fairwater Road providing direct access to the The Grange Shopping Centre.

4.1.3 John Andrew Drive Connection

An intersection is proposed to connect the development with the existing road network via John Andrew Drive. This intersection will be 'Give Way' controlled T-intersection on John Andrew Road.

The proposed John Andrew Road connection is around 130m north of McKinney Road and will operate as a secondary development vehicular access from the east and is expected to accommodate the minority of vehicular trips associated with the PPC.

All new roads will be designed in accordance with Auckland Transport Code of Practice and / or the Transport Design Manual. Visibility at the intersection of the new road and McKinney Road will also comply with the Austroads Safe Intersection Sight Distance requirements.

4.2 INTERNAL TRANSPORT NETWORK OPERATION (PROPOSED LOCAL STREETS)

The proposed development internal road network will be designed for a 30 km/h operating speed. This will be achieved through use of appropriate road cross section design and implementation of speed calming measures. A 30 km/h operating speed will provide a safe environment to accommodate all modes of travel including walking and cycling.

Implementation of narrow roads with planting in berms, chicanes and raised tables at some key intersections are proposed to be key elements to discourage rat-running through the development and support low speed environment.

The minor and local roads are proposed to accommodate:

- A two-way carriageway,
- On-street parking,
- Kerbing;
- Footpaths of 1.8m in width on both sides of the road,
- Street lighting,
- Street trees,
- Stormwater treatment, and
- Sufficient space for services under the berm on both sides of the road.

4.3 PEDESTRIAN AND CYCLISTS

Cycling and pedestrian access from the subject land will be provided on to Fairwater Road that will provide a connection for pedestrians and cyclist to the Grange commercial area by the existing easement.

4.4 EFFECT OF OTHER DEVELOPMENTS

At this stage there are no existing consented developments in the vicinity of the site, but it is understood that the potential for other developments in the area exists. To enable any future developments to be taken into consideration within the analysis a growth factor of 2% per annum has been applied to existing traffic volumes.

5.0 ASSESSMENT OF ROAD CONNECTION(S)

5.1 SIGHT DISTANCE REQUIREMENTS

Sight distances have been assessed based on the Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads Guide).

The Austroads Guide states that it is required to provide:

- Approach Sight Distance (ASD);
- Safe Intersection Sight Distance (SISD); and
- Minimum Gap Sight Distance (MGSD)

ASD is the minimum sight distance that must be available on minor road approaches to all intersections to ensure drivers are aware of the presence of an intersection. SISD is the distance required for drivers on major roads of an intersection, based on the operating speed of the road, and time taken to observe and react to vehicles turning in or out of the side road. MGSD is the distance corresponding to critical acceptance gap that drivers are prepared to accept when turning into or out of an intersection.

McKinney Road and John Andrew Drive have a 50km/h speed limit (60km/h design speed), whilst the proposed internal roads are expected to have an operating speed of 30km/h, that will be managed through narrow carriageway and speed reduction measures.

Sight distance requirements for McKinney Road based on the Austroads are summarised below:

- ASD – 73m;
- SISD – 123m; and
- MGSD – 83m

The proposed development site access arrangements have been checked and can accommodate the minimum visibility distances referred to above.

6.0 TRAFFIC EFFECTS

6.1.1 Development Trips

Development trip generation and distribution assessments have been calculated. The following sections outline the key data and parameters relevant in assessing the development trips and potential impact on the road network.

6.2 TRIP GENERATION

Development traffic peak hour trip rates of 0.9 trips per dwelling (based on the NZ Transport Agency Research Report 453 for "Dwelling (outer suburban)") for houses and apartments have been used to calculate trip generation. This is consistent with the NSW Road and Traffic Authority Guide trip rate for new residential subdivisions in an area where public transport may be limited. Generally, trip rates for apartments and town houses will be lower than houses. Therefore, the development trip generation assumption is considered to represent a robust assessment.

Based on 0.9 trips per dwelling, it is anticipated that development will generate around 135 (two way) vehicle movements during the afternoon and morning peak hours (vph).

6.3 TRIP DISTRIBUTION

The inbound and outbound traffic distributions of 20:80 during the AM peak hour, and 65:35 for the evening peak hour have been applied at the proposed McKinney Road access. These are assumed based on typical residential traffic distributions.

The proportion of traffic travelling to / from Warkworth town and the south is 70:30 respectively for another nearby residential area in Warkworth, based on the Auckland Council Macro Strategic Model (MSM).

This assessment assumes that access to / from the site will be predominantly via McKinney Road and SH1 intersection. In reality, there will be northbound traffic that may travel via John Andrew Drive. Therefore, the trip distribution assumption are considered to represent a robust assessment.

Development trip distributions at the two key intersections considered in the assessment have been estimated and summarised in **Table 6-1** and **Table 6-2** respectively.

Table 6-1: Trip distribution at the McKinney Road / New Road intersection

Peak	Direction	% Peak Hour Trip Generation	Traffic Volume (vph)
AM	Inbound (left-in to New Road)	20%	30
	Outbound (right-out to McKinney Road)	80%	120
PM	Inbound (left-in to New Road)	65%	98
	Outbound (right-out to McKinney Road)	35%	53

Table 6-2: Trip distribution at the SH1 / McKinney Road intersection

Peak	Direction	% Peak Hour Trip Generation	Traffic Volume (vph)
AM	Inbound (left-in to McKinney Road from SH1 North)	70% of inbound	21
	Inbound (right-in to McKinney Road from SH1 South)	30% of inbound	9
	Outbound (left-out to SH1 South from McKinney Road)	30% of outbound	36
	Outbound (right-out to SH1 North from McKinney Road)	70% of outbound	84
PM	Inbound (left-in to McKinney Road from SH1 North)	70% of inbound	68
	Inbound (right-in to McKinney Road from SH1 South)	30% of inbound	30
	Outbound (left-out to SH1 South from McKinney Road)	30% of outbound	16
	Outbound (right-out to SH1 North from McKinney Road)	70% of outbound	37

Whilst it is understood that the weekend peak period is also prominent in Warkworth area, generally weekend peak periods are considered to be less on McKinney Road.

It is understood the development will be fully constructed in 2026 when the P2Wk motorway will be operational. This leads to a reduction in traffic volumes on SH1. Furthermore, SGA indicate that the SH1 / McKinney Road intersection is proposed to be upgraded by 2028 to incorporate traffic signals.

Existing traffic volumes as illustrated earlier in **Figure 3-1** have been reduced to consider the benefit of the P2Wk motorway on the existing SH1 / McKinney Road intersection to represent the volumes on SH1 as per Table 3-1. This equates to around a 40% reduction of traffic volumes on the through traffic movements on SH1.

To be robust, 10% additional traffic volumes have been added to consider growth in the area that is not currently known or been considered. The 2026 traffic volumes associated with the SH1/ McKinney Road intersection with development traffic added is illustrated in **Figure 6-1**.

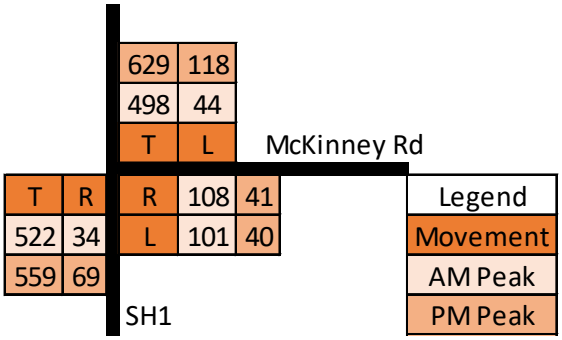

Figure 6-1: 2026 and Development Traffic Volumes – AM and PM peak hour

6.4 CAPACITY ANALYSIS

6.4.1 Traffic Impact

The results of the analyses undertaken demonstrates that overall additional traffic arising from the development during the peak hours will have minimal impact.

The total two way development trips (135 vph) is equivalent to around 8% of the 2026 forecasted SH1 traffic volumes at the intersection with McKinney Road. This equates to an average of less than two additional

vehicles per minute during the peak hour. Therefore, trips arising from the development, are not anticipated to lead to a material impact on the operation of the existing SH1 / McKinney Road intersection.

As discussed earlier, implementation of the P2Wk motorway will lead to a reduction in traffic volumes on SH1. Furthermore, SGA indicates that the SH1 / McKinney Road intersection will be upgraded by 2028 to incorporate traffic signals.

Modelling has been undertaken using SIDRA software to assess the impacts arising from the increase in trips travelling to / from the SH1 / McKinney Road intersection. SIDRA provides an industry standard tool for assessing the capacity and delay at give-way and traffic signal controlled intersections.

The morning and evening peak hours have been assumed to be 06:45 to 7:45am and 3:15 to 4:15pm respectively, based on the peak hours calculated from the traffic surveys.

The results of this model, comparing the existing base operation (2021) with future base operation (2026) and the additional development traffic added (2026) are summarised in **Table 6-4 to Table 6-5** below.

Table 6-3: SIDRA Modelling Results of the SH1 / McKinney Road Intersection – Existing Layout, Existing Scenario (2021)

Approach	Movement	AM Peak			PM Peak		
		Ave Delay (s)	LOS	Ave Q (m)	Ave Delay (s)	LOS	Ave Q (m)
SH1 (South)	Through	1.2	A	0.0	1.2	A	0.0
	Right	8.1	A	0.6	11	B	1.0
McKinney Road (East)	Left	14.4	B	2.2	19.3	C	1.0
	Right	16.1	C	2.2	22.4	C	1.0
SH1 (North)	Left	5.0	A	0.0	5.0	A	0
	Through	0.2	A	0.0	0.3	A	0

Table 6-4: SIDRA Modelling Results of the SH1 / McKinney Road Intersection – Existing Layout, Future Scenario (2026)

Approach	Movement	AM Peak			PM Peak		
		Ave Delay (s)	LOS	Ave Q (m)	Ave Delay (s)	LOS	Ave Q (m)
SH1 (South)	Through	1.1	A	0.0	1.1	A	0.0
	Right	5.4	A	0.4	6.3	A	0.6
McKinney Road (East)	Left	11.0	B	1.5	12.7	B	0.6
	Right	11.7	B	1.5	13.8	B	0.6
SH1 (North)	Left	4.9	A	0.0	4.9	A	0.0
	Through	0.1	A	0.0	0.2	A	0.0

Table 6-5: SIDRA Modelling Results Results of the SH1 / McKinney Road Intersection – Existing Layout, Future Scenario (2026) with the Development Traffic

Approach	Movement	AM Peak			PM Peak		
		Ave Delay (s)	LOS	Ave Q (m)	Ave Delay (s)	LOS	Ave Q (m)
SH1 (South)	Through	1.1	A	0.0	1.1	A	0.0
	Right	5.7	A	0.6	7.3	A	1.2
McKinney Road (East)	Left	12.2	B	4.8	13.1	B	1.9
	Right	13.4	B	4.8	15.6	C	1.9
SH1 (North)	Left	5.0	A	0.0	5.0	A	0.0
	Through	0.2	A	0.0	0.3	A	0.0

As can be seen from the above results, the operation of the intersection will continue to operate at an acceptable LOS with development traffic included in. The morning and afternoon peak hour results indicate that the intersection will continue to operate at acceptable LOS with development traffic included.

The maximum delays of 15.6 seconds are associated with vehicles turning right out of McKinney Road during the afternoon peak hour. This represents an increase in delay of around 2 seconds and not considered a material impact when compared to the existing.

The SIDRA outputs have been provided at **Appendix A**.

Overall, it is considered that the PPC will have a negligible impact on the capacity of the surrounding road network in the vicinity of the site.

7.0 MITIGATION MEASURES

7.1 SAFETY IMPROVEMENTS

7.1.1 Pedestrian and Cycling Infrastructure

Proposed pedestrian and cyclist infrastructure measures described in Section 4.3 are considered to be sufficient to provide a safe walking and cycling environment that connects in with existing infrastructure in the wider area.

7.1.2 Street Lighting

Street lighting will be provided as part of this development. An assessment of the adequacy of existing street lighting in the vicinity of the site as well as the appropriate level of lighting within the site will be undertaken during the engineering approval stage of development.

7.1.3 Public Transport

In considering the proposed PPC development, trips to / from Warkworth will still be dependent on private transport with this development not justifying an additional public transport services when considered alone.

Once residential development in the area extends beyond that enabled by the plan change it may be viable for Auckland Transport to expand the bus network and provide more frequent connections to the nearby urban centres, thus decreasing the dependency on private vehicle usage somewhat.

8.0 TRANSPORT PLANNING AND POLICY

The following sections provide a review of established policy and plans in relation to the proposed PPC development. The documents reviewed include:

- Future Urban Land Supply Strategy;
- Auckland Plan 2050 (updated in 2018);
- Government Policy Statement on Land Transport Funding 2018/19 – 2027/28;
- Auckland Regional Land Transport Plan 2018 – 2028;
- Auckland Regional Public Transport Plan 2018 – 2028;
- Auckland Unitary Plan Operative in part (Updated 20 December 2018); and
- Warkworth Structure Plan.

8.1 FUTURE URBAN LAND SUPPLY STRATEGY

The Future Urban Land Supply Strategy 2017 (FULSS) sets out a framework and schedule to sequence the urbanisation of Future Urban land across Auckland, over the next 30 years (2017-2047). The FULSS timeframe is split into three decades, and each decade into five year intervals, to distribute the live zoning of Future Urban land. The sequencing of live zoning was determined based on the following principles:

1. Optimise the outcomes from investment
2. Supply land on time
3. Support uplifting Māori social, environmental, economic and cultural wellbeing
4. Create good quality places
5. Work collaboratively in partnership

Key considerations in the FULSS for the sequencing of Warkworth specifically were:

> *"The Unitary Plan identifies 69 hectares of live zoned business land in the north of Warkworth which results in this being sequenced for 2017.*
>
> *A new wastewater treatment plan at Snells Beach, along with an associated new pipeline from Warkworth and upgraded outfall, is required to service development in the rest of Warkworth north. This work is currently being consented, and expected to be implemented over the next five to six years. The Ara Tuhona Puhoi to Warkwoth Road of National Significance is expected to be completed in 2021, and assocuiated upgrades to the local roading network align with the sequencing of Warkworth North.*
>
> *The later sequencing of Warkworth South provides for the efficient staging of wastewater infrastructure. Warkworth North East is sequenced later to enable connections to the town centre to be adequarely addressed."*

The FULSS has scheduled the rezoning of Warkworth South (including the subject land), to occur within the first half of 'Decade Two'- 2028 to 2032.

The proposed sequencing set out in the FULSS is in Figure 8-1 below (with Warkworth in the green border):

Proposed timing – Development ready (Large future urban areas)	Area^
Actuals, contracted or planned 2012 - 2017	Live Zoned Areas and Special Housing Areas Warkworth North Wainui East Whenuapai Scott Point Red Hills Kumeu Huapai Puhinui Hingaia Takanini (Walters Rd) Bellfield Rd (Opaheke) Drury South Bremner Rd (Drury West) Wesley (Paerata) Belmont (Pukekohe)
Decade One 1st half 2018 – 2022	Warkworth North* Silverdale - Dairy Flat (business) Whenuapai Stage 1 Drury West Stage 1* Paerata (remainder)
Decade One 2nd half 2023 - 2027	Pukekohe Cosgrave Rd (Takanini)
Decade Two 1st half 2028 - 2032	Warkworth South Whenuapai Stage 2 Red Hills North Kumeu Huapai Riverhead Puhinui (remainder) Opaheke Drury Drury West Stage 2
Decade Two 2nd half 2033 - 2037	Warkworth North East Wainui East (remainder) Silverdale Dairy Flat (remainder)
Decade Three 1st half 2038 – 2042	
Decade Three 2nd half 2043 - 2047	Takanini# Yet to be determined – new growth areas

Figure 8-1: FULSS Timing of Large Future Urban Areas

8.2 AUCKLAND PLAN

The Auckland Plan 2050 (the Plan) is a long-term spatial plan to ensure Auckland grows in a way that meets future opportunities and challenges. The plan outlines the issues facing Auckland and recommends the way that Aucklanders and others involved in the future of Auckland can best respond to them.

The Plan, adopted in June 2018, is a more streamlined spatial plan with a simple structure and clear links between outcomes, directions and measures. It shows how Auckland is expected to grow and change during the next 30 years.

In the Transport and Access section the document discusses the direction of future transport and seven focus areas.

Three identified directions are:

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

Focus areas for Auckland are as the following:

- **Focus Area 1** - Make better use of existing transport networks;
- **Focus Area 2** - Target new transport investment to the most significant challenges;
- **Focus Area 3** - Maximise the benefits from transport technology;
- **Focus Area 4** - Make walking, cycling and public transport preferred choices for many more Aucklanders;
- **Focus Area 5** - Better integrate land-use and transport;
- **Focus Area 6** - Move to a safe transport network, free from death and serious injury; and
- **Focus Area 7** - Develop a sustainable and resilient transport system.

Initially produced in 2012, the new plan was updated in June 2018. Since the release of the original plan, the AUP has been introduced and several significant infrastructure developments have been completed, including completion of Waterview Tunnel. The new draft Auckland Plan shows how Auckland will prepare for an expected population increase by 39% or up to 2.4 million people by 2034, and key challenges Auckland faces in dealing with this population growth. Other key challenges identified are sharing prosperity with all Aucklanders and reducing environmental degradation.

The Plan discusses how, when and where Auckland will grow, it overviews the development strategy to accommodate that growth and how Auckland's infrastructure has to keep pace with this growth scale.

8.3 GOVERNMENT POLICY STATEMENT ON LAND TRANSPORT FUNDING

The Government Policy Statement on Land Transport Funding 2018/19 – 2027/28 (GPS) outlines the Government's priorities for expenditure from the National Land Transport Fund for the next ten years. It sets out how funding is allocated between land transport infrastructure, activities and maintenance.

The main themes within the GPS are to have a mode-neutral approach to transport planning; incorporate technology and innovation; and integrate land use and transport planning.

The GPS sets out four strategic priorities to align with the GPS themes, as follows:

- **Safety** - A safe system free of death and serious injury;
- **Access** - Provides increased access to economic and social opportunities and enables transport choice and is resilient;
- **Value for Money** - Delivers the right infrastructure and services to the right level at the best cost; and
- **Environment** - Reduces the adverse effects on the climate, local environment and public health.

The GPS sets funding ranges for 12 activity classes. The funds for each class are:

- Public transport;
- Rapid transit;
- Walking and cycling improvements;
- Local road improvements;
- Regional improvements;
- State highway improvements;
- Road policing;
- Promotion of road safety and demand management;
- State highway maintenance;
- Local road maintenance;
- Investment management; and
- Transitional rail.

Rapid transit and Transitional rail are new activity classes compared to the previous document version. In the updated version of the GPS it is also mentioned that funding is divided into activity classes as a means of achieving the results specified. The new strategic direction will increase investment in safety, public transport, walking and cycling, and regional improvements. It will shift investment away from state highway improvements.

8.4 AUCKLAND REGIONAL LAND TRANSPORT PLAN

The Auckland Regional Land Transport Plan 2018 – 2028 (RLTP) sets out the region's land transport objectives, priorities and measures for the next ten years. It is prepared every six years in accordance with the Land Transport Management Act 2003 and includes a 10-year programme of activities to support the achievement of these objectives. It includes the land transport activities of AT, the NZTA, KiwiRail and other agencies.

Since the 2015 RLTP was prepared, Auckland's population growth has increased at a much faster pace than was envisaged. By 2028, the population of Auckland is expected to be around two million people – four years earlier than projected in 2015. Significant investment in transport infrastructure and services will be required to meet the increasing needs of these additional people both to service new housing required to match growth and to service many more customers. The Auckland Transport Alignment Project study provides a framework for this investment.

Similar to other documents RLTP examines the challenges that Auckland will face in the future and as one of the key challenges identifies the estimated population growth. It discusses road safety challenges and the impact road deaths and injuries have on economy. Other challenges such as Accessibility and Freight are also discussed. The document discusses how these challenges can be tackled and which direction the evolving transport network should take.

8.5 AUCKLAND REGIONAL PUBLIC TRANSPORT PLAN

The objectives outlined in Auckland Regional Public Transport Plan 2018 – 2028 (RPTP) are similar in nature and desired outcome to those discussed in RLTP.

The RPTP discusses the role and importance of Public Transport in Auckland. It describes current public transport, recent development and identifies future challenges.

The RPTP seeks to deliver an improved public transport network in Auckland by increasing public transport frequency along key transport corridors and simplifying ticketing to improve user experience.

The vision of the RPTP is to deliver *"An integrated, efficient and effective public transport network that offers a wider range of trips and valued by Aucklanders"*. To achieve this vision, Auckland's public transport system needs to deliver:

- Services that align with future land use patterns;
- Services that meet customer needs;

- Increased passenger numbers;
- Increased public transport mode share; and
- Improved value for money.

The RPTP also discusses the key directions and focus areas of the future public transport in Auckland. One of the focus areas is the Integrated Corridor Programme. As part of the RPTP, AT is also looking to apply some of the advantages of the Frequent Transport Network (FTN) through the Integrated Corridor Priority Programme. This Programme will seek to extend bus-priority for the full length of key FTN routes, improving average speed and reliability and reducing operating costs. Auckland has constrained arterial corridors and there will be trade-offs to be made around competing uses including general traffic lanes, cycle lanes, parking and median strips. AT will design and deliver whole-of-route bus priority on the FTN where:

- current and planned services experience inconsistent travel times due to congestion
- where travel-time savings and patronage levels justify the cost of delivery
- where capacity exists, or new services are planned that can leverage priority infrastructure to deliver patronage growth
- if reallocation of road space is required, where expected patronage gains are sufficient to ensure that bus priority implementation will increase overall people throughput along the corridor.

Another focus area is harnessing future technologies and one of these technologies that can impact the way transport operates in the future is Mobility-as-a-Service which is briefly discussed in RPTP.

8.6 AUCKLAND UNITARY PLAN

The AUP is a statutory rule book for planning in Auckland. It is based on the strategic direction set by the 2012 Auckland Plan and:

- outlines what can be built where;
- provides for a compact urban form; and
- describes how to maintain the rural and freshwater and marine environments.

The AUP indicates where Auckland's population, commercial and industrial growth can be accommodated.

The AUP, which has been operative in part since November 2016, has the following objectives with regard to the region's transport infrastructure:

- Land use and all modes of transport are integrated in a manner that enables:

The benefits of an integrated transport network to be realised; and

The adverse effects of traffic generation on the transport network to be managed;

- An integrated public transport, walking and cycling network is provided for;
- Parking and loading support urban growth and the quality compact urban form;
- The provision of safe and efficient parking, loading and access is commensurate with the character, scale and intensity of the zone;
- Pedestrian safety and amenity along public footpaths are priorities; and
- Road/rail crossings operate safely with neighbouring land use and development.

8.7 WARKWORTH STRUCTURE PLAN

The Warkworth Structure Plan (WSP) has been developed by Council and adopted in early 2019 to guide rezoning and supporting infrastructure networks for the Future Urban zoned land in Warkworth. The WSP provides for 7,500 dwellings, in general accordance with the figures set out in the FULSS, over a range of zones with varying densities and typographies. Under the WSP, Aztek and its adjoining land would be zoned Mixed Housing Suburban (proposed zoning map included in the Figure below).

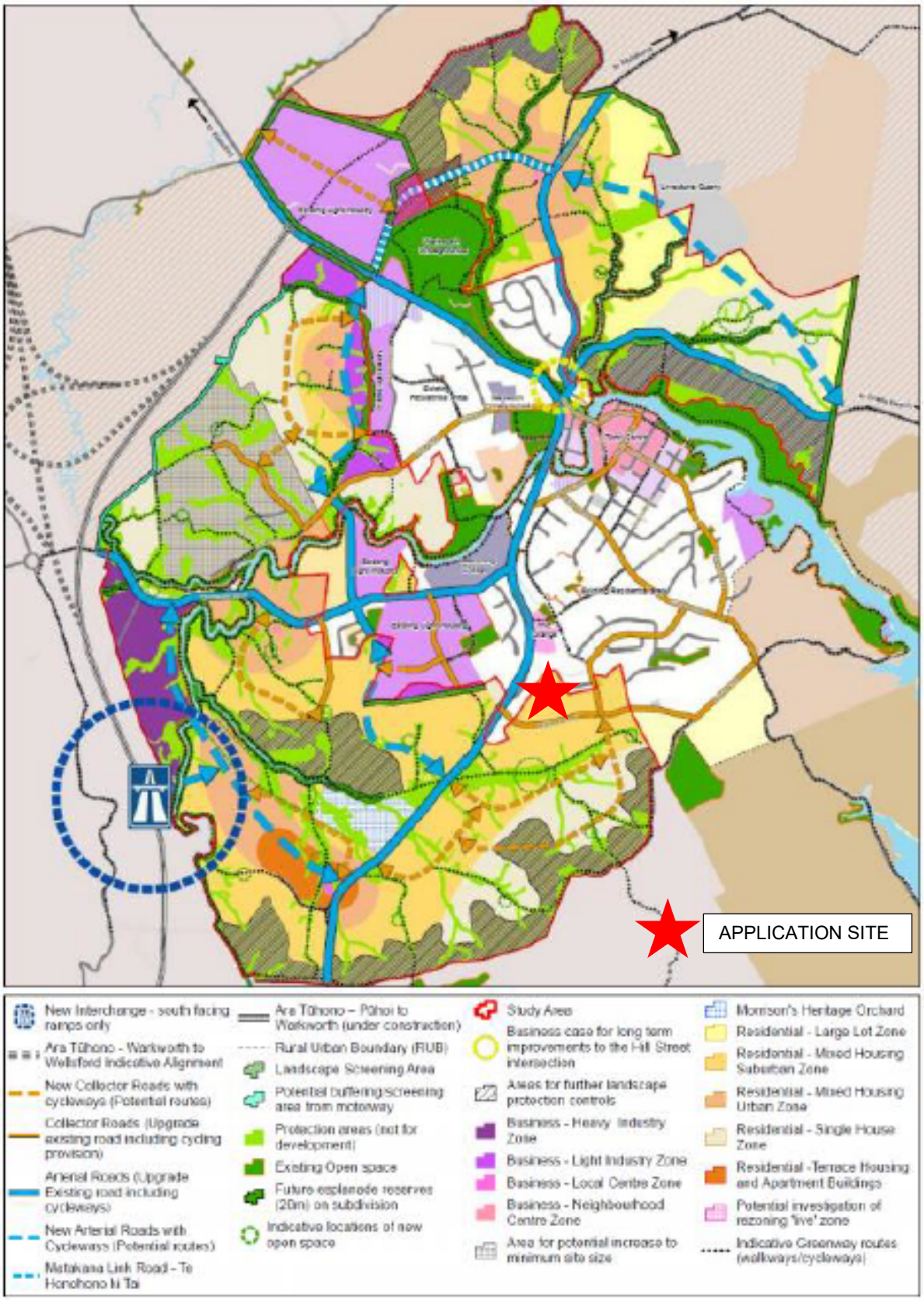

Figure 8-2: Warkworth Structure Plan

8.8 TRANSPORT PLANNING AND POLICY ASSESSMENT

After analysing the key policies and plans for Auckland it can be concluded that the proposed PPC at McKinney Road in Warkworth will not contradict the direction and vision of how Auckland should be developed. Overall, the plan change will provide opportunity for the PPC area to be better integrated into the wider transport network. It will offer improved internal connectivity and encourage active travel modes such as walking and cycling.

The inclusion of the land within the Mixed Housing Suburban Zone provides for better managed urban growth in Warkworth, as there is currently a shortage of land assigned as residential and an excess assigned as Future Urban.

The land in question is located close to the State Highway network for private vehicle accessibility for movement of residents / visitors to the site.

The Mixed Housing Suburban Zone enables intensification while retaining a suburban built character. The development is anticipated to be two storey detached and attached residential dwellings in a variety of types and sizes. Within Warkworth, the zone is applied to land which is relatively close to a centre or public transport route, with no significant natural or physical constraints.

Parking and loading will be provided in accordance with AUP requirements in order to support future activities within the site to a level appropriate for the proposed zoning.

The proposed PPC is considered to support a compact urban form by providing for development adjacent to an existing centre. According to the AUP, a quality compact urban form should enable all of the following:

- A higher-quality urban environment;
- Greater productivity and economic growth;
- Better use of existing infrastructure and efficient provision of new infrastructure;
- Improved and more effective public transport;
- Greater social and cultural vitality;
- Better maintenance of rural character and rural productivity; and
- Reduced adverse environmental effects.

It is considered that from a transport perspective, the proposed PPC assists in meeting these objectives.

Overall, the proposed inclusion of the land within the Mixed Housing Suburban at Warkworth and incorporation of the proposed roading network as set out in the structure plan for the site produces outcomes that are consistent with the relevant transport policy, strategy, principles and assessment criteria. The residential activities proposed within the subject land will generate a range of transport effects on the adjoining and surrounding road network that can be appropriately mitigated, so as to ensure that such effects are able to be accommodated.

The above assessments show that the PC is generally in alignment with the overarching themes and strategic priorities of the transport plans and policies discussed above.

9.0 CONCLUSION

Aztek Projects Ltd are seeking through their PPC to rezone 7.5ha rural land that is currently FUZ to a Mixed Housing Suburban Zone.

The development site is well located in terms of accessibility by private vehicles, due to its close proximity and connections with the State Highway road network, thereby providing connections to Warkworth, Whangarei in the north and wider Auckland region in the south.

The traffic impacts arising from future residential development at this location on the supporting road network will not require upgrades to accommodate any additional traffic demand.

The relevant transport policy, proposed assessment criteria and guidance for the rezoning request have been considered. The inclusion of this land within the Mixed Housing Suburban zone in Warkworth is supported by the existing transportation policy and meets the assessment criteria and guidelines provided by both Council / AT and Independent Hearings Panel.

The road layout developed within the Structure Plan for the land has been reviewed with additional input provided. It is considered that the proposed access network will increase the opportunity for a connected road network for Warkworth. The implementation of these road connections will enhance the transport opportunities for residents, visitors and deliver positive benefits for the wider population of Warkworth.

Accordingly, it is concluded that there is no traffic engineering or transportation planning reason to preclude acceptance of this proposal.

Stantec New Zealand

Appendices

Appendix A SIDRA OUTPUTS

MOVEMENT SUMMARY

Site: 101 [AM McKinney Rd/SH1 1 (Site Folder: 2021 Base with stage crossing)]

Network: N101 [AM Stage crossing (Network Folder: 2021 Base)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH1														
3	R2	26	20.0	26	20.0	0.048	8.1	LOS A	0.1	0.6	0.68	0.82	0.68	34.0
Approach		26	20.0	26	20.0	0.048	8.1	NA	0.1	0.6	0.68	0.82	0.68	34.0
East: McKinney Rd														
4	L2	68	4.6	68	4.6	0.210	14.4	LOS B	0.3	2.2	0.72	1.02	0.75	29.3
5	T1	25	0.0	25	0.0	0.210	16.1	LOS C	0.3	2.2	0.72	1.02	0.75	29.5
Approach		94	3.4	94	3.4	0.210	14.9	LOS B	0.3	2.2	0.72	1.02	0.75	29.4
North: SH1														
7	L2	24	26.1	24	26.1	0.431	5.0	LOS A	0.0	0.0	0.00	0.02	0.00	48.7
8	T1	749	12.4	749	12.4	0.431	0.2	LOS A	0.0	0.0	0.00	0.02	0.00	49.8
Approach		774	12.8	774	12.8	0.431	0.3	NA	0.0	0.0	0.00	0.02	0.00	49.8
All Vehicles		894	12.0	894	12.0	0.431	2.1	NA	0.3	2.2	0.10	0.15	0.10	47.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [AM McKinney Rd/SH1 2 (Site Folder: 2021 Base with stage crossing)]

Network: N101 [AM Stage crossing (Network Folder: 2021 Base)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH1														
2	T1	785	16.8	785	16.8	0.447	1.2	LOS A	0.0	0.0	0.00	0.17	0.00	68.7
Approach		785	16.8	785	16.8	0.447	1.2	NA	0.0	0.0	0.00	0.17	0.00	68.7
East: McKinney Rd														
6	R2	25	0.0	25	0.0	0.056	10.9	LOS B	0.1	0.5	0.66	1.00	0.66	38.6
Approach		25	0.0	25	0.0	0.056	10.9	LOS B	0.1	0.5	0.66	1.00	0.66	38.6
All Vehicles		811	16.2	811	16.2	0.447	1.5	NA	0.1	0.5	0.02	0.20	0.02	67.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [PM McKinney Rd/SH1 1 (Site Folder: 2021 Base with stage crossing)]

Network: N101 [PM Stage crossing (Network Folder: 2021 Base)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH1														
3	R2	41	2.6	41	2.6	0.101	11.0	LOS B	0.1	1.0	0.79	0.90	0.79	31.5
Approach		41	2.6	41	2.6	0.101	11.0	NA	0.1	1.0	0.79	0.90	0.79	31.5
East: McKinney Rd														
4	L2	25	8.3	25	8.3	0.106	19.3	LOS C	0.1	1.0	0.81	1.01	0.81	25.9
5	T1	4	0.0	4	0.0	0.106	22.4	LOS C	0.1	1.0	0.81	1.01	0.81	25.9
Approach		29	7.1	29	7.1	0.106	19.7	LOS C	0.1	1.0	0.81	1.01	0.81	25.9
North: SH1														
7	L2	53	10.0	53	10.0	0.552	5.0	LOS A	0.0	0.0	0.00	0.03	0.00	48.9
8	T1	945	11.8	945	11.8	0.552	0.3	LOS A	0.0	0.0	0.00	0.03	0.00	49.7
Approach		998	11.7	998	11.7	0.552	0.6	NA	0.0	0.0	0.00	0.03	0.00	49.6
All Vehicles		1068	11.2	1068	11.2	0.552	1.5	NA	0.1	1.0	0.05	0.09	0.05	48.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [PM McKinney Rd/SH1 2 (Site Folder: 2021 Base with stage crossing)]

Network: N101 [PM Stage crossing (Network Folder: 2021 Base)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH1														
2	T1	841	9.4	841	9.4	0.458	1.2	LOS A	0.0	0.0	0.00	0.18	0.00	68.7
Approach		841	9.4	841	9.4	0.458	1.2	NA	0.0	0.0	0.00	0.18	0.00	68.7
East: McKinney Rd														
6	R2	4	0.0	4	0.0	0.010	11.0	LOS B	0.0	0.1	0.67	0.93	0.67	38.5
Approach		4	0.0	4	0.0	0.010	11.0	LOS B	0.0	0.1	0.67	0.93	0.67	38.5
All Vehicles		845	9.3	845	9.3	0.458	1.2	NA	0.0	0.1	0.00	0.18	0.00	68.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: STANTEC NEW ZEALAND | Licence: NETWORK / Enterprise | Processed: Tuesday, 2 March 2021 4:55:34 p.m.
Project: \\NZ4105-PPFSS01\shared_projects\310203519\310203519 33, 37, 43 McKinney Road\4.0 Technical\4.9 Transportation\Reports\ita\sidra\anl_3519_mckr_210302_dft.sip9

MOVEMENT SUMMARY

Site: 101 [AM McKinney Rd/SH1 1 2026 Base (Site Folder: 2026 Base with stage crossing)] **Network: N101 [2026 AM Stage crossing (Network Folder: 2026 Base)]**

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH1														
3	R2	26	20.0	26	20.0	0.032	5.4	LOS A	0.1	0.4	0.56	0.67	0.56	37.4
Approach		26	20.0	26	20.0	0.032	5.4	NA	0.1	0.4	0.56	0.67	0.56	37.4
East: McKinney Rd														
4	L2	68	4.6	68	4.6	0.138	11.0	LOS B	0.2	1.5	0.56	0.99	0.56	32.4
5	T1	25	0.0	25	0.0	0.138	11.7	LOS B	0.2	1.5	0.56	0.99	0.56	32.9
Approach		94	3.4	94	3.4	0.138	11.2	LOS B	0.2	1.5	0.56	0.99	0.56	32.5
North: SH1														
7	L2	24	26.1	24	26.1	0.306	4.9	LOS A	0.0	0.0	0.00	0.03	0.00	48.8
8	T1	524	12.4	524	12.4	0.306	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	50.9
Approach		548	13.0	548	13.0	0.306	0.3	NA	0.0	0.0	0.00	0.03	0.00	50.8
All Vehicles		668	11.9	668	11.9	0.306	2.1	NA	0.2	1.5	0.10	0.19	0.10	48.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [AM McKinney Rd/SH1 2 2026 Base (Site Folder: 2026 Base with stage crossing)] **Network: N101 [2026 AM Stage crossing (Network Folder: 2026 Base)]**

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH1														
2	T1	549	16.8	549	16.8	0.312	1.1	LOS A	0.0	0.0	0.00	0.18	0.00	68.8
Approach		549	16.8	549	16.8	0.312	1.1	NA	0.0	0.0	0.00	0.18	0.00	68.8
East: McKinney Rd														
6	R2	25	0.0	25	0.0	0.037	8.0	LOS A	0.0	0.3	0.48	0.94	0.48	40.7
Approach		25	0.0	25	0.0	0.037	8.0	LOS A	0.0	0.3	0.48	0.94	0.48	40.7
All Vehicles		575	16.0	575	16.0	0.312	1.4	NA	0.0	0.3	0.02	0.21	0.02	67.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Organisation: STANTEC NEW ZEALAND | Licence: NETWORK / Enterprise | Processed: Tuesday, 2 March 2021 4:55:38 p.m.
Project: \\NZ4105-PPFSS01\shared_projects\310203519\310203519 33, 37, 43 McKinney Road\4.0 Technical\4.9 Transportation\Reports\ita\sidra\anl_3519_mckr_210302_dft.sip9

MOVEMENT SUMMARY

Site: 101 [PM McKinney Rd/SH1 1 2026 Base (Site Folder: 2026 Base with stage crossing)] **Network: N101 [2026 PM Stage crossing (Network Folder: 2026 Base)]**

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH1														
3	R2	41	2.6	41	2.6	0.056	6.3	LOS A	0.1	0.6	0.61	0.76	0.61	36.8
Approach		41	2.6	41	2.6	0.056	6.3	NA	0.1	0.6	0.61	0.76	0.61	36.8
East: McKinney Rd														
4	L2	25	8.3	25	8.3	0.055	12.7	LOS B	0.1	0.6	0.62	0.99	0.62	31.0
5	T1	4	0.0	4	0.0	0.055	13.8	LOS B	0.1	0.6	0.62	0.99	0.62	31.4
Approach		29	7.1	29	7.1	0.055	12.8	LOS B	0.1	0.6	0.62	0.99	0.62	31.1
North: SH1														
7	L2	53	10.0	53	10.0	0.396	4.9	LOS A	0.0	0.0	0.00	0.05	0.00	49.1
8	T1	662	11.8	662	11.8	0.396	0.2	LOS A	0.0	0.0	0.00	0.05	0.00	50.8
Approach		715	11.7	715	11.7	0.396	0.6	NA	0.0	0.0	0.00	0.05	0.00	50.7
All Vehicles		785	11.0	785	11.0	0.396	1.3	NA	0.1	0.6	0.06	0.12	0.06	49.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [PM McKinney Rd/SH1 2 2026 Base (Site Folder: 2026 Base with stage crossing)] **Network: N101 [2026 PM Stage crossing (Network Folder: 2026 Base)]**

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH1														
2	T1	588	9.4	588	9.4	0.320	1.1	LOS A	0.0	0.0	0.00	0.18	0.00	68.8
Approach		588	9.4	588	9.4	0.320	1.1	NA	0.0	0.0	0.00	0.18	0.00	68.8
East: McKinney Rd														
6	R2	4	0.0	4	0.0	0.006	8.0	LOS A	0.0	0.1	0.49	0.88	0.49	40.7
Approach		4	0.0	4	0.0	0.006	8.0	LOS A	0.0	0.1	0.49	0.88	0.49	40.7
All Vehicles		593	9.3	593	9.3	0.320	1.2	NA	0.0	0.1	0.00	0.18	0.00	68.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [AM McKinney Rd/SH1 1 2026 Base + Dev (Site Folder: 2026 Base + Dev with stage crossing)]

Network: N101 [2026 + Dev AM Stage crossing (Network Folder: 2026 Base + Dev)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH1														
3	R2	36	20.0	36	20.0	0.045	5.7	LOS A	0.1	0.6	0.57	0.70	0.57	37.1
Approach		36	20.0	36	20.0	0.045	5.7	NA	0.1	0.6	0.57	0.70	0.57	37.1
East: McKinney Rd														
4	L2	106	4.6	106	4.6	0.352	12.2	LOS B	0.7	4.8	0.62	1.08	0.79	30.9
5	T1	114	0.0	114	0.0	0.352	13.4	LOS B	0.7	4.8	0.62	1.08	0.79	31.2
Approach		220	2.2	220	2.2	0.352	12.8	LOS B	0.7	4.8	0.62	1.08	0.79	31.0
North: SH1														
7	L2	46	26.1	46	26.1	0.320	5.0	LOS A	0.0	0.0	0.00	0.06	0.00	48.9
8	T1	524	12.4	524	12.4	0.320	0.2	LOS A	0.0	0.0	0.00	0.06	0.00	51.0
Approach		571	13.5	571	13.5	0.320	0.6	NA	0.0	0.0	0.00	0.06	0.00	50.7
All Vehicles		826	10.8	826	10.8	0.352	4.1	NA	0.7	4.8	0.19	0.36	0.23	45.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [AM McKinney Rd/SH1 2 2026 Base + Dev (Site Folder: 2026 Base + Dev with stage crossing)]

Network: N101 [2026 + Dev AM Stage crossing (Network Folder: 2026 Base + Dev)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH1														
2	T1	549	16.8	549	16.8	0.312	1.1	LOS A	0.0	0.0	0.00	0.18	0.00	68.8
Approach		549	16.8	549	16.8	0.312	1.1	NA	0.0	0.0	0.00	0.18	0.00	68.8
East: McKinney Rd														
6	R2	114	0.0	114	0.0	0.166	8.3	LOS A	0.2	1.5	0.52	1.00	0.52	40.5
Approach		114	0.0	114	0.0	0.166	8.3	LOS A	0.2	1.5	0.52	1.00	0.52	40.5
All Vehicles		663	13.9	663	13.9	0.312	2.4	NA	0.2	1.5	0.09	0.32	0.09	64.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [PM McKinney Rd/SH1 1 2026 Base + Dev (Site Folder: 2026 Base + Dev with stage crossing)]

Network: N101 [2026 + Dev PM Stage crossing (Network Folder: 2026 Base + Dev)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH1														
3	R2	73	2.6	73	2.6	0.113	7.3	LOS A	0.2	1.2	0.67	0.84	0.67	35.5
Approach		73	2.6	73	2.6	0.113	7.3	NA	0.2	1.2	0.67	0.84	0.67	35.5
East: McKinney Rd														
4	L2	42	8.3	42	8.3	0.190	13.1	LOS B	0.3	1.9	0.69	1.02	0.69	29.7
5	T1	43	0.0	43	0.0	0.190	15.6	LOS C	0.3	1.9	0.69	1.02	0.69	30.0
Approach		85	4.1	85	4.1	0.190	14.4	LOS B	0.3	1.9	0.69	1.02	0.69	29.8
North: SH1														
7	L2	124	10.0	124	10.0	0.437	5.0	LOS A	0.0	0.0	0.00	0.11	0.00	49.3
8	T1	662	11.8	662	11.8	0.437	0.3	LOS A	0.0	0.0	0.00	0.11	0.00	50.7
Approach		786	11.5	786	11.5	0.437	1.0	NA	0.0	0.0	0.00	0.11	0.00	50.4
All Vehicles		944	10.2	944	10.2	0.437	2.7	NA	0.3	1.9	0.11	0.25	0.11	48.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [PM McKinney Rd/SH1 2 2026 Base + Dev (Site Folder: 2026 Base + Dev with stage crossing)]

Network: N101 [2026 + Dev PM Stage crossing (Network Folder: 2026 Base + Dev)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: SH1														
2	T1	588	9.4	588	9.4	0.320	1.1	LOS A	0.0	0.0	0.00	0.18	0.00	68.8
Approach		588	9.4	588	9.4	0.320	1.1	NA	0.0	0.0	0.00	0.18	0.00	68.8
East: McKinney Rd														
6	R2	43	0.0	43	0.0	0.065	8.2	LOS A	0.1	0.6	0.50	0.97	0.50	40.5
Approach		43	0.0	43	0.0	0.065	8.2	LOS A	0.1	0.6	0.50	0.97	0.50	40.5
All Vehicles		632	8.7	632	8.7	0.320	1.6	NA	0.1	0.6	0.03	0.23	0.03	67.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

CREATING COMMUNITIES

Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of belonging. That's why at Stantec, we always **design with community in mind**.

We care about the communities we serve—because they're our communities too. We're designers, engineers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

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