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Smales Farm TOD

Private Plan Change

Integrated Transportation Assessment

July 2018

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Integrated Transportation Assessment

Quality Assurance Statement

Prepared by:

Harry Shephard and Michael Hall

Project Transportation Engineers

Reviewed by:

Daryl Hughes

Auckland Transportation Leader

Approved for Issue by:

Brett Harries

Transport Sector Leader, Private Development

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PO Box 2592, Shortland Street, Auckland 1140
New Zealand

P: +64 9 531 5006

www.Stantec.com

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Executive Summary

This Integrated Transportation Assessment has been prepared by TDG, now Stantec, (Stantec) on behalf of Northcote Rd1 Holdings Limited in support of a Private Plan Change application for the Smales Farm site in Takapuna.

The site's Unitary Plan zoning has allowed Smales Farm to develop office activities, which are supported by smaller ancillary activities such as retail and cafes. The current rules allow the development of further office and supporting activities, and visitor accommodation and boarding houses.

The proposed Plan Change will enable the development of high-density residential activities within the site over the next 30 years, in addition to existing and planned office activities. This will allow the site to become both a trip generation origin and a destination, and will desirably provide for people to live, work and play at Smales Farm.

Smales Farm is ideally located with high levels of connectivity to a range of travel modes. The Smales Farm Bus Station, located immediately adjacent to the site, provides direct access to a range of rapid and high frequency bus routes, including the Northern Express. Future infrastructure schemes include further enhancements to bus services, the Northcote Safe Cycleway, the Skypath and Seapath projects; and the potential provision of a North Shore light rail service. This proximity to a range of transport modes, and rapid transit in particular, provides an ideal opportunity for Smales Farm to be uniquely developed as a Transit Oriented Development, a form of high-density development which capitalises on public transport availability and achieves the highest levels of land use-transportation integration.

Highly conservative traffic modelling has been undertaken for the future 2026 and 2036 scenarios, which have focused on determining how the travel demands of both the Smales Farm and North Shore Hospital sites can be accommodated in the future. Due to physical constraints of existing land uses, it is not feasible to continuously widen roads to provide additional capacity. This has therefore required considerations of how travel demand measures and sustainable travel modes associated with the Transit Oriented Development can work together to achieve a supportable and acceptable transport solution for the surrounding road network.

The proposed Plan Change at Smales Farm is highly supportive of mode shifts, primarily through its proximity to highly frequent public transport routes. The Auckland city centre has experienced similar mode shifts since 2001 due to limited available road capacity. The availability of public transport has resulted in significant increases in patronage for trips into the city centre, which could also occur at Smales Farm.

This Integrated Transport Assessment report concludes that the proposed Plan Change will enable a development form and scale for Smales Farm that appropriately responds to its location at the focal point of significant public transport and active transport connections. It will ultimately provide an exemplar for how Transit Oriented Developments can be successfully established to support growth in Auckland, in a manner that positively contributes to mutually supportive land use and transport infrastructure relationships.

1. Introduction

TDG, now Stantec has been commissioned by Northcote Rd1 Holdings Limited to undertake an Integrated Transportation Assessment for a proposed Private Plan Change application (**Plan Change**) relating to the Smales Farm Business Park site (**Smales Farm**). The site comprises the properties 68 – 76 Taharoto Road and 78 – 94 Taharoto Road in Takapuna, (**Site**), and has a total area of 10.8 hectares.

The site currently contains office activities, which are supported by a mix of smaller activities including retail, banking, cafes and tavern.

The Business Park zoning of the site and its location within the Smales 1 Precinct under the Auckland Unitary Plan – Operative in Part (**AUP-OIP**) currently enables the development of further office and supporting activities, but only enables one form of residential activity being visitor accommodation and boarding houses. It is intended that the Plan Change will enable provisions to develop high-density residential activity within the site. A staging schedule as part of the Plan Change has been created to indicate the possible timing of development on the site over the next 30 years.

The connectivity of the site to the external transport network through its proximity to State Highway 1 (**SH1**) and the Smales Farm Bus Station, together facilitate the development of a Transit Oriented Development (**TOD**). This form of development promotes mode shifts away from single occupancy private vehicles through the accessibility of various transport modes and provides safety and congestion benefits.

The transportation issues that are central to this Plan Change proposal include:

- The existing accessibility of the site to the various modes of transport;
- The ability of the surrounding road network, including the future environment, to safely and efficiently support the development potential of the site that will be enabled by the Plan Change; and
- The ability of the proposal to meet key national, regional and local policies relating to the site accessibility and sustainability.

This report also addresses the effects of the proposed development in the future 2026 and 2036 scenarios. These scenarios also include development within the adjacent North Shore Hospital, as well as other expected developments in the area.

All of the above matters will be addressed in detail in this report. By way of a summary however, it is found that this proposed Plan Change provides a unique opportunity to achieve a form of development that is able to maximise the benefits associated with the high accessibility of the site to multiple transport modes, all in a manner that achieves a level of land use – transportation integration that is currently unprecedented in Auckland.

2. Existing Environment

2.1 Site Location

The subject site comprises the properties 78 – 94 and 68 – 76 Taharoto Road, Takapuna. Located in the northwest of the Takapuna area, the site is adjacent to the Northern Motorway section of State Highway 1 (**SH1**). The site currently has access to the external road network via Taharoto Road, Shakespeare Road and Northcote Road. The Avenue and The Boulevard are private roads which provide internal connectivity within the existing Smales Farm site.

Figure 1 shows an aerial of the Smales Farm site, while **Figure 2** shows the site within the context of the wider road network.

Figure 1: Aerial Photograph of Site

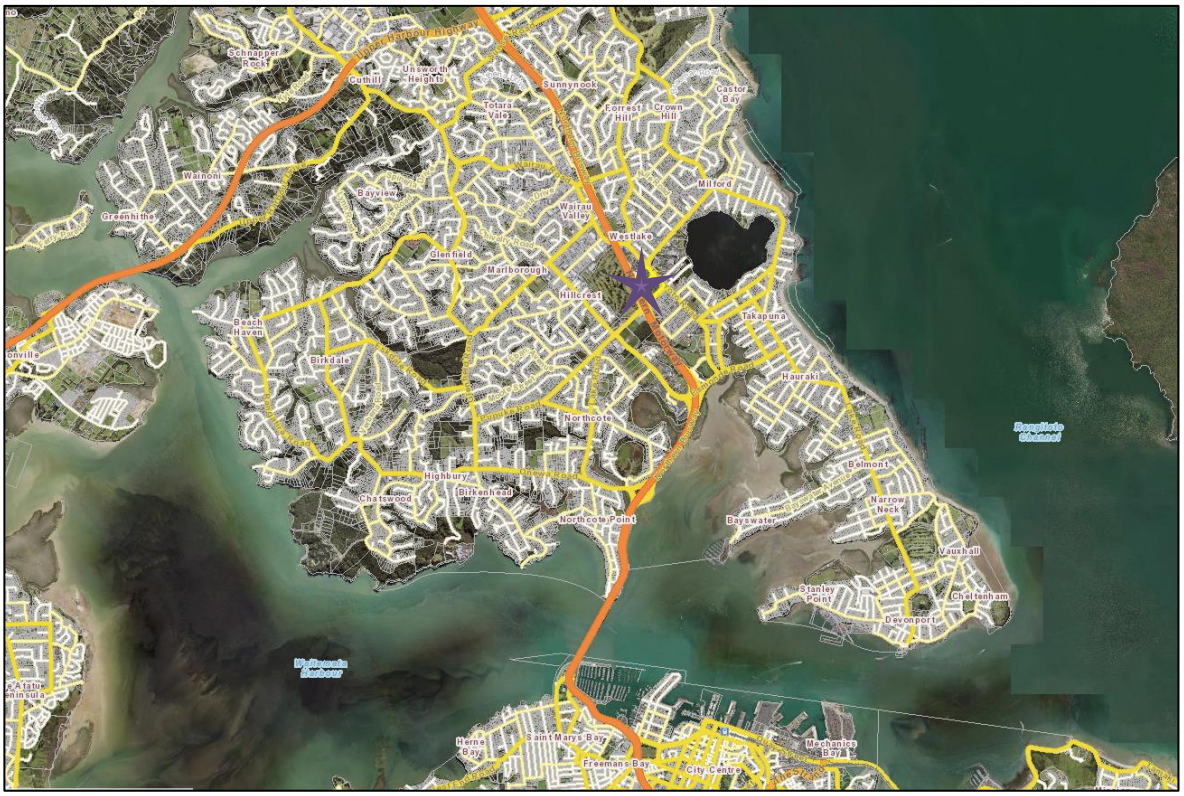


Figure 2: Site (Purple Star) in the Context of the Wider Road Network

A diverse range of activities are located within the vicinity of Smales Farm. The North Shore Hospital is located to the northeast of the site on the opposite side of Taharoto Road. Multiple schools are located within a 1km radius of the site, including Westlake Girls High School, Westlake Boys High School, Takapuna Normal Intermediate and Carmel College. Notably, Westlake Girls High School is located immediately northwest of the site and shares access from the southwest section of Shakespeare Road with the site and the Smales Farm Bus Station. Light industrial activity is located northwest of the site in Wairau Valley, while a host of retail activity can be accessed east of the site at the Shore City mall, Milford and Takapuna town centre. The A F Thomas Park is located on the opposite (western) side of SH1, which includes the Takapuna Golf Course. Residential activity is also located within the surrounding area. Accordingly, it is demonstrated that the site is well located to have convenient access to a wide mixture of activities.

2.2 Planning Context

The site is currently zoned as Business – Business Park Zone in the AUP-OIP. These zones are described as:

> *'a location where office-type business activities can group together in a park or campus like environment. The zone enables moderate to intensive office activity and some ancillary services such as gymnasiums, child care and food and beverage outlets.'*

Smales Farm currently contains multiple office complexes which support a range of office and small retail activities, which meet the zoning description as outlined in the AUP-OIP.

The site is also located within the Smales 1 Precinct under the AUP-OIP. The objective of this precinct, as outlined by the AUP-OIP, is to provide:

> *"Ongoing development of the Smales Farm Technology Office Park as an employment node is enabled while managing significant adverse effects on the safe and efficient operation of the transport network, on the amenity of neighbouring zones, and on the function and amenity of the Business – Metropolitan Centre Zone and Business – Town Centre Zone."*

The AUP-OIP describes the Smales 1 Precinct as:

> *"the precinct permits a maximum gross floor area for activities, a maximum number of car parking spaces, and provides for some accessory activities to address demand from those employed on the site and visitors to the precinct."*

The rules of the precinct allow for development of office activities up to 162,000 sqm before becoming a discretionary activity.

Business development over 105,000 sqm requires significant effects on the safe and efficient operation of the transport to be mitigated. Accessory activities such as commercial services, food and beverage retail, and care centres are limited to those which meet the needs of Smales Farm employees and are based on the gross floor area of office activity.

2.3 Road Network

As previously noted, the site has three primary road frontages: Taharoto Road, Shakespeare Road and Northcote Road. The Smales Farm site has frontage lengths of approximately 380m, 195m, and 325m to these roads respectively.

The key transport links of the Smales Farm site with the external road network are outlined below.

2.3.1 Taharoto Road

Taharoto Road is classified as an arterial road under the AUP-OIP. Located from Shakespeare Road to Fred Thomas Drive, Taharoto Road provides Takapuna with links to Wairau Valley and Forrest Hill in the north, and Devonport to the south. Access to SH1 from Taharoto Road is achieved via Northcote Road.

The Smales Farm site has direct access onto Taharoto Road through the signalised intersection with The Boulevard.

Along the Smales Farm site frontage, Taharoto Road accommodates a minimum of two northbound lanes and a minimum of three southbound lanes. The number of lanes increases up to five lanes on the approaches to its signalised intersections with Shakespeare Road, The Boulevard and Northcote Road, in both directions. The section of Taharoto Road from The Boulevard to Northcote Road is separated with a raised median. No-stopping lines are painted across the full length of Taharoto Road to prevent on-street parking.

The posted speed limit of Taharoto Road is 50km/h.

Cycle lanes with a typical width of 1.7m are provided within the carriageway for the northbound and southbound directions. Cycle boxes are also located on the approaches to all signalised intersections along Taharoto Road, which enables cyclists to stop in front of vehicles at the intersections during red signal phases.

Taharoto Road provides footpaths on both sides. Pedestrians are able to safely cross the road at the signalised intersections during pedestrian phases.

Bus stops are located on both sides of Taharoto Road outside the Smales Farm site frontage and the North Shore Hospital, which are connected to the footpath network, which enable pedestrians to connect to bus services travelling on this road.

2.3.2 Shakespeare Road

Shakespeare Road can be split into two distinct sections – west of Taharoto Road and east of Taharoto Road. The western section is classified as a non-arterial road under the AUP-OIP, while the eastern section is classified as an arterial road under the AUP-OIP.

The western section of Shakespeare Road provides access to Smales Farm, the Smales Farm Bus Station, and Westlake Girls High School. Shakespeare Road terminates at the southwest end of this section with a 'teardrop' shaped raised island, which provides access to the aforementioned sites, and permits U-turns back onto Taharoto Road. This section of Shakespeare Road has one to two lanes in each direction.

Smales Farm connects to the western section of Shakespeare Road through The Avenue, and a single entry-only lane 35m southwest of the Shakespeare Road / Taharoto Road intersection.

The eastern section of Shakespeare Road connects Taharoto Road to Kitchener Road to the north, and provides access for the North Shore Hospital, Carmel College and residential activities. The southbound lane of this section includes a bus only / T2 transit lane to provide priority to buses servicing this road.

Shakespeare Road has a posted speed limit of 50km/h.

Cycle lanes are located within the carriageway of the eastern section of Shakespeare Road from Taharoto Road to the North Shore Hospital access road.

2.3.3 State Highway 1

SH1 provides the central arterial roading spine for Auckland by way of the Southern and Northern Motorways which together extend from Bombay Hills in the south to Puhoi in the north.

Within the vicinity of the site, SH1 (Northern Motorway) typically provides three lanes in each direction, which increases by the presence of on-ramps and off-ramps. The two directions of SH1 are separated by median barriers.

Smales Farm connects to SH1 via Northcote Road, and the Northcote Road Interchange which is located at the site's south-eastern boundary. The Northcote Road interchange is a standard full diamond interchange with signalised ramp intersections on either side of the interchange.

As with all other interchanges in Auckland, ramp signals operate on the on-ramps during periods of high mainline flows in order to control the rate of entries into the mainline. In the weekday morning peaks in particular, the ramp signals generate queues that extend back along Northcote Road, including across the subject site frontage.

SH1 has a posted speed limit of 100km/h for both directions.

2.3.4 Northcote Road

Northcote Road (west of Taharoto Road) is classified by the AUP-OIP as an arterial road

Northcote Road accommodates at least two traffic lanes in each direction. Across its full length, it has each direction separated with either a raised or flush median. On-street parking is prohibited with the presence of no-stopping lines.

As outlined previously, Northcote Road has on-ramps and off-ramps onto SH1, which are controlled with ramp metering. In order to ensure that traffic entering the Northern Motorway from the on-ramp can be best accommodated without creating bottleneck congestion, the ramp signals manage the rate of flow onto the on-ramp . During morning peak times in particular, this typically results in queueing extending back from the SH1 on-ramps onto the adjoining road network.

Smales Farm connects to Northcote Road on its southeastern frontage via a signalised intersection with The Avenue. Right turn entry movements into The Avenue are not permitted, which means that vehicles can only enter The Avenue via the left-in slip lane. Vehicles are able to exit in both directions. However, right turns out from Smales Farm onto Northcote Road can be difficult during peak periods due to the queueing extending back from the SH1 on-ramp. The presence of a clear zone at this intersection restricts the queueing capacity, and therefore the ability of right turning exiting vehicles to join the queue. As a consequence of this constraint, right turns from The Avenue are not permitted during weekday morning peak periods between 06:00 and 09:00.

The posted speed limit of Northcote Road is 50km/h.

A cycle lane is located within the carriageway for the eastbound direction from The Avenue to Taharoto Road. This connects to the other cycle lanes on Taharoto Road. Footpaths are located on both side of Northcote Road, and pedestrians are provided crossing opportunities at the signalised intersections with The Avenue and Taharoto Road.

2.3.5 The Avenue and The Boulevard

The Avenue and The Boulevard both provide internal connectivity for the site and are privately operated by Smales Farm. These internal local roads currently provide direct access to the parking spaces and business complexes within the site.

The Avenue runs from Shakespeare Road at its northern end to Northcote Road at its southern end. The Boulevard connects Taharoto Road to The Avenue. The two roads intersect at a roundabout controlled intersection.

The Avenue and The Boulevard typically provide one lane in each direction. The carriageway of The Avenue is divided with a raised median across the majority of its length. Angled on-street parking is provided along sections of both roads.

The speed limits of these internal roads are 30km/h.

Pedestrians are provided regular and safe opportunities to cross The Avenue and The Boulevard with dedicated pedestrian crossings frequently provided.

2.4 Traffic Volumes

Tube count surveys of the five arterial roads providing access to the Smales Farm site were commissioned by TDG for the full week 22 – 28 November 2017. The locations of the five tube counters are shown in **Figure 3**.

The results of the tube count surveys are summarised in **Table 1**. The average daily traffic for both directions at each site is presented in vehicles per day (**vpd**) for the average weekday and over the average of a full week. The table also summarises the weekday peak hour volumes for each road in vehicles per hour (**vph**), and the time (being the beginning of the peak hour) in which they occurred.

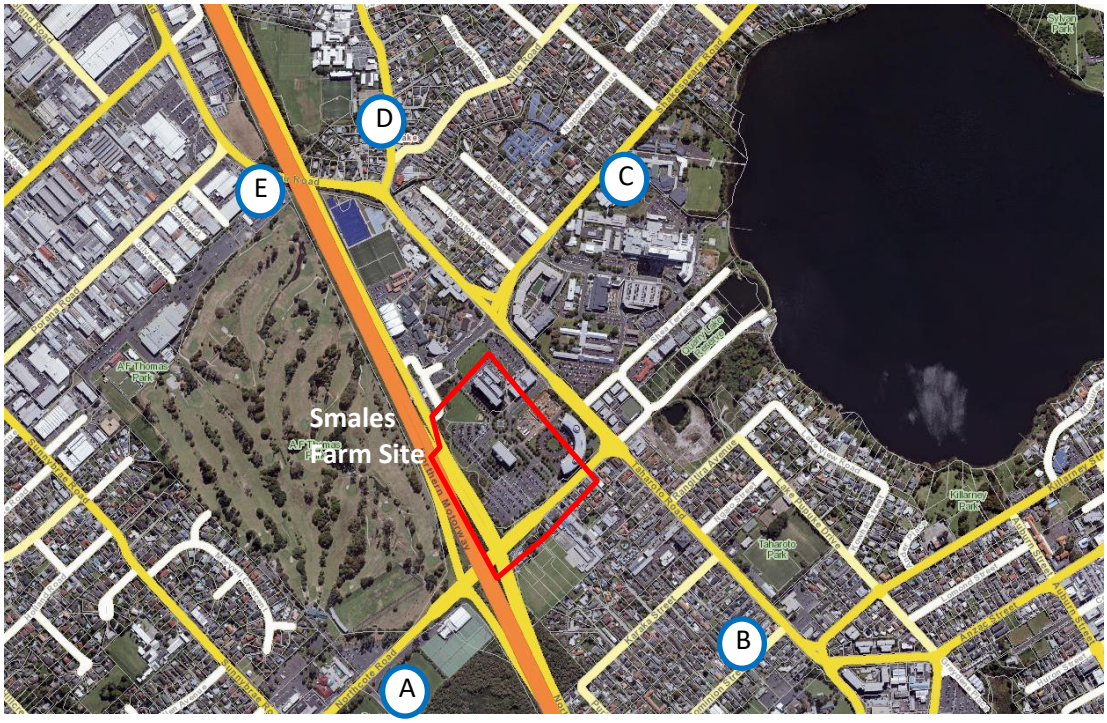


Figure 3: Tube Count Survey Locations, 22 – 28 November 2017

Road	Figure 3 Legend	Direction	Average Daily Traffic (vpd)		Weekday Peak Hour Traffic (vph)	
			Weekday	Full Week	AM	PM
Northcote Road (Akaronga Dr to SH1 On-Ramp)	A	Northbound	15,559	15,128	1,234 [7:45]	993 [16:45]
		Southbound	14,038	13,525	805 [8:15]	1,367 [16:15]
		Total	29,597	28,653	2,000 [8:00]	2,301 [16:30]
Taharoto Road (Dominion St to Karaka Rd)	B	Northbound	12,969	12,192	852 [8:00]	1,098 [16:30]
		Southbound	13,970	13,130	1,169 [8:00]	1,165 [16:30]
		Total	26,939	25,322	2,020 [8:00]	2,264 [16:30]
Shakespeare Road (Alma Rd to Waterloo Rd)	C	Northbound	8,224	7,698	935 [7:30]	594 [14:45]
		Southbound	7,098	6,726	415 [8:30]	681 [16:30]
		Total	15,322	14,424	1,268 [7:45]	1,175 [14:45]
Forest Hill Road (Nile Rd to Currey Cres)	D	Northbound	5,727	5,105	739 [7:15]	389 [16:30]
		Southbound	4,962	4,500	386 [8:00]	673 [16:45]
		Total	10,689	9,605	1,091 [8:00]	1,057 [16:45]
Wairau Road (Porana Rd to SH1 Overbridge)	E	Northbound	11,046	10,190	825 [8:15]	1,084 [16:30]
		Southbound	11,687	10,867	899 [7:00]	1,004 [16:30]
		Total	22,733	21,057	1,549 [7:15]	2,088 [16:30]

Table 1: Tube Count Traffic Volumes, 22 – 28 November 2017

The traffic data shows that Northcote Road, Taharoto Road and Wairau Road all carry high volumes of traffic over a full day and during the peak hours, which is enabled with the provision of at least two lanes in each direction for these three roads. While Wairau Road and Shakespeare Road carry lower volumes than the other roads, they still have relatively high traffic volumes for a road configuration of one lane in each direction at the tube count location.

The peak hour for these roads most commonly occurs in the hours beginning at approximately 8:00am for the morning period and 4:30pm for the afternoon period, which predominantly aligns with daily commuting patterns.

The proximity of schools within the local area such as Westlake Girls High School, Westlake Boys High School and Carmel College influences the timing of the peak hours due to pick-up and drop-off trips for students. This is demonstrated by the offset peak times on Shakespeare Road in the afternoon.

Count data from the NZTA database was obtained for the section of SH1 within the Northcote interchange and for the south-facing ramps between 22 and 28 November 2017. This time period was selected to match the times when tube data was collected for the surrounding roads. Direct count data was not available for the north-facing ramps. **Table 2** summarises the daily and peak hour traffic volumes for the motorway and the associated ramps.

Road	Direction	Average Daily Traffic (vpd)		Weekday Peak Hour Traffic (vph)	
		Weekday	Full Week	AM	PM
SH1 Mainline	Northbound	60,956	58,547	3,088 [9:00]	5,107 [15:15]
	Southbound	54,143	52,872	4,691 [6:15]	3,206 [15:15]
South Facing Ramps	On-Ramp Southbound	11,040	10,434	1,040 [7:00]	667 [16:45]
	Off-Ramp Northbound	8,748	8,173	717 [7:15]	736 [17:00]

Table 2: Tube Count Traffic Volumes, 22 – 28 November 2017

The data demonstrates that the Northern Motorway carries very high traffic volumes over the full day and during the peak hours. Three traffic lanes are provided in both directions with the off-ramp being an exit only lane where the northbound mainline reduces from four down to three lanes.

During the peak hours, the motorway becomes heavily congested which limits throughput. Therefore, the highest observed volumes occur on the shoulders of the peak when congestion is not as severe. The ramp metering also restricts throughput more during the peakiest times. It is also noted that in the evening peak, the Harbour Bridge has only three southbound lanes, which creates congestion that extends back to the Northcote Interchange and affects the traffic throughput volumes.

2.5 Road Safety

A search of NZTA's Crash Analysis System was undertaken for the five-year period from 2013 to 2017, as well as all available crash records as at May 2018. The study area was divided into multiple zones to review all major intersections where the Smales Farm site connects to the surrounding road network.

The zones are outlined below and include the following road segments and their connecting intersections:

- Zone 1: 50m radius of The Avenue / Northcote Road intersection;
- Zone 2: 50m radius of Taharoto Road / The Boulevard intersection;
- Zone 3: 50m radius of Shakespeare Road / Taharoto Road intersection;
- Zone 4: 50m radius of Shakespeare Road / The Avenue intersection;
- Zone 5: Shakespeare Road between Taharoto Road and The Avenue (exclusive of Zone 4); and
- Zone 6: All crashes on the internal roads within Smales Farm including The Avenue and The Boulevard (exclusive of Zones 1 – 5).

A total of 94 crashes were recorded for this period with 14% (13 crashes) resulting in injury.

The crashes which resulted in an injury are summarised in **Table 3** below.

Search Zone	Number of Crashes by Injury Severity				
	Fatal	Serious	Minor	Non-Injury	Total
1: The Avenue / Northcote Road Intersection	0	0	6	14	20
2: Taharoto Road / The Boulevard Intersection	0	0	3	2	5
3: Shakespeare Road / Taharoto Road Intersection	0	2	1	17	20
4: Shakespeare Road / The Avenue Intersection	0	0	0	1	1
5: Shakespeare Road – Taharoto Road to the Avenue	0	0	0	0	0
6: Smales Farm Internal Roads	0	0	1	0	1
Total	0	2	11	34	47

Table 3: Crash History by Local Search Zone, 2013 – 2018

More detailed descriptions of the crashes within each zone are outlined below.

2.5.1 Intersection between The Avenue and Northcote Road

Six injury crashes occurred within the search area, all of which were minor injury crashes. All six crashes involved an eastbound vehicle failing to stop at a red traffic light signal at the intersection between The Avenue and Northcote Road, causing a collision with a vehicle turning right out from The Avenue into Northcote Road. All of these crashes occurred before July 2017.

Between June and November 2017, painted yellow hatched road markings were placed at the intersection by Auckland Transport to improve the safety record at this intersection. As well as trying to prevent blocking of the intersection, these markings aim to prevent the number of drivers travelling through red lights by making them more aware of the presence of the intersection.

As it is likely that that these markings were installed after the most recently reported crash, further monitoring by Auckland Transport should be required before determining whether the markings have been effective in preventing these types of crashes.

2.5.2 Taharoto Road / The Boulevard Intersection

Three injury crashes occurred at this intersection, all of which are minor injury crashes. Summaries of these crashes are as follows:

- Vehicle 1 travelling on Taharoto Road hit the rear of vehicle 2 due to the vehicle 1 driver mistaking the accelerator for the brake.
- Driver of vehicle 1 lost control while turning from The Boulevard into Taharoto Road, causing a swerve into the adjacent lane and a subsequent collision with another vehicle.
- A driver unfamiliar with the vehicle being driven accelerated into a parked vehicle.

There does not appear to be any obvious or recurring crash patterns or inherent road safety defects at this intersection.

2.5.3 Shakespeare Road / Taharoto Road Intersection

Three injury crashes occurred at this intersection, two of which were serious crashes, and the remaining one being a minor injury crash. These crashes are summarised as follows:

- Driver of vehicle was evading enforcement and was chased by police at the time of collision. Driver drove onto incorrect side of Shakespeare Road and lost control, resulting in collision with traffic light pole.
- Driver of vehicle 1 failed to stop at a red traffic light signal, causing collision with vehicle 2.
- Driver of vehicle 1 failed to stop at a red traffic light signal, causing collision with vehicle 2. Alcohol test was either refused by the driver, or he / she tested above limit.

There does not appear to be any obvious or recurring crash patterns for this intersection.

2.5.4 Shakespeare Road / The Avenue Intersection

No injury crashes were recorded within the area for the selected five-year period.

2.5.5 Shakespeare Road

No crashes were recorded within the area for the selected five-year period.

2.5.6 Internal Roads in Smales Farm

One minor injury crash occurred at this intersection. The crash was caused by a vehicle exiting the roundabout between The Avenue and The Boulevard and then colliding with a cyclist crossing the pedestrian crossing.

2.5.7 Road Safety Summary

Overall a mixture of crash types has occurred which are considered typical of the site's road environment. One safety issue was identified where eastbound vehicles on Northcote Road were travelling through red lights at the intersection with The Avenue and colliding with right turning vehicles from The Avenue, which resulted in six minor injury crashes over the past five years. However, this issue appears to have been addressed by Auckland Transport with the installation of yellow hatched markings at the intersection. It is recommended that the crash history is monitored by Auckland Transport in the future to determine the effectiveness of the markings.

Otherwise, there do not appear to be any significant safety issues for the search area. The overall number of crashes is not considered an issue as the total traffic volumes are relatively high and the extents of the road safety assessment area relatively substantial. There is certainly no inherent road safety defect with the operation of the surrounding road network that would likely be influenced by, or have an influence on, the development potential that will be provided for by the Plan Change.

3. Existing Accessibility

3.1 Public Transport

3.1.1 Buses

Auckland Transport is scheduled to introduce a new public transport network for the North Shore in September 2018, which will result in substantial changes to existing bus routes within the North Shore area. The key principle behind implementing the new network was to increase its connectivity through the provision of higher frequency services to key connection points, which will enable fewer but more direct routes. As the new network will be introduced in the imminent future, the focus of this assessment is on the new network rather than the existing network.

Auckland Transport considers that there will be three key benefits of this new network:

- Simplicity: A simpler network will increase the attractiveness of public transport and make it an easier option to reach destinations.
- All day frequency: Providing higher frequencies that run over a full day will enable public transport users with greater choice when selecting to travel as they are not dependent on an infrequent and rigid timetable.
- Connectivity: A well connected network will provide greater choice and flexibility for patrons to access more destinations within the Auckland area than the previous network.

In the new network, Smales Farm is designated as an 'Interchange'. With its role as an Interchange, Smales Farm will act as key hub for the North Shore network where local and connector services can access higher frequency routes (frequent and busway services) to travel to a range of destinations within Auckland.

Table 4 below outlines all of the routes which alight at the Smales Farm Interchange within the new network and provides the frequencies of each route throughout weekday and weekend periods. A map of the new network at the Smales Farm Interchange is shown in **Figure 4.**

Route	Description	Service Type	Operational Periods		Weekday Frequency (minutes)			Weekend Peak (minutes)	
			Weekday	Weekend	All Day (7am-7pm)	Peak (morning and evening)	Late (after 7pm)	All Day (7am-7pm)	Late (after 7pm)
NX1	Albany to Britomart	Busway	0530 – 2400	0530 – 2300	10	7 - 8	10	15	15
NX2	Albany to City Universities	Busway	0530 – 2300	0530 – 2200	10	7 - 8	10	15	15
NX3	Albany to Newmarket	Busway	0600 – 2100	n/a	30	10	60	-	-
N6	Massey University to Takapuna via Albany Stn and Browns Bay	Frequent	0530 – 2400	0600 – 2200	15	15	30	15	30
N21	Northcote Point to Smales Farm Stn via North Shore Hospital	Local	0630 – 1900	0630 – 1900	60	30	-	60	-
N25	Beach Haven to Takapuna, via Glenfield and Smales Farm Stn or Highbury and Northcote Shops	Connector	0630 – 2200	0630 – 2200	30	15	30	30	30
N32	Milford to Takapuna via North Shore Hospital	Local	0600 – 1900	0900 – 1700	60	60	-	60	-
N41	Albany Station to Takapuna via Beach Rd and North Shore Hospital	Connector	0600 – 2300	0630 – 2200	30	30	30	30	30
N43	Crown Hill to Smales Farm Stn to Takapuna via Forrest Hill Rd	Peak period	0600 – 1800	n/a	-	10	-	-	-
N42	Constellation Stn to Takapuna via Forrest Hill Rd	Connector	0600 – 2300	0630 – 2300	30	10	30	30	30
N49	Smales Farm Stn to Constellation Stn via Windy Ridge	Local	0630 – 2100	0630 – 1900	30	15	60	60	-

Table 4: Smales Farm Interchange Bus Route Summary, New Network for North Shore, Auckland

Figure 4: Smales Farm Interchange Network Map, New Network for North Shore, Auckland Transport

The Smales Farm Interchange has a high level of connectivity to the new public transport network for the North Shore, which is demonstrated by the 11 distinct bus routes it serves. Table 4 above shows that these routes provide patrons of Smales Farm with a wide variety of destinations within the North Shore and Central Auckland.

The Northern Express routes (NX 1 – 3) allow patrons to travel directly to Britomart, the central universities, and Newmarket, at high frequencies throughout the full week. Notably, the Northern Express service has a distinct advantage over private vehicles utilising SH1 as buses on this route exclusively utilise the northern busway, which enables congestion on SH1 to be bypassed. The Smales Farm Interchange also services frequent and peak period services, which operate at high frequencies. While commuters during peak periods are provided with a selection of high frequency routes, the frequency of the services outside weekday peak hours and during weekends remains high. This provides patrons with a high level of flexibility when travelling by bus.

The Smales Farm site is located immediately east of the Smales Farm interchange. Several footpaths connect the subject site and the interchange to enable pedestrians to readily walk between the two. Approximately 400m separates the interchange from the furthest point within the site from the interchange. This means that a pedestrian from any point within the site can walk to the interchange in a relatively short time of less than 5 – 6 minutes.

In summary, the Smales Farm site enjoys excellent connectivity to the new public transport network for the North Shore, which is scheduled to become operational in mid-2018. The short walking distance from the Smales Farm site to the Smales Farm interchange provides bus patrons with flexibility to reach a diverse selection of destinations within Auckland at high frequencies throughout a full seven-day week.

This incredibly close relationship of the Smales Farm site to the new high frequency bus hub with its wide-reaching network, in itself highlights the strategic value of providing the sort of intense mixed-use activities that are anticipated by the Plan Change. Not only does it enable growth to occur where the transport infrastructure can sustainably accommodate that growth, it also helps to ensure the viability and success of the considerable investments that have been, and are continuing to be made, on the bus network and its supporting infrastructure that will serve the wider region.

3.1.2 Rail

There are currently no trains in operation within the vicinity of the Smales Farm site, or in the wider North Shore area.

However, future light rail initiatives for the North Shore are being considered. These are discussed later in Section 4. It is noted in this regard that developments of the nature and scale as anticipated by the Plan Change will no doubt assist to ensure the viability of any such future scheme, and in this regard may assist in bringing a focus onto that travel mode.

3.2 Private Vehicles

The site has excellent access to the external road network via its proximity to SH1 and several arterial roads within the local area, as detailed in Section 2.3.

Private vehicles are can access the site from the network through several locations, as listed below:

- Taharoto Road / The Boulevard signalised intersection;
- Northcote Road / The Avenue signalised intersection, right-in turning movements restricted;
- Shakespeare Road / The Avenue intersection; and
- Shakespeare Road (35m southwest of Taharoto Road), entrance only

Once in the site, private vehicles are able to park within several different parking areas, (both existing and proposed).

Accordingly, private vehicles are provided with several options to reach a variety of destinations within the site and the local and wider road network.

3.3 Walking and Cycling

As described in Section 2.3, the local road network accommodates various cycle lanes. Auckland Transport has released cycling and walking maps of the North Shore area, which identifies existing cycle infrastructure and outlines the suitability of roads to accommodate cyclists. A map of the cycling infrastructure for the North Shore area is shown in **Figure 5 with the site location indicated by the purple star.**

Figure 5: North Shore Cycling Infrastructure

Route in blue are routes with existing cycling infrastructure. The route in green identifies the cycling route under construction along Northcote Road and Lake Road. The red route highlights the proposed route for the SkyPath and SeaPath path projects.

Table 5 below summarises the cycle infrastructure within the vicinity of Smales Farm.

Type of Cycle Infrastructure	Road	Section of Road and Direction
Shared path or pedestrian link	• Shakespeare Road • Wairau Road • Forrest Hill Road • Fred Thomas Drive	• Kitchener Road to Taharoto Road, southbound side only • Archers Road to Forrest Hill Road, eastbound side only • Wairau Road to Havelock Avenue (northbound side) and Havelock Avenue to East Coast Road (southbound side) • Takapuna Landing to 140m south of Taharoto Road (northbound side) and Takapuna Landing to Esmonde Road (southbound side)
Dedicated cycle lane (within carriageway)	• Taharoto Road • Shakespeare Road • Wairau Road • Northcote Road • Fred Thomas Drive	• Shakespeare Road to Fred Thomas Drive • Taharoto Road to North Shore Hospital • Westlake Girls High School access to 50m west of Forrest Hill Road, northbound direction only • The Boulevard to Taharoto Road, eastbound direction only • Taharoto Road to 140m south of Taharoto Road, northbound direction only
Shared bus / cycle lane	• Shakespeare Road	• Kitchener Road to North Shore Hospital, southbound direction only
Route with space for cyclists, may be on busy roads	• The Boulevard • Shakespeare Road • Forrest Hill Road • Shea Terrace • Rangitira Avenue • Lake Pupuke Drive • Killarney Street	• Full length • Taharoto Road to The Avenue • Full length • Taharoto Road to North Shore Hospital • Taharoto Road to Lake Pupuke Drive • Rangitira Avenue to Killarney Street • Lake Pupuke Drive to Hurstmere Road

Table 5: Existing Cycle Infrastructure within Vicinity of Site

As can be seen from the table above, cyclists have a number of route options they can utilise when cycling in the local area. The shared paths / pedestrian links allow cyclists to travel along a route without sharing the road carriageway with vehicles, although some interaction with vehicles will occur where the paths discontinue at intersections. It should be noted that there are currently no fully off-road cycle paths within the vicinity of the site or the wider North Shore area. This will be addressed in the short and medium-term future through committed cycle route projects, which are discussed in further detail in Section 4.2.

Pedestrian footpaths are provided on all major roads within the vicinity of the site. Regular crossing opportunities are provided for pedestrians along the nearby arterial roads at the various signalised intersections. This allows pedestrians from the Smales Farm site to access a wide variety of activities within the local area, as outlined in Section 2.1. The North Shore Hospital is immediately opposite Smales Farm; and the Shore City mall and the Takapuna town centre are approximately 1.6km walking distance from the site. The pedestrian facilities within the Smales Farm site are also used as a through route for pedestrian to access the nearby Westlake Girls High School and Takapuna Normal Intermediate in both directions.

In summary, the site is currently well connected to the existing footpath and cycling networks within the local area, which enables people to visit the site through active travel modes.

3.4 Mode Share

3.4.1 Existing Smales Farm Mode Share

A community survey of employees working within Smales Farm was undertaken in 2016. The purpose of this survey was to determine travel patterns to Smales Farm, and how the employees generally perceive the area.

One question within the survey asked how the employee usually travels to Smales Farm. The results of this question are summarised below:

Travel Mode	Number of Employee Responses	Percentage of Total Employee Responses
Car (Private)	441	63%
Bus	135	19%
Walk	54	8%
Car (Carpool)	31	4%
Motorcycle	15	2%
Other	25	4%
Total	**701**	**100%**

Table 6: Preferred Transport Mode of Smales Farm Employees (Community Survey 2016)

The results of the survey show that almost two-thirds of employees currently use their own vehicle for travel. However, the number of employees arriving by bus is currently significant at 19%. A further 8% also arrive by walking. It is noted that there were 701 responses from the total of 593 employees who answered this question, which means that some employees listed more than one mode as their preferred mode of travel, i.e. that some employees make multi-modal trips, which could include driving to a park-and-ride facility via a private car, and then travelling to Smales Farm on a bus. Alternatively, some Smales Farm employees may switch between modes of transports for different days of the week.

The community survey also asked the employee which alternative transport option they would use other than their own private car. The responses to this question are outlined below:

Travel Mode	Number of Employee Responses	Percentage of Total Employee Responses
Bus	277	49%
Car (Carpool)	72	13%
Train	62	11%
Walk	46	8%
Cycle	42	7%
Other	64	11%
Total	**563**	**100%**

Table 7: Preferred Non-Private Car Transport Mode Alternative of Smales Farm Employees (Community Survey 2016)

Transportation to Smales Farm by bus was clearly preferred by employees as the first alternative mode to private cars. The proximity of the Smales Farm Bus Station and the range of routes it services means that employees view this as a strong and viable alternative to private cars. The preference for other travel modes was evenly distributed, with carpooling viewed as the second-best alternative, followed by train. Although transportation to Smales Farm via train is not currently available, the proportion of employees listing this as their preferred travel mode to private cars shows that this would be a well utilised mode if available. Like the preferred mode of transport question, Smales Farm employees were given the opportunity to list multiple alternative transport modes for this question. As 435 employees answered this question, up to 128 employees have more than one preferred alternative travel mode to private cars.

3.4.2 Mode Share in Wider Auckland Context

In order to provide context to the existing mode share for employees travelling to Smales Farm, data was obtained from the 2013 Census. Richard Paling Consulting issued a report titled 'Journey to Work Patterns in the Auckland Region[1]' (**Paling Report**) which provides an analysis of the Census data from 2001 – 2013. The report divided Auckland into five primary zones based on the extent of urban activity. A map of these zones is shown in **Figure 6**. According to these zones, Smales Farm is in an Inner Urban area.

[1] https://www.transport.govt.nz/assets/Uploads/Research/Documents/Richard-Paling-report-Transport-Patterns-in-the-Auckland-Region.pdf

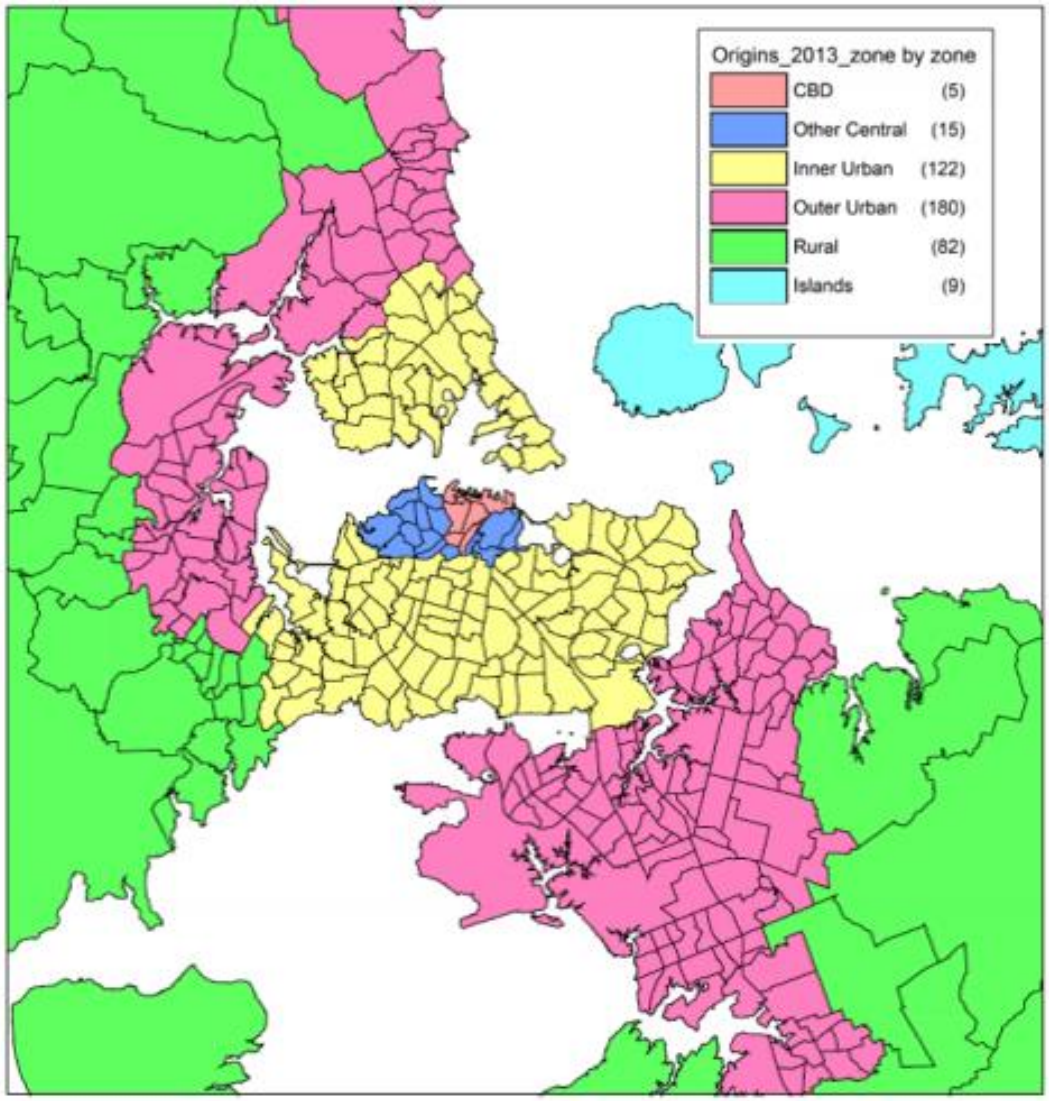
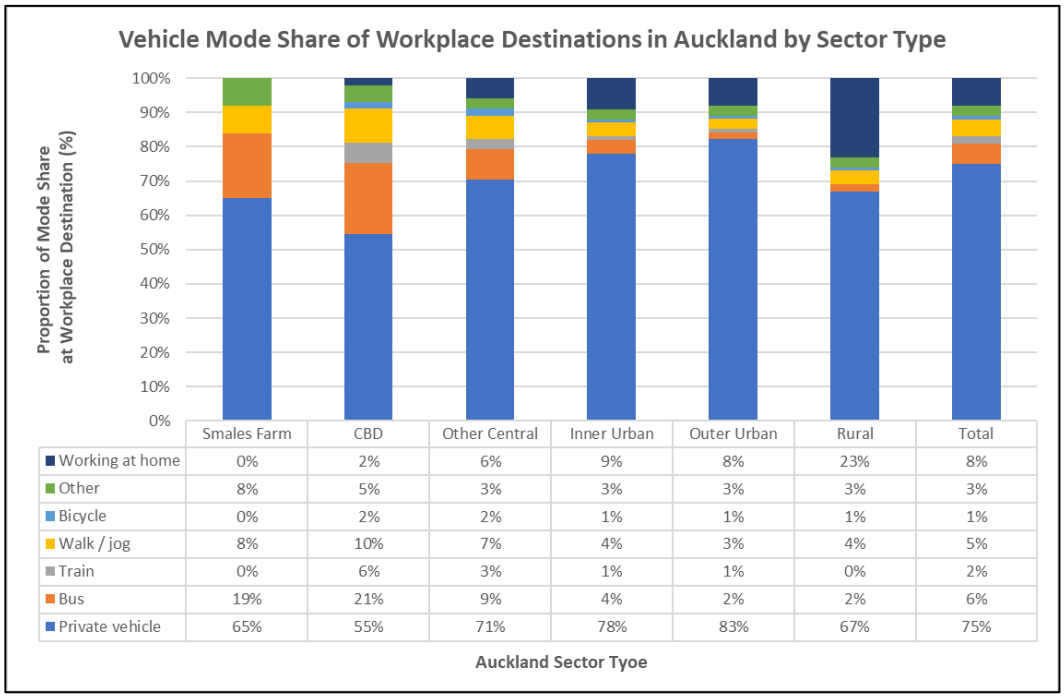


Figure 6: Auckland Sector Types, 'Journey to Work Patterns in the Auckland Region,' Richard Paling Consulting

The Paling Report provides mode share data of trips made to workplaces within the zones defined above in 2013. This allows a direct comparison with the Smales Farm employee mode share survey results. The mode share proportions of Smales Farm and the other Auckland sector types are shown in **Figure 7** below. In order to align with the travel mode categories outlined in the Paling Report, travel to Smales Farm by motorcycle was classified as a private vehicle trip. Carpooling was grouped in the 'other' category as these employees would not be using their own vehicle. While the proportion of cyclists for Smales Farm is listed as 0%, there would have likely been some cyclists included in the 'other' category in **Table 6**. No Smales Farm employees would be working at home as the site has no existing residential components.



	Smales Farm	CBD	Other Central	Inner Urban	Outer Urban	Rural	Total
Working at home	0%	2%	6%	9%	8%	23%	8%
Other	8%	5%	3%	3%	3%	3%	3%
Bicycle	0%	2%	2%	1%	1%	1%	1%
Walk / jog	8%	10%	7%	4%	3%	4%	5%
Train	0%	6%	3%	1%	1%	0%	2%
Bus	19%	21%	9%	4%	2%	2%	6%
Private vehicle	65%	55%	71%	78%	83%	67%	75%

Figure 7: Employee Mode Share Proportions, Smales Farm and Auckland Sectors

The mode share results above show that Smales Farm has a noticeably lower proportion of private vehicle trips than Inner Urban Auckland areas, of which Smales Farm is a part of. Smales Farm also has a lower private vehicle trip proportion than workplaces within Other Central areas, which are located closer to the CBD. The proximity of the site to the Smales Farm Bus Station means the mode share of bus is comparable to the CBD area, which has a high level of public transport accessibility. The proportion of travel to the site through walking or jogging is also similar to the CBD and Other Central areas. Overall, these results show that Smales Farm compares very well with high density Auckland areas in terms of employees utilising non-private vehicle transport modes to their workplaces.

3.4.3 Auckland City Centre Mode Share Trends

The number of private vehicle trips into the Auckland city centre during the morning peak hour has remained relatively static over the period 2001 – 2016, as shown in **Figure 8** below. However, the proportion of private vehicle trips has decreased as more people modify their travel behaviours, and in particular travel into the city centre via public transport. This is largely driven by the limited capacity of the road network to accommodate these trips during peak hours, and the inability to further increase roadway capacity.

The City Centre Masterplan 2012 confirms that by 2041, the mode share proportion of trips into Auckland's city centre will be quite different from that now experienced. It is forecast that all new trips into Auckland's city centre will be made via public transport, or active modes such as walking and cycling. Planned improvements to public transport and active mode infrastructure will help enable this future mode shift.

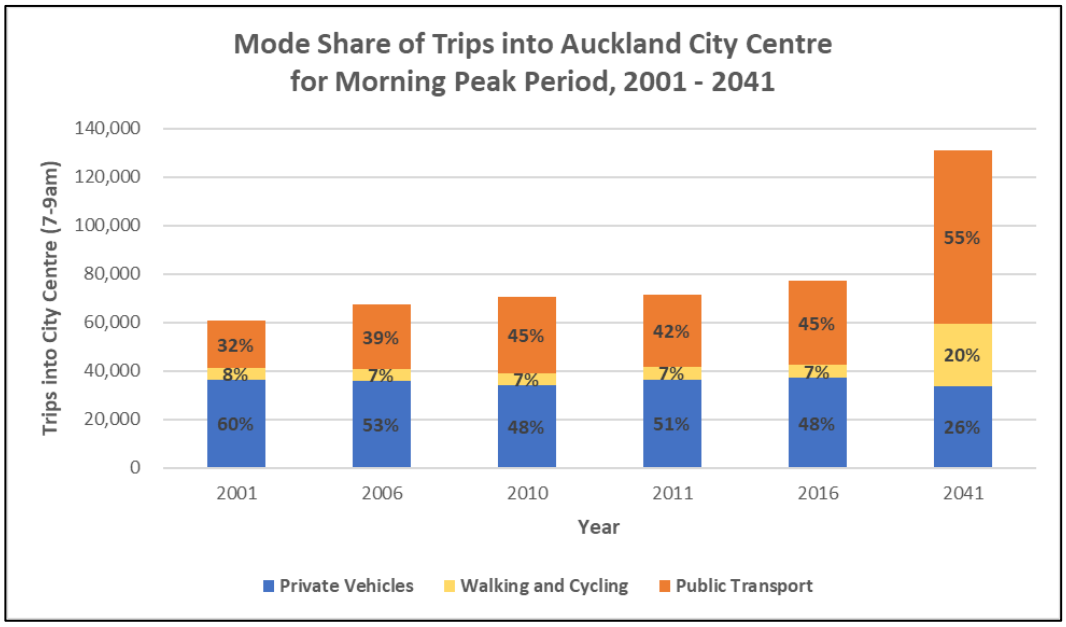


Figure 8: Mode Share of Morning Peak Hour Trips into Auckland City Centre, 2001-2041[2]

These mode share trends being experienced by Auckland's city centre are pertinent to Smales Farm and the proposed Plan Change, in that a similar response to accommodating future travel demands can be achieved.

Like Auckland's city centre, the road network within the vicinity of Smales Farm currently operates with limited capacity, particularly during peak periods, and there is very limited scope for accommodating future travel demands simply by adding to existing road network capacity. As will be further discussed in Section 7.1, in terms of the assessment of development-enabling Plan Changes such as the one proposed at Smales Farm, this requires something of a paradigm shift away from "predict and provide", to something that is in fact far more aligned with essentially all of Auckland's transport policy and strategy documents, (each of which are addressed in detail in Chapter 9 of this report).

[2] The 2010 and 2041 trip volumes and mode share proportions were sourced from the City Centre Masterplan 2012 – Vision and Guiding Factors (https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/place-based-plans/docscitycentremasterplan/the-vision-and-guiding-factors.pdf)

The mode share proportions for the years 2001, 2006, 2011 and 2016 were sourced from The Auckland Plan 2050, draft February 2018 (https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/auckland-plan/about-the-auckland-plan/docsprintdocuments/auckland-plan-2050-print-document.pdf). The volumes for these years were extrapolated based on the 2010 and 2041 volumes.

This means that in the same way that Auckland's city centre attempts to accommodate its travel demand growth by way of a combination of internalisation of travel through inclusion of intense residential development, coupled with the promotion of sustainable travel modes in favour of private vehicle travel, the successful development of this TOD at Smales Farm will rely upon the same principles. This is discussed further in Chapter 8 of this report which addresses the traffic modelling associated with the proposed Plan Change.

3.5 Summary

The Smales Farm site currently has excellent accessibility to a range of transportation modes. The proximity of SH1 and several arterial roads within the North Shore area mean that private vehicles are currently the preferred mode of transportation, as shown by the results in the 2016 community survey. While public transport is currently well used by Smales Farm employees, there is clearly potential for it to be utilised at a much higher level. The community survey confirmed that current users of private vehicles would strongly consider using bus services to travel to Smales Farm. The increased accessibility and the number of routes available from the Smales Farm Bus Station would clearly assist in this regard, as would the other sustainable transport measures that are anticipated.

Travel by active modes such as walking and cycling are also enabled within the local area surrounding the site. Results from the 2013 Census also show that Smales Farm has mode share proportions comparable to the Auckland city centre and other central high-density areas.

4. Future Transport Network

4.1 Rapid Transit

The latest version of the Auckland Transport Alignment Project (**ATAP**) released in April 2018 has identified rapid transit as a means of providing opportunities to provide higher levels of density for housing and urban developments. ATAPs package for rapid transit includes currently committed projects, new projects for the 10-year period 2018-2028, and future priorities beyond 2028.

The Northern Busway extension from Constellation Station to Albany is a committed project which will allow buses on the Northern Express routes between these two points to travel on a dedicated bus lane instead of on SH1, which experiences congestion during peak periods. This will reduce travel times and improve reliability for buses travelling along this route. This will benefit public transport users of Smales Farm who are travelling to / from Albany or other northern areas within the North Shore. The NZTA anticipates completion of this project by 2021/2022.

ATAP identifies the North Shore as a future priority to upgrade Auckland's rapid transit network beyond 2028. While the Northern Busway will be upgraded with the Constellation Station to Albany extension, Auckland Transport has projected that future demands may warrant a higher capacity mode such as light rail.

The Waitemata Harbour Crossing project by the NZTA aims to provide an alternative means of travelling between the North Shore and the CBD to the current Auckland Harbour Bridge. The current concept provided by the NZTA is in the form of a tunnel, which could include the provision of rapid transit. ATAP identifies that any rapid transit system through the Waitemata Harbour would need to be integrated with the City to Airport light rail corridor, which is a new ATAP project for the 2018-2028 period.

As ATAP has identified that enhanced rapid transit in the form of light rail would likely replace the Northern Busway, Smales Farm residents and employees would have access to a higher capacity and potentially more frequent and reliable rapid transit service. ATAP also outlines rail from Akoranga to Takapuna as a future priority, which would further increase the site's public transport connectivity.

4.2 Walking and Cycling

The Northcote Safe Cycle Route is currently under construction and is expected to be completed by mid to late 2018. The cycle route will provide a 5.2km connection from the Smales Farm site at Northcote Road to Northcote Point Ferry Terminal. For cyclists, the route is primarily undertaken on the form of a shared path, which reduces the number of interactions with private vehicles. While there are some on-road components for this route, it will improve the existing situation for cyclists as there is limited off-road cycle facilities in this area. Significantly for Smales Farm, the Northcote Road component of this route has off-road shared paths on both sides of the road.

Increased funding for walking and cycling has been provided in the latest ATAP which will enable further active mode infrastructure to be constructed in the 2018-2028 period.

The Skypath and Seapath projects have received funding in the latest ATAP package. The Skypath project provides a pedestrian and cycle connection from Northcote to the Westhaven in the CBD through an attachment to the Auckland Harbour Bridge. The Seapath project supplements this by providing a 3km walking and cycle path from the Northcote end of Skypath to Esmonde Road / Akoranga Drive. These projects will allow cyclists and pedestrians from the North Shore to travel to the city centre in a continuous off-road trip. This is not currently enabled with the current network as cyclists from the North Shore are required to take public transport through bus or ferry when travelling to the City Centre. The Northcote Safe Cycle Route will connect to both Skypath and Seapath at Northcote.

These projects will benefit future residents and employees of Smales Farm as the cycling connectivity to the wider network will greatly increase when completed.

4.3 Private Vehicles

The Northern Corridor improvement project by the NZTA will improve connectivity for private vehicles within the upper North Shore area. Part of the road improvements for this project is providing a new SH1 / SH18 interchange, which will allow motorists on SH1 to more readily access the Western Ring Route, which provides better access to West Auckland and an alternative route to the Airport via the Waterview Tunnel on SH16. This will provide users of private vehicles from Smales Farm with more route choices. The design of the interchange will also separate motorway through traffic from local traffic, which aims to reduce congestion in the local area. Previous stages of this project have been completed, and it is expected that construction will have finished by mid-2021.

The previously mentioned Waitemata Harbour Crossing will provide private vehicles with an alternative link to the Auckland Harbour Bridge as a means to access Central Auckland from the North Shore. The current concept provided by the NZTA includes three lanes per tunnel direction, which includes potential provision for rapid transit on a different level. ATAP identifies the Waitemata Harbour Crossing as a future priority beyond 2028. ATAP also indicates that flexibility with its construction should be allowed to potentially deliver rapid transit and the roading tunnels at separate times. The Waitemata Harbour Crossing aims to improve the resilience of the roading network, which would increase route choices for private vehicles accessing Smales Farm from the State Highway network.

5. The Proposed Plan Change

5.1 The Development Concept

As previously noted, the proposed Plan Change will enable Smales Farm to transition from a business park to a TOD that includes business and residential components. The vision is to fully develop the site over a period of 20 to 30 years.

The proposed development staging of Smales Farm, as allowed for by the Plan Change, is summarised below in **Table 8**. It is proposed to develop the commercial activity up to the limit of 162,000sqm, as allowed for under the Smales 1 Precinct of the AUP-OIP. A similar level of development for residential activity is proposed, which gives an assumed total development yield of 300,000sqm by 2051.

Year	Commercial GFA (sqm)		Residential GFA (sqm)		Residential (apartments, estimated)	
	Per Five-Year Period	Cumulative Total	Per Five-Year Period	Cumulative Total	Per Five-Year Period	Cumulative Total
Existing	58,000	58,000	-	-	-	-
2021	12,000	70,000	-	-	-	-
2026	22,000	92,000	19,000	19,000	190	190
2031	25,000	117,000	19,000	38,000	190	380
2036	8,000	125,000	19,000	57,000	190	570
2041	17,000	142,000	20,000	77,000	200	770
2046	8,000	150,000	26,000	103,000	260	1,030
2051	12,000	162,000	35,000	138,000	350	1,380

Table 8: Proposed Smales Farm Plan Change Development Staging

It is estimated that the residential activity will consist of apartments with an average size of 100sqm per unit. Table 8 above outlines the potential number of apartments which could be constructed as part of this plan change. By 2051, it is estimated that 1,380 apartment units could be developed.

The Plan Change will enable this level of development, and mix of activities, principally by amending the provisions of the Smales 1 Precinct.

The proposed Smales 1 Precinct provisions include precinct plans, one of which is shown below in **Figure 9**. The Precinct Plan maintains the same vehicle access points as the existing site layout but places a greater emphasis on providing pedestrian linkages within the site. One of the key linkages is to the Smales Farm Bus Station, which will allow the high frequency public transport routes to be readily accessed. Central to these linkages is a pedestrian plaza in the centre of the site, which will prioritise pedestrian mobility. Vehicles may be directed around the perimeter of the site towards underground or above-ground parking, which would provide more space for active travel modes such as cycling and walking. This will also enable more space to be dedicated towards the proposed commercial and residential activities.

Figure 9: Smales Farm Precinct Plan

5.2 Transit Oriented Development

5.2.1 The TOD Concept

As noted, the Smales Farm proposed Plan Change has been based upon the principles of a TOD. A TOD is a type of community development which focuses on planning mixed-use and high-density development in close proximity to a major public transport station or corridor. In so doing, a TOD ultimately aims to create places where people can live, work and play, all within a walkable neighbourhood; where non-car transportation modes to, within and from the site are easily accessible and positively encouraged; and where public transport infrastructural investments can be supported by a large localised ridership base. This helps in reducing the overall dependency and reliance on private vehicles while also providing wider transportation benefits and enabling urban growth.

5.2.2 TOD Design Principles

From a transportation perspective, a well-designed TOD will consider the following principles:

5.2.2.1 Pedestrian Connectivity

Connectivity helps build more direct connections and shortens travel time, which effectively brings people closer to their destinations. Pedestrian friendly design emphasises the importance in considering the user experience of pedestrians through the urban design process. This helps to encourage walking and cycling to local destinations and activities where possible. An effective TOD will include creating a safe, inviting and pleasant environment for pedestrians within the TOD street network. The Smales Farm Precinct Plan includes a central pedestrian plaza and several key pedestrian linkages which ensure that a high level of pedestrian connectivity within the site and to the external network is enabled.

5.2.2.2 Reliable and Frequent Public Transport

On longer journeys where walking and cycling is not possible, it is important that residents within TODs have reliable, high quality and frequent public transport options which allow them to travel to key destinations within the wider region. This helps reduce their reliance on private vehicles and allows for reduced parking needs within a development. It is also important that high frequency public transport services are provided outside the typical morning and evening peak periods as residents will require regular access to other activities throughout the day beyond commuting trips. The location of the Smales Farm development places it immediately adjacent to the Smales Farm Bus Station. The rapid, reliable and frequent bus routes it services, including the Northern Express, allow people within the site to be readily connected to a variety of destinations including the city centre.

5.2.2.3 Private Vehicles

The number of private vehicles serving a TOD will be comparatively lower than what would be typically expected from a similarly sized non-TOD. While TOD puts a higher emphasis on public transport and active travel modes, private vehicles still form an important mode of transportation, especially in Auckland.

As per the process for a regular development, the design process must consider key vehicle user groups and their needs as part of the design process. This includes:

- drop-off and pick-up facilities near transit nodes;
- loading facilities to service shops, restaurants and ground floor activities; and
- provision of parking where necessary, especially for accessibility needs of disabled patrons.

The existing vehicle connections to the surrounding road network will be maintained as part of the Plan Change to ensure that the needs of private vehicles are still maintained.

5.2.2.4 Mixed-Use Activities

Mixed-use activities located within close proximity to each other ensure that TODs are liveable spaces where people are encouraged to walk to local activities within the development. A mix of residential and commercial also enables all day activity within a TOD which helps to increase public transport patronage outside of typical morning and evening peak periods. The proposed residential, retail and office activities proposed as part of the plan change will enable these mixed-use principles.

5.2.3 TOD Benefits

A wide range of benefits are provided for residents and other users of a TOD. Beyond economic, land use and environmental rewards, some of the main benefits from a transportation context include:

5.2.3.1 Reduced Congestion

As a result of reduced private car usage, roads within a TOD and within its near vicinity see major improvements in flow due to reduced congestion. People are more likely to travel by public transport or by active modes to their destinations. The proposed plan change will help to alleviate congestion within the local area as the development will encourage public transport use and active modes of travel locally.

5.2.3.2 Transportation Options

Improved housing density, proximity to activities and transport means that TODs present more affordable and attractive living options. This creates opportunities for a diverse range transportation trips located within walking distance, a public transport journey, or a bicycle ride to a number of accessible destinations.

5.2.3.3 Safety Benefits

A reduced dependency on personal vehicles leads to reduced emissions and improved air quality in the environment. Additionally, TOD streets are typically much safer for pedestrians and results in a reduction in road casualties due to the high level of pedestrian connectivity required.

6. Future Accessibility

6.1 Public Transport Access

As demonstrated in Section 3.1, the site will have excellent connectivity to the bus network when the new network for the North Shore area becomes operational later in 2018. The Smales Farm Bus Station will become a key interchange in this new network, which will service 11 distinct routes to a variety of destinations within Auckland. The immediate proximity of the site to this interchange will enable regular public transport trips to be made.

The Northern Busway improvements will further improve the connectivity of the rapid transit Northern Express route to Albany in the short term. Beyond 2028, ATAP has identified that a rapid transit line from the city centre to Orewa is a priority. This would likely be achieved by upgrading the existing Northern Busway into the form of light rail and would be connected to the CBD through a crossing over the Waitemata Harbour. While the site will have very good public transport connectivity, light rail to the city centre would increase the capacity of the public transport network and further improve journey times and reliability.

The improved public transport network in the future will strongly promote mode shifts away from private vehicles towards public transport. This is a key component of the vision of the Smales Farm Plan Change in becoming a TOD.

6.2 Walking Access

The Smales Farm Precinct Plan as part of the Plan Change places a priority on pedestrian accessibility. A pedestrian plaza will be located in the centre of the site and will promote pedestrian mobility within the site.

The Precinct Plan also identifies several key pedestrian linkages to the external footpath network, which allow pedestrians to efficiently and safely access a variety of destinations. One of these pedestrian linkages is to the Smales Farm Bus Station, which will allow the public transport network to be readily accessed.

Finally, the Precinct Plan outlines the locations of pedestrian amenity frontages, which will aim to make walking at these locations pleasant, safe and convenient. Accordingly, pedestrians will be well connected with the Plan Change.

6.3 Private Vehicle Access and Parking

The Smales Farm Precinct Plan proposes that the same vehicle access points will be maintained for private and service vehicles. This includes the three existing major connections to each of Shakespeare Road, Taharoto Road and Northcote Road. The minor entry-only access on Shakespeare Road will also be maintained.

Much of the on-grade parking on the site is in the location of future building platforms. Over time these areas will be developed, and the parking spaces lost will be replaced with underground basement or above-ground parking.

While private vehicles currently enjoy a high level of accessibility to the external road network through the site's proximity to SH1, this will be further enhanced in the future with the ATAP package. Section 4.3 of this report outlines the proposed upgrades in ATAP, which includes the upgrade of the SH1 / SH18 interchange. This will provide more convenient access to the West Auckland area. The Waitemata Harbour Crossing project is also identified as a future priority in ATAP, which could provide private vehicles with an alternative route to access the Auckland CBD instead of the Auckland Harbour Bridge.

It should be noted that there is the potential for additional North Shore Hospital access points along Taharoto Road and / or its other frontages. This ITA does not provide details of these possible access arrangements as they are unconfirmed at this time. However, it is known that there are two most likely options, with one possibly involving a new connection to Taharoto Road at the existing signalised intersection with The Boulevard; while the other anticipates enhanced use of Shea Terrace using a one-way loop arrangement that incorporates Mary Poynton Crescent.

As far as this Proposed Plan Change is concerned however, it will enable the existing high level of connection between Smales Farm and its adjacent road frontages to be maintained into the future.

6.4 Cycling Access

Cycling infrastructure is currently available along several roads near Smales Farm, which enable cycling trips within the local area to be made. However, there are currently no completely off-road cycle routes in the nearby area, nor any routes into central Auckland. This will be addressed with the Northcote Safe Cycle Route project, which is scheduled to be completed within the next couple of months. This will provide cyclists with a partially off-road cycle route to Northcote Point Ferry Terminal.

Furthermore, the Skypath and Seapath projects are scheduled to be completed within the next decade. These projects will provide a dedicated cycle and pedestrian path from Akoranga Drive / Esmonde Road in Takapuna to Westhaven in central Auckland. Once in the city centre, cyclists have access to several dedicated cycle paths such as the Light Path, Grafton Gully Cycleway and the Northwestern Cycleway.

The site currently has cycling connections available to Akoranga Road / Esmonde Road, which will ensure that cyclists travelling to or from Smales Farm will have excellent connectivity to the wider cycling network. This will allow regular and safe trips to be made outside the local Takapuna area, and subsequently increase the cycling mode share.

6.5 Smart Transport

Recent developments within Smales Farm have increased the total number of employees to over 4,000, which has generated additional demand for parking spaces. In order to optimise the utilisation of the existing transportation infrastructure within the site and to encourage mode shifts to non-private vehicles, Smales Farm is in the process of developing a programme called 'Smart Transport by Smales Farm.'

The programme will include a suite of initiatives aimed at modifying travel behaviours, reducing the number of single occupancy vehicles commuting to Smales Farm, and optimising parking utilisation. The proposed initiatives will ultimately include:

- Active modes: Users will be able to track their walking, jogging or cycle journeys. End of trip facilities will also be provided to encourage these trips.
- Public transport: Using data from Auckland Transport, public transport journeys can be tracked with Smales Farm employees with HOP Cards, and subsequently incentivised.
- Motorcycles: Smales Farm currently provides free motorcycle parking, which requires less space than parking for cars. The intention would be to capitalise on these benefits to make travel via motorcycle more attractive and incentivised.
- Carpooling: As Smales Farm employees are travelling to the same destination each morning, organised carpooling becomes a viable option.
- Shared Vehicles: It is understood that Smales Farm intends to provide a pool of vehicles for the use of employees while at work, thereby reducing reliance on private vehicles for travel to/from work.
- Parking: In order to optimise parking utilisation, shared parking arrangements will be encouraged.

Ultimately, this programme will assist Smales Farm to become a highly successful TOD, especially by encouraging sustainable travel behaviours.

6.6 Summary

The Smales Farm Precinct Plan and Plan Change include provisions for all modes of transport to ensure that it will become a successful and vibrant TOD. Of note is the site's existing proximity to the Smales Farm Bus Station, which provides access to the frequent Northern Express routes and a variety of other routes. Access to rapid transit will be further enhanced in the future with light rail designated as a future priority under ATAP.

Active travel modes will be well served in the future due to scheduled projects such as the Northcote Safe Cycle Route, Skypath and Seapath. This will allow connections to areas beyond the North Shore, sspecifically the Auckland CBD. The Precinct Plan accommodates these active modes by prioritising connectivity within the site by providing key linkages and a central pedestrian plaza.

Private vehicles will continue to have a good level of accessibility with the site's proximity to SH1 and major arterial roads in the North Shore area. The site will continue to provide the same access points as existing for private vehicles.

The programme of travel planning initiatives that are being developed by Smales Farm will further assist to realise their vision of becoming an exemplar Auckland TOD which is able to match its growth aspirations with sustainable travel practices, and to achieve a place where people desire to live, work and play.

7. Traffic Modelling Background

7.1 Overview

Smales Farm and Waitemata District Health Board (WDHB), as neighbours preparing to develop their respective sites, agreed to collaborate on traffic modelling in the vicinity of their sites. The traffic modelling methodology was developed between Flow (representing WDHB) and TDG (representing Smales Farm) and was presented to authorities prior to commencing.

Early discussions were initially undertaken at executive level, followed by discussions with technical specialists. The specialist discussions were carried out as follows:

- 26 October 2017 with Sarah Ho and Graham O'Connell of the New Zealand Transport Agency (NZTA); and
- 5 October 2017 with Theunis Van Shalkwyk, John Davies, Chris Morgan, Jimin Hong of Auckland Transport / Auckland Forecasting Centre (AFC).

It was decided that Flow would undertake the modelling exercise for both parties accounting for development proposed by both Smales Farm and North Shore Hospital, with TDG undertaking the peer review for both parties. AT, AFC and NZTA agreed that an independent peer review would not be necessary, and that the modelling methodology developed was appropriate. The AIMSUN microsimulation software package was used to assess the traffic effects of the proposed developments. The network layout was extracted from the Auckland Dynamic Traffic Assignment (**ADTA**) model which was built using the AIMSUN mesoscopic software package. Existing traffic demands on the network were obtained using traversals from the Macro Strategic Model (**MSM**) model which is a regional macroscopic model built using the EMME software package. These volumes were compared against surveyed volumes to ensure their suitability in reflecting the existing conditions.

As previously described in Section 3, the environment surrounding Smales Farm and North Shore Hospital is well developed, and the road network already operates with limited available capacity, especially during peak periods. There is also very limited opportunity to create new road capacity to accommodate future growth in traffic demands.

This therefore requires something of a paradigm shift away from more traditional methods of assessing future development potential, which typically involve "predict and provide" assessments, to something that is in fact far more aligned with Auckland's transport policies which focuses on accommodating future growth demands in the most sustainable manner possible. This philosophy recognises that there may necessarily be a trade-off between the long-term development of a sustainable land use-transportation relationship, against the shorter-term implications to private vehicle travel conditions.

In this regard it is noted that with or without any further development on Smales Farm beyond that already provided for by the Smales 1 Precinct, there will continue to be high, and growing demands for travel on the adjacent road network as the new residential growth areas that are occurring throughout the City, especially to the north, put more pressure on the Northern Motorway and its supporting arterial network, (particularly as residents travel to and from Auckland's central employment areas).

This means that as Smales Farm is developed over the next 30 years to the extent provided for by the proposed Plan Change, it will be virtually impossible for it to mitigate against its own travel demands plus the future base travel demands that will have already saturated the road network.

Rather, the transportation assessments of this TOD need to consider the following broad concepts:

(i) The extent that travel behaviours become modified by the increasing difficulties associated with car travel, regardless of what happens on Smales Farm;

(ii) The extent that the nature of development on Smales Farm, and its support of the viability and success of public transport infrastructure, assists to enable and incentivise a broader travel mode shift by the wider community;

(iii) The extent that the mix of office, retail and supporting leisure activities on the site can either "internalise" trips, (e.g. people who do not need to travel off-site to get from, say, home to work, or work to gym); or integrate with neighbouring activities to "localise" non-car trips, (e.g. hospital to café, or home to school);

(iv) The extent that any external travel demands that are generated by activities on the site can be met by the immediately adjacent public transport hub, and/or other more sustainable travel modes; and

(v) The extent that intensive residential development proposed for this site might delay the need for residential development beyond the extent of existing urban areas, thereby delaying the introduction of the much less efficient travel implications associated with that more remote development.

These considerations then lead to an assessment of the extent that it would be possible to assume that travel behaviours on the surrounding road network have been, or could reasonably be, modified in the future to ensure sufficient road network capacity to accommodate both background traffic demands plus any external traffic demands due to Smales Farm. The modelling was undertaken on this basis.

Put simply, the modelling of this proposal utilised MSM demand models for 2026 and 2036, overlaid with the anticipated additional demands due both to Smales Farm and North Shore Hospital at those design years, then determined the extent of subsequent travel behaviour change that would be required to ensure that the performance of the road network remained no worse than would occur without the additional Smales Farm traffic at those design years.

For this final step, the criterion that was examined was the extent that through traffic would have to be "removed" from Taharoto Road and Northcote Road to enable Smales Farm traffic to be accommodated with no net change in network performance.

This removal of through trips assumes that either those trips have been diverted onto other routes (the motorway for example), or that the trips have been made at another time, or that the trips have been made by another mode. On a saturated network, motorists do not take long to adopt one or more of these measures, as evidenced by what is currently being experienced in central Auckland. The key however, is to determine if the number of trips that is assumed to be reduced (as determined from the models) is assessed to be reasonably practical. The modelling that has been undertaken seeks to answer this question.

7.2 Land Use

The MSM model is regional model of the entire Auckland area. It takes land use as an input to calculate the existing traffic volumes on the road network, as well as the estimated traffic demands in 2026 and 2036.

The zones in the MSM model are reasonably large and do not include individual sites. It is therefore not always possible to exactly determine the land use for individual sites.

Two MSM zones are considered to be directly related to the subject developments, one for Smales Farm (zone 122) and one for North Shore Hospital (zone 121). The zone for Smales Farm includes the full extent of the Smales Farm site and Westlake Girls High School. The zone for North Shore Hospital includes the full extent of the hospital, Carmel College, a retirement village, approximately 400 dwellings and some small scale medical offices and dairies.

The land use inputs are broken down into three categories: persons; households; and employment. Each of those categories is comprised of multiple classes to define the type of people living in the zone, the type of households in the zone, and the employment type. Education activities are included within the employment category.

It should be noted that the MSM land uses do not account for every proposed development and are an estimation of what may be developed in a zone. It is therefore not possible to exactly determine what land uses are assumed for the Smales Farm and Hospital precincts in the future modelled years.

Figure 10 below summarises the assumed land use inputs for the zone that includes the Smales Farm business park for 2016 (existing scenario), 2026 and 2036.

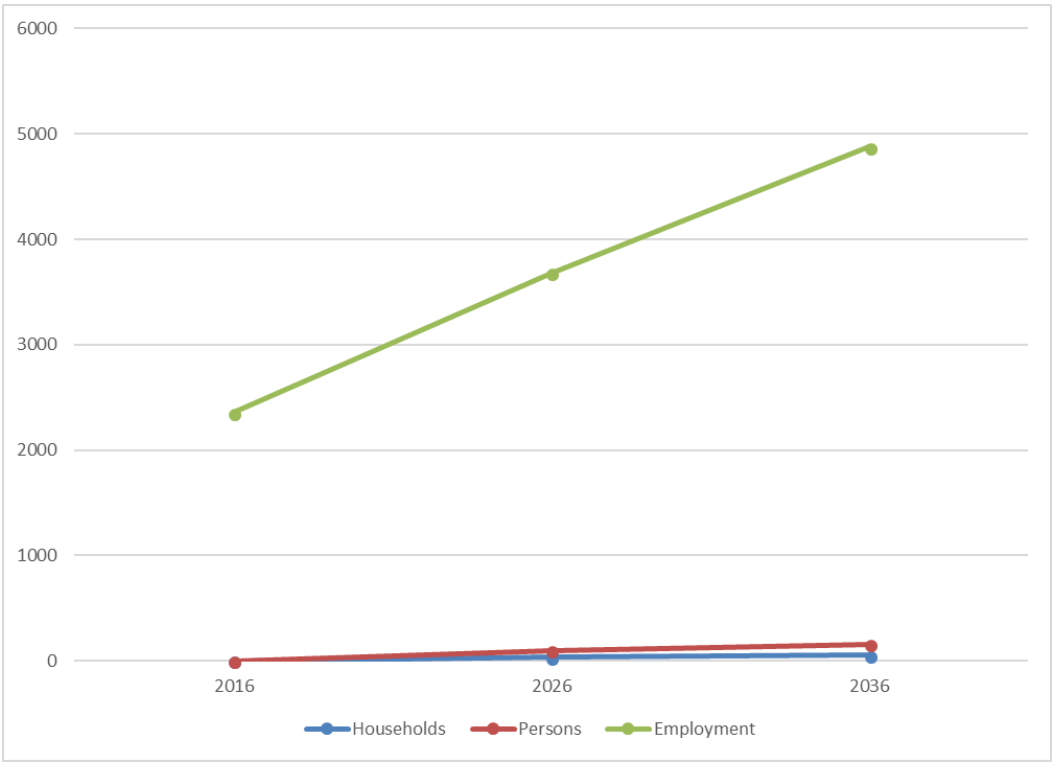


Figure 10: Smales Farm MSM Zone Land Use

The Smales Farm zone has a high amount of employment driven primarily by the Smales Farm business park and the secondary school. A small amount of housing and population has been forecast for the 2026 and 2036 scenarios but not to the same extent as what is being proposed by this Plan Change.

On average, approximately eight office workers occupy 100sqm of office floor space (including area for hallways, meeting rooms, break rooms etc). Person density is typically higher in schools with approximately 30 people per 100sqm. However, schools utilise outdoor areas where students are able to learn and play outside the classroom. The increase to the employment shown in Figure 10 above is predominantly for office-based workers with a relatively minor increase (less than 100 persons) to the number of people in the education sector between 2016 and 2036.

The number of people employed in the Smales Farm zone has been forecast to increase by 2,607 between 2016 and 2036. This equates to an increase in office floor area of approximately 31,000 to 32,000sqm. This value is notably less than the amount of floor area proposed to be developed as part of the subject development.

Figure 11 below summarises the assumed land use inputs for the zone that includes the North Shore Hospital for 2016 (existing scenario), 2026 and 2036

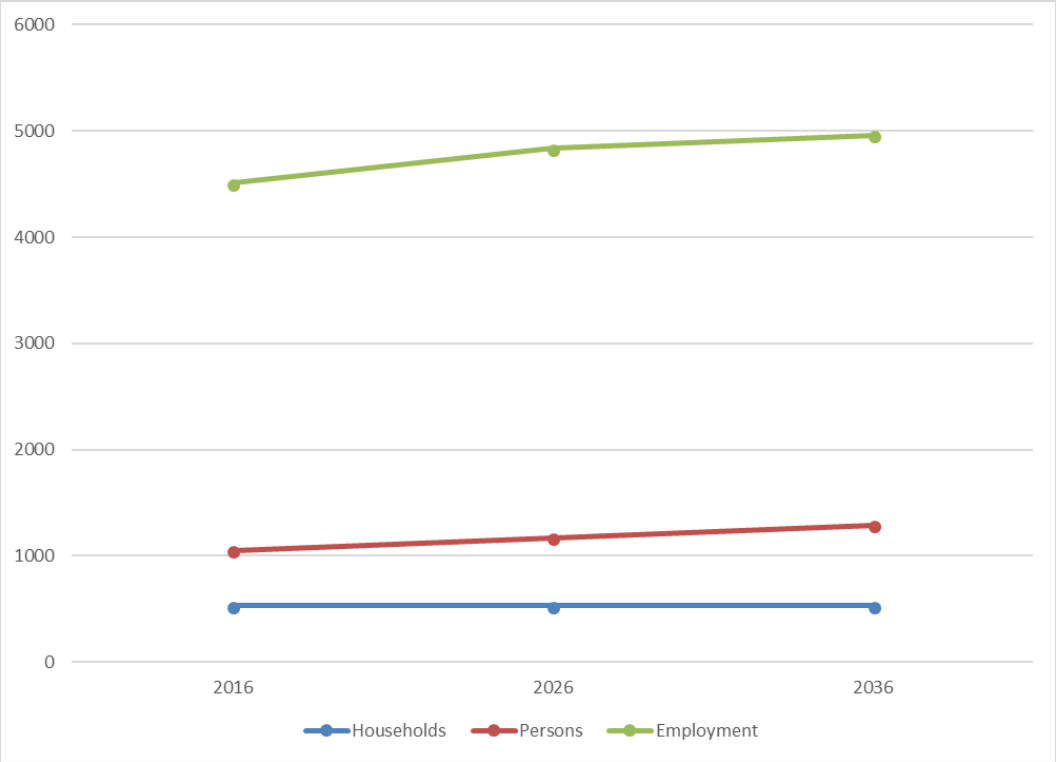


Figure 11: Hospital MSM Zone Land Use

The North Shore Hospital zone also features a high amount of employment, again driven by the adjacent school and the high number of employees within the hospital. The total amount of employment within the zone has not been expected to increase significantly. The floor area of the hospital is proposed to double between 2016 and 2026. It is therefore likely that the number of employees will also approximately double.

This zone also features approximately 500 households which is not expected to increase noticeably over the next 20 years.

For both zones, the MSM model has assumed that there will be some level of additional development. Future do-minimum scenarios were included to provide a baseline to investigate what effects the proposed developments would have on the surrounding road network. These do-minimum scenarios did not increase the amount of traffic generated by the subject sites. Therefore, the comparison between these and the 'with development' scenarios will overestimate the effects of the proposed developments. The subsequent assessment is therefore considered to be conservative.

Overall, the MSM model understates the extent of development proposed at Smales Farm and the Hospital. The Smales Farm zone will experience an increase beyond what the MSM model has anticipated in both employment and household activity. The Hospital employment assumption is expected to increase more rapidly than currently assumed.

7.3 Traffic Surveys

TDG organised for traffic surveys to be undertaken throughout the Northcote area in November 2017. The data collected included the following:

- Intersection turning counts at:
  - Forrest Hill Road/Nile Road
  - Forrest Hill Road/Wairau Road
  - Shakespeare Road/Waterloo Road
  - Shakespeare Road/North Shore Hospital Access
  - Shakespeare Road/Taharoto Road/Wairau Road
  - Wairau Road/Westlake Girls High School
  - Taharoto Road/The Boulevard
  - Taharoto Road/Shea Avenue
  - Taharoto Road/Northcote
  - Northcote/The Avenue
  - SH1 Northbound Ramps/Northcote Road
  - SH1 Southbound Ramps/Northcote Road
- Week-long tube counts outlined in Section 2.4.
- SCATS loop volume counts to supplement the intersection turning counts at the above locations in addition to the following locations:
  - Wairau Road/Porana Road
  - Sunnybrae Road/Northcote Road/Akoranga Drive
- Automatic Number Plate Recognition (ANPR) cameras were used at the following locations to establish the origin-destination matrices for the model:
  - Forrest Hill Road north of Nile Road
  - Wairau Road west of Forrest Hill Road
  - Northcote Road north of Takapuna Cricket Club access
  - Northcote Road between SH1 interchange and The Avenue
  - Taharoto Road south of Karaka Street
  - Mary Poynton Crescent between Shea Terrace and Northcote Road
  - Shea Terrace east of Taharoto Road
  - Northshore Hospital access east of Shakespeare Road
  - Shakespeare Road south of Alma Road
  - Westlake Girls High School access west of Wairau Road
  - Westlake Girls High School access west of Shakespeare Road
  - The Boulevard west of Taharoto Road

  - The Avenue north of Northcote Road

- Travel time surveys along the key routes identified below were extracted from the ANPR data:
  - Route 1 – **Shakespeare Road** south of Alma Road to **Wairau Road** west of Forrest Hill Road.
  - Route 2 – **Taharoto Road** south of Karaka Street to **Northcote Road** adjacent to Takapuna Cricket Club access.
  - Route 3 – **Taharoto Road** south of Karaka Street to **Wairau Road** west of Forrest Hill Road.
  - Route 4 – **Shakespeare Road** south of Alma Road to **Taharoto Road** south of Karaka Street.
  - Route 5 – **Shakespeare Road** south of Alma Road to **Northcote Road** west of The Avenue.
- Traffic signal timings were extracted from the SCATS system.
- Queue observations were reported at key intersections and along the Taharoto corridor.

The intersection survey locations and journey time routes are illustrated in **Figure 12** below.

Figure 12: Survey Locations and Travel Time Routes

7.4 Trip Generation

Trip generation rates for the Smales Farm development were determined by TDG while trip generation rates for the North Shore Hospital were determined by Flow. While the calculation methodologies are slightly different for the two sites given the different on-site activities, both are considered to be suitable and appropriate methodologies for the activities that they address. The trip generation calculations for both sites are discussed below.

7.4.1 Smales Farm

Smales Farm currently comprises 58,000sqm of commercial area. For the purposes of the traffic modelling, it is proposed to expand this to 92,000sqm by 2026 and 125,000sqm by 2036. No residential units are currently provided within the Smales Farm precinct. Initially, it was assumed that 285 apartments could be developed within Smales Farm by 2026 and a total of 855 could be completed by 2036. This level of residential development was adopted for modelling the effects of the Smales Farm development on the wider road network.

The adopted apartment numbers for determining the number of trips generated by the site are higher than those outlined in Section 5. The values in Section 5 have been further refined based on additional information received by the applicant that considers other aspects of the development. The modelling process was well underway when the revised numbers were received and given that the level of development had decreased, it was decided to continue using the adopted trip generation rates. The traffic demands for the Smales site are therefore considered to be an over-estimate and the modelling is therefore conservative.

Trip rates for the existing office and commercial activity within the Smales Farm were determined using the November 2017 traffic counts. The Smales Farm Precinct includes an access off the Wairau Road/Shakespeare Road intersection that is shared with Westlake Girls High School and the Smales Farm Bus Station. The surveys undertaken are not able to differentiate exactly between which trips were associated with Smales Farm or the school.

In the morning peak hour there are 446 trips inbound and 260 outbound using the Shakespeare access to Smales Farm, Westlake Girls High School and the bus station. It was assumed that the 260 outbound trips were drop-off's related to the school or the bus station, given that most of the Smales related traffic is inbound at that time, leaving 186 inbound trips. Of these 186 trips, 50 were assumed to be related to the school (car park size of 100 spaces) and the remaining 136 were assigned to Smales Farm.

A similar method was used in the evening peak. A total of 133 inbound and 287 trips outbound were observed in the evening peak hour. The 133 inbound were considered to be pick-up's related to the school and bus station. The evening peak hour occurs after school has formally finished (some staff and students may still be in attendance for extra-curricular activities such as sport) leaving 154 outbound trips. It was assumed that of these trips, 30 would be related to people leaving the school and the remaining 124 trips were allocated to the Smales Farm business park.

In the morning peak hour for the site, a total of 908 trips (inbound and outbound) were generated by the site and 719 in the evening peak hour. This equates to a generation rate of 1.57 trips per 100sqm in the morning peak hour and 1.24 trips per 100sqm in the evening peak hour. These rates were maintained for the future scenarios, which is a conservative assumption given that it is expected that reliance on private cars is expected to continually decrease.

Trip rates for the proposed residential units were derived from the New South Wales Road and Maritime Services' *Guide to Traffic Generation Developments* (**RMS Guide**). The proposed residential activity is of a high density and located within an area that currently experiences high levels of traffic congestion, has excellent public transport connections and has nearby complementary activities in terms of employment zones and schools for future residents. Such conditions are similar to those in a city centre. It is therefore considered that the "High Density Residential Flat Building" located in a metropolitan regional centre is the activity that best represents the residential development in this location. The corresponding peak hour trip rate for this activity is 0.24 trips per unit. Again, this is potentially conservative given the location.

Table 9 below summarises the total number of trips expected to be generated by the Smales Farm development:

Activity	Trip Rate		Existing		2026		2036	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Commercial	1.57 per 100sqm	1.24 per 100sqm	908	719	1,440	1,140	1,957	1,550
Residential	0.24 per unit	0.24 per unit	0	0	68	68	205	205
Total			**908**	**719**	**1,508**	**1,208**	**2,162**	**1,755**

Table 9: Smales Farm Trip Generation

The proposed residential activity is complementary to the commercial development in that people may both live and work within the Smales precinct. The trips rates are considered to have accounted for the proximity of complementary land uses and no further reductions to trips rates have been applied. All trips generated will be external to the Smales Farm precinct.

7.4.2 North Shore Hospital

The hospital currently comprises a total of 80,540sqm of floor area. It is proposed to expand this to 163,920sqm by 2026. No further expansion of the hospital is proposed between 2026 and 2036. It is understood that an increase in floor area of over 80,000sqm is ambitious and unlikely to be completed by 2026. This assumption is therefore considered very conservative when forecasting future development traffic and effects.

Total trip rates for the hospital were calculated from the survey data. This was to be 768 trips in the morning peak hour and 822 in the evening peak hour, rates of 0.95 per 100sqm and 1.02 for the respective peak hours. These rates were maintained for the future trip generation scenarios.

The North Shore Hospital 2016 Masterplan Preliminary Transport Assessment (June 2016 and available on request) prepared by Flow (**Flow report**) determined that 78% of the total trips generated in the peak hour by the hospital were associated with staff, while the remaining 22% were associated with visitors and other purposes. The Flow report also considered that 20% of trips could change travel mode from a single occupant vehicle to public or active transport modes. This reduction would be a result of constrained parking conditions and a congested network.

Table 10 below summarises the total number of trips expected to be generated by the hospital development by staff and visitors with the corresponding trip rate included in brackets.

Trip Purpose	Existing Trips		Future Trips	
	AM Peak	PM Peak	AM Peak	PM Peak
Staff	599 (0.74 per 100sqm)	641 (0.80 per 100sqm)	1,047 (0.64 per 100sqm)	1,065 (0.65 per 100sqm)
Visitor/Other	169 (0.21 per 100sqm)	181 (0.22 per 100sqm)	295 (0.18 per 100sqm)	301 (0.18 per 100sqm)
Total	**768 (0.95 per 100sqm)**	**822 (1.02 per 100sqm)**	**1,342 (0.82 per 100sqm)**	**1,365 (0.83 per 100sqm)**

Table 10: North Shore Hospital Trip Generation

As previously noted, it is considered that the proposed development schemes are ambitious and unlikely to achieve the levels of development within the timeframes specified. The number of trips actually generated in the 2026 and 2036 scenarios are therefore, likely to be significantly lower than those calculated above. The assessment of effects on the surrounding road network is therefore considered to be very conservative.

7.5 Trip Distribution

7.5.1 Smales Farm

The inbound/outbound distribution of trips for the commercial activities was based on observed movements. In the morning peak hour, 66% of trips were inbound and 34% outbound while 30% of trips were inbound in the evening peak and 70% outbound.

Distribution for the residential trips was based on the Institute of Transportation Engineers Trip Generation Manual which is an industry accepted document for determining the inbound/outbound distribution of future trips.

The activity which is considered to best represent the residential component of the development is the High-Rise Apartment (Land Use 222). For the morning peak, 25% of trips are inbound and 75% outbound while 61% of trips are inbound in the evening peak and 39% are outbound.

7.5.2 North Shore Hospital

The inbound/outbound split for the hospital was also based on observed traffic movements. The split was assumed to be the same between staff and visitor movements. In the morning peak hour, 79% of trips were inbound and 21% outbound while 30% of trips were inbound in the evening peak and 70% outbound.

7.5.3 Total Trip Generations and Distributions

Table 11 below summarises the peak hour trip generation and distribution for the Smales Farm and North Shore Hospital developments.

Activity	Existing				2026				2036			
	AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
Smales Commercial	603	305	215	504	957	483	341	799	1,300	657	464	1,086
Smales Residential	0	0	0	0	17	51	42	26	51	154	125	80
Hospital Staff	471	128	191	450	824	233	318	757	824	233	318	757
Hospital Visitors	133	36	54	127	232	63	90	211	232	63	90	211
Total	**1,207**	**469**	**460**	**1,081**	**2,030**	**830**	**791**	**1,793**	**2,407**	**1,107**	**997**	**2,134**
	1,676		**1,541**		**2,860**		**2,584**		**3,514**		**3,131**	

Table 11: Total Trip Generation and Distribution

The distribution of generated trips to the wider road network was based on the surveyed traffic volumes. In general, traffic could head north on Wairau Road, east on Shakespeare Road, south on Taharoto Road, towards the motorway or west on Northcote Road. There is a small number of trips predicted to travel within the Smales Farm and Hospital precincts. These trips have been classified as internal trips.

Table 12 and **Table 13** below summarise the directionality of trips leaving from and arriving to Smales Farm and the Hospital for the morning and evening peak respectively.

Direction	From Smales	To Smales	From Hospital	To Hospital
North	30%	28%	17%	39%
South	20%	6%	9%	13%
East	15%	18%	5%	19%
West	3%	9%	4%	11%
Motorway North	7%	9%	28%	2%
Motorway South	21%	30%	36%	14%
Internal	5%	0%	1%	2%

Table 12: Distribution of Development Trips to Network – AM Peak

Direction	From Smales	To Smales	From Hospital	To Hospital
North	28%	35%	29%	44%
South	8%	13%	15%	20%
East	19%	11%	12%	8%
West	11%	26%	16%	5%
Motorway North	16%	8%	15%	0%
Motorway South	17%	5%	12%	21%
Internal	1%	1%	1%	2%

Table 13: Distribution of Development Trips to Network – PM Peak

8. Modelling

8.1 Modelling Methodology

As described above, Flow prepared a microsimulation model of the Northcote area to investigate the effects of the Smales Farm and North Shore Hospital expansions on the surrounding road network. TDG peer reviewed the models and undertook additional modelling work to assess the effects of the additional traffic demands.

The full modelling results are provided in Appendix A with a summary of results provided in section 8.7.

8.1.1 Model Extent

The network layout was taken as an excerpt from the ADTA model. Any inconsistencies in the layout were corrected. The area covered by the model is highlighted in blue in **Figure 13** below.

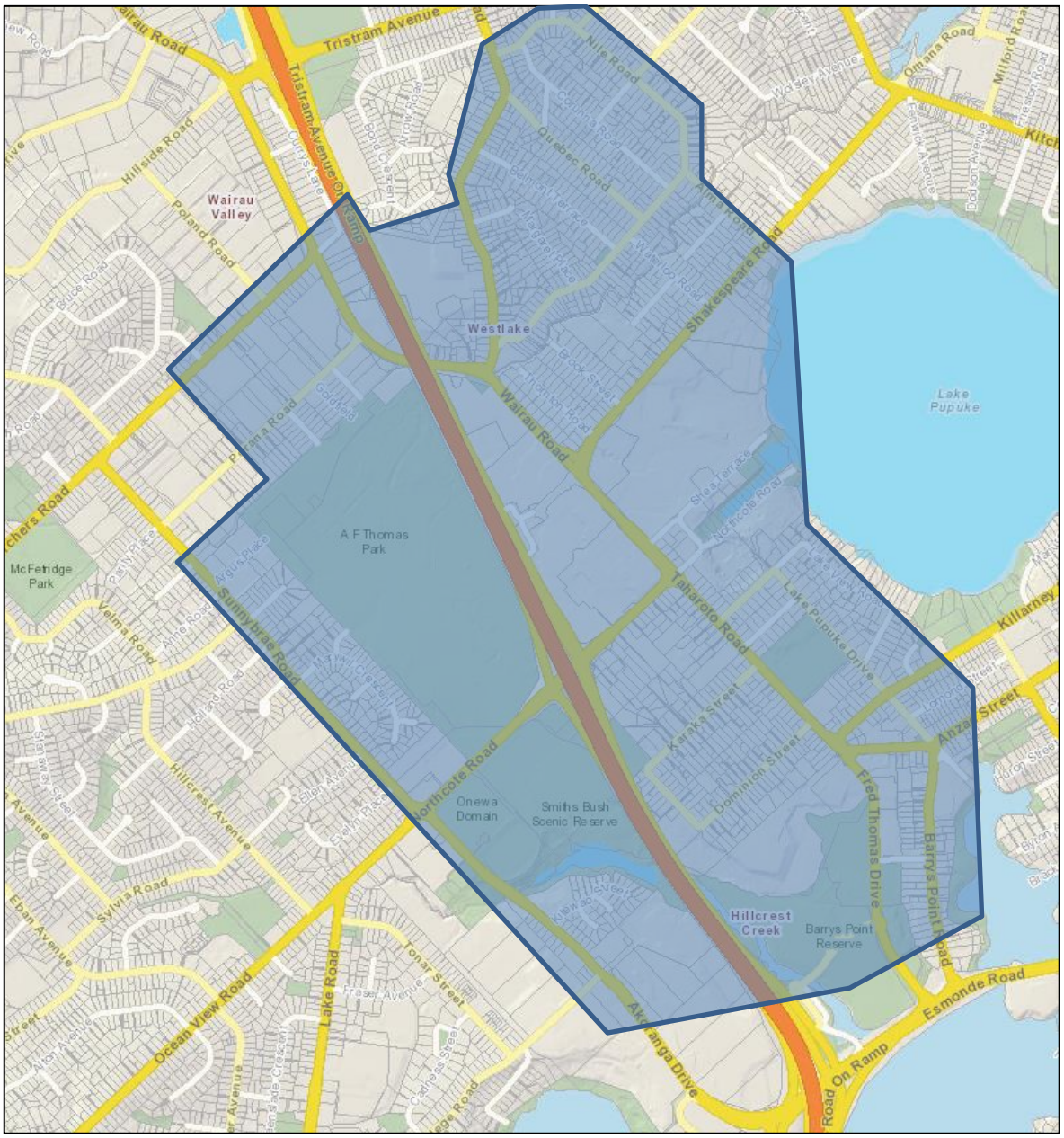


Figure 13: Extent of Model

While the motorway mainline was included in the model with through traffic applied in both directions, it was not calibrated to include congestion and queuing as a result of other factors outside the model area. The motorway mainline has therefore been ignored in analysis. Motorway on-ramps are governed by ramp signals and therefore the mainline has no impact on the remainder of the model. The queuing on the on-ramp as result of congestion on the mainline has been taken into account through the adjustment of the signal timings. Modelled Time Periods

The model includes four-hour peak periods that encompass the morning and evening peak hour as well as the peak periods for the subject sites and nearby schools. The time periods modelled are as follows:

- Morning peak from 6:00am to 10:00am with the background peak hour between 8:000am and 9:00am
- Evening peak from 2:00pm to 6:00pm with the background peak hour between 4:30pm and 5:30pm.

The modelled time periods were confirmed with both Auckland Transport and NZTA at the outset of the model development. The peak hours were derived from the traffic surveys throughout the area.

8.1.2 Model Demands

The base traffic volumes for the future 2026 and 2036 scenarios were derived from MSM model which includes scenarios in 10-year intervals from 2016. The future years 2026 and 2036 were selected to use in the AIMSUN modelling to provide some level of consistency between the observed traffic patterns and the future traffic patterns. It is noted that transport environment is always changing and that longer-term forecasts are less reliable than shorter terms forecasts.

The MSM model covers a two-hour period for both the morning and evening peak. To ensure consistency between the MSM model and four-hour AIMSUN model, the MSM volumes were scaled up using factors derived from the surveyed data. The differences between the years was then added to the existing volumes to create the base future traffic volumes.

Using an additive method for forecasting traffic volumes has resulted in some links experiencing significantly greater volumes when compared to the 2017 counts while some links experience a reduction or negligible increase. The MSM model does not have the same level of definition as the AIMSUN model and therefore may exaggerate demand increases on some routes that in reality would be shared between local streets. However, the key arterial routes are included in the MSM model and should provide a good measure for calculating the expected traffic demands on the key routes of Shakespeare Road, Wairau Road, Northcote Road and Taharoto Road.

The Flow report provides the predicted traffic demand differences between each origin-destination pair through the centre of the modelled area. **Table 14** below summarises the total background network demand (in vehicles) for the model across the four-hour period for the existing, 2026 and 2036 scenarios along with a % increase when compared to the base volumes. The additional demands relating to the developments at Smales Farm and the hospital are not included in these values.

Peak Period	Existing	2026	2036
AM Peak	63,839	66,681 (+4.5%)	66,201 (+3.7%)
PM Peak	88,871	90,328 (+1.6%)	90,510 (+1.8%)

Table 14: Total Background Network Demand (veh)

Overall, the increase in background traffic volumes is very small. This could be attributed to the fact that the area is already congested with little capacity remaining to accommodate additional volumes.

The MSM model also includes anticipated infrastructure upgrades, including upgrades to public transport infrastructure, that would be operational by 2026 and 2036. These upgrades could attribute to the slight reduction in total trips through the Northcote area between 2026 and 2036 in the morning peak.

8.1.3 Demand Profiles

The traffic demands were divided into 30-minute periods and profiled across the four-hour periods based on the surveyed volumes. Profiles were kept consistent between the existing and future scenarios.

Profiles for the morning and evening peak hours are shown in **Figure 14** and **Figure 15** below.

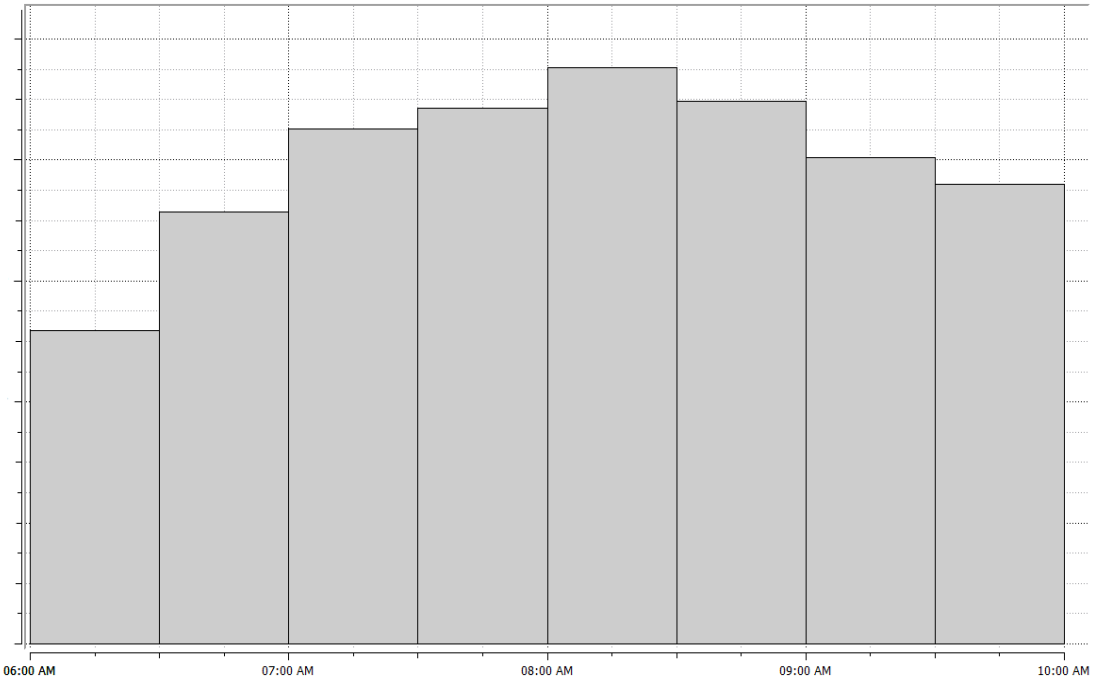


Figure 14: Morning Peak Demand Profile

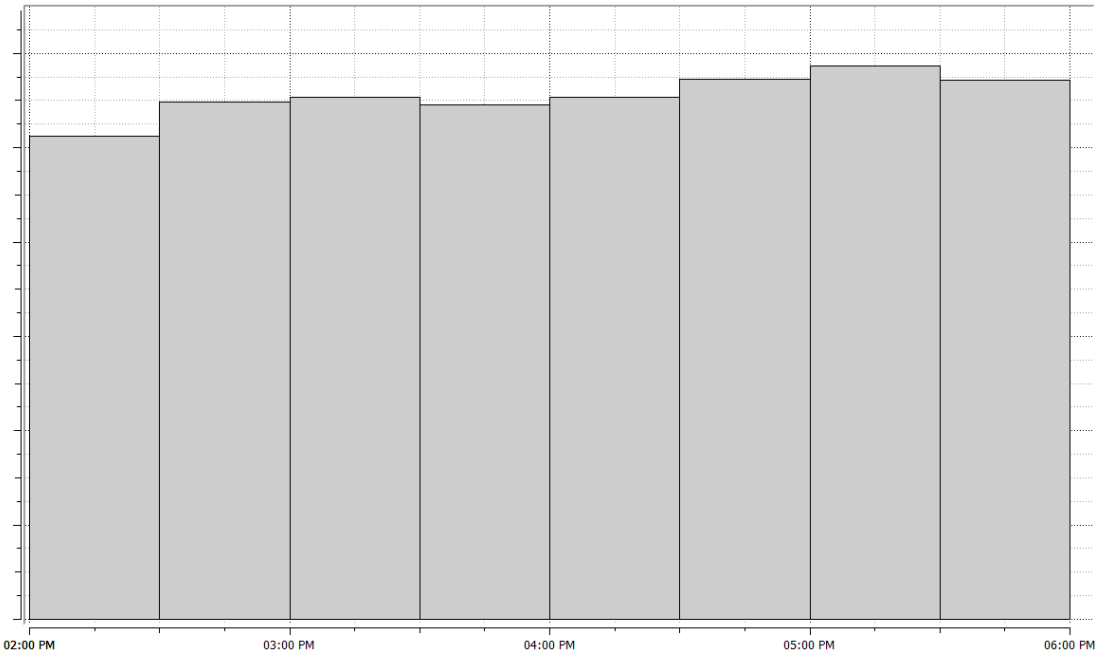


Figure 15: Evening Peak Demand Profile

In the morning peak, the demand clearly rises and falls. The evening peak is much flatter and therefore vehicles within the model build quickly and do not flush out as quickly as in the evening peak.

8.1.4 Signal Timings

Signalised intersections within the network were modelled as fixed time intersections. Signal timings were based on the actual signal timings as recorded by SCATS. Control plans were developed for each 30-minute period. While this is an acceptable approach for the base period, intersections are able to change phasing in reality based on the demands. If demands change, then the phasing is able to adapt to accommodate the change in travel patterns. Fixed time intersections also do not include the ability to allow for diamond lead interchanges where variable phasing may be appropriate if one right turn volume is higher than the opposing right turn movement.

TDG updated signal timings for the future scenarios in order to cater for the change in traffic patterns and demands. This includes updates to the do-minimum scenarios where increases to some approaches are notable and other volumes have experienced a reduction.

The ramp signal timings were adjusted by Flow to match the observed throughput. This includes reducing the frequency of green signals if the queue from the motorway mainline extends back up the on-ramp. The ramp timings have not been changed for the future scenarios as in reality these are more dependent on the mainline conditions rather than the on-ramp demands.

8.1.5 Vehicle Types

Four vehicle classes are present in the model. One of these is a bus which is used for prescribed public transport routes only. The bus network is the same as that which was extracted from the ADTA model. No changes are understood to have been made to the public transport lines including the dwell time at bus stops.

The new North Shore bus network has not been included within the model for the future scenarios as it is possible that the bus network may change further in the years following its release. The change to the number of buses and their route through the model area are not expected to have discernible difference on the modelling results. Public transport routes make no difference to traffic demands in this model.

The other three vehicles classes are normal cars, T2 cars and trucks. The number of cars and trucks was based on the surveyed traffic volumes and those extracted from the MSM model. The split between normal cars (one occupant) and T2 cars (two or more occupants) was based on the split of vehicles using the T2 lane on Shakespeare Road. This is considered to be appropriate as this is the only T2 lane in the model network and the only road that would be affected by T2 vehicles.

8.1.6 Warm-Up

The model does not include a warm-up period. Given that the model commences at least one hour before the peak hour, it is considered that adding a warm-up would have no discernible difference to the model outcomes.

8.2 Model Calibration

Flow calibrated the existing model based on the observed traffic volumes, travel times and queuing. In general, the parameters from the ADTA model were maintained through to the subject model. Through the calibration process, specific parameter changes were made to reflect localised behaviour. The changes made to the model are described below:

- Road type adjustments to reduce the 'rat running' effect (lower level in the hierarchy represents more attractive routes). The following sections were adjusted:
  - **5-Urban – Flush Median**
  - Taharoto Road south to Northcote Road
  - Northcote Road between The Avenue and Taharoto Road
  - Wairau Road north to Westlake Girls High School
  - **6-Urban – Centre Line w Marked Shoulder, for locations of**
  - Shakespeare Road north to Taharoto Road
  - Taharoto Road between Shakespeare Road and The Boulevard
  - Wairau Road between Shakespeare Road and Westlake Girls High School
  - Forest Hill Road

  - **8-Urban – No Median/Centre Line**
  - Nile Road
  - Waterloo Road
  - Quebec Road
  - Corunna Road
  - **9-Urban – Narrow Carriageway**
  - Belmont Terrace

- Gap acceptance parameters for the left turn movement from The Avenue onto Northcote Road.
- Acceleration factors and reaction times at traffic signals/stop lines. These parameters were adjusted to refine the queue discharge behaviour to better match observed behaviour.
  - **Acceleration Factors:**
  - Taharoto Road southbound north to Northcote Road
  - Taharoto Road northbound between the left slip lane entry and Northcote Road
  - Wairau Road southbound between the left slip lane entry and Shakespeare Road
  - Shakespeare Road southbound left slip lane
  - Northcote Road southbound between Taharoto Road and the southbound motorway on-ramp
  - **Reaction Times:**
  - Northbound motorway on-ramp
  - Southbound motorway on-ramp
  - Taharoto Road southbound north to Northcote Road
  - Taharoto Road southbound left slip lane
  - Shakespeare Road southbound left slip lane
  - Northcote Road southbound between Taharoto Road and the southbound motorway on-ramp
  - The Boulevard northbound between the left slip entry and Taharoto Road
- Zone 1 and Zone 2 distances control when vehicles will change lanes in anticipation of an upcoming turn. These distances have been modified for the following turns:
  - Left turn from Northcote Road southbound to the southbound motorway on-ramp
  - Right turn from Taharoto Road southbound to Northcote Road southbound
  - Through southbound movement at the intersection of Taharoto Road and Northcote Road

The full details of the calibration process are provided in the Flow report. A summary is provided in **Table 15** below.

Criteria	Sub-Criteria	Description	Criteria Satisfied	
			AM Peak	PM Peak
Link Flows	GEH Statistic	85% GEH less than 5	1% outside target	✓
		90% GEH less than 7.5	✓	✓
		95% GEH less than 10	✓	✓
	Coefficient of Determination (R^2)	A minimum of 95%	✓	✓
	Line of Best Fit	Y = 0.95x to 1.05x	✓	1% outside target
	Percentage-Root-Mean-Square Error (RMSE)	Acceptable: <15% Requires clarification: 15-25%	✓	✓
Turn Flows	GEH Statistic	85% GEH less than 5	✓	✓
		90% GEH less than 7.5	✓	✓
		95% GEH less than 10	✓	✓
	Coefficient of Determination (R^2)	A minimum of 95%	✓	✓
	Line of Best Fit	Y = 0.95x to 1.05x	✓	1% outside target
	Percentage-Root-Mean-Square Error (RMSE)	Acceptable: <15% Requires clarification: 15-25%	1% outside target	✓
Journey Times	Difference Comparison	90% or more of the modelled travel times should fall within 15% (or 1 minute if 1 minute is greater than 15% of the travel time)	✓	✓

Table 15: Modelling Criteria Summary

8.3 Future Road Network

8.3.1 Northcote Interchange

Flow identified through the 2026 modelling that the existing layout at the Northcote motorway interchange would struggle to cater for the increased traffic demands, in particular for the right turn to head north on SH1 during the evening peak period. Currently there are three lanes westbound on Northcote Road over the motorway with two lanes continuing to the western side of SH1 and one lane catering for right turning traffic heading north on SH1.

To mitigate the effects of increased traffic demands, not only from the proposed developments but also from the general increase to background traffic, the centre westbound lane on Northcote Road was altered into a shared through and right turn lane. This change increases the capacity and queuing storage area for the right turn movement at this location. Flow updated the signal timings on Taharoto Road, Wairau Road and Shakespeare Road to account for the change in road layout.

TDG observed that the road layout change affects the southbound motorway off-ramp where right turning traffic is held up by the queuing for the northbound on-ramp. This creates a stationary queue on the motorway mainline. TDG would therefore not recommend implementing this change in lane allocation and it is likely that NZTA would not support a change to the road layout that would result in queuing on the motorway mainline.

The proposed change results in an additional queue storage area of approximately 210m within the central westbound lane on Northcote Road. This is the equivalent of approximately 30 vehicles. TDG has noticed that the queue for the right turn extends beyond The Avenue only during the busier period (after 4pm) of the evening peak. This would be the only time of day that may benefit from the increased queuing storage. During this period the extent of queuing would increase by approximately 30 vehicles, which is not considered to be significant given that the queue at present already extends onto Taharoto Road.

Outside the busy evening peak times, the double right turn onto SH1 north would have no discernible effect on traffic operations. Notwithstanding this minor issue for the purposes of this assessment and ensuring consistency between the models prepared by Flow and the modifications applied by TDG, the layout change has been maintained.

8.3.2 Roundabouts

Two roundabouts are present within the model, one within the hospital grounds near the eastern access and one at the intersection between Killarney Street and Lake Pupuke Drive. TDG noticed that for some replications, the model would self-congest where vehicles would get stuck within the roundabout despite there being no downstream queue restricting vehicles exiting (although self-congestion would usually occur during congested times and fail to clear). To reduce this effect the circulating section of the roundabout within hospital grounds was expanded to allow vehicles more space to manoeuvre. The roundabout at the Killarney Street/Lake Pupuke Drive was widened to allow for two circulating lanes, one lane catering for circulating movements the other for exiting traffic. The roundabout was also expanded to increase circulating section lengths.

These changes are considered to be a work-around to software limitation rather than increasing the capacity of the intersection. For consistency, the changes were applied to all model scenarios.

The updated layout to the Killarney Street is included in **Figure 16** below.

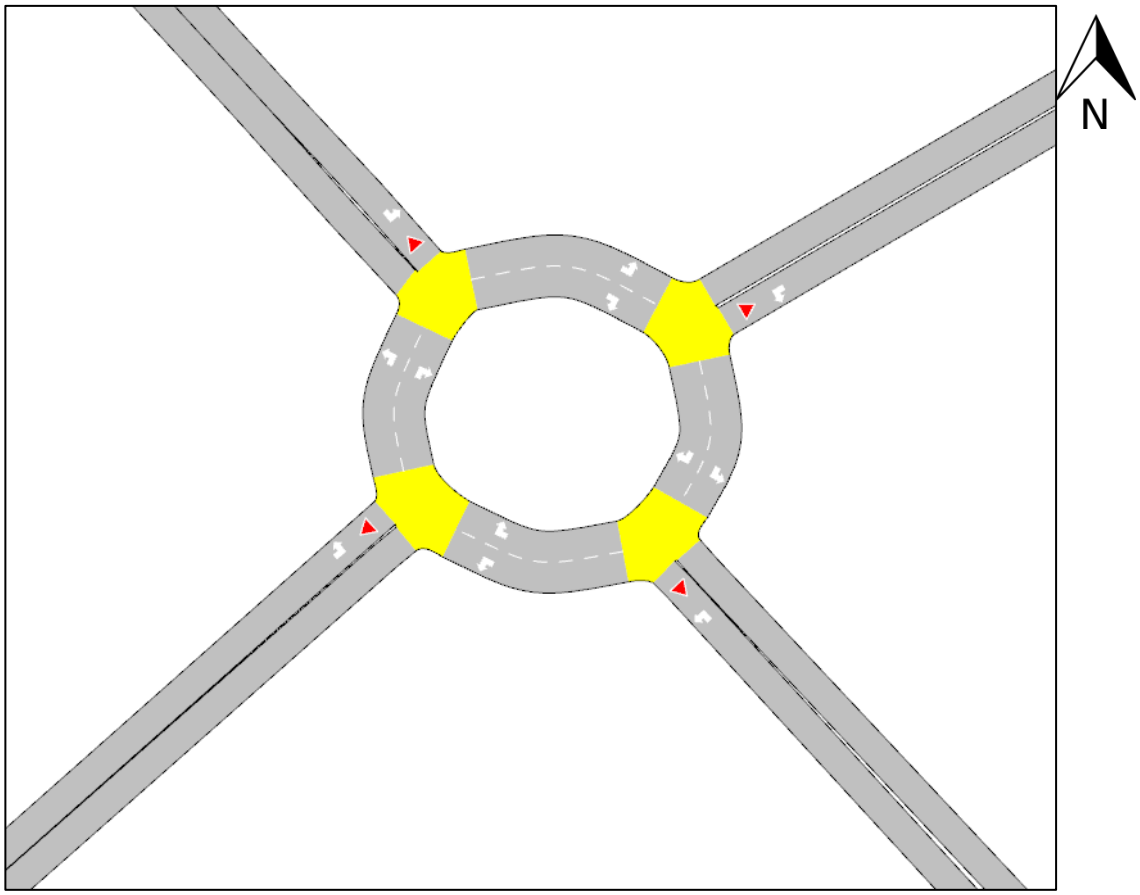


Figure 16: Modified Killarney Street/Lake Pupuke Drive Roundabout

8.3.3 Hospital Access

Various access arrangements for the hospital site were explored to minimise the effect on the surrounding road network. These included either a new link to Taharoto Road at the existing signalised intersection with The Boulevard, or a one-way loop arrangement that utilises an enhance Shea Terrace access. Preliminary modelling established that the Shea Terrace option works better in terms of effects on the overall network and also from a pedestrian accessibility perspective. However, the hospital access is not the subject of this Plan Change and to date has yet to be discussed with the hospital in detail.

Accordingly, this report incorporates the 'one-way loop' Shea Terrace option which does not create any additional access points to the Hospital site on the Taharoto Road frontage. Rather, Mary Poynton Crescent is converted into a one-way, one-lane northbound route from Taharoto Road and converts Shea Terrace into a one-way, two-lane route between Mary Poynton Crescent and Taharoto Road, effectively creating a one-way anti-clockwise loop. The intersection between Shea Terrace and Taharoto Road would be upgraded into a signalised intersection with timings directly linked to the Taharoto Road/Northcote Road intersection. The intersection would allow right turn movements out of Shea Terrace but would not cater for any inbound movements given its one-way layout.

Figure 17 illustrates the one-way loop access arrangements for the hospital.

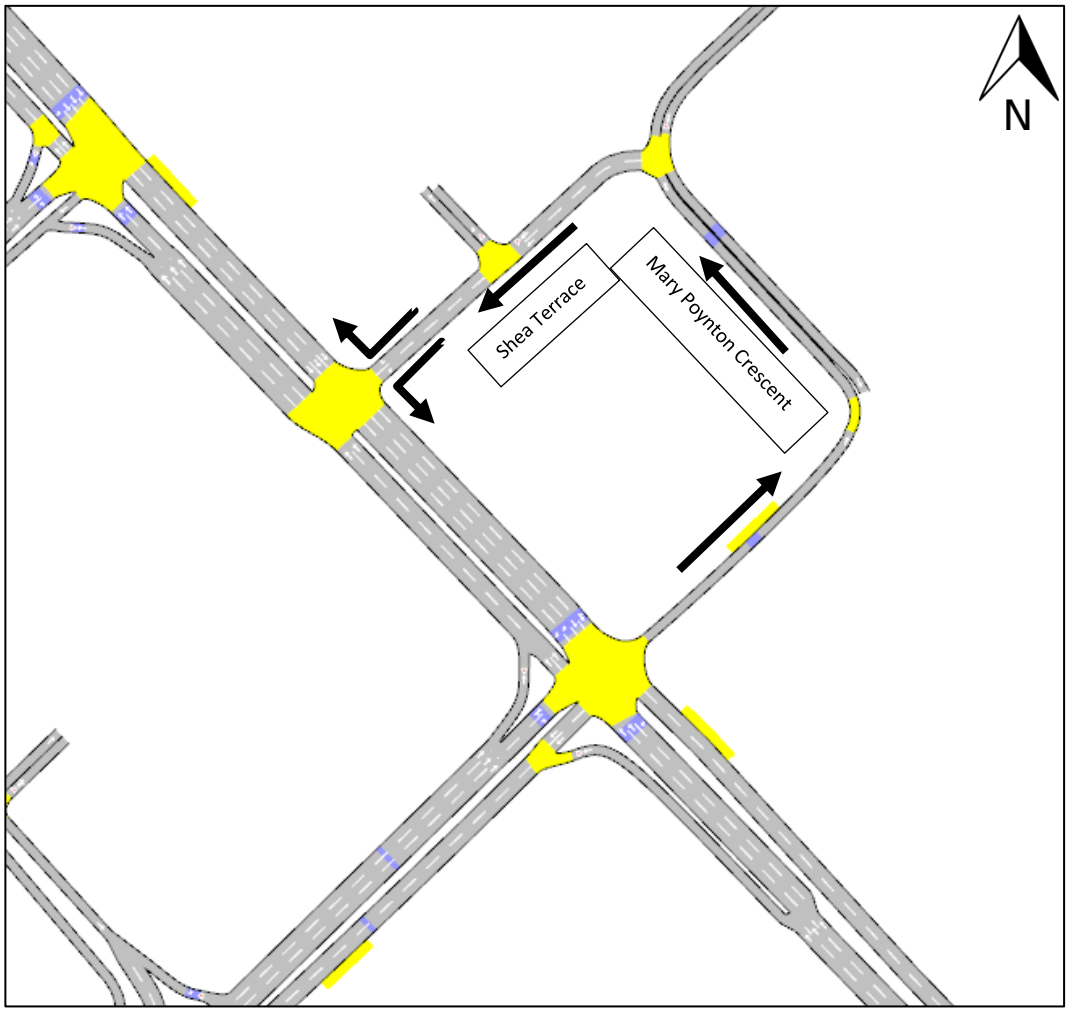


Figure 17: One-Way Loop Hospital Access Layout

No other changes to the road layout have been incorporated within the model. Only the signal timings (excluding ramp meters) at the various intersection locations have been modified between the different scenarios.

8.4 Initial Model Observations

The key model results are the travel times and virtual queues. Travel times have been measured along key routes through the model where the key routes match those surveyed. Virtual queues are created when vehicles are queuing outside the model and waiting to enter. Large virtual queues represent significant levels of congestion within the model network. The time vehicles spend waiting to enter the model is not counted as part of the travel time routes.

In general, it has been observed that virtual queues are apparent in every scenario modelled including the do-minimum models. Virtual queues, in the evening peak particularly, increase significantly to over 1,000 vehicles by the end of the modelled period for the do-minimum scenarios with increases observed when additional development traffic is added. While this is considered to be excessive, it is consistent across the model scenarios and therefore a comparison in network layout can still be provided between different network layouts.

TDG modified the signal timings in order to reduce the virtual queuing observed in all scenarios. However, the network is still heavily congested, with the SH1 ramp meters in particular limiting the extent of throughput that is possible. It is therefore considered likely that the amount of through traffic passing through the Northcote area is likely to reduce as a result of the high congestion levels. People will either choose a route that avoids the Northcote area, change their time of travel, work from an alternative location (e.g. home), or change transport mode. Changing transport mode is considered to be a viable and attractive option given the new public transport network, the proximity of rapid transit, and the Skypath, Seapath and Northcote Safe Cycle Route walking and cycling paths to provide a connection for the active modes between the North Shore and the city.

8.5 Background Traffic Reductions

The Northcote and surrounding areas are currently heavily congested particularly in the peak periods. Given the nature of the surrounding urban environment, and with most intersections already being signalised, there is little opportunity to mitigate the traffic effects of the additional development-related traffic except through people either changing modes in their travel, using alternative routes, or travelling outside the peak times.

One consequence of congestion is to encourage commuters to use public transport. The ongoing improvements to the speed, efficiency, convenience and frequency of public transport services are demonstrating that increases in the uptake of public transport is occurring.

As previously noted in Section 7.1 above, modelling tests were undertaken to investigate how much change in base travel patterns would have to occur in response to the introduction of additional Smales Farm and North Shore Hospital development traffic. Comparisons were made between the 2026 and 2036 'do minimum' scenarios (i.e. no additional development at either Smales Farm or North Shore Hospital), and the scenario with reduced through traffic volumes where the amount of traffic reduced was adjusted so that the amount of virtual queuing between the scenarios of the same year was similar.

It is emphasised that the do-minimum scenarios do not include any additional development beyond what is on the site currently. The amount of traffic generated by North Shore Hospital and Smales Farm sites in the future years is the equivalent to what was surveyed in 2017. These volumes are therefore less than what the MSM would have forecasted for the sites and is less than what is currently permitted at Smales Farm.

The criterion for scenario comparison adopted by Flow was that travel times on the key routes do not increase by more than five minutes. Given the amount of virtual queueing and already congested conditions, this criterion was considered insufficient. If a route is congested, the travel time will not increase any more than existing, but instead the extent of virtual queuing will continue to grow. Therefore, and for the purposes of the Smales Farm assessments, the extent of virtual queuing at the end of the model period was considered more appropriate to use as measure for this model to ensure that the traffic throughput is consistent when reducing background traffic demands.

For the future scenario, not all background traffic was reduced. It was identified that the motorway ramp meters are the critical locations that limit the amount of through traffic that can be served by the network. Therefore, the number of non-development related trips turning left or right from Taharoto Road into Northcote Road have been reduced to reflect the change in travel behaviour. This predominantly comprises vehicles heading to the motorway but also includes those heading west along the full length of Northcote Road as these people are also directly affected by congestion around the motorway interchange.

A reduction of 25% for the turning traffic from Taharoto Road into Northcote Road was used for the future scenarios. For context, the 25% reduction on these turns represents approximately 7%-9% of all traffic on Taharoto Road. For the 2036 AM scenarios, only the evening peak had background traffic volumes reduced. The calculations to background traffic volumes were made by Flow and adopted by TDG.

Table 16 below defines the number of trips that have been reduced in absolute terms. The values reported are number of vehicles reduced over the full 4-hour modelled period. The reduction of trips is profiled in the same manner as the overall demand profile for the respective modelled scenario.

Percentage Reduction	AM Four Hour Period		PM Four Hour Period	
	2026	2036	2026	2036
25%	588	0	974	1,259

Table 16: Reduction to Background Traffic Demands (Vehicles Per Four-Hour Period)

In the 2026 morning peak scenarios, the 25% reduction equates to only 588 vehicles over the four-hour period, an average of 147 vehicles per hour. In the 2026 evening peak scenarios, the 25% reduction equates to 974 vehicles over the four-hour period, an average of 244 vehicles per hour. Again, for context this equates to approximately 7% of all traffic using Taharoto Road. This quantum of trips that would need to be redistributed away from the network to enable a consistent network performance is considered realistic and achievable in the context of the total number of vehicles traveling in and around the area.

As noted previously, no reductions to background traffic volumes were made to the morning peak in the 2036 scenarios.

A reduction of 1,259 trips in the 2036 evening (four hour) peak period equates to an average reduction of 315 vehicles per hour. This volume of trips required to change travel behaviour is also considered to be achievable, given the expected improvements to alternative transport modes over the next 20 years, and represents approximately 9% of all traffic using Taharoto Road.

8.6 Modelled Scenarios

The list of scenarios tested, and the land use and background traffic for each scenario, is summarised in **Table 17** as follows:

Scenario	Background Traffic	Smales Development	Hospital Development
2026 Do-Minimum	2026 forecasted volumes	58,000sqm commercial 0 residential units (Same as 2017)	80,540sqm (Same as 2017)
2026 with Development	2026 forecasted volumes	92,000sqm commercial 285 residential units	163,920sqm
2026 Development with 25% turning traffic reduction	2026 forecasted volumes with 25% reduction to movements from Taharoto Road into Northcote Road	92,000sqm commercial 285 residential units	163,920sqm
2036 Do-Minimum	2036 forecasted volumes	58,000sqm commercial 0 residential units (Same as 2017)	80,540sqm (Same as 2017)
2036 Development with 25% turning traffic reduction	2036 forecasted volumes with 25% reduction to movements from Taharoto Road into Northcote Road	125,000sqm commercial 855 residential units	163,920sqm

Table 17: Modelled Scenarios

The do-minimum scenarios do not increase the amount of traffic using the Smales or Hospital precincts from the 2017 base scenario. The do-minimum scenarios therefore include less development than has been previously anticipated for these zones and is indeed less than what is permitted. The subsequent comparisons in Appendix A and Section 8.7 between the development scenarios and the do-minimum scenarios over-estimate the reduction in through traffic required to be diverted in order to maintain a comparable network performance.

TDG has modified the signal timings of intersections within the network in order to improve network performance. This was undertaken for all scenarios to ensure that a fair comparison was being made between the scenarios. In the future, it is likely that the signal timings will adjust to different traffic patterns and demands and therefore it is considered that changing signal timings for the future case does not affect any of the other parameters.

When considering the results, the future models were compared to the do-minimum scenario for the respective year. No references are made between different years.

Each model scenario comprises ten replications, five for each time period. The results have been averaged and are reported in Appendix A and in Section 8.7 as follows.

8.7 Model Results

The key results extracted from the model were the travel times along key routes and the virtual queuing present at the end of the model. The journey times across the routes were averaged to provide an overall journey time through the model. The average was weighted based on the demand for each route. A direct comparison is made between the with-development scenarios and the do-minimum scenario for that particular year, with numbers in red representing an increase in travel times or queuing and green numbers representing a decrease.

Figure 18 identifies the key routes that were analysed. These routes match the surveyed routes identified in Figure 12.

Figure 18: Modelled Routes Through Network

The full modelling results for each scenario are provided in **Appendix A**. A summary of the travel time and virtual queue results are provided in **Table 18** and **Table 19** for the 2026 and 2036 scenarios respectively.

Route	Travel Time (s)					
	Do-Minimum		Development		Development with 25% Reduction in turns	
	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Shakespeare to Wairau	256	259	828 **572**	317 **57**	484 **228**	323 **64**
Wairau to Shakespeare	183	208	513 **329**	328 **120**	350 **167**	221 **13**
Taharoto to Northcote	261	377	369 **109**	446 **69**	216 **-45**	342 **-34**
Northcote to Taharoto	364	330	167 **-197**	341 **11**	144 **-220**	385 **54**
Taharoto to Wairau	267	377	444 **177**	581 **204**	338 **71**	351 **-27**
Wairau to Taharoto	258	270	579 **321**	354 **84**	462 **204**	237 **-33**
Shakespeare to Taharoto	237	205	948 **711**	265 **60**	590 **353**	190 **-15**
Taharoto to Shakespeare	260	423	501 **241**	730 **307**	408 **148**	354 **-70**
Shakespeare to Northcote	475	550	1570 **1096**	669 **119**	815 **341**	407 **-143**
Northcote to Shakespeare	244	232	240 **-4**	359 **127**	267 **23**	275 **43**
Average Journey Time	**287**	**331**	**501** **214**	**446** **116**	**369** **82**	**314** **-16**
Virtual Queue (vehicles)	9	1,223	1775 1766	4498 3275	40 31	1017 -206

Table 18: 2026 Model Results

Route	Travel Time (s)			
	Do-Minimum		Development with 25% Reduction in turns	
	AM Peak	PM Peak	AM Peak	PM Peak
Shakespeare to Wairau	257	314	483 **226**	401 **87**
Wairau to Shakespeare	172	199	362 **190**	232 **32**
Taharoto to Northcote	245	630	259 **14**	283 **-348**
Northcote to Taharoto	289	361	150 **-138**	258 **-103**
Taharoto to Wairau	273	402	442 **169**	438 **36**
Wairau to Taharoto	242	259	499 **257**	239 **-20**
Shakespeare to Taharoto	216	194	542 **325**	212 **18**
Taharoto to Shakespeare	272	411	509 **236**	481 **70**
Shakespeare to Northcote	377	356	838 **460**	387 **31**
Northcote to Shakespeare	229	270	278 **49**	300 **29**
Average Journey Time	**261**	**338**	**406** **145**	**334** **-4**
Virtual Queue (vehicles)	3	2,626	160 157	1872 -754

Table 19: 2036 Model Results

In general, it is considered that a 25% reduction to traffic demands from Taharoto Road into Northcote Road is an appropriate approximation of trip reductions that would be necessary to mitigate the effects of the proposed developments for both the 2026 and 2036 scenarios.

It is empathised that the do-minimum scenarios only include the 2017 levels of development within the Smales Farm and North Shore Hospital sites. The change in base traffic patterns is therefore considered to be conservative.

8.8 Effect Contributors

The proposed Plan Change has been modelled alongside a proposed development of North Shore Hospital. The proposed hospital expansion doubles the current size of the facility by 2026 which is considered to be a very ambitious goal (that is unlikely to be realised) given the already large size of the hospital.

The modelling has analysed the combined effects of all of the proposed development within the Smales Farm and North Shore Hospital sites. No analysis has been undertaken of the individual components of each aspect of the development. This section breakdown the individual components of the development and highlights the likely relative impact of each land use.

The proposed developments can be categorised into three groups:

(i) Commercial development within Smales Farm.

(ii) Residential development within Smales Farm.

(iii) North Shore Hospital expansion.

At present, hospital activities within the North Shore Hospital site and commercial activities within Smales Farm are anticipated activities. Residential activities however are not currently permitted within either site, but will be enabled at Smales Farm by this Plan Change.

Table 20 below summarises the proposed amount and proportion of traffic generated by each of the three activities in the peak hour (veh/h).

Activity	2026		2036	
	AM	PM	AM	PM
Smales Commercial	1,440 (50%)	1,140 (44%)	1,957 (56%)	1,550 (50%)
Smales Residential	68 (2%)	68 (3%)	205 (6%)	205 (7%)
Hospital	1,352 (47%)	1,376 (53%)	1,352 (38%)	1,376 (44%)
Total	**2,860**	**2,584**	**3,514**	**3,131**

Table 20: Proportion of Trips Generated by Activity Type in the Peak Hour (veh/h)

The table above clearly demonstrates that the residential activity has the smallest relative impact on the surrounding road network. This analysis in itself is conservative in that residential traffic in this area will be outbound in the morning and inbound in the evening, which is generally opposite to the predominant movements for the commercial and hospital activities, thereby further reducing the residential impact on the surrounding road network.

The indiscernible effects from the residential activities are an important point when considered in a strategic sense. If the same number of household equivalents as anticipated in the Plan Change were to be developed in the current growth areas to the north of the city, then their cumulative impacts to this part of the road network would be considerably greater. This is especially the case given the comparative availabilities of alternative travel modes which are already at a high level at Smales Farm, but will be years from implementation at other future growth areas.

In summary, the core element of the proposed Plan Change is to enable the development of residential activity within the Smales Farm site. The proposed commercial activities are already enabled on the site up to a total of 105,000sqm before resource consent and associated additional traffic assessments are required, currently up to a maximum of 162,000sqm. As is demonstrated above, the residential component of the proposed development will have a minimal impact on the surrounding road network and it is considered that the effects of the commercial development can be sufficiently mitigated.

9. Integration with Transport Policy

The following section provides a review of established policy and plans in relation to the development enabled by the proposed plan change. The documents reviewed comprise:

(i) Government Policy Statement;

(ii) Auckland Plan;

(iii) Auckland Unitary Plan;

(iv) Integrated Transport Programme;

(v) Regional Land Transport Plan;

(vi) Regional Public Transport Plan; and

(vii) Auckland Transport Alignment Project

9.1 Government Policy Statement on Land Transport (GPS)

The Government Policy Statement on Land Transport sets out the Government's desired outcomes and priorities for the land transport sector. It describes what the Government expects to achieve through the National Land Transport Fund and the manner in which funding is allocating to upgrade and maintain the land transport network.

A draft GPS was released by the Minister of Transport for public engagement on 14 March 2018. While the current draft GPS is not yet official Government policy, it is anticipated that the majority of the priorities and objectives outlined the draft will be adopted by the Government in the final GPS by 30 June 2018. The final GPS will provide strategic direction for a 10-year period until 2027/2028 to improve the performance of the land transport system.

The four strategic priorities of the draft GPS are safety, access, environment and value for money. The GPS summarises the objectives of these priorities as follows:

(i) Safety – is a safe system free of death and serious injury;

(ii) Access – provides increased access to economic and social opportunities, enables transport choice and is resilient;

(iii) Environment – reduces the adverse effects on the climate, local environment and public health; and

(iv) Value for money – delivers the right infrastructure and services to the right level at the best cost.

The draft GPS outlines three themes to assist with effectively delivering upon the strategic priorities. These themes for the draft GPS are described below:

(i) A mode neutral approach to transport planning and investment decisions;

(ii) Incorporating technology and innovation into the design and delivery of land transport investment; and

(iii) Integrating land use and transport planning and delivery.

The Proposed Plan Change will fully enable the site to become a TOD, which is highly compatible with the strategic priorities of the draft GPS. Providing higher density housing and employment within Smales Farm which is immediately adjacent to a rapid transit hub, will enable more people to have a greater level of access. This provides increased access to social economic opportunities, as outlined in the draft GPS. The ability of the proposed TOD development to capitalise on existing infrastructure such as the Northern Busway and the future infrastructure plans outlined in ATAP means that the Plan Change provides value for money, as minimal expenditure on further infrastructure upgrades is required. Other transportation modes such as walking, and cycling are also available, which provides people at Smales Farm with a variety of choices and subsequently increases resilience. These active modes increase safety by encouraging less travel through private vehicles. Health benefits are provided by travelling through these modes, which also reduces adverse effects on the local environment such as fuel emissions.

The Smales Farm Plan Change considers the requirements for all transportation modes, which aligns with the draft GPS theme of undertaking a mode-neutral approach to transport planning.

The synergy of the residential, retail and office activities enabled by the Plan Change also allows integrated land use both within the development and within the context of supplementary activities in the local North Shore area.

It is therefore demonstrated that the proposed Plan Change at Smales Farm integrates very well with the strategic priorities and the themes outlined in the draft GPS.

9.2 Auckland Plan

The Auckland Plan is Auckland Council's 30-year strategy to create the world's most liveable city. Initially produced in 2012, a new draft plan was released in February 2018. Since the original Plan was released, the Auckland Unitary Plan has been introduced and several significant infrastructure developments have been completed, including the completion of the Waterview Tunnel. The new draft Auckland Plan shows how Auckland will prepare for an expected population increase of 39% or up to 2.4million people by 2043, and the 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 draft Auckland Plan is comprised of six outcomes where significant progress is targeted, one of which addresses transport and access. The Auckland Plan summarises this outcome as "*Aucklanders will be more easily able to get to where they want to go, and will have choices how they get around*."

The transport and access outcome outlines three directions:

(i) Create an integrated transport system connecting people, places, goods and services;

(ii) Increase genuine travel choices for a healthy, vibrant and equitable Auckland; and

(iii) Maximise safety and environmental protection.

The draft Plan also includes seven focus areas for the transport and access outcome:

(i) Make better use of existing transport networks, including a greater focus on influencing travel demand;

(ii) Target new transport investment to the most significant challenges;

(iii) Maximise the benefits from transport technology;

(iv) Make walking, cycling and public transport preferred choices for many more Aucklanders;

(v) Better integrate land use and transport decisions;

(vi) Move to a safe transport network, free from death and serious injury; and

(vii) Develop a sustainable and resilient transport system

Providing a high quality, residential, retail and employment space within the Smales Farm site within the proximity of rapid transit and complementary land activities allows an integrated transport system to be created, which allows people to be connected with places, goods and services. Employees and residents within Smales Farm will also have a wealth of travel choices available beyond private vehicles such as walking, cycling and public transport due to the connectivity of the site to the external network. This demonstrates that the Proposed Plan Change integrates well with the transport and access outcomes of the draft Auckland Plan.

9.3 Auckland Unitary Plan (AUP-OIP)

The Auckland Unitary Plan, which has been operative in part since November 2016, has the following objectives with regard to the regions transport infrastructure:

(i) Land use and all modes of transport are integrated in a manner that enables

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

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

(ii) An integrated public transport, walking and cycling network is provided for;

(iii) Parking and loading is supports urban growth and the quality compact urban form;

(iv) The provision of safe and efficient parking, loading and access is commensurate with the character, scale and intensity of the zone;

(v) Pedestrian safety and amenity along public footpaths is priorities; and

(vi) Road / rail crossings operate safely with neighbouring land use and development.

Smales Farm is well located with respect to rapid transit via its close proximity to the Smales Farm Bus Station, and the external walking and cycling networks. This means that the site is already well integrated with these transportation modes. It is anticipated that future projects planned will further enhance the site's integration with these various modes. This will ultimately provide the benefits of an integrated network by providing residents and employees with transportation choices, thereby reducing the effects of generated traffic by reducing the demand for private vehicle travel.

Parking will be provided at a rate appropriate to support the future activities within Smales Farm, while remaining sufficiently constrained to not undermine the benefits associated with having high levels of accessibility to non-car travel modes.

Pedestrian safety and amenity is well considered by providing dedicated pedestrian areas such as the central plaza, and by ensuring that several key linkages to the public footpath network and the Smales Farm Bus Station are provided.

In summary, the Smales Farm site is well located to a variety of transportation modes which means that the proposed Plan Change integrates well with both the objectives of the Unitary Plan and the existing and future transportation network.

9.4 Auckland Transport Alignment Project (ATAP)

Given the growth challenges that Auckland is facing, and the need for some big transport decisions to deal with this, the Government and Auckland Council have agreed on the need for a collaborative approach to improving alignment on a long-term strategic approach to transport in Auckland. Originally finalised in September 2016, a new edition of the Auckland Transport Alignment Project was released in April 2018 to provide a package to develop Auckland's transport system over the next 30 years.

The direction of ATAP is based upon the latest draft GPS and the draft Auckland Plan. Compared to the previous edition of ATAP, a greater emphasis has been placed on public transport (including rapid transit), walking, cycling and safety. Ultimately, ATAP aims to provide Auckland with a transport system that provides safe, reliable and sustainable access.

It contains investment to be made in projects to assist growth over the next decade (2018 – 2028), while identifying future priorities beyond 2028. The projects identified in ATAP which affect the Plan Change include the following:

- Rapid transit:
  - Northern Busway Extension (Constellation Station to Albany) – 2018-2028; and
  - North Shore (Orewa to City, including Takapuna connection, upgrade of the Northern Busway and new harbour crossing) – 2028 beyond.
- Strategic and local road network:
  - Northern Corridor Improvements – 2018-2028; and
  - Additional Waitemata Harbour Crossing – 2028 beyond.
- Walking, cycling and Local Board priorities:
  - Skypath and Seapath – 2018-2028.

Further detail of these projects has been provided in Section 4 of this report.

The projects outlined in ATAP will greatly enhance the accessibility of Smales Farm to all modes. While private vehicles currently have a high level of access due to the proximity of SH1, the emphasis of rapid transit in ATAP will enable increased utilisation of public transport. In the short term, the Northern Busway will be extended from Constellation Station to Albany, increasing accessibility in the North Shore. This will improve further if the Northern Busway is upgraded to light rail, which could connect to the city centre through a new harbour crossing.

Accessibility for active modes will also be improved with the Skypath and Seapath projects over the next decade by providing Smales Farm with off-road routes for cyclists and pedestrians to Auckland's city centre.

The projects included within the ATAP package will further enhance Smales Farm's ability to become a strong TOD, and will encourage mode shifts away from single occupancy private vehicles.

9.5 Regional Land Transport Plan (RLTP)

The Regional Land Transport Plan prepared by Auckland Transport with NZTA and Kiwirail, identifies the priority of a number of region-wide transport projects over a 10-year period. The current RLTP was adopted in 2015 and covers the period 2015-2025. The RLTP is reviewed every three years, which means that it will be updated in 2018. The ATAP package released in April 2018 will provide direction for the new RLTP. Projects outlined in the existing RLTP are outlined in ATAP, as detailed in Section 9.4.

The 2015 edition of the RLTP outlines five strategic themes to deliver the transportation components, which include:

(i) Prioritise rapid, high frequency public transport;

(ii) Transform and elevate customer focus and experience;

(iii) Build network optimisation and resilience;

(iv) Ensure a sustainable funding model; and

(v) Develop creative, adaptive and innovative implementation.

The Plan Change integrates well with the RLTP by aligning with these strategic themes. The proximity of the site to high frequency public transport via the Northern Busway allows rapid transit to be prioritised as a transport mode.

Furthermore, the variety of feasible modes people can utilise to travel to Smales Farm allows network optimisation by providing a variety of alternative routes, which also enhances resilience and manages congestion.

9.6 Regional Public Transport Plan (RPTP)

The Auckland Regional Public Transport Plan 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:

(i) Services that align with future land use patterns;

(ii) Services that meet customer needs;

(iii) Increased passenger numbers;

(iv) Increased public transport mode share; and

(v) Improved value for money.

The Plan Change complements the vision of the RPTP. As the site is located next to the Smales Farm Bus Station, a range of bus services including the frequent Northern Express route can be readily accessed. The new public transport for the North Shore area will be implemented in mid-2018 which will further enhance the site's public transport accessibility.

The frequent services that can be accessed by residents and employees align with the level of density that is proposed in the Plan Change, which allows the site to become a TOD. Convenient access will enable components of the RPTP's vision to be achieved such as increasing public transport passenger numbers and mode share. Further additions to the public transport network, as outlined in ATAP, will allow public transport to become an even more attractive mode in the short, medium and long-term future.

9.7 Integrated Transport Programme (ITP)

Auckland's 2012-2041 Integrated Transport Plan sets out the 30-year investment programme to meet the transport priorities outlined in the Auckland Plan across travel modes covering the responsibilities of all transport agencies. The ITP provides a consolidated transport investment programme across the transport system over the next 30 years. The programme covers footpaths, cycle facilities, public transport, state highways and local roads, intermodal transport facilities and supporting facilities such as parking and park-and-ride sites. In particular the ITP:

(i) Guides transport agencies in their detailed planning activities for maintaining, operating, renewing and developing their transport networks;

(ii) Directs transport asset management, corridor and network development, transport service levels and the transport capital portfolio for each of the 10-year periods to 2041; and

(iii) Informs the detailed programming of activities in the Regional Land Transport Plan (RLTP) which is a 10-year plan prioritising region wide transport projects currently for 2015-2025.

Projects identified in the ITP are largely addressed by ATAP, the RLTP and the RPTP, which are all detailed previously in this report. As it has been demonstrated that the Plan Change integrates well with these policies, it is considered that it also links well with the ITP.

9.8 Summary

It has been demonstrated that the future on-site activity that would be enabled by the Plan Change has excellent alignment with the various transport-related policy documents relevant to this proposal. As a TOD, Smales Farm is precisely the sort of development which the Auckland Plan, the GPS and the AUP-OIP all envisage with a high-density development maximising the use of rapid transit and active transportation modes. The proximity of the Smales Farm Bus Station ensures future residents and employees at the site would be well integrated with the high frequency public transport system.

Further, the nature, scale and location of the development potential that is anticipated by the Plan Change will positively influence the viability of and confidence in the public- and active- transport infrastructure investments that have already occurred and are planned in the area.

Other policy documents such as ATAP also outline funded and future priority projects which will further enhance the sites high level of accessibility to multiple transportation modes.

10. Discussion of Proposed Plan Change

The proposed Plan Change will specifically enable residential activity to be developed at the site, which is currently restricted with the current Business Park zoning and Smales 1 Precinct rules under the AUP-OIP. The addition of residential apartments, (potentially 1,380 units by 2051), and the proximity to rapid transit will together greatly support this unique opportunity of developing Smales Farm as Auckland's first true TOD. This development as a TOD aligns perfectly with the type of land use and transportation integration that the various policy documents see as being essential to successfully realise Auckland's growth intentions.

The site currently has excellent connectivity to a range of transport modes, particularly public transport through the Smales Farm Bus Station, and private vehicles through the proximity to SH1. A wide range of bus routes will continue to be available when the new public transport network for the North Shore is introduced in mid-2018. A key route is the Northern Express, which allows passengers from Smales Farm to rapidly access the city centre and Albany via the separated Northern Busway. The site's connectivity to all modes will increase in the next ten years, with committed schemes such as upgrades to SH1 and the Northern Busway, and the Northcote Safe Cycleway, Skypath and Seapath for cyclists. Beyond ten years, enhancements to the rapid transit system are likely through a potential upgrade of the Northern Express bus route to light rail. Collectively, these schemes will further reinforce Smales Farm's ability to act as a multi-modal destination and origin. Conversely, the demands for travel that Smales Farm will generate, that are ideally focussed at a key confluence of travel modes, will provide significant support for these future investments.

While the road network within the vicinity of the site currently experiences high levels of congestion, which is expected to continue in the future 2026 and 2036 scenarios, a mode shift away from private vehicles is both necessary and feasible to enable the proposed level of development. Given the current levels of development in the local area, it is not practical to continuously widen the roads and intersections to provide additional capacity for private vehicles. As outlined in Section 3.4.3, the limited and reducing capacity of the road network has led to Aucklanders increasingly arriving to Auckland's city centre via public transport since 2001. Improvements to the public transport infrastructure and services over this period have enabled and encouraged this growth in public transport patronage. By 2041, it is projected that the total number of private vehicle trips into the city centre will remain relatively constant, but the overall mode share of public transport and active modes will significantly increase. It is considered that Smales Farm is able to perform a similar mode shift due to the available accessibility of a range of transport modes, particularly the rapid Northern Express route.

The addition of residential activity will significantly change the nature of Smales Farm by allowing it to become a trip origin, as well as a destination. The proposed residential activity will complement the existing office activity as future residents would be able to live directly by their workplace. Becoming a major origin also allows Smales Farm to capitalise on the Northern Express route, which is primarily utilised in one direction during peak periods. Adding residential activity would allow the trips to be made in the non-peak direction, (for example from Smales Farm to Albany during the morning peak).

The proposed Smales Farm TOD provides the best opportunity to maximise density within the vicinity of the Smales Farm Bus Station. A walkable catchment of a 400m radius allows an average person to walk to a destination within five minutes before considering alternative transport modes3. Smales Farm is almost fully within this 400m walkable catchment of the Smales Farm Bus Station, which allows employees and future residents to easily walk to access public transport. However, the majority of the 400m radius area of the Smales Bus Station is unable to be utilised due to the presence of SH1 and the AF Thomas Park Golf Course. This limits the potential number of walkable trips that can be made. Providing high density development within the 400m walkable catchment of the Smales Farm Bus Station therefore allows the potential number of walkable trips to be maximised. Ultimately, higher levels of density within a 400m walking catchment of the Smales Farm Bus Station will allow more trips to be made through public transport.

The location of Smales Farm allows the level of development enabled by the proposed Plan Change to efficiently integrate with the surrounding network far more effectively than if it was located in a different location, such as a greenfield site in one of the growth areas to the north of the City. Smales Farm's location in Takapuna allows current employees and potential future residents to readily and conveniently access a wide range of supporting activities without having to make long trips in private vehicles. The close proximity to activities such as schools, retail and the North Shore Hospital means that people are able to easily walk or cycle to reach destinations within the local area. This level of convenience would not be possible if this level of development was provided at a greenfield site, where new supporting infrastructure and activities would likely need to be constructed. A greenfield location would most likely not have immediate access to rapid transit, which would increase the reliance on private vehicles. To access central urban locations, vehicles would effectively join the back of any queues, creating further congestion. Smales Farm's unique location in a developed area and directly adjacent to rapid transit prevents these issues, as supporting land uses and public transit is readily accessible.

The modelling undertaken demonstrates that a reduction of 25% of trips turning from Taharoto Road into Northcote Road would be necessary to mitigate the effect of the expected development from the North Shore Hospital and the Smales Farm development enabled by this plan change. This represents an average of less than 250 vehicles per hour, which is considered easily achievable given the factors discussed in this section. The residential activities only contribute a very small amount of trips when compared to the commercial and hospital expansions and results in the reduction of less than 20 vehicles per hour. This is an important point when considered in a strategic sense as if the same number of dwellings were established on the fringe of the urban area, then their cumulative impacts would be considerably greater. This is especially the case given the comparative availabilities of alternative travel modes which are already at a high level at Smales Farm, but will be years from implementation at other future growth areas.

In summary, a mode shift away from private vehicles is required to accommodate the level of activity proposed in the Plan Change. Mode share trends in the Auckland city centre and the proximity of rapid transit through the Smales Farm Bus Station show that

[3] http://temp.aucklandcouncil.govt.nz/SiteCollectionDocuments/aboutcouncil/planspoliciespublications/technicalpublications/tr2013014walkablecatchmentsanalysisatauckandtrainnorthernbuswaystations2013.pdf

this mode shift is achievable. The location of the site means that Smales Farm will provide a strong TOD. The walking catchment of the Smales Farm Bus station can also be developed to its full potential through this Plan Change, including enhancing walking routes to / from the North Shore Hospital, with its high employment.

11. Conclusion

This Integrated Transportation Assessment report has detailed the transportation implications of the proposed Plan Change for Smales.

The proposed Plan Change will enable the existing Smales Farm business park site to expand upon its existing office activities to include high density residential activities over the next 20 – 30 years. By capitalising on the site's proximity to the Smales Farm Bus Station, the long-term vision of the site is to become a Transit Oriented Development which is able to take full advantage of the significant transportation hub that it abuts, in favour of reliance on single-occupancy private vehicle trips to travel to or from the site. Community surveys of Smales Farm employees show that the mode share of non-private vehicles is high compared to other workplaces in Auckland, and that employees are willing to further utilise public transport in the future.

It has been demonstrated in this report that the site currently has excellent connectivity to a wide range of transport modes. The short walking distance to the Smales Farm Bus Station enables immediate access to the rapid transit network through the Northern Express bus routes. A variety of other bus routes at this key transportation hub mean that many locations within the North Shore and Auckland can be accessed from the site through public transport.

Private vehicles also have a high level of access to the external road network with SH1 and various major arterial roads located closely to Smales Farm.

Good walking and cycling infrastructure also exists within the surrounding areas.

Future transportation projects as outlined in ATAP will further enhance Smales Farm's excellent connectivity. Projects with committed funding such as Skypath and Seapath will enable cyclists from Smales Farm to access the Auckland CBD in a primarily off-road route. The Northern Busway will be upgraded in the future, enabling easier access to Albany. Future priorities have been identified in ATAP which could result in a second harbour crossing for private vehicles and rapid transit, and light rail in the North Shore.

A detailed analysis of current transport policy and strategy documents show that the proposed Plan Change anticipates a form of development for Smales Farm that aligns particularly well with the stated intentions for Auckland's transportation future, particularly in terms of how land-use and transportation are to be integrated to best accommodate future growth demands.

Traffic modelling has been undertaken for the future 2026 and 2036 scenarios. The assumptions that have gone into the modelling methodology have been conservative, and if anything will overestimate the traffic effects of the proposed developments. In particular, the completion of the hospital, which is proposed to double in size, is unlikely to be completed by 2026.

The modelling demonstrates that in order to achieve traffic performances on the surrounding road network in 2026 and 2036 that are comparable to no development at all occurring on the Smales Farm or North Shore Hospital sites, there will need to be a reduction of less than 250 vehicles per hour turning from Taharoto Road into Northcote Road . For context, this equates to 7-9% of total traffic volumes on Taharoto Road. Of this, only a very small proportion of this is attributable to the proposed residential. Trends in the Auckland city centre show that such reductions are achievable when the road network is congested, and when viable and frequent public transport is provided. This is also applicable to the commercial activities within Smales Farm.

Accordingly, it is considered that the Smales Farm site is an excellent candidate to support the future levels of activity enabled by the Plan Change proposal, and that the development can be efficiently integrated into the surrounding transportation network in a complementary and sustainable manner.

Appendix A

Modelling Results

1. 2026 Do-Minimum

The 2026 scenario increases background traffic demands but no additional traffic is added to or from the Smales Farm or hospital centroids when compared to the 2017 surveyed demands. TDG has modified the signal timings to reduce the extent of virtual queues, and the results are provided in **Table 21**.

Route	Travel Time (s)	
	AM Peak	PM Peak
Shakespeare Rd to Wairau Rd	256	259
Wairau Rd to Shakespeare Rd	183	208
Taharoto Rd to Northcote Rd	261	377
Northcote Rd to Taharoto Rd	364	330
Taharoto Rd to Wairau Rd	267	377
Wairau Rd to Taharoto Rd	258	270
Shakespeare Rd to Taharoto Rd	237	205
Taharoto Rd to Shakespeare Rd	260	423
Shakespeare Rd to Northcote Rd	475	550
Northcote Rd to Shakespeare Rd	244	232
Average Journey Time	**287**	**331**
Virtual Queue (vehicles)	9	1,223

Table 21: 2026 Do-Minimum Scenario Model Results

The 2026 do-minimum scenario has negligible queuing at the end of the morning period. There is still a significant queue of over 1,000 vehicles at the end of the evening peak period.

12. 2026 with Development

The with development scenario includes the trips generated by the expected completed development by 2026 as outlined in section 7. Details of the 'one-way loop' layout are detailed in section 8.3.3 and the modelling results are presented in **Table 22** below.

Route	Travel Time (s)	
	AM Peak	PM Peak
Shakespeare Rd to Wairau Rd	828 **572**	317 **57**
Wairau Rd to Shakespeare Rd	513 **329**	328 **120**
Taharoto Rd to Northcote Rd	369 **109**	446 **69**
Northcote Rd to Taharoto Rd	167 **-197**	341 **11**
Taharoto Rd to Wairau Rd	444 **177**	581 **204**
Wairau Rd to Taharoto Rd	579 **321**	354 **84**
Shakespeare Rd to Taharoto Rd	948 **711**	265 **60**
Taharoto Rd to Shakespeare Rd	501 **241**	730 **307**
Shakespeare Rd to Northcote Rd	1570 **1096**	669 **119**
Northcote Rd to Shakespeare Rd	240 **-4**	359 **127**
Average Journey Time	**501** **214**	**446** **116**
Virtual Queue (vehicles)	1775 1766	4498 3275

Table 22: 2026 One-Way Loop Scenario Model Results

Similar to adding the additional hospital access opposite The Boulevard, travel times and virtual queues notably increase. However, confirming that this is a viable access solution, overall increases are not as significant as providing an additional hospital access.

13. 2026 Development with a 25% Reduction

The 25% reduction to the movements from Taharoto Road into Northcote Road was applied to the one-way loop network layout. The demands are the same as those used in the scenario testing a 25% reduction to the network adding a fourth access to the hospital.

Route	Travel Time (s)	
	AM Peak	PM Peak
Shakespeare Rd to Wairau Rd	484 **228**	323 **64**
Wairau Rd to Shakespeare Rd	350 **167**	221 **13**
Taharoto Rd to Northcote Rd	216 **-45**	342 **-34**
Northcote Rd to Taharoto Rd	144 **-220**	385 **54**
Taharoto Rd to Wairau Rd	338 **71**	351 **-27**
Wairau Rd to Taharoto Rd	462 **204**	237 **-33**
Shakespeare Rd to Taharoto Rd	590 **353**	190 **-15**
Taharoto Rd to Shakespeare Rd	408 **148**	354 **-70**
Shakespeare Rd to Northcote Rd	815 **341**	407 **-143**
Northcote Rd to Shakespeare Rd	267 **23**	275 **43**
Average Journey Time	**369** **82**	**314** **-16**
Virtual Queue (vehicles)	40 31	1017 -206

Table 23: 2026 One-Way Loop with 25% Reduction Model Results

The results for this scenario are overall very similar to the do-minimum scenario. The evening peak experiences travel time improvements for more routes and has a notable reduction to the extent of virtual queues at the end of the modelled period. This demonstrates that a 25% reduction to the Taharoto Road movements into Northcote Road is likely to be more than is necessary to offset the effects of the development with this hospital access configuration.

14. 2036 Do-Minimum

The 2036 scenario increases background traffic demands but no additional traffic is added to or from the Smales Farm or hospital centroids. The results for the 2036 do-minimum scenario are presented in **Table 24** below.

Route	Travel Time (s)	
	AM Peak	PM Peak
Shakespeare Rd to Wairau Rd	257	314
Wairau Rd to Shakespeare Rd	172	199
Taharoto Rd to Northcote Rd	245	630
Northcote Rd to Taharoto Rd	289	361
Taharoto Rd to Wairau Rd	273	402
Wairau Rd to Taharoto Rd	242	259
Shakespeare Rd to Taharoto Rd	216	194
Taharoto Rd to Shakespeare Rd	272	411
Shakespeare Rd to Northcote Rd	377	356
Northcote Rd to Shakespeare Rd	229	270
Average Journey Time	**261**	**338**
Virtual Queue (vehicles)	3	2,626

Table 24: 2036 Do-Minimum Scenario Model Results

Similar to the 2026 scenario, there is negligible virtual queuing present at the end of the morning peak period. The evening peak has a large amount of virtual queuing with over 2,500 vehicles.

15. 2036 Development with a 25% Reduction

The 25% reduction to the movements from Taharoto Road into Northcote Road was applied to the one-way loop network layout. The demands are the same as those used in the scenario testing a 25% reduction to the network adding a new access to the hospital site.

Route	Travel Time (s)	
	AM Peak	PM Peak
Shakespeare Rd to Wairau Rd	483 **226**	401 **87**
Wairau Rd to Shakespeare Rd	362 **190**	232 **32**
Taharoto Rd to Northcote Rd	259 **14**	283 **-348**
Northcote Rd to Taharoto Rd	150 **-138**	258 **-103**
Taharoto Rd to Wairau Rd	442 **169**	438 **36**
Wairau Rd to Taharoto Rd	499 **257**	239 **-20**
Shakespeare Rd to Taharoto Rd	542 **325**	212 **18**
Taharoto Rd to Shakespeare Rd	509 **236**	481 **70**
Shakespeare Rd to Northcote Rd	838 **460**	387 **31**
Northcote Rd to Shakespeare Rd	278 **49**	300 **29**
Average Journey Time	**406** **145**	**334** **-4**
Virtual Queue (vehicles)	160 157	1872 -754

Table 25: 2036 One-Way Loop with 25% Reduction Model Results

The modelling results for this scenario are reasonably consistent with the do-minimum scenario.