Auckland Transport
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Mill Road Corridor Upgrade

Integrated Transport Assessment - Final Report

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Client: Auckland Transport

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Quality Information

Document Mill Road Corridor Upgrade

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Revision History

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			Name/Position	Signature
A	9-May-2014	Draft Report for Client Comment	Craig Hind Project Manager	
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D	02-Oct-2014	Final for NoR Submission	Craig Hind Project Manager	

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Executive Summary

Purpose

This Integrated Transport Assessment (ITA) was undertaken to support the three Notices of Requirement for the Mill Road Corridor Upgrade (the proposal), to assess the impacts of the proposal on the corridor and to assess the future land use assumptions of the Unitary Plan.

The proposal involves re-grading, realigning and widening Redoubt Road, Murphys Road (to Flatbush School Road) and Mill Road (to Alfriston Road). The upgrade provides for four-laning of the carriageway, cycle facilities, footpaths and bus lanes on Redoubt Road.

The need for upgrade

The majority of trips along the corridor are car based (93%), with little or no provision of walking, cycling and public transport. Trips tend to be through movements, between origins and destinations at the sub-regional level. The Mill Road corridor does offer an alternative route to SH1, particularly for trips between Papakura, Flatbush and Manukau Centre.

Congestion currently occurs on the northern parts of the corridor including Murphys Road and Redoubt Road during the morning peak period. There are considerable safety issues along the corridor, with 89 crashes in the previous five year period.

Key strategic land use change proposed by the Auckland Plan and Proposed Auckland Unitary Plan (PAUP) includes the opportunity for significant population and employment growth in the Flatbush area and the southern growth areas around Papakura and Drury (see ***Future Urban Zone***, below). As development occurs within these areas increased travel demand will result in existing levels of congestion resulting in longer and inconsistent travel times throughout the corridor.

Future travel demand at various locations along the corridor suggests that the Mill Road upgrade between SH1 and Redoubt Road - covered by NoR 1 and 2 - will result in congestion relief and more consistent travel times along this part of the corridor. The anticipated release and uptake of land both within Flatbush and the wider area would warrant an upgrade of the SH1 to Redoubt Road section prior to 2024. Certainly traffic issues increasing at the current rate would be more than likely to stifle development within these areas within this timeframe.

The Redoubt Road to Alfriston section (covered by NoR 3) is anticipated to suffer from increasing levels of congestion both in response to urban land release in the Flatbush area but more significantly the Takanini Future Urban Zone. Traffic issues anticipated from these land release areas warrants an upgrade between Redoubt Road and Alfriston prior to 2026.

The realignment and widening of the corridor, particularly the Murphys Road section and intersection with Reboubt Road, and the NoR 3 section will have a positive impact on the safety record of the corridor.

The upgrade

The implementation of the Mill Road upgrade results in a greater growth in trips along the corridor than under base (no upgrade) conditions. Approximately 80% of trips along the corridor are between 8-16km in length, suggesting that the corridor is used more for sub-regional trips rather than local trips.

The upgrade will relieve congestion throughout the corridor beyond 2041 under current land use conditions (i.e. no or minimal release of FUZ). There will remain some traffic issues on approach to SH1, most likely caused by the inevitable queuing from ramp signals in the morning and evening peak periods.

Justification for the upgrade does rely on the function of Mill Road as an intra-regional peri-urban arterial route and an alternative corridor to SH1. The provision of an upgraded corridor will redistribute traffic from SH1 and parts of the local network. This does support the project objective of providing network resilience however may be questioned in terms of its future strategic function to trigger land use development and support more local trips, including access to public transport interchange.

Future Urban Zone

The PAUP identifies a strong indication of future urban development potential through the Future Urban Zone (FUZ) at Takanini and Drury. The FUZ provides significant opportunity for master-planned urban development in locations identified through the strategic planning process.

The Takanini FUZ in particular has the potential to release significant tracts of residential land reliant on the Mill Road corridor for local and inter-regional trips.

If the Takanini FUZ develops in a manner that reflects adjacent suburban areas, there will be an increase in the number of trips on the network. Without any upgrade on Mill Road these trips will result in the corridor becoming increasingly congested within the first two years of release (at up to 150 units per year). This could occur as early as 2018 – 2020.

The Mill Road upgrade does cater for the release of FUZ land and is almost certainly a strong strategic justification for the release of FUZ through a plan change process. One reason for this is that even with sensible land release and potential mitigation measures (see Section 7) the FUZ has the potential to utilise any spare capacity along the corridor. Modelling of the FUZ indicates that congestion of the upgraded corridor could result as early as 2030 (pre-mitigation).

The recent identification of the Special Housing Areas within the Takanini FUZ and Flatbush may have the effect of accelerating development earlier or faster than expected.

Mitigation

The opportunity to mitigate the impacts of traffic growth on the Mill Road corridor is heavily influenced by the release of FUZ land. Mitigation opportunities for non-FUZ related trips is limited as these are heavily dispersed trips from current and planned regional land use (the transport model also includes some mitigation).

As an unknown quantum the FUZ could support local employment and community facilities such as schools, parks, reserves, commercial and retail opportunities. The multiple FUZ locations within reasonable distance from the Mill Road corridor would therefore have complementary facilities that would benefit from the construction of high quality walking and cycling facilities along the corridor plus improved access to potential public transport services.

While the corridor upgrade can be justified on the basis of capacity and safety the addition of FUZ related trips provides significant justification on a strategic level. The mitigating factors of the FUZ will reduce the impacts of the FUZ on the corridor, further enhancing the economic life of the upgrade itself.

Staging and Constructability

An assessment of the proposal staging and constructability concludes that the area proposed for designation will cater for the reasonable construction effects of the upgrade.

An assessment of construction traffic flows indicates that much of the corridor will need to be maintained in order to avoid serious queuing and delay. Options are limited to re-route or limit the quantum of trips along the corridor. However, providing one lane in each direction can be maintained, with appropriate approach lanes at signalised intersections, construction impacts can be managed and mitigated.

Outcomes and Recommendations

The ITA identifies that without any upgrade:

- The Mill Road corridor will reach unreasonable levels of congestion by 2024
- The Mill Road corridor will continue to contribute to the high crash rate in the area
- Urban growth in locations with strategic support may be constrained to less than desirable levels.

The ITA consistently supports the designation of the corridor, particularly:

- The staging and timing defined by NoR 1 and NoR 2 sections
- The ability of NoR 3 to connect and support strategic land use development indicated by the Future Urban Zone land
- The ability to future proof for public transport services, and walking and cycling infrastructure.

The upgrade supports the project objectives in terms of:

- providing reasonable capacity for a 30 year planning horizon
- improving safety for future users
- providing an appropriate degree of resilience to SH1
- supports a more connected environment (particularly the release of FUZ land)
- provides for walking, cycling and public transport use
- Manages potential negative impacts on the environment (through the SAR assessment)
- Is constructable within the footprint of the NoRs and can be staged appropriately
- Supports national and regional strategic policy objectives.

What Next?

While not matters to be considered by the current Notices of Requirement it is important to note the potential next steps in terms of connections to and from the south and the need for mitigating the impact of trips generating through urban land development.

A future upgrade to the central section of the Mill Road corridor (i.e. south of Alfriston) will be driven by the trip demands resulting from the FUZ, and is likely to be triggered by capacity increases in the southbound direction towards Papakura and the southern growth sector. Mitigation through provision of infrastructure for walking, cycling and access to public transport is required to minimise the impact of the FUZ on the corridor, and will extend the economic life of the upgrade.

Further mitigation of appropriate land use development that supports travel demand management is required (for the FUZ) and should include such measures as local employment, local community facilities (schools, parks and reserve land), home based employment, car sharing and travel information (or other measures to be assessed as part of the FUZ release).While a degree of resilience is provided with the upgrade the release of FUZ land will erode this resilience over time, particularly during morning peak periods in the northbound direction.

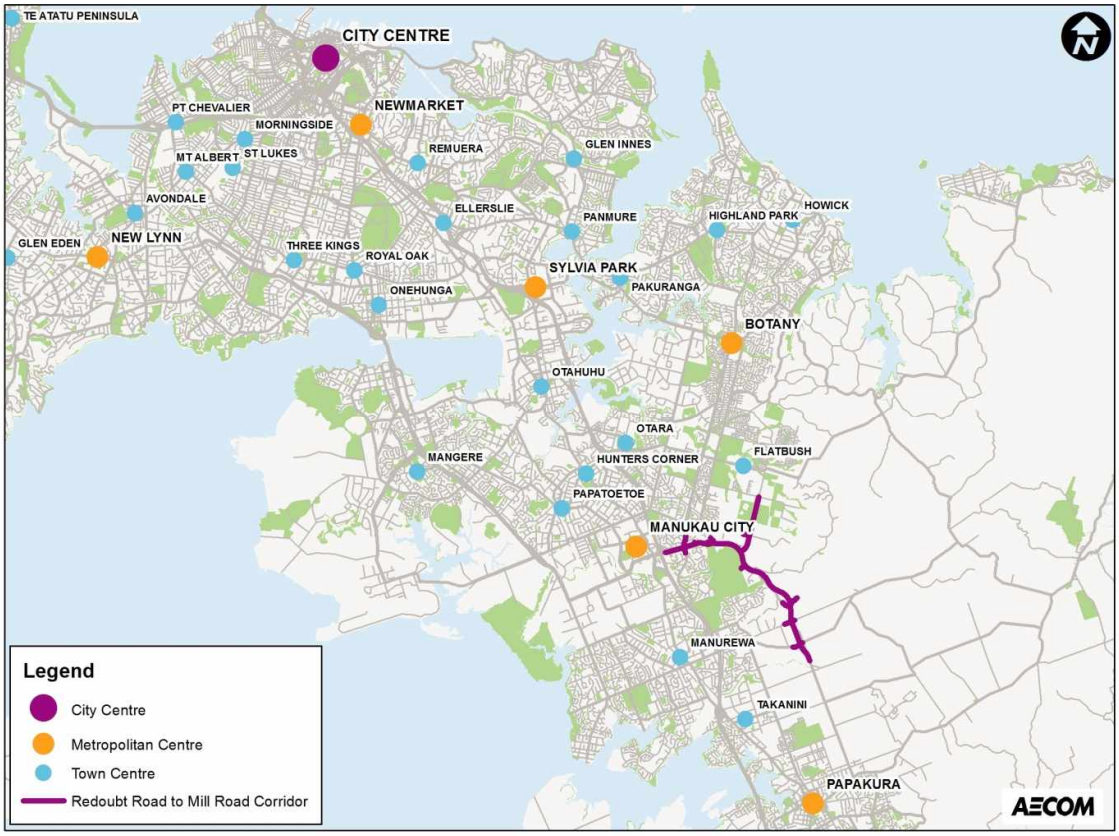
1.0 Introduction

1.1 Background

This Integrated Transport Assessment (ITA) relates to the Auckland Transport (AT) Notices of Requirement (NoR) for the Mill Road Corridor Upgrade.

The Mill Road Corridor is located in south Auckland and provides a connection between Manukau, Papakura, Takanini and Drury. The section subject to upgrade and NoR is the northern section of the corridor identified in Figure 1.

Figure 1 Location of Redoubt Road to Mill Road Corridor



The northern section travels from the SH1 interchange at Redoubt Road, running east then south along Redoubt Road to Mill Road. At the intersection between Redoubt Road and Mill Road, the corridor runs south along Mill Road to Alfriston Road. Murphy's Road between Redoubt Road and Flat Bush School Road, and Hollyford Drive north of Redoubt Road also form part of the corridor.

The Redoubt Road to Mill Road Scheme Assessment Report (AECOM, 2013) identifies a series of upgrades to the corridor in response to safety and congestion issues. The proposal generally involves re-grading, realigning and widening Redoubt Road, Murphys Road (to Flatbush School Road) and Mill Road (to Alfriston Road). The upgrade provides for four-laning of the carriageway, cycle facilities, footpaths and bus lanes on Redoubt Road.

Section 3.0 contains greater detail on the proposed upgrades.

1.2 Purpose of ITA

An ITA is generally required to support a planning application under the Resource Management Act 1991 (RMA) by providing an assessment of the transport effects of a proposed development. An ITA provides a wider scope of assessment when compared to a Traffic Impact Assessment (TIA). The benefits of an ITA is that it provides a more holistic assessment of transport effects, as it takes into account all transport modes.

The Mill Road Corridor Upgrade ITA will support the Notices of Requirement prepared for the Mill Road Corridor. ITAs are generally prepared for land use developments; however, due to the scale of the corridor upgrade it is necessary to consider the wider impacts on the transport network.

1.3 Regional Objectives and Policies

The Mill Road corridor is aligned with the high level planning and development strategies in Auckland, namely the Auckland Plan and Proposed Auckland Unitary Plan (PAUP). These plans set a series of objectives and policies that form the strategic direction for Auckland. These objectives and policies should contribute to the development and realisation of project specific objectives, guide the development and assessment of project options and ultimately seek realisation through project outcomes.

The ITA will be used to test realistic project outcomes and guide appropriate development using land use and transport assumptions and scenarios.

Project specific objectives were developed for the Mill Road Corridor Upgrade, these reflect the higher level strategy set out by the Auckland Plan and Proposed Auckland Unitary Plan. The problem definition, objectives and outcomes of the Redoubt Road to Mill Road SAR are outlined in Section 3.0.

1.3.1 Regional Strategic Policy

Regional strategic direction for transport is set through the Regional Policy Statement and the Auckland Regional Land Transport Strategy. Project consistency with regional strategic context is demonstrated in the Assessment of Environmental Effects (AECOM, 2014).

1.3.2 Auckland Plan

The Auckland Plan was adopted in March 2012 and sets out the high level development strategy for Auckland over the next 30 years. The Auckland Plan outlines a series of priorities and targets relating to transport in this period, with improvements to the Mill Road Corridor seen as a priority project.

The following transport targets are outlined in the Auckland Plan:

- Double public transport from 70 million trips in 2012 to 140 million trips by 2022 (subject to additional funding)
- Increase the proportion of trips made by public transport into the city centre during the morning peak, from 47% of all vehicular trips in 2011 to 70% by 2040
- Reduce road crash fatalities and serious injuries from 506 (2010) to no more than 410 in 2020
- Reduce congestion levels for vehicles on the strategic freight network to at or below the average of 2006-2009 levels (average daily speed of 45kph and average delay of 32 seconds per kilometre) by 2021
- Increase the proportion of people living within walking distance of frequent public transport stops from 14% (2011) to 32% by 2040

These targets are supported by the following four priorities:

1) Manage Auckland’s transport as a single system
2) Integrate transport planning and investment with land use development
3) Prioritise and optimise investment across transport modes
4) Implement new transport funding mechanisms

1.3.3 Proposed Unitary Auckland Plan

The Proposed Auckland Unitary Plan (PAUP) articulates the strategic direction of the Auckland Plan into a series of policies and rules for development. The PAUP was notified for submissions in September 2013, with the

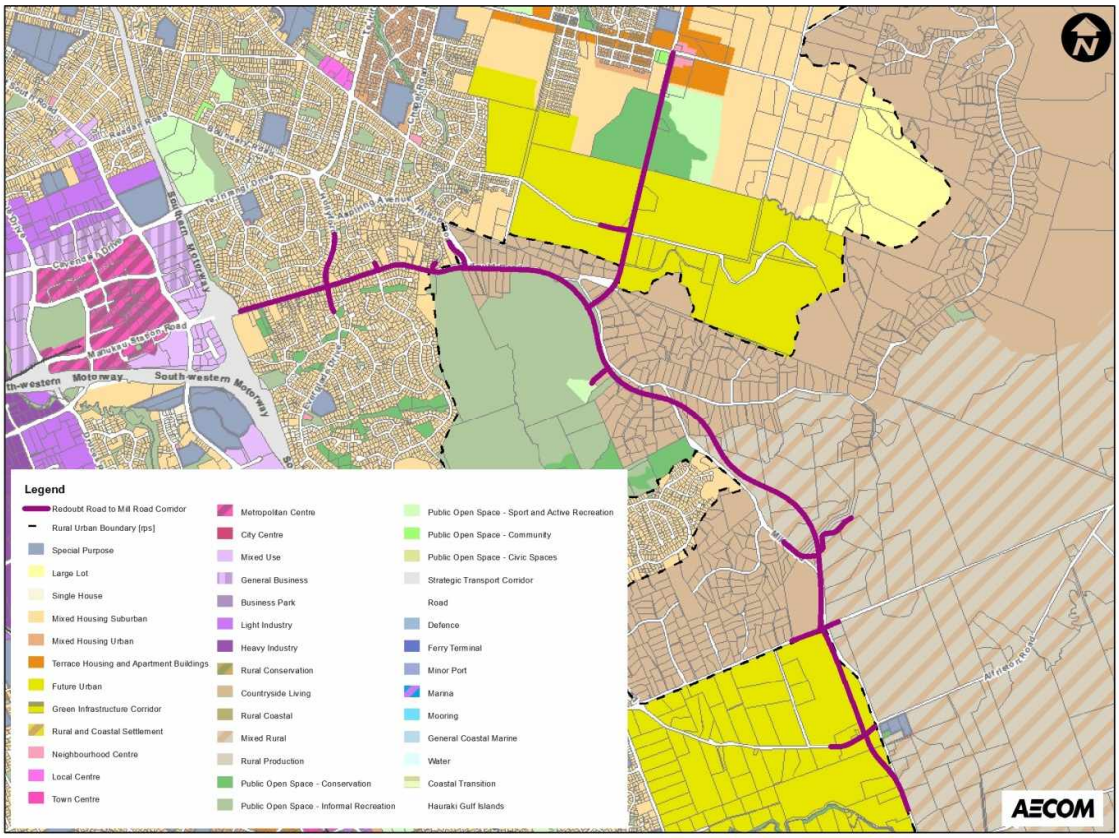
submission period closing in February 2014. Upon its adoption the PAUP will supersede the existing seven legacy district plans in Auckland.

The PAUP outlines the following six objectives relating to transport:

1) Land use and all modes of transport are integrated in a manner that enables the adverse effects of traffic generation on the transport network to be managed.
2) An integrated public transport, walking and cycling network is provided for.
3) The number, location and type (short-term or long-term, public or private) of parking and loading spaces, including cycle parking and associated end-of-trip facilities, support:
    a) intensification in the following locations:
        i) the City, Metropolitan, Town and Local Centres zones
        ii) the City Centre Fringe overlay (as identified on the planning maps)
        iii) the Terrace Housing and Apartment Buildings zone
        iv) the Mixed Use zone.
    b) the effective, efficient and safe operation of the transport network
    c) the use of more sustainable transport options including public transport, cycling and walking
    d) the economic activity of businesses
    e) the efficient use of land.
4) Parking and loading is designed, located and accessed safely and efficiently for pedestrians and vehicles within and outside the site and in a manner which contributes to quality design of the built environment.
5) Development provides access between the road and activities by:
    a) facilitating the effective, efficient and safe operation of the transport network
    b) prioritising pedestrian safety and amenity along public footpaths
    c) achieving a balance between the placemaking, movement and access functions of the road.
6) Safety is not compromised by access, buildings and structures adjacent to road/rail level crossings.

The proposed zoning along the corridor is shown in Figure 2. Of note are the two areas of Future Urban Zoning (dark yellow) where the pattern and density of development is still under investigation.

Figure 2 Unitary Plan Zoning



Of note Objective 2.1.1 Chapter B to the PAUP states:

> "*A quality compact urban form with a clear defensible limit (Rural Urban Boundary) to the urban expansion of the metropolitan area, satellite towns, rural and coastal towns and serviced villages.*"

As the Mill Road corridor passes through current urban and rural land, part of which will become more urbanised, it will be important to note the changing function (movement verses place) of the corridor and its contribution to maintaining a defensible urban limit.

1.4 Other Objectives and Policies

The Mill Road Upgrade project, through the Notice of Requirement process must also have regard to Regional Policy Statements and operative planning documents.

A discussion of the Manukau and Papakura District Plans is included in Section 4.

These objectives and policies are outlined in the draft Notice of Requirement, and must also be considered in relation to the outcomes of the ITA.

1.5 Outcomes of ITA

The ITA will seek to support the Mill Road Notices of Requirement which respond to the northern section upgrade, however must also consider the direction and weighting given to potential the future corridor upgrade (Alfriston to Drury).

For the Mill Road NoR the ITA will seek to:

- Support regional objectives and policies
- Support the need for the three NoR's and confirm the NoR footprint
- Investigate and test the land use assumptions within the Unitary Plan
- Test the effects of the Mill Road Upgrade on the network
- Test the impacts of construction traffic on the network

The outcomes the ITA is seeking to achieve are:

- Identify the extent to which the corridor upgrade (NoR section) will accommodate traffic growth in relation to changes in land use along the full corridor
- Confirm the corridor upgrade as an appropriate response in relation to its proposed function and anticipated outcomes
- Advise on the extent to which the corridor upgrade will contribute to maintaining a defensible rural urban boundary
- Advise on the level of acceptable land use intensification in relation to the corridor objectives
- Proposes mitigation of transport effects on the corridor through such measures as:
    - Travel demand management
    - Walking
    - Cycling
    - Public transport
    - Land use change
- Contributes towards an upgraded corridor that provides network resilience (i.e. provides an alternative north-south route to SH1 in the event of a natural event or serious crash restricting or closing SH1).

2.0 Existing Conditions

2.1 Land use

2.1.1 Existing Land Use

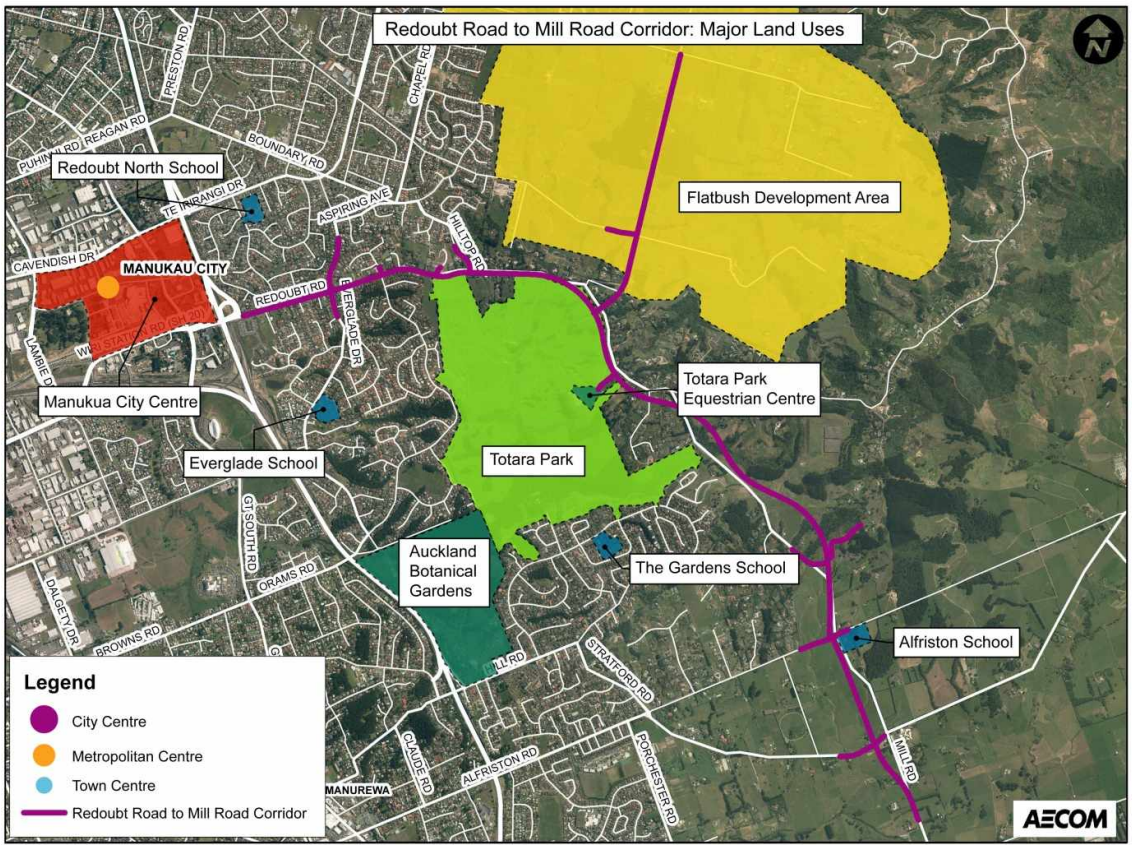
The Redoubt-Mill Road Corridor may be split into two distinct areas of typical land uses. The section of Redoubt Road between SH1 and Hilltop Road is developed and is typified by suburban residential development. East of Hilltop Road, the land along the corridor is devoted to more rural uses, such as lower density lifestyle blocks.

Figure 3 displays the major land uses along the corridor. The Manukau City Centre is a major metropolitan centre that anchors the north-western part of the corridor as a significant commercial destination.

The Flatbush development area, which encompasses Murphy's Road, is a planned new town and will accommodate 40,000 residents by 2025. The development is split into three stages: the first stage is complete, Stage 2 is under construction and work on Stage 3 yet to begin (of note Stage 2 and Stage 3 are part of the Flatbush Strategic Area – Special Housing Area (SHA) which is likely to bring forward development). There are approximately 12,000 residents living within the completed sections of the Flatbush development.

Totara Park is a major regional land use and contains a swimming pool, mountain bike tracks and the Totara Park Equestrian Centre. Although not directly accessed from the corridor, the Auckland Regional Botanical Gardens border onto Totara Park.

Figure 3 Major Land Uses

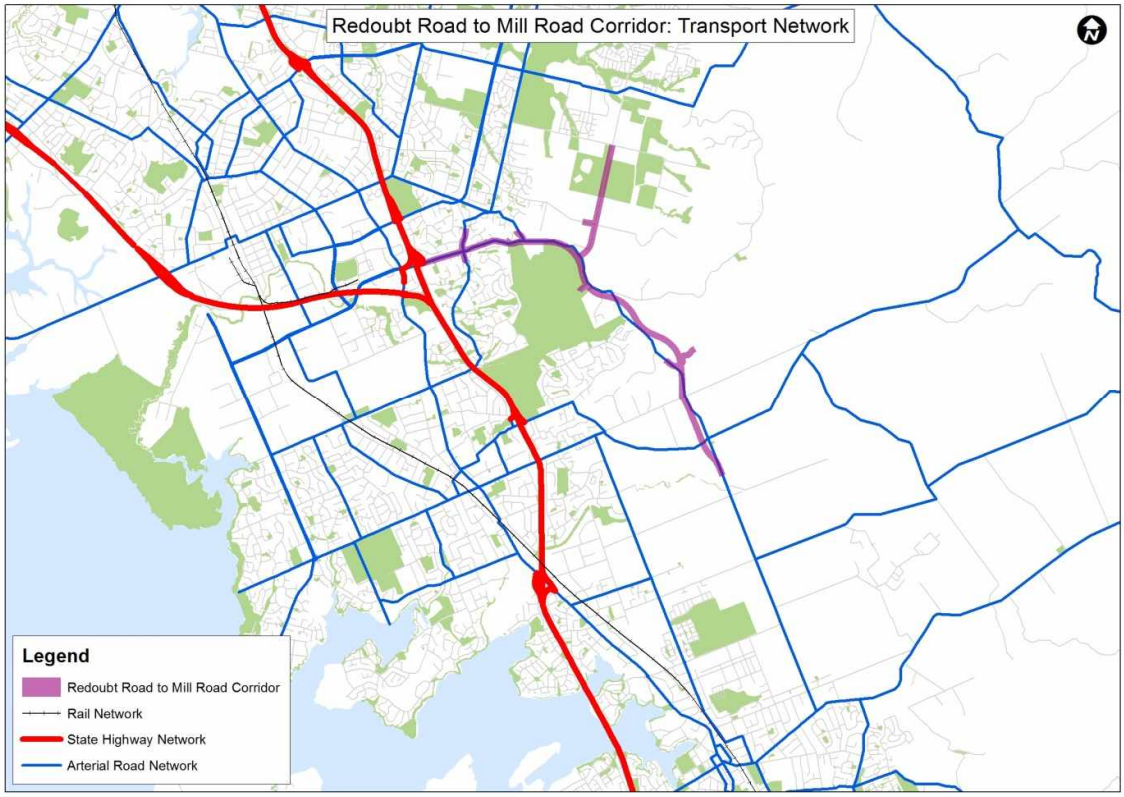


2.2 Transport

2.2.1 Description of Network

Figure 4 displays the existing transport network around the Mill Road Corridor. Both Mill Road and Redoubt Road are identified as arterial roads, with Redoubt Road providing access to the State Highway network.

Figure 4 Existing Transport Network

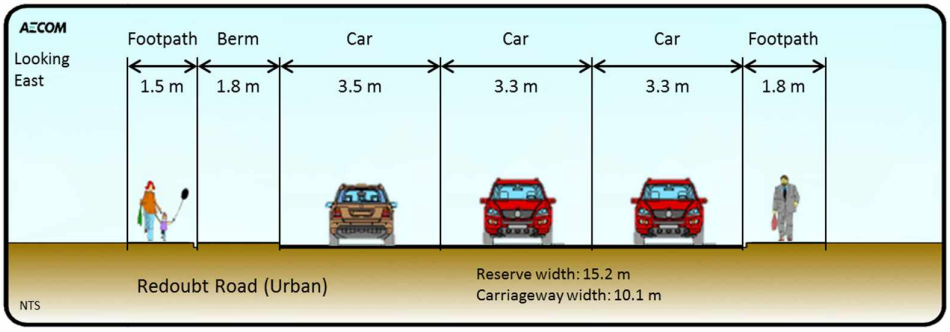


2.2.2 Corridor Cross Sections

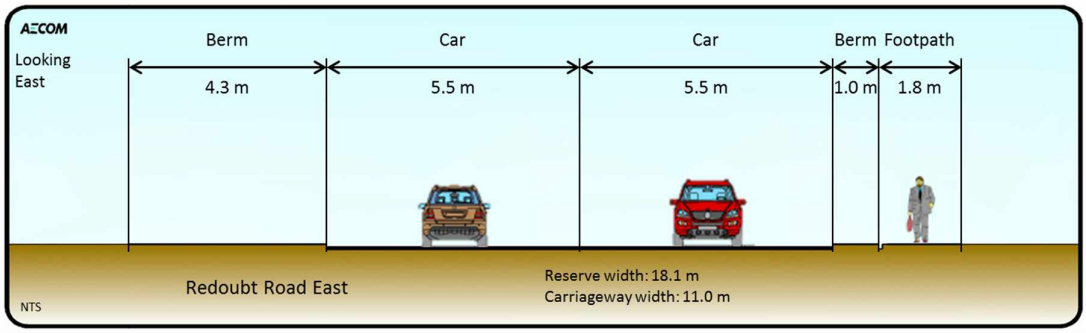
Table 1 displays the existing cross sections along the Redoubt-Mill Road Corridor. There are four distinct areas of similar characteristics along the corridor: the urban section of Redoubt Road, Redoubt Road to Mill Road, Mill Road and Murphys Road. Typical cross sections from these sections have been identified and reveal the existing transport conditions along the corridor. The corridor generally provides a single traffic lane in each direction, with a second westbound lane provide along the urban section of Redoubt Road. There are no footpaths along Mill Road or Murphys Road, with the urban section of Redoubt Road the only section with footpaths on both sides.

Table 1 Existing Cross Sections

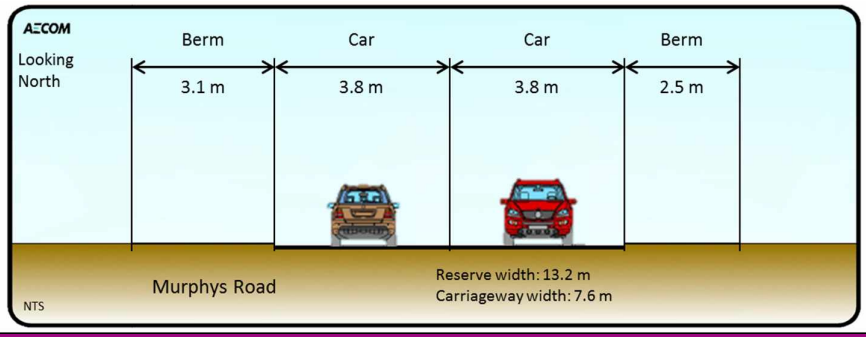
Redoubt Road: State Highway 1 to Hilltop Road



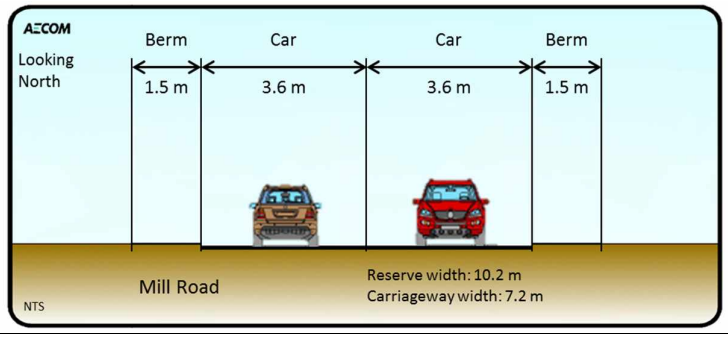
Redoubt Road: Hilltop Road to Mill Road



Murphys Road: Redoubt Road to Flat Bush School Road



Mill Road: Redoubt Road to Popes Road



2.2.3 Corridor Conditions

2.2.3.1 Traffic Volumes

Table 2 displays the existing all day traffic volumes along the corridor at the points shown in Figure 5. The section of the corridor between Hollyford Drive and SH1 experiences the highest traffic volume as a result of its role providing access to the State Highway. Traffic volumes appear to be consistent along the corridor, with AADT values between 10,000 and 14,000 trips for all other locations along the corridor.

Figure 5 Locations of AADT Volumes along the Corridor

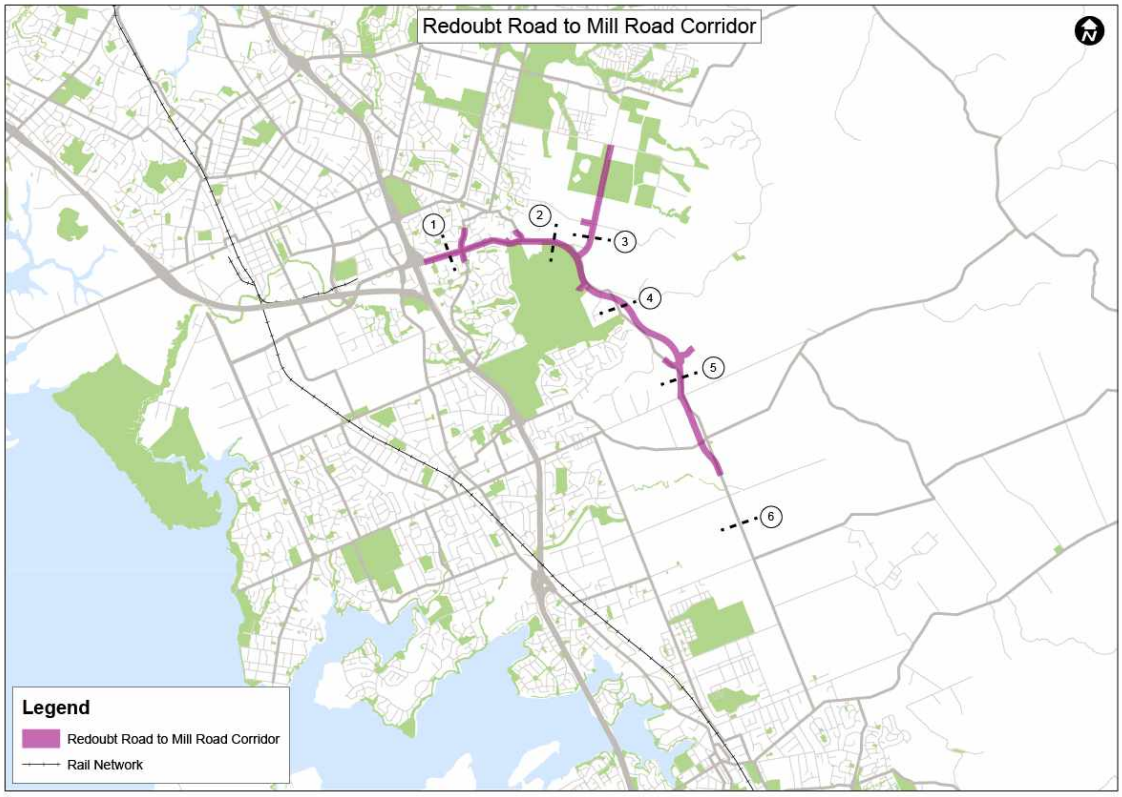


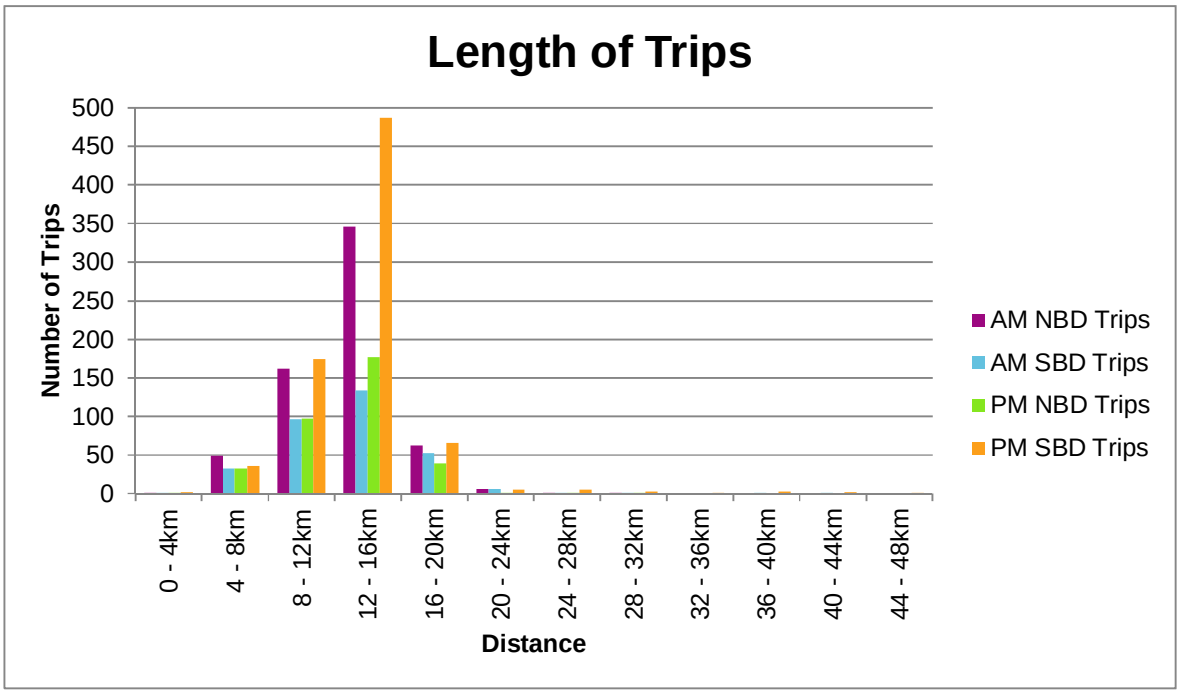
Table 2 2011 AADT (two-way average daily traffic flow)

Location	AADT	Posted Speed	Typical Peak Hour Flow (two-way)
1	20,000	50	2,000
2	12,000	50	1,200
3	10,000	50	1,000
4	14,000	60	1,400
5	14,000	80	1,400
6	11,000	80	1,100

2.2.3.2 Length of Trips

Figure 6 displays the length of trips travelling along the corridor (passing through location 6 in Figure 5) in both the morning and evening peak periods. The peak flow is northbound in the morning and southbound in the evening peak. The majority of the trips using the corridor are between 8 and 16km, suggesting that the destination is to sub-regional employment centres such as Manukau and East Tamaki. This also indicates that the majority of trips are through trips, with only a small proportion appearing to accessing destinations along the corridor.

Figure 6 Length of Peak Period Trips along the Mill Road Corridor



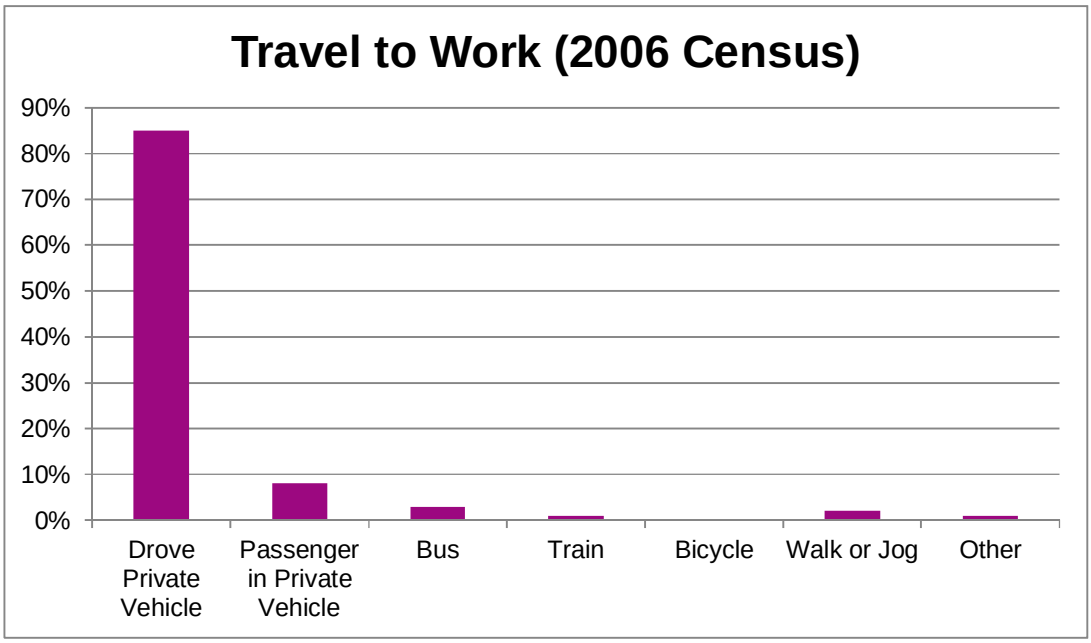
2.2.3.3 Travel to Work

Figure 7 displays the existing mode for travel to work for people living adjacent to the Mill Road corridor. The data has been extracted from 2006[1] census information and the census area units selected for analysis reflects those in the Redoubt Road to Mill Road Corridor Social Impact Assessment.

The census data shows that 85% of people within the area of analysis (adjoining the study area) drive a private vehicle to work, with another 8% traveling as a passenger in a private vehicle. In total 93% of people travel to work via private vehicle, with only 4% using public transport. A further 2% of people walk or jog to work.

[1] 2006 census data is used by regional maodelling and is therefore consistent with the analysis. 2013 Census data only became recently available.

Figure 7 2006 Travel to Work by Mode



2.2.4 Walking and Cycling

There are currently no formal cycle facilities along the corridor and no cycle counts taken. There are footpaths either side of Redoubt Road between State Highway 1 and Goodwood Drive. A footpath runs along the southern side of the corridor between Goodwood Drive and Hilltop Road. There are no footpaths east of Hilltop Road, along Mill Road or Murphys Road.

2.2.5 Public Transport

There are no existing public transport routes that utilise the Mill Road section of the corridor. Five routes are however present on Redoubt Road between Hollyford Drive and State Highway 1.

Table 3: Frequencies and Operational Hours of Current Bus Services

Service		Hours of Operation	Frequency
457 / 457X	Otahuhu, Downtown via Otara	6:25am – 10pm, 3:05pm – 6:30pm	10-45 min
466	Manukau City Centre to Manurewa via Everglade Terrace and the Gardens	6:25am – 7:20pm	30 min
497 / 497X	Otahuhu, Downtown via Otara	5:30am – 11:10pm	20-60min
566	Wattle Downs to East Tamaki via Wiri, Manukau City and Chapel Road	6:25am – 7:20pm	30min
580	Manukau City Centre to Howick via Stancombe Road and Botany Town Centre	6:10am – 7:10pm	15-35min

In addition to these routes the 568 route runs adjacent to the Mill Road corridor along Alfriston Road at 30 min frequencies between 6:15am and 5:45pm.

Currently there are four bus stops within the corridor. These are located either side of the Diorella Drive intersection.

2.2.6 Crashes

Using the CAS online database, crash data for the Mill Road corridor for the period 2009-2013 was analysed. Overall, there were 283 reported crashes in the defined period, with 89 of these causing injuries.

The different characteristics along the corridor have resulted in a varied distribution of crash types and factors. The majority (68%) of crashes along the route were located along the urban area.

There were four fatal crashes during this period. These were split between the rural and urban sections of the corridor, with three occurring as a result of lost control. The other fatal crash was a crossing / turning incident.

There were 11 serious injury crashes on the corridor with 74 resulting in minor injuries. Figure 8 shows the crashes clustered by location. From this it is clear that the majority of the crashes (63%) occurred near intersections along the corridor. However, there are significant 'hot-spots' at curves in the road where crashes are common. In total 29% of all crashes are as a result of loss of control on bends in the road, with all of these crashes occurring in the rural or urban-rural interface of the corridor. A further 8% of crashes were as a result of losing control on straight sections of the road, predominantly in the rural section of the corridor.

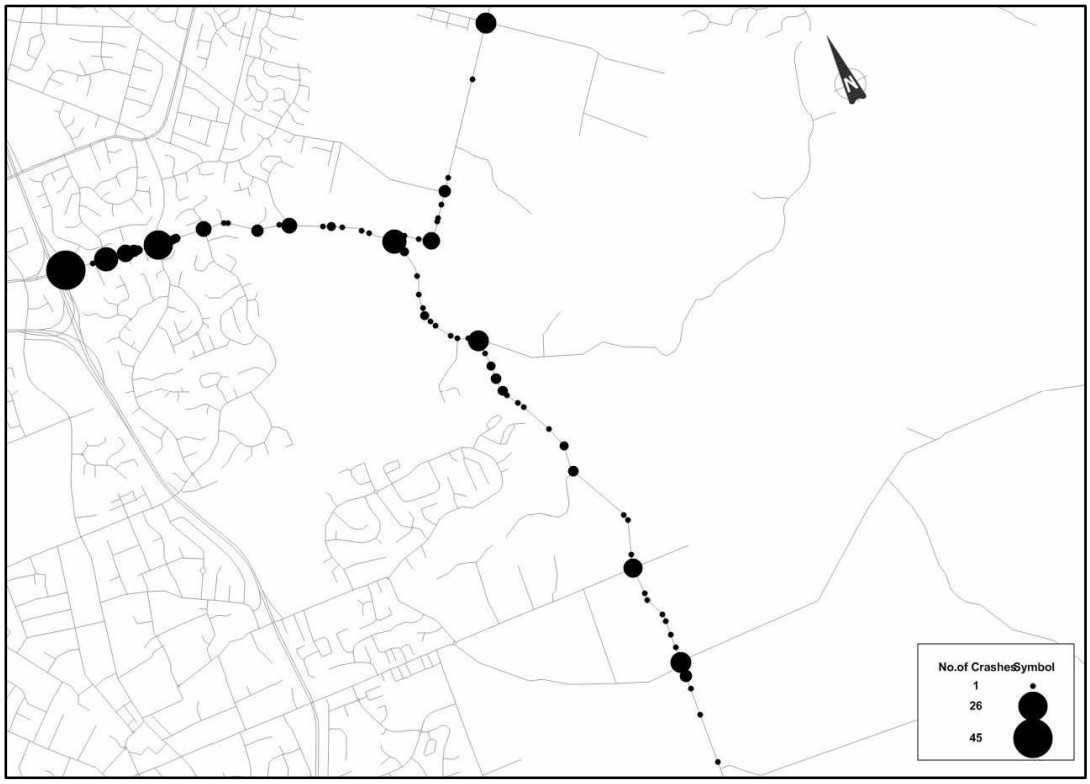
35% of all crashes were rear end / obstruction type crashes, most of which were located within the urban section of the corridor. Crossing / turning crashes accounted for 23% of crashes with many of these occurring in the urban section of the corridor, and a significant number at the Murphy's Road intersection.

The major factors influencing crashes are poor observation (32%), failure to giveway / stop (22%) and poor handling (22%). A further 12% of crashes were as a result of road factors.

Time of day does not appear to be a significant factor in causing crashes, with 66% of crashes occurring in light or overcast conditions. 35% of crashes occurred in wet or icy conditions, however, weather was only considered to be a factor in 4% of crashes. This indicates that weather is not a large influence on crashes within the corridor.

There has been a consistent trend in the annual numbers of crashes which range between 51 and 63 crashes a year.

Figure 8: Mill Road Corridor Crash Locations 2007-2011



2.2.7 Parking

Currently there is limited on-street parking along the corridor. A peak period clearway operates westbound along Redoubt Road between Hollyford Drive and State Highway 1. There is space within the existing corridor for on-street parking between Hollyford Drive and Alexia Place. South of Alexia Place there is no provision for on-street parking along the Mill Road corridor. There is no provision for on-street parking along Murphys Road.

Off-Street Parking

Table 4 displays the location of off-street car parking along the corridor. The majority of residential properties along the corridor have provision for off-street parking.

Table 4 Off-Street Parking

Location	Number of Car Park Spaces
Church of Jesus Christ of the Latter Day Saints	250
Totara Park (opposite Alexia Place)	34
Totara Park Equestrian Centre	16
Manukau Assembly of God	70
Alfriston School	24
Murphys Bush	60

2.3 Related Transport Projects

2.3.1 Southern Corridor

Improvements to State Highway 1 are identified within the Auckland Regional Land Transport Programme. These improvements are split into two key projects:

- Hill Road to Takanini 3 Laning Southbound
- Takanini to Papakura 6 Laning

The improvements will increase the capacity of State Highway 1, which provides a parallel corridor to the Mill Road Corridor. Construction of a third southbound lane between Hill Road and Takanini will begin in the 2013-14 financial year. The addition of a third lane in each direction south of Takanini is still in the design phase, with construction to begin after 2016. Both of these projects are identified within the Auckland RLTP, with funding assigned for various stages of the two projects over the next three years.

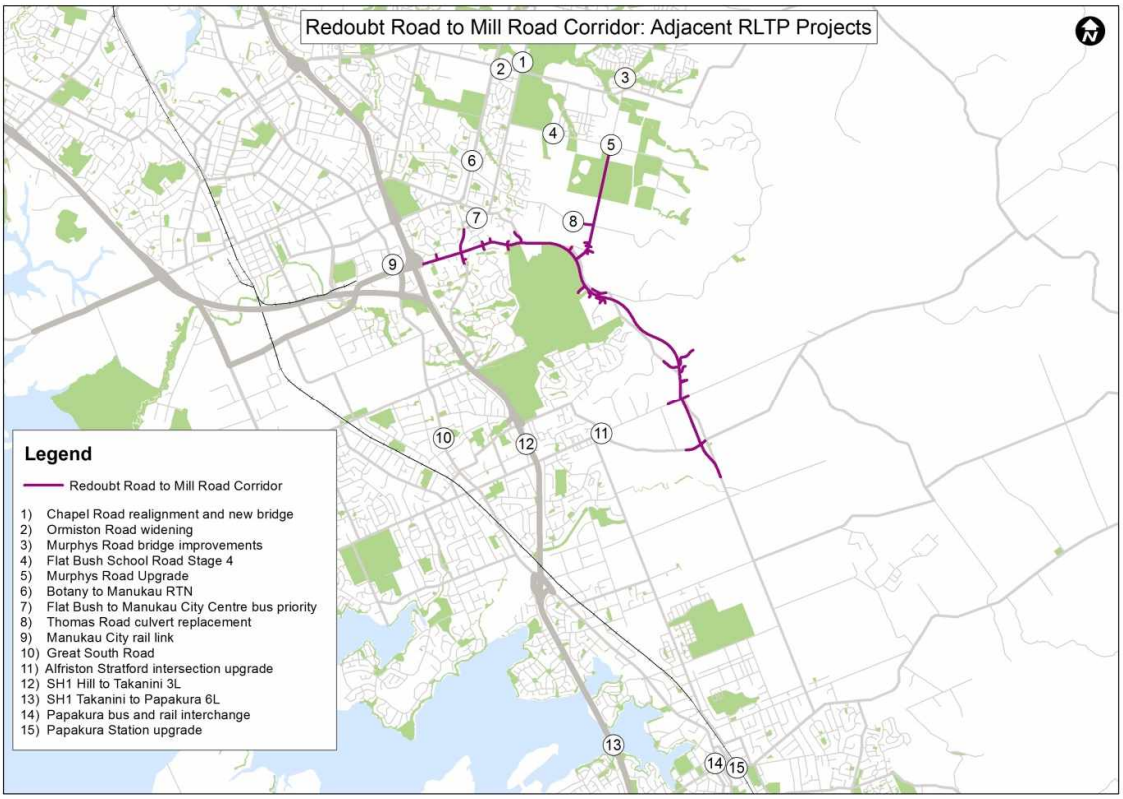
2.3.2 Auckland Electrification Project

The southern rail corridor runs parallel to the Mill Road corridor and provides a connection between Papakura, Takanini, Manukau and the central city. The Auckland Rail Network is being upgraded to an electric system, with the first services operating in 2014. A full rollout is expected by 2016. The Auckland Electrification Project (AEP) will introduce faster, more frequent train services to Auckland, increasing the capacity of the rail network.

2.3.3 Regional Land Transport Programme

The RLTP sets out the funding allocation for transport projects in Auckland over the next three years. Both the AEP and Southern Corridor improvements are identified within the RLTP, alongside the projects displayed in Figure 9.

Figure 9 Adjacent RLTP Projects



2.4 Summary of Transport and Land Use Characteristics

The corridor has two land use typologies, with the eastern end of Redoubt Road being characterised by suburban residential development and the remainder of the corridor consisting of low density rural residential living. Although there are some significant land uses along the corridor (Totara Park, Churches), the land uses adjacent to and accessed via the corridor have a greater influence upon it such as the Flatbush Redevelopment Area and Manukau Centre.

Existing trips along the corridor are predominantly through movements, despite the presence of some trip generating land uses. Travel to work data indicates that the majority of trips are car based (93%), with poor provision for walking, cycling and public transport. Analysis of trip lengths reveals that the majority of trips on the corridor are through movements, with destinations generally at the sub-regional level. The peak flows along the corridor show a bias towards northbound trips in the morning peak (likely to East Tamaki and Manukau employment areas) and southbound in the evening peak.

There are significant safety issues along the corridor, with 89 crashes resulting in injury or fatality in the period 2009-2013.

3.0 Mill Road Corridor Upgrade

3.1 Project Description

3.1.1 Problem Definition

The Redoubt Road to Mill Road Scheme Assessment Report responded to a series of problems identified along the corridor. The problems impacting upon the corridor were identified through a logic mapping process and using inputs from the project brief. Table 5 displays the problems the corridor faces and provides a description of the nature of the problem.

Table 5 Problem Definition

Problem	Description
Corridor capacity	The land use growth in Flat Bush, Takanini and Papakura combined with decreasing levels of service on alternative north-south routes such as SH1 and the Great South Road has led to significant traffic growth on this corridor, which has not been matched by improvements in route quality and capacity. The limited corridor capacity results in peak hour congestion, especially at the Redoubt Road / Hollyford Road intersection as well as at the connecting side roads. Analysis carried out as part of the Southern Sector Strategic Transport Study indicates that in the medium to long term, demand will exceed capacity of the current route with significantly slower travel speeds and higher levels of congestion.
Lack of pedestrian and cycling facilities	The route has created significant community concern in recent years, due to its safety record. Auckland Transport considers that the standard of the route at present does not align with its arterial function. There are limited cycling opportunities along the current urban section between the SH1 ramps and Murphy's Road due to the narrow carriageway and lack of off-road cycle paths. South of Murphy's Road to Alfriston there are no walking or formal cycle facilities, and the road alignment and high speeds makes for an unsafe journey for non-vehicle modes. Murphy's Road is a critical link to Flat Bush and there are currently no walking or cycle facilities. Opportunities to cross the corridor do not exist as there are no formal pedestrian crossing facilities.
Access to public transport	Bus stops on Redoubt Road are not recessed and force traffic to wait in a queue or to overtake, with only one travel lane in each direction. This leads to long queues and congestion during busy peak hours, and creates a safety hazard if impatient drivers choose to overtake on the narrow carriageway. The current provision of public transport facilities is not in keeping with the strategic hierarchy of the route, nor is it in keeping with the importance of the public transport link between Manukau and the eastern residential areas. The public transport pressures are forecast to increase with higher levels of demand and patronage as the residential areas develop to their planned limits.
Road alignment, cross section and traffic facilities	The physical nature of the route is substandard for its existing and intended arterial road function with substandard horizontal and vertical curvature in places. There is currently poor provision of multimodal facilities within the corridor. The road cross section is too narrow for the forecast traffic flows, cycle facilities, public transport facilities, and pedestrian facilities. The route is not "future-proofed" against the planned growth in any of these transport modes.
Poor safety record	Crash analysis of corridor indicates a significant safety issue, with five fatal crashes over the most recent 5 year period, all of which occurred on the rural section of the corridor. Three of these reported crashes were 'lost control' type crashes. Nearly two thirds of all crashes occur in the vicinity of intersections, with a particularly high density of crashes between the SH1 ramps and Hollyford Drive.
Poor journey time reliability and congestion	Concerns have existed for some time regarding a lack of resilience in the transport network in the southern part of the Auckland Region. While SH1 will continue to be the preferred north-south route, the Mill Road Corridor can provide a secondary route to SH1 south of the SH20 Western Ring Route in times of high demand or emergencies.

3.1.2 Project Objectives

Through logic mapping and the project brief, the Redoubt-Mill Road SAR identified eight project objectives. These objectives are aligned to the high level strategy of the Auckland Plan and guided the development of the preferred option:

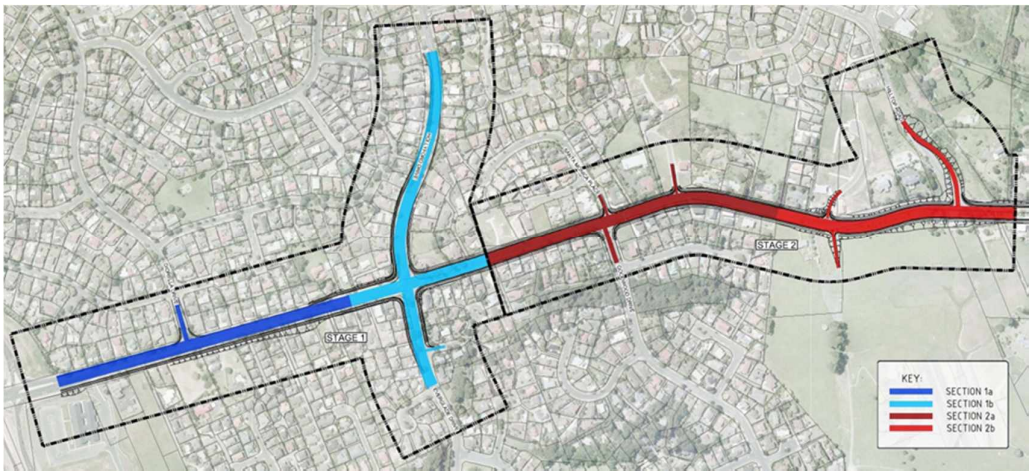
Table 6 Mill Road Corridor Objectives

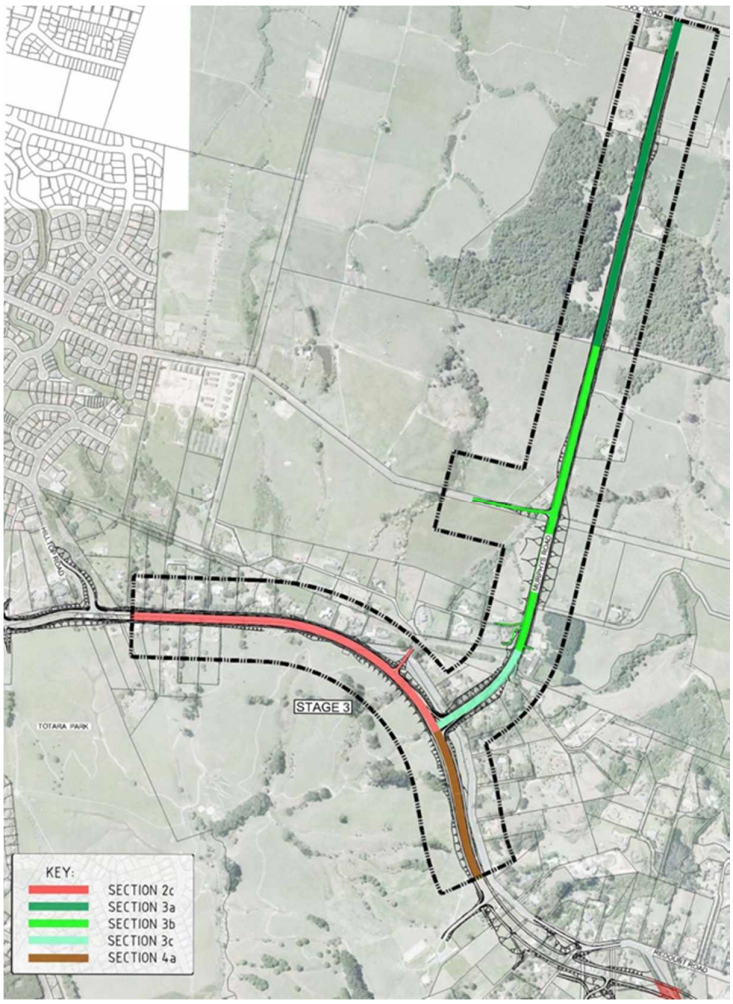
Capacity	Confirm the preferred route for a 30 year planning horizon with sufficient capacity along the route to accommodate planned growth effectively and which addresses current and future predicted congestion issues, as well as providing capacity for local freight traffic.
Safety	Design for an appropriate level of safety to address the high crash rate, including for future traffic and multimodal users.
Resilience	Ensure that the corridor is a suitable secondary North/South corridor parallel to State Highway 1 to improve network security/resilience and where the risk of closure is minimised.
Connectivity	Provide an upgraded corridor which addresses access and mobility for walking and cycling in a safe environment, and connectivity to open spaces and community facilities.
Multi Modal	Ensure that the upgraded corridor makes provision for all transportation modes including road vehicles, walking and cycling and passenger transport, including provision to accommodate future changes in Public Transport use and demands.
Environmentally Sustainable	Manages the impact of the transport network on the local community, mitigates negative environmental impacts, and is sensitive to the cultural heritage of the area.
Constructable	Design a corridor which is economically justified and is able to be delivered in a staged manner.
Strategic Policy	The project objectives contribute to the following policy visions and objectives: - New Zealand Transport Strategy (NZTS) vision - Land Transport Management Act (LTMA) 2003 objectives - Auckland Regional Land Transport Strategy (RLTS) 2010-30 objectives - - Auckland Plan transport priorities

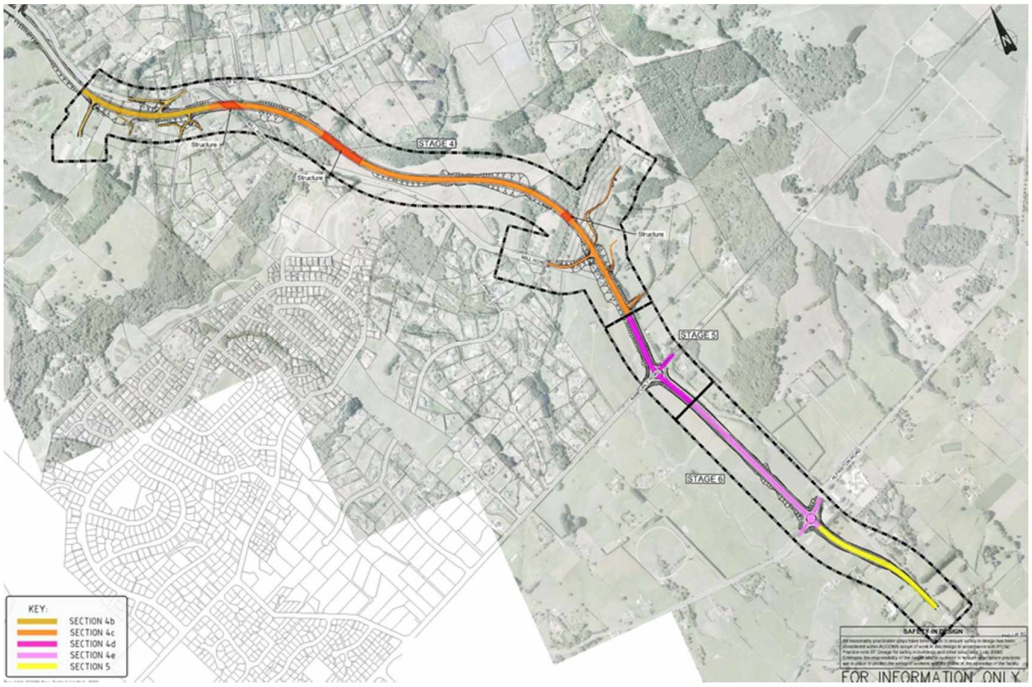
3.1.3 Summary of NoR Sections

The Mill Road Corridor upgrade is divided into three sections, each with a separate Notice of Requirement. Table 7 provides a summary of the upgrades and works along the corridor.

Table 7 Mill Road Corridor Upgrade

Section	Details
NOR 1 SH1 to 162 Redoubt Road	 - Re-grading, realigning and widening Redoubt Road to four lanes between the Redoubt Road SH1 motorway on and off ramps terminating approximately 100m east of the Redoubt Road/

Section	Details
	Hilltop Road intersection; - Providing cycle lanes in both directions and footpaths - Widening and signalising Diorella Drive to allow for separate left and right turn lanes - Providing a bus lane beginning at the Hollyford Drive/Everglade/Redoubt Road intersection and terminating approximately 100m east of the Redoubt Road southern motorway on ramp - Re-aligning and widening the Redoubt Road / Hollyford Drive intersection and introducing a priority bus lane - Redoubt Road / Hilltop Road intersection re-grading and providing an un-signalised seagull intersection - Earthworks associated with re-grading and re-alignment including earthworks to establish retaining walls and embankment fills - Establishment of retaining walls - Removal of established street trees and private landscaping - Removal of houses and ancillary buildings to accommodate the road widening and intersection improvements - Service relocation and protection works - Construction of stormwater infrastructure - Establishment of landscaping - Operation and maintenance of the road corridor
NOR 2 162 Redoubt Road to 251 Redoubt Road, Murphys Road	 - Re-grading, realigning and widening Redoubt Road and Murphy's Road to four lanes - Providing cycle lanes in both directions and footpaths - Earthworks associated with re-grading and re-alignment including earthworks to establish cuts,

Section	Details
	retaining walls and embankment fills - Establishment of retaining walls - Removal of houses and ancillary buildings to accommodate road widening - Removal of established trees (including in the gully heads of Totara Park) and private landscaping - Service relocation and protection works (including relocation of a Transpower pylon and communication infrastructure) - Construction of stormwater infrastructure including stormwater treatment ponds - Signalisation of the Redoubt Road/Murphys Road intersection - Pedestrian crossing facilities on all legs of the Murphys Road intersection - Establishment of landscaping - Operation and maintenance of the road corridor
NOR3 251 Redoubt Road to 333 Mill Road	 - Realignment and widening of Redoubt and Mill Road to accommodate four lanes and cycle lanes. Re-alignment of Mill Road will include construction of new greenfields sections - Realignment of the Pony Club entrance into Totara Park - Realignment of the intersection of Redoubt Road and Mill Road - Realignment of Kinnard Lane - Establishment of retaining walls - Construction of stormwater infrastructure including stormwater treatment ponds - Construction of two bridges - Establishment of a new intersection to enable vehicle and cyclist access from the former Mill Road alignment to the new Mill Road alignment - Construction of two new roundabouts at the realigned intersections of Mill Road/Ranfurly Road and Mill Road/Alfriston Road - Earthworks associated with re-grading and re-alignment including earthworks to establish cuts, retaining walls and embankment fills - Removal of established native bush and private landscaping - Service relocation and protection works - Construction of stormwater infrastructure including stormwater treatment ponds - Operation and maintenance of the road corridor

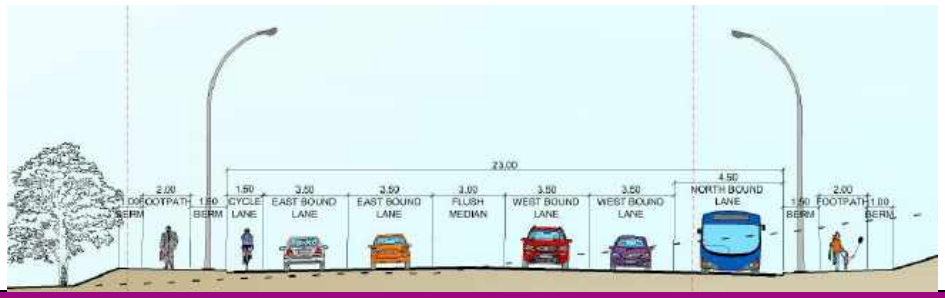
The Mill Road corridor will be used by active, private and public transport modes to access land uses along the corridor. The corridor will also be used by through traffic to provide access to and from the State Highway Network, areas of employment and other destinations.

3.1.4 Proposed Cross Sections

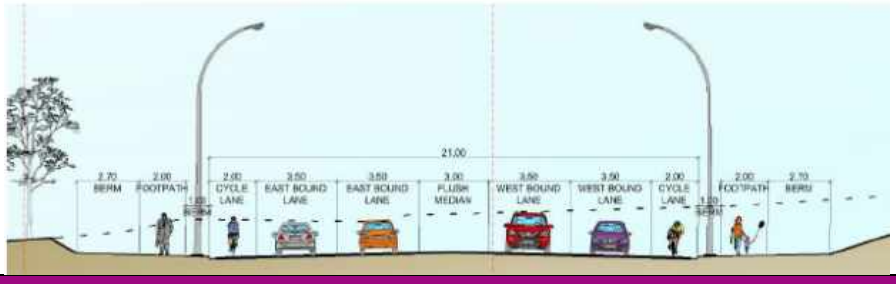
Table 8 displays the cross sections proposed as part of the Redoubt Road to Mill Road Corridor SAR. The improvements will see the corridor widened along its entire length (and realigned in some locations) to include a minimum two lanes in each direction, footpaths and cycle lanes.

Table 8 Proposed Cross Sections

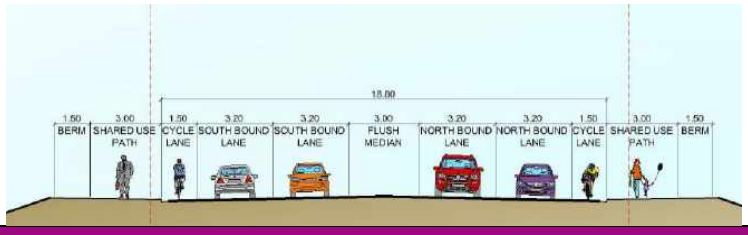
Redoubt Road: State Highway 1 to Hilltop Road



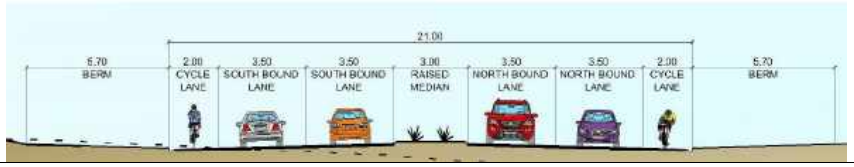
Redoubt Road: Hilltop Road to Mill Road



Murphys Road: Redoubt Road to Flat Bush School Road



Mill Road: Redoubt Road to Popes Road



3.1.5 Changing Nature of Corridor

It is important to recognise that the project passes through a changing environment in terms of the impacts of current, proposed and potential development.

The corridor through NoR 1 is largely urban. The corridor through NoR 2 is largely rural, but will become urbanised in response to zoning change and special provisions (such as the SHA). The corridor through NoR 3 is

currently rural but will become increasingly urbanised in response to future plan change potential on the western side (in response to the Future Urban Zone), while the eastern side looks to remain rural in nature.

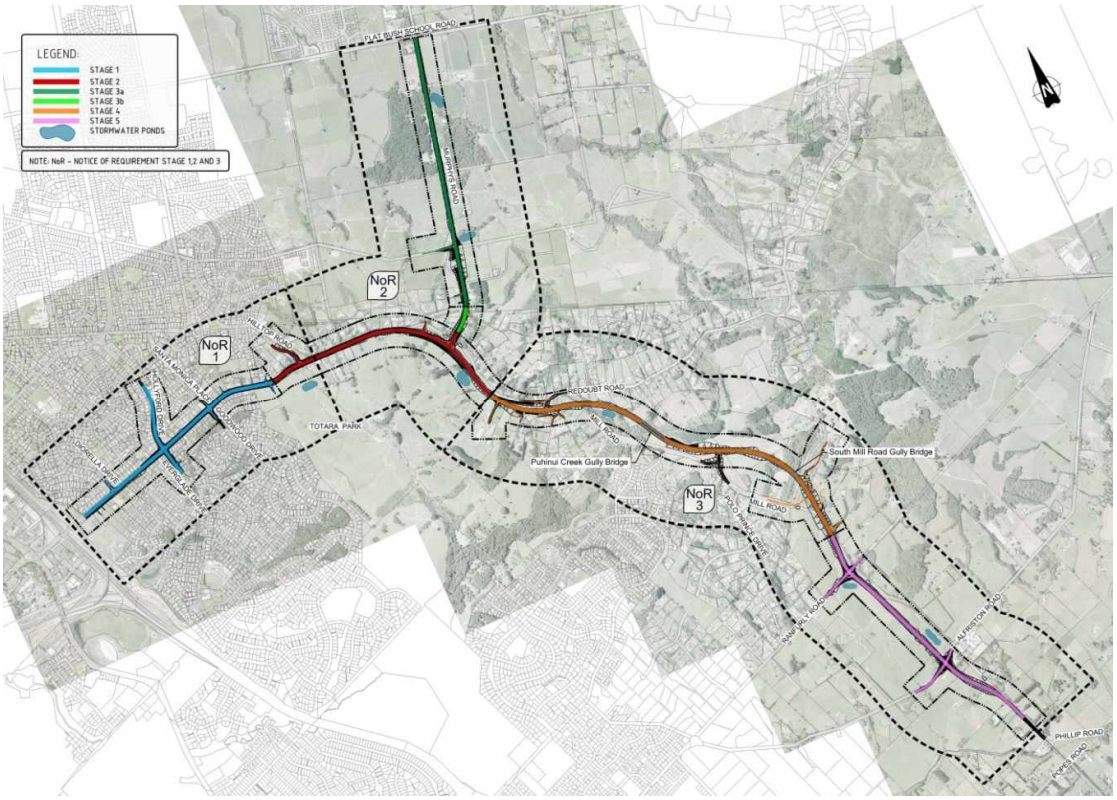
South of NoR 3 the western side of the corridor is also zoned for change (Future Urban Zone) through to Papakura.

The road design presents a largely urban response (arterial road classification) however with limited access and a higher design speed (regional road classification). It is recognised that the road design is considered to maintain a defensible urban limit (proposed RUB) serving both a urban (accessible) and rural (movement) function.

3.2 Construction and Staging

The project can be divided into 5 separable construction stages. Figure 10 displays the proposed construction staging for the corridor upgrade.

Figure 10 Construction Staging



The Mill Road Corridor upgrade project can be divided into 5 separable construction stages with the initial staging, constructability and Traffic Management ideas outlined below.

Construction Stage 1: Redoubt Road / Hollyford Drive (urban environment)	The intersection between Redoubt Road and Hollyford Drive is heavily trafficked and roads users experience significant delays during peak times. The proposed widening of Redoubt Road and Hollyford/Everglade Drive will ensure delays are minimised. As a first priority stage, this separable portion can be constructed in isolation on the southern side without affecting the existing traffic flows. Once completed traffic can be moved to the south and the northern side constructed.
Construction Stage 2: Redoubt Road	This section involves widening and realignment of Redoubt opposite the Totara Park and includes a realigned Hilltop Road. The section can be constructed without the proposed Murphys Road intersection, with the exiting intersection modified to fit the stage 2 alignment. To enhance legibility, it would be beneficial to construct stage 2 after stage 1, but it is not reliant to sections 3 and 4.

Construction Stage 3a and 3b: Murphys Road	Stage 3a - This stage includes the widening of an existing section connecting to Flat Bush School intersection constructing the eastern side, then moving the traffic across and finishing the western side. 3b - The green fields section (cutting) between the existing Murphys Road and Redoubt Road can be undertaken independently. Section 3a involves a large amount of fill not necessarily obtained from other stages of the project and will therefore have to be imported. This section would require major traffic management planning to provide both a north / south flow possibly utilising a link along Flat Bush School Road and or Ormiston Road / Chapel Road / Matthews Road / Hilltop Road with temporary traffic signals at Hilltop / Redoubt Road intersection. Alternatively the existing Murphys Road intersection could benefit from temporary signals if 3b is not constructed simultaneously. The construction of stage 3a is dependent on having stage 2 constructed especially the upgrade to Hilltop Road intersection completed.
Construction Stage 4: Redoubt Road / Mill Road	This stage is essentially green fields the most costly and involves large cuts and fills. There are 3 bridges within the section, a Mill Road overbridge and two gully crossings. The southern tie in can be constructed to tie back into the existing Mill Road near Ranfurly Road.
Construction Stage 5: Mill Road	Stage 5 consists of two roundabouts, at the Mill / Ranfurly Road intersection and at the Mill / Alfriston Road intersection and sections linking them. This stage can be constructed without the requirement for stage 4 A tie into the existing alignment north of Ranfurly Road is required with some temporary (but not redundant) work. The two roundabouts at Ranfurly and Alfriston can also be constructed in separation with some design modification required involving redundant temporary works.

The staged implementation of the corridor will take place over multiple years, with each stage as identified in the staging plan above. Each of these staged sections will require preparation of a practical linked programme covering each phase being the detailed design, land purchase and project procurement. This includes looking at ways to meet the Auckland Transport program and budget by overlapping various phases. A staging programme that aligns with their current program is displayed in Table 9 below.

Table 9: Staging Programme of Preferred Option

Stage		Length	Detail design, land purchase, procurement		Construction	
			Start Date	Duration	Start Date	Duration
Stage 1	SH1 to Alexia Place, incl. Hollyford/Everglade and intersection, Goodwood/Santa Monica, Bartells and Alexia Place.	2,300m	2015 / 16	12 months	2017 / 18	24 months
Stage 2	Hollyford to Pony Club (Totara Park), incl. Hilltop Road.	1,720m	2016 / 17	12 months	2019 / 2020	12 months
Stage 3a and 3b	Murphys Road plus Murphys Road intersection connecting to Stage 2	3a = 1,620m 3b = 280m	2017 / 18	12 months	2020 / 21	24 months
Stage 4	Pony Club to north of Ranfurly, incl. new Redoubt Road and Mill Road intersections.	3,050m	2018 / 19	12 months	2022 / 23	36 months
Stage 5	Ranfurly and Alfriston intersections	2,250m	2020 / 21	12 months	2025 / 26	15 months

Construction staging drawings have been prepared, and are available separately to this report. The drawings and supporting analysis indicates that construction can be undertaken within the proposed NoR limits and that tie-ins between NoR's allow staging to occur.

3.3 Traffic Management

Traffic analysis was undertaken to provide traffic management options in response to construction staging. The supporting analysis is attached in **Appendix A**.

The traffic analysis provides forecast daily traffic flow profiles for each construction stage within the approximate year of construction. The forecast traffic flows are based on background growth and are not mitigated in any way in response to construction delay and potential route diversions.

It is acknowledged that due to the long construction period traffic demand is likely to mitigate the impacts of traffic on the corridor. Adversely it is recognised that alternative routes are not evident, with the exception of drawing off northbound and southbound traffic onto the SH1 interchanges at Manukau and Papakura. Porchester Road and Ranfurly Road / Great South Road offer alternative routes however may be less attractive alternatives as journey times increase.

Stage 1 Traffic Management (2018) – SH1 to Hollyford

The current two westbound lanes will generally need to be maintained for SH1 access. After 9.30am there is an opportunity to reduce this to one lane, however approach lanes to the interchange should remain open. The current eastbound lane should remain open, as should the approach lanes to Hollyford Drive.

Queueing on approach to the SH1 interchange ramps during the morning peak is likely to be subject to further delay and queueing if lanes are narrowed or capacity limited.

Stage 2 Traffic Management (2020) –Hollyford to Hilltop

One lane in each direction must remain open throughout the day. These lanes could be narrowed to enable construction on one side of the corridor. Approach lanes to Hollyford and Hilltop should be maintained.

Stage 3 Traffic Management (2020 / 21) –Murphy's Road

One lane in each direction must remain open throughout the day. These lanes could be narrowed to enable construction on one side of the corridor. It is possible that restrictions to one lane (Stop / Go or signals) could operate between 10.00am – 3.00pm on weekdays however advance warning and alternative routes should be identified to avoid serious queuing and delay. Full closures may be necessary to construct the Thomas to Redoubt re-grading.

Stage 4 Traffic Management (2020 / 21) –Redoubt Road to Mill Road

One lane in each direction must be maintained during peak times however temporary reductions to one lane during the day will be an option. Some construction will be off-line however tie-ins and intersection construction (Mill Road / Redoubt Road) will need close management.

Stage 5 Traffic Management (2023) – Mill Road to Alfriston Road

Construction is generally off-line. However for intersection and overlying works it would be necessary to maintain one lane in each direction open (with narrowing).

4.0 Strategic Direction

4.1 Transport

4.1.1 National

There are two national level documents that shape the strategic context for transport in New Zealand:

- New Zealand Transport Strategy (2008)
- Government Policy Statement on Land Transport Funding (2009) (GPS)

The main objectives of the GPS on Land Transport Funding centre on increasing economic growth and productivity. The NZTS sets five objectives around sustainability, economic development, safety, access and public health.

4.1.2 Regional

In addition to the Auckland Plan and Unitary Plan (as mentioned in section 1.3), the following Auckland wide strategies and plans are relevant to the Mill Road corridor.

The **Southern Sector Strategic Transport Study** (SSSTS) developed in 2006, sets out the strategic direction for transport networks in Auckland's Southern Sector. The SSSTS highlights transport schemes for future investigation in this area.

The Mill Road corridor is identified as part of the **Regional Arterial Road Plan** (RARP). Under the RARP, the corridor is considered an essential arterial link between Drury, Papakura and Flat Bush / Manukau.

The **Regional Land Transport Programme** (RLTP) outlines Auckland Transport's projects over a three year period. The current RLTP is for the period 2012-2015. The RLTP also identifies projects for the next 4-10 years, although these projects have zero funding in the three year period of the RLTP. Projects adjacent to Mill Road, Redoubt Road and Murphys Road are identified within the RLTP are shown in **Error! Reference source not found.**.

The **Integrated Transport Programme** (ITP) sets out the 30 year investment programme to meet the transport priorities outlined in the Auckland Plan. The programme covers state highways and local roads, railways, buses, ferries, footpaths, cycleways, intermodal transport facilities and supporting facilities such as parking and park-and-ride.

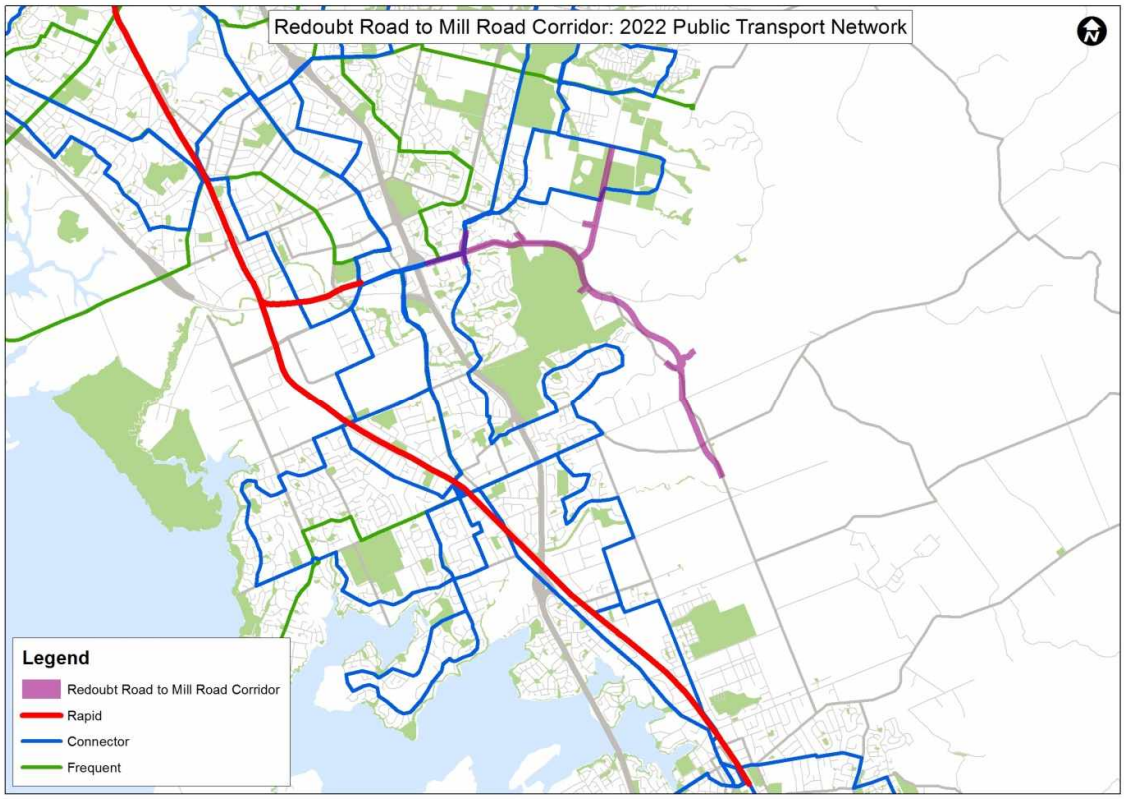
In particular the ITP:

- Guides transport agencies in their detailed planning activities for maintaining, operating, renewing and developing their transport networks.
- 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.
- Informs the detailed programming of activities in the Regional Land Transport Programme (RLTP).

The ITP provides funding support to the implementation of the Regional Public Transport Plan and Auckland Cycle Network.

The **Regional Public Transport Plan** (RPTP) consolidates and redesigns the public transport network. The RPTP identifies the section of Redobut Road between Hollyford Drive and State Highway as part of the connector network (Figure 11).

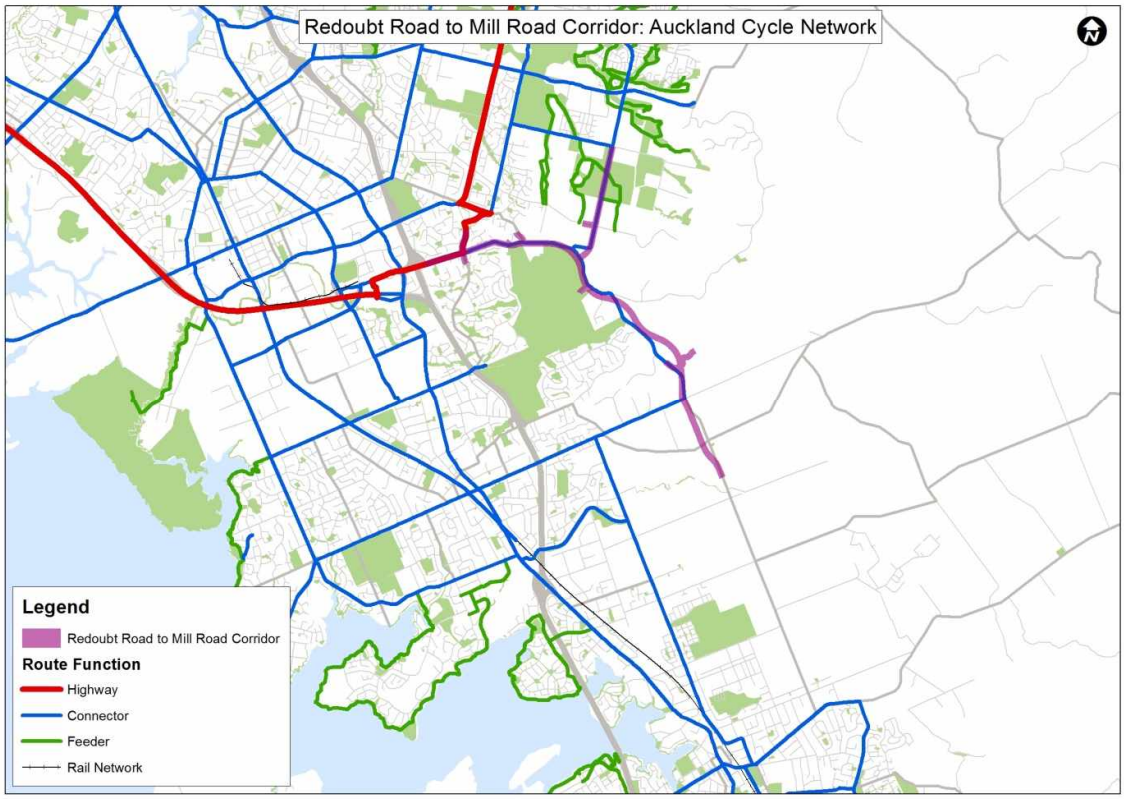
Figure 11 2022 Public Transport Network



The **Auckland Cycle Network** is comprised of Cycle Highways (off-road and shared path cycle ways) which are the backbone of the network and link metropolitan centres. Cycle Connectors (on-road cycle lanes and other facilities on arterials and collector roads) provide links to and from the Cycle Highways, and to town centres, public transport interchanges, residential areas and schools. Cycle Feeders (on-road or off-road facilities on slow speed streets) provide local area access and linkages to the cycle network, key community facilities and open spaces.

The Redoubt Road section through to Hollyford Drive is identified as a Cycle Highway, with the rest of Redoubt Road, Mill Road and Murphys Road identified as cycle connectors (Figure 12).

Figure 12 Auckland Cycle Network



4.2 Land Use

4.2.1 Operative Plan

The Auckland District Plan (Manukau and Papakura Sections) is the operative planning document regulating zoning and development.

Having regard to the Manukau and Papakura District Plan objectives and policies relating to the underlying zonings over which the proposed corridor traverses, the purpose of a designation is to provide for works which do not typically fall within the zoning provisions of a District Plan.

The current zoning provisions of the District Plan do not provide for such an activity and therefore the majority of the policies and objectives relating to zones over which the corridor traverses are not relevant to the assessment of the NoR's.

4.2.2 Proposed Auckland Unitary Plan

The regulatory direction is influenced by the Proposed Auckland Unitary Plan (PAUP) (September 2013). The PAUP includes the following potential modification in relation to population and employment growth:

1) Introduction of large tracts of "Future Urban Zone" between Mill Road and Porchester Road.

2) Introduction of large tracts of "Future Urban Zone" between Papakura and Drury (including to the south and west of Drury).

3) "Future Urban Zone" identifies land suitable for urban development in the future. This is a placeholder for development as required and subject to Plan Change – the type and intensity of development subject to structure planning (and presumably an ITA).

4.2.3 Future Urban Zone

The PAUP includes the proposed Rural Urban Boundary (RUB) for the south which comprises growth focused along the "core" areas and including additional development areas in Drury, north of Paerata and south of

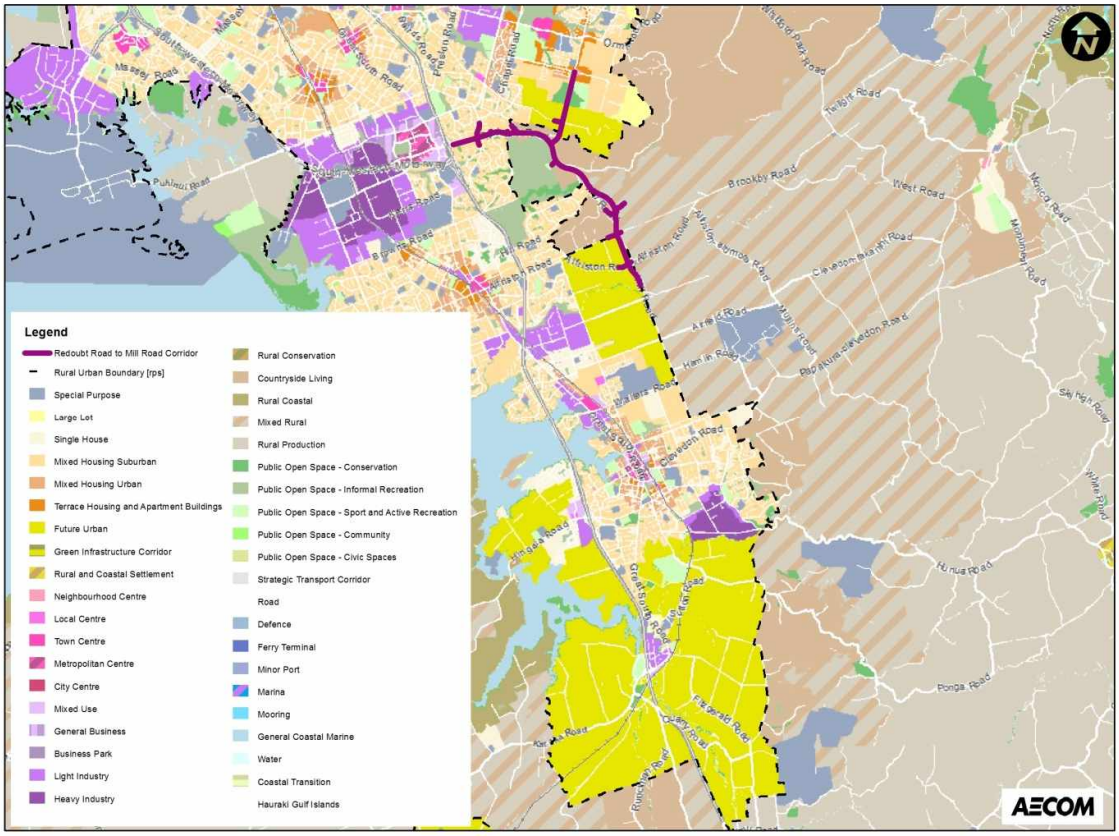
Pukekohe. The southern growth area specifies an additional 55,000 population and 35,000 jobs (by 2040). Figure 13 displays the location of the two areas of Future Urban Zone (FUZ) and the RUB.

As an unknown quantum the FUZ could support local employment and community facilities such as schools, parks, reserves, commercial and retail opportunities. The multiple FUZ locations (shown in Figure 13) lie within reasonable distance from the Mill Road corridor. The effect of these complementary land uses would presumably be beneficial to the provision of high quality walking and cycling facilities along the corridor plus improved access to potential public transport services.

4.2.4 Flatbush Special Housing Area

It is noted that the Special Housing Area (SHA) comprising Stage 2 and Stage 3 of the Flatbush development is now operative which will have the effect of bringing the timing of residential development in this area forward.

Figure 13 PAUP Zoning and Location of Rural Urban Boundary



As a summary the key strategic change is greater population and employment growth resulting in increased demand within the study area. This demand may be realised more quickly than previously envisaged. However the introduction of the FUZ leaves much of the study area open to a market-led response.

5.0 Accessibility of the Corridor

5.1 Introduction

The purpose of this section is to present the future transport conditions of the Mill Road corridor and identify a probable mode share of trips. The future conditions are based on estimations of trips from the regional transport model plus additional trips generated by potential future land use change adjoining the study area.

It is noted that all land use and modelling assumptions should be verified at the time of NoR submission, particularly the population figures for the southern growth area. The figures currently used may be changed as further investigations become available; however the impact of change is not likely to have a significant effect on the scenarios tested in this ITA.

5.2 Modelling of Trips

5.2.1 Version Used

The Southern Strategic Saturn transport Model (S3M) used for the model runs relies on the Auckland Regional Transport (ART) model Scenario I. Scenario I relies on a base year model of 2011 (which uses 2006 census data) and was used to inform the development of the Auckland Plan and PAUP.

It is noted that Scenario I version 8b is the latest version of the ART model being used to inform the Integrated Transport Plan and Regional Long Term Plan processes. This version is known to include growth as a result of the Takanini FUZ but limited growth within the Drury FUZ.

It is not proposed to update the model used, however it is advised to compare the different assumptions used so we are aware of the changes on demand forecast to occur along the corridor (this will be undertaken in the comments tracking document attached to this ITA).

At this stage the testing we have undertaken anticipates the following:

- Future demand modelled may understate the impact of the Flatbush SHA.
- Future demand modelled may understate the impact of the Drury FUZ (however initial testing indicated limited impact as travel time along SH1 was reasonably aligned with the Mill Road corridor.
- The ITA includes a scenario that tests the impact of the Takanini FUZ as having the most immediate access to the corridor.

5.2.2 Scenario I Model Assumptions

The Southern Strategic Saturn transport model has been calibrated using traffic date for the area around the corridor. This model has been used to analyse the corridor at present and in the future under the base and preferred option scenarios. The model carries a series of assumptions to forecast transport patterns. Of particular importance to the Mill Road corridor are the following:

- 10% of trips are removed from the network as a result of Travel Demand Management (TDM)
- Improvements to the Mill Road corridor south of Popes Road (as outlined in the Mill Road CMP) are not included within the model. This includes the new link road through Papakura to Drury.
- The growth within the Flatbush development area (**yield of up to 28,000 new residents**) has been included within the future modelled scenarios.
- The development of the Takanini Structure Plan has been included within the future modelled scenarios
- The development of the Drury South Business Area has been included within the future modelled scenarios
- No development scenario for the Future Urban Zone land (Drury and Takanini); and as a consequence, the model does not identify a significant number of trips from these areas.

5.2.3 Options

Two options (over two time periods) have been analysed as part of the SAR process:

- **Do Minimum:** the 'Do Minimum' option whereby no improvements are made to the corridor over and above usual or routine maintenance
- **Upgrade:** the upgrade of the corridor consistent with the NoR.

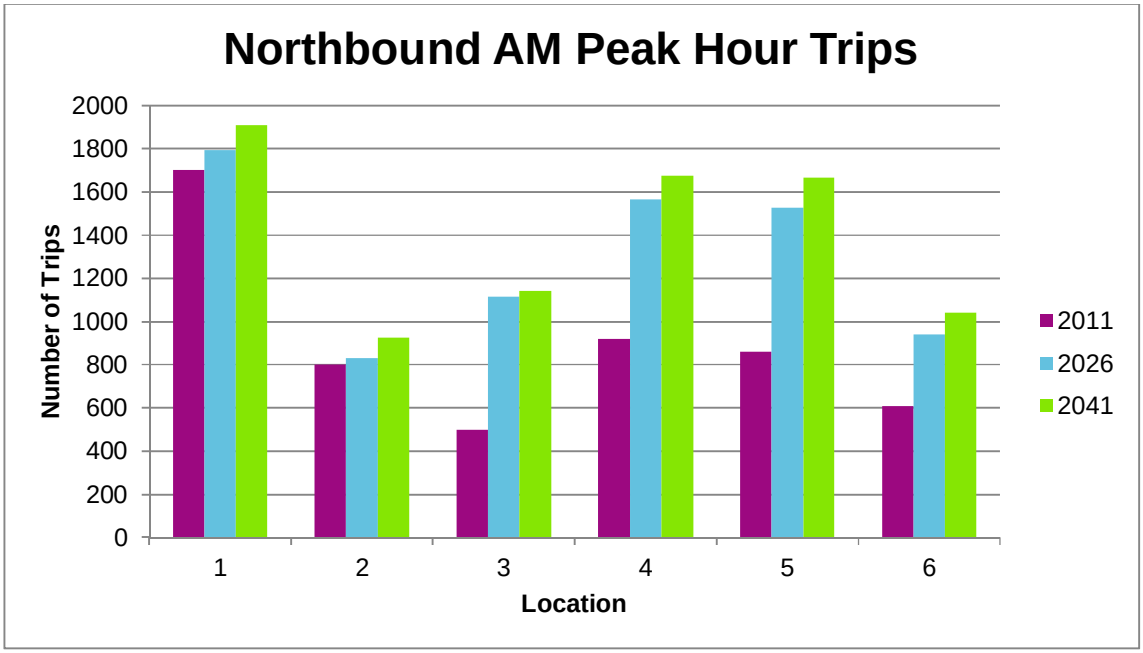
Further analysis of trips has been undertaken to understand the potential impacts of additional development as a result of the Takanini FUZ area identified within the PAUP. Two scenarios have been analysed:

- **Do Minimum plus FUZ:** the 'Do Minimum' option whereby no improvements are made to the corridor over and above usual or routine maintenance plus additional trips on the network as a result of growth in the FUZ area
- **Upgrade plus FUZ:** the upgrade of the corridor plus additional trips on the network as a result of growth in the FUZ area

5.3 Future Conditions (Modelled)

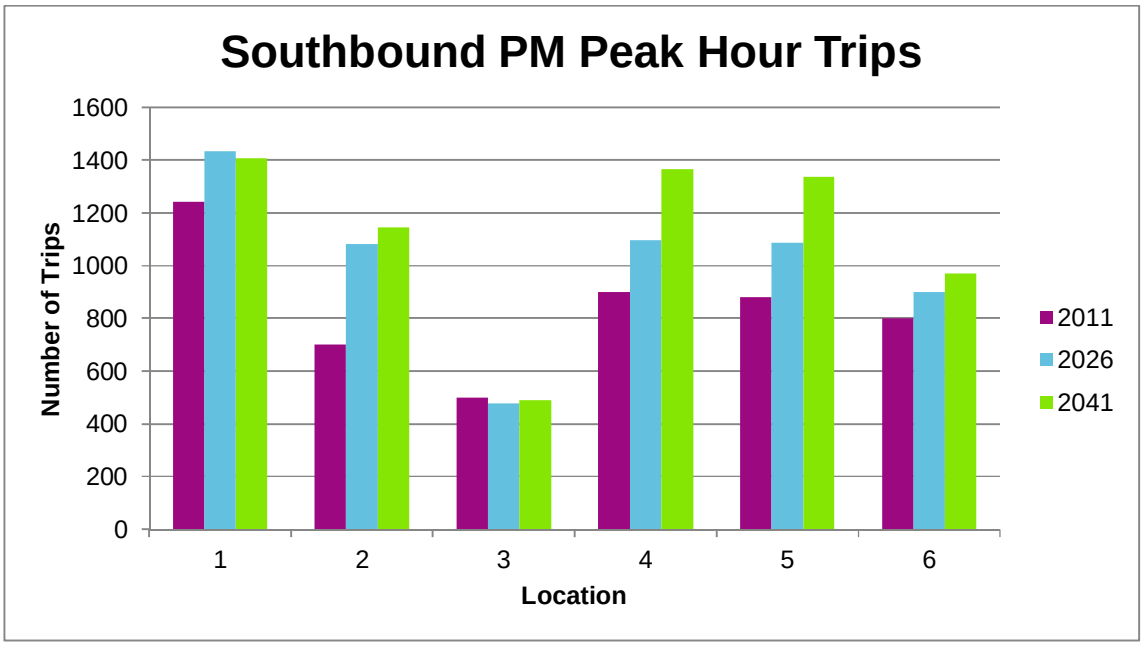
Figure 14 displays the growth in northbound trips during the morning peak period for the Do Minimum option. There appears to be little growth in trips at the northern end of the corridor (locations 1 and 2), with trips remaining reasonably stable. However, there is significant growth further east and south with approximately an extra 600 trips accessing the corridor. This growth is almost completely realised between 2011 and 2026, with trip volumes stabilising after 2026.

Figure 14 Growth in Northbound Morning Trips Along Corridor



For southbound trips, Figure 15 shows that there is not a significant growth in the number of trips exiting the motorway onto Redoubt Road (location 1). Despite a slight increase by 2026, the number of trips effectively returns to current levels by 2041. Along the remainder of Redoubt Road and Mill Road traffic volumes will experience growth of between 300-500 trips, generally staggered over the two time periods. There is no growth of southbound trips along Murphys Road, with the peak direction appearing to be northbound in both the morning and evening peak.

Figure 15 Growth in Southbound Evening Trips Along Corridor



The Upgrade option will see an increase in peak hour trip volumes, at all points on the corridor, over what is anticipated under the Do Minimum option. This appears to be a take up (in part) of the additional capacity provided along the corridor, resulting in trips being redirected from elsewhere to the upgraded corridor. Figure 16 and Figure 17 show the difference in peak hour trips along the corridor under the Upgrade scenario. With the exception of location 2 in the evening peak, all locations experience a significant increase in trips in the two peak periods as a result of the upgrade.

Figure 16 Difference in Northbound Morning Peak Hour Trips Along Corridor Under Upgrade Scenario

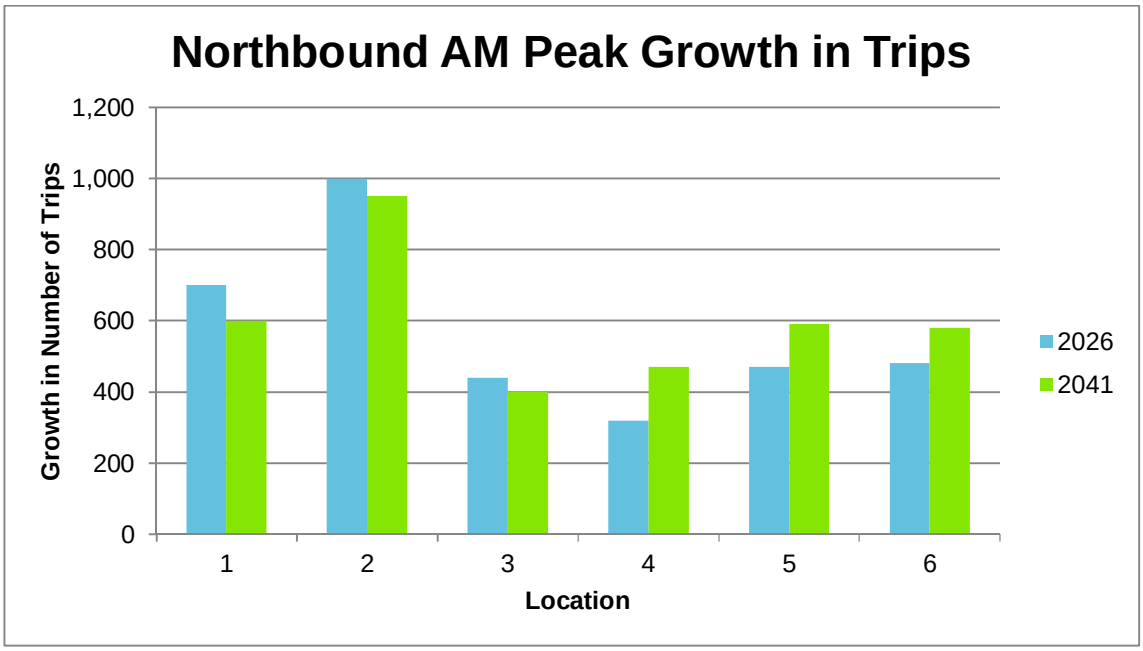


Figure 17 Difference in Southbound Evening Peak Hour Trips Along Corridor Under Upgrade Scenario

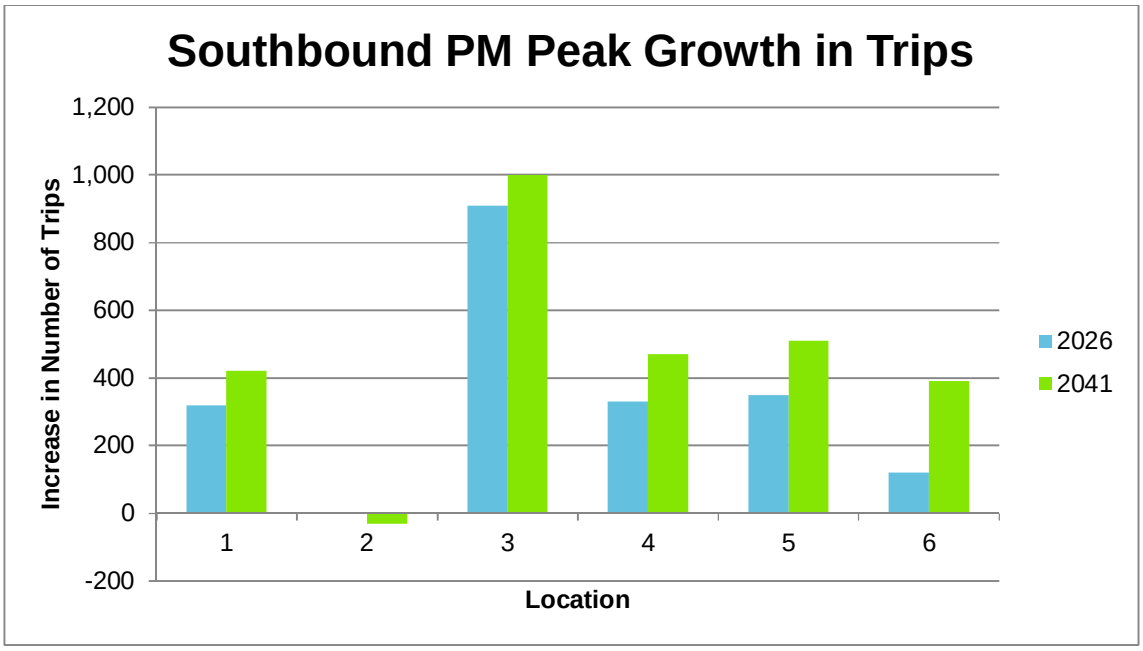
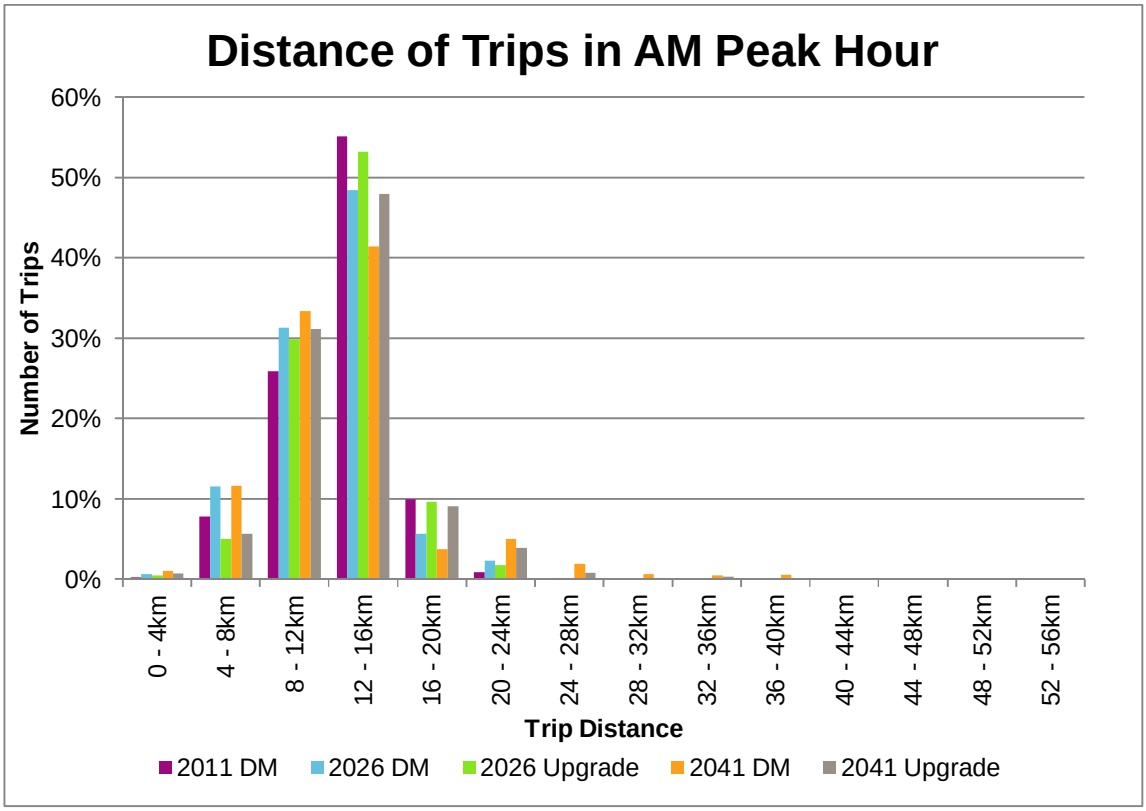


Figure 18 displays the distance travelled by trips along the corridor in 2026 and 2041 under the Do Minimum and Upgrade options. The pattern of trip distance is similar in both periods under both scenarios, with approximately 50% of trips travelling between 12-16km. There is a slight shift (around 5%) to longer trips under upgrade scenario. The corridor is approximately 7km long; with the majority of trips being longer than this, it appears that the corridor is generally used for through movements.

Figure 18 Distribution of Trips in AM Peak



5.4 Mode Share

The mode share for trips on the Mill Road corridor under the base option is assumed to reflect that of the existing situation as described in Section 2.2. Mode share for 2011 trips and 2026 trips without the upgrade is therefore expected to be:

- 93% private vehicle
- 4% public transport
- 2% walking or running
- Negligible cycle trips.

Mode share as a result of the corridor upgrade and future land use change is assumed to reflect typical mode share of adjoining serviced (in terms of public transport, walking and cycling infrastructure) residential areas.

The FUZ is identified as an indicator to support future mode shift and is tested in the following section.

5.5 Future Urban Zone

As described in Section 4, the Future Urban" zone (FUZ) identifies land suitable for urban development in the future as a placeholder for development subject to Plan Change.

In addition to the growth in trips identified above, the FUZ includes potential future urban land with direct access to the southern section of the Mill Road upgrade. A further future scenario is therefore presented, one in which includes the release of the Takanini FUZ land as urban residential.

The impact of the Drury FUZ is less evident in terms of impact on the Mill Road corridor. Testing suggests that the Drury FUZ to some extent is recognised in the future modelled trips along the corridor, however may be under estimated.

5.5.1 Trip Generation

A first principles analysis of the FUZ area to the west of the corridor has been undertaken to assess the level of trip generation resulting from the development.

The FUZ zoning covers an area of 480 ha of predominantly greenfield land and it is assumed that approximately 50% of this land would be available for development, once allowances are made for roads and other infrastructure. This leaves a total developable area of 240 ha. Three development scenarios for this area have been identified:

- Mixed Housing Suburban Zone: one dwelling per 400m^2
- Mixed Housing Urban Zone: one dwelling per 300m^2
- Hobsonville (Scenario) Development: one dwelling per 550m^2

The rate of residential development was assumed to be approximately 150 units per year, with the first year of development in 2021 (post adoption of the PAUP and the completion of a plan change).

Under this adopted land use growth scenario (FUZ scenario), there will be an additional 575 dwellings adjacent to the corridor in 2026, and 2300 by 2041. Each dwelling is assumed to generate one trip in the morning peak period, with 80% of trips being outbound onto the external road network. It is assumed that in the morning peak, the peak direction of travel is northbound and for the evening peak southbound. Analysis of the model outputs suggests that the peak direction on Murphys Road is northbound in both periods. However, for ease of analysis, southbound evening peak trips have been assessed on Murphys Road.

The distribution of trips from the block bordered by Walters Road, Grove Road, Old Wairoa Road and Porchester Road has been used to predict the distribution of trips from the FUZ area. Under the do minimum option, the distribution of trips between Mill Road and State Highway 1 is approximately 50% to each corridor. However, the preferred option sees approximately 60% of trips using Mill Road. Table 10 displays the growth anticipated within the FUZ area and the impact this may have in terms of peak hour trips.

Table 10 Forecast Growth Under FUZ Scenario

Year	Option	Dwellings	No Of Peak Hour Trips	Trips on Mill Road	Northbound Trips	Southbound Trips
2026	Do Minimum	575	460	270	150	65
	Upgrade	575	460	270	190	80
2041	Do Minimum	2300	1840	920	640	280
	Upgrade	2300	180	1140	800	340

5.5.2 Mode Shift

The release of FUZ land will influence mode share on the external road network as higher intensity residential land use will increase the demand for public transport trips to areas of employment, such as Papakura, Flatbush, Manukau and further afield such as the centre city.

There is also anticipated to be an increased demand for cycling trips due to the acceptable trip distances to places of employment such as Takanini, Papakura, Drury, Flatbush and Manukau. This is explored in more detail in section 6.

5.6 Summary

In summary, there is growth in peak hour trips along the corridor in 2026 and 2041 under both the Base and Upgrade options. The implementation of the corridor upgrade results in a much greater growth in trips along the corridor than the base option. The distance of trips along the corridor appears to be reasonably consistent under both the base and upgrade scenarios. Approximately 80% of trips are between 8-16km in length, suggesting that the corridor is used for sub-regional trips rather than local trips. Therefore, the upgrade itself has a traffic inducing effect on the Mill Road Corridor.

The FUZ scenario does add significant trips to the network and to the Mill Road Corridor by 2026. This is likely to alter the mode share of trips along the Mill Road Corridor, the impacts of which are assessed in the following section.

6.0 Assessment of Effects

6.1 Introduction

The purpose of this section is to identify the impacts of future trips on the Mill Road Corridor, with and without the upgrade. The impact of the additional trips generated by the FUZ is also assessed.

6.2 Future Traffic Impacts

The screenlines identified in Figure 20 were assessed as mid-block capacities. For this level of assessment it is assumed that signalised intersections, as a part of the upgrade provide suitable levels of service (Murphys Road intersection). The impact of queuing back along Redoubt Road from SH is included in the modelling undertaken.

Figure 19 Corridor Screenlines

The three Notices of Requirement relate to the following screenline locations:

- NoR 1: Screenline 1
- NoR 2: Screenlines 2 and 3
- NoR 3: Screenlines 4 and 5

Figure 20 displays the traffic volumes to capacity (V/C) ratio for the six screenlines along the corridor (see Figure 5). These V/C ratios have been analysed for the four different scenarios in both 2026 and 2041.

It is noted that V/C ratios are affected by the impact of congestion at the SH1 interchange (e.g. Screenline 1) and by local congestion at or near intersections. However, the indicators used generally identify the improved performance of the corridor under the upgraded conditions for 2026 and 2041.

The application of the FUZ on the existing corridor displays more significant impacts on performance, however these impacts are generally mitigated by the corridor upgrade and mitigated further through application of mode shift towards public transport use, walking and cycling.

Figure 20 Congestion Levels

Year	Screenline	Period	Existing Land Use	Corridor Upgrade, Existing Land Use	FUZ Recognised	Corridor Upgrade, FUZ Recognised	Corridor Upgrade, FUZ with Mitigation
2011	1	AM NBD	0.61	Same as Existing			Same as Existing
		PM SBD	0.83				
	2	AM NBD	0.53				
		PM SBD	0.47				
	3	AM NBD	0.45				
		PM SBD	0.45				
	4	AM NBD	0.61				
		PM SBD	0.60				
	5	AM NBD	0.57				
		PM SBD	0.59				
	6	AM NBD	0.44				
		PM SBD	0.57				
2026	1	AM NBD	0.63	0.88	0.66	0.92	0.89
		PM SBD	0.96	0.95	0.99	1.02	0.97
	2	AM NBD	0.52	0.59	0.60	0.64	0.61
		PM SBD	0.69	0.34	0.76	0.39	0.36
	3	AM NBD	1.00	0.55	1.03	0.57	0.56
		PM SBD	0.42	0.49	0.45	0.51	0.49
	4	AM NBD	1.00	0.61	1.10	0.67	0.63
		PM SBD	0.69	0.45	0.79	0.52	0.47
	5	AM NBD	0.97	0.64	1.07	0.71	0.66
		PM SBD	0.68	0.39	0.78	0.45	0.41
	6	AM NBD	0.67	0.71	0.67	0.80	0.74
		PM SBD	0.92	0.68	0.64	0.77	0.71
2041	1	AM NBD	0.64	1.04	0.79	1.04	0.94
		PM SBD	0.93	1.04	1.15	1.24	1.08
	2	AM NBD	0.53	0.58	0.86	0.78	0.67
		PM SBD	0.68	0.33	1.00	0.53	0.42
	3	AM NBD	1.00	0.54	1.15	0.61	0.57
		PM SBD	0.41	0.52	0.56	0.59	0.55
	4	AM NBD	1.01	0.66	1.44	0.93	0.77
		PM SBD	0.80	0.56	1.23	0.82	0.67
	5	AM NBD	1.00	0.70	1.43	0.96	0.81
		PM SBD	0.78	0.56	1.21	0.83	0.67
	6	AM NBD	1.00	0.83	1.00	1.24	1.01
		PM SBD	1.00	0.95	0.73	1.48	1.21

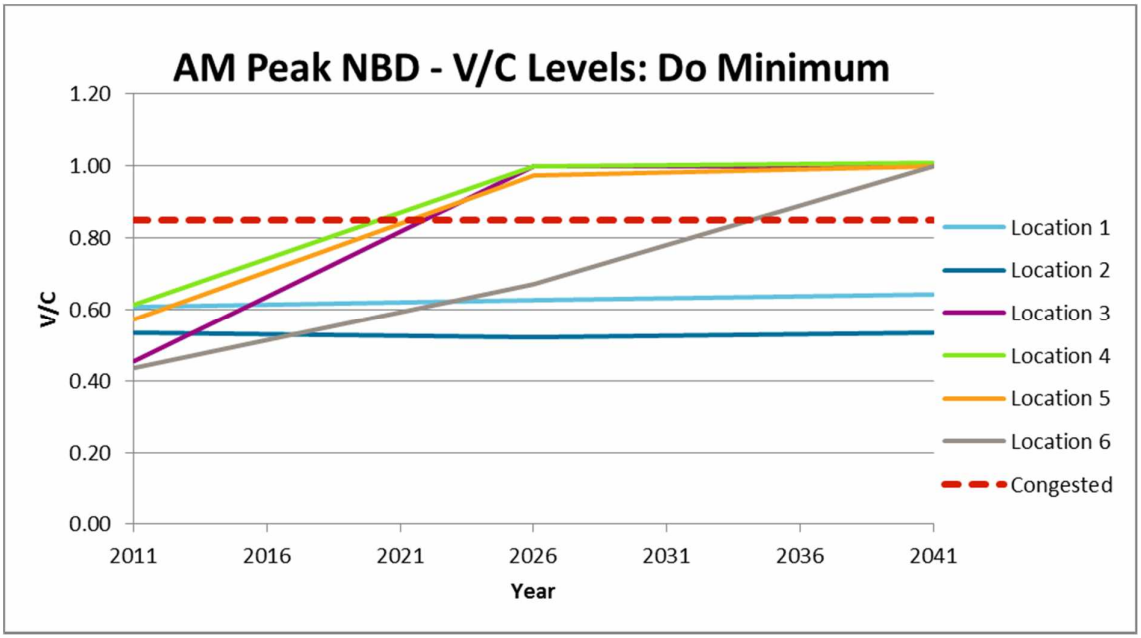
Note: The corridor is assumed to be operating at capacity if the midblock V/C value is greater than or equal to 0.85.

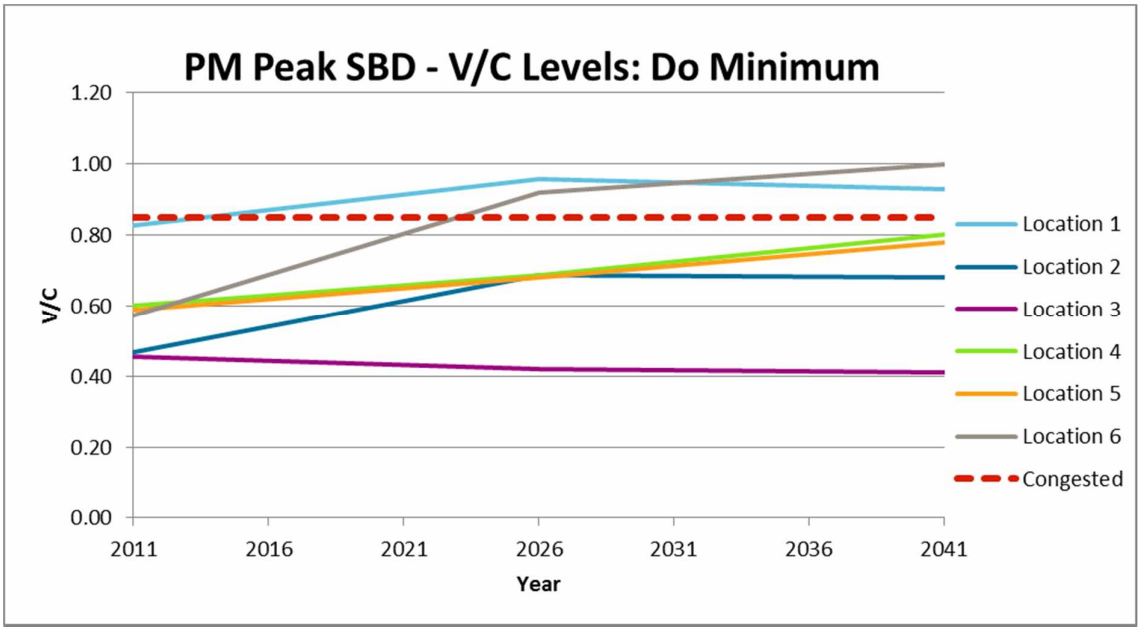
6.2.1 Do Minimum Corridor Performance

Figure 21 displays the change in northbound and southbound V/C levels. Under the existing land use scenario (Do Minimum), the corridor reaches practical capacity in the northbound direction before 2026. The southbound direction is generally affected by congestion around the SH1 interchange, while the other locations do not reach practical capacity prior to 2041.

While it is unlikely that the change will be linear, the graph indicates that the corridor will reach practical capacity in the northbound direction between 2020 and 2024.

Figure 21 Change in AM and PM Midblock V/C Levels Under Do Minimum Option



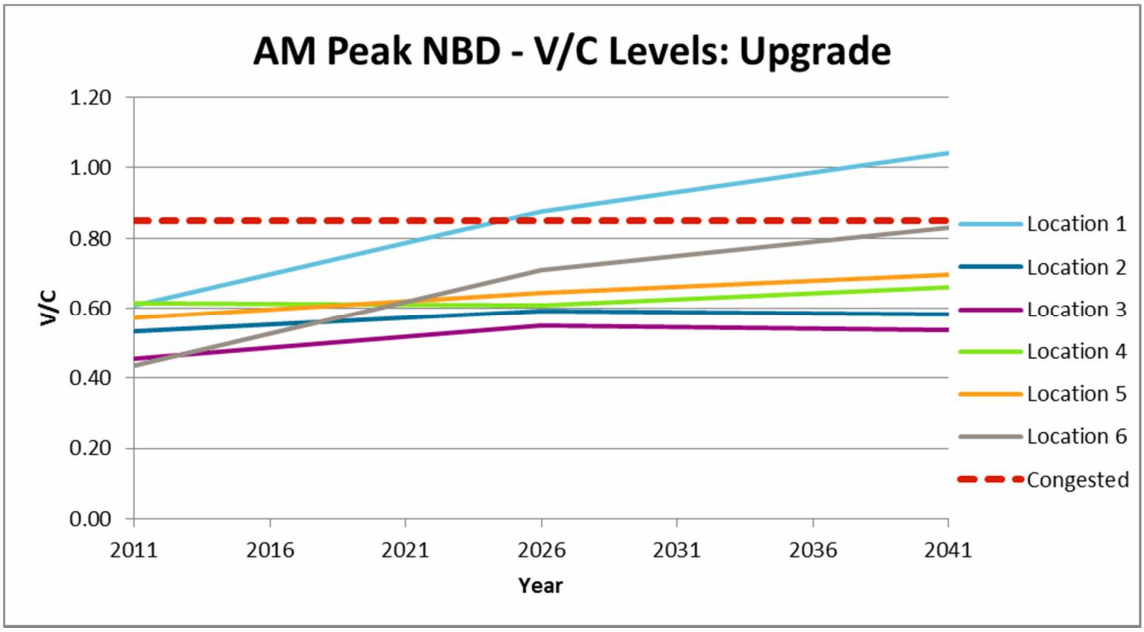


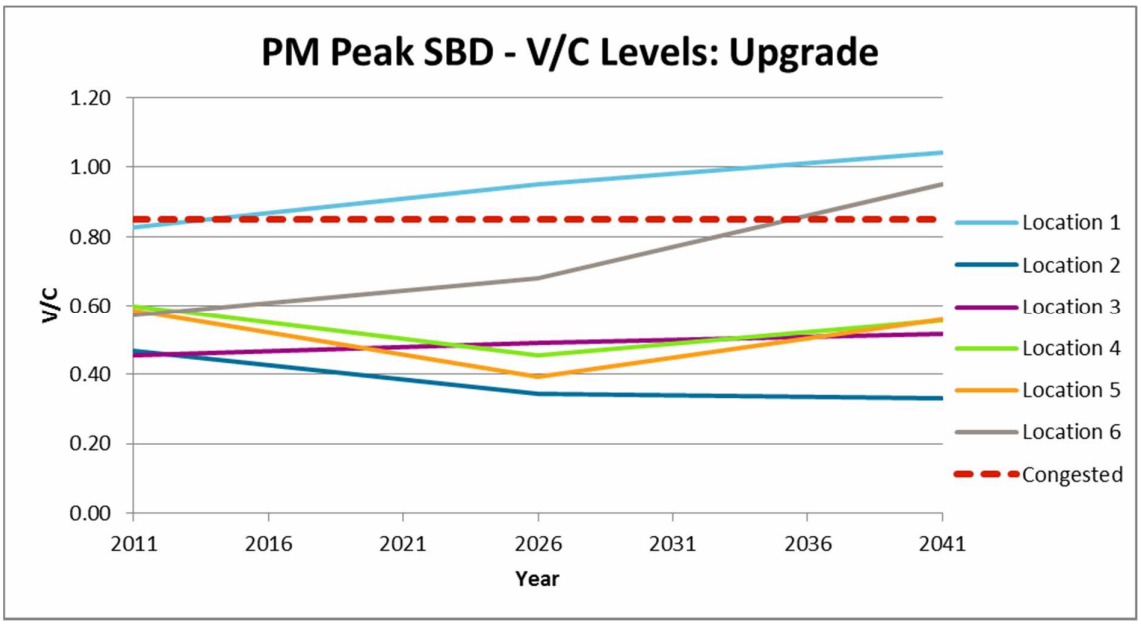
6.2.2 Upgrade Option Corridor Performance

A growth in trips is anticipated under the upgrade option, however as shown in Figure 22, the additional capacity provided means that the V/C levels do not reach a point where the corridor becomes congested during northbound or southbound directions prior to 2041.

It is noted that these performance indicators do not include potential mitigation measures that would eventuate from increasing urbanisation. These are investigated in Section 7.

Figure 22 Change in AM and PM Midblock V/C Levels Under Upgrade Option





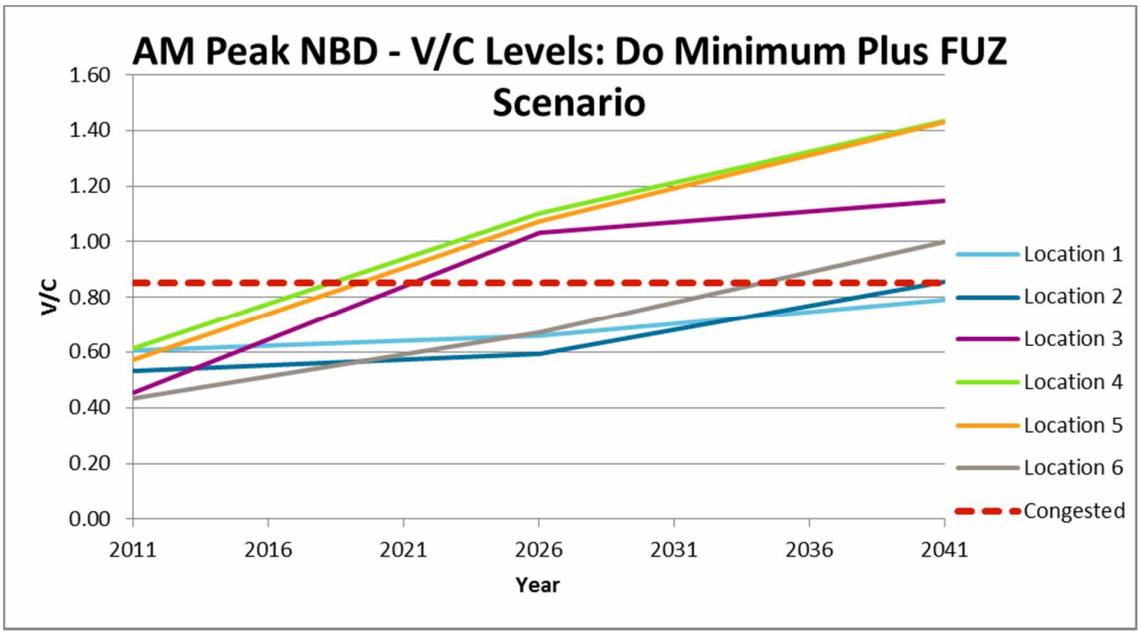
6.2.3 FUZ Scenario Corridor Performance (No Upgrade)

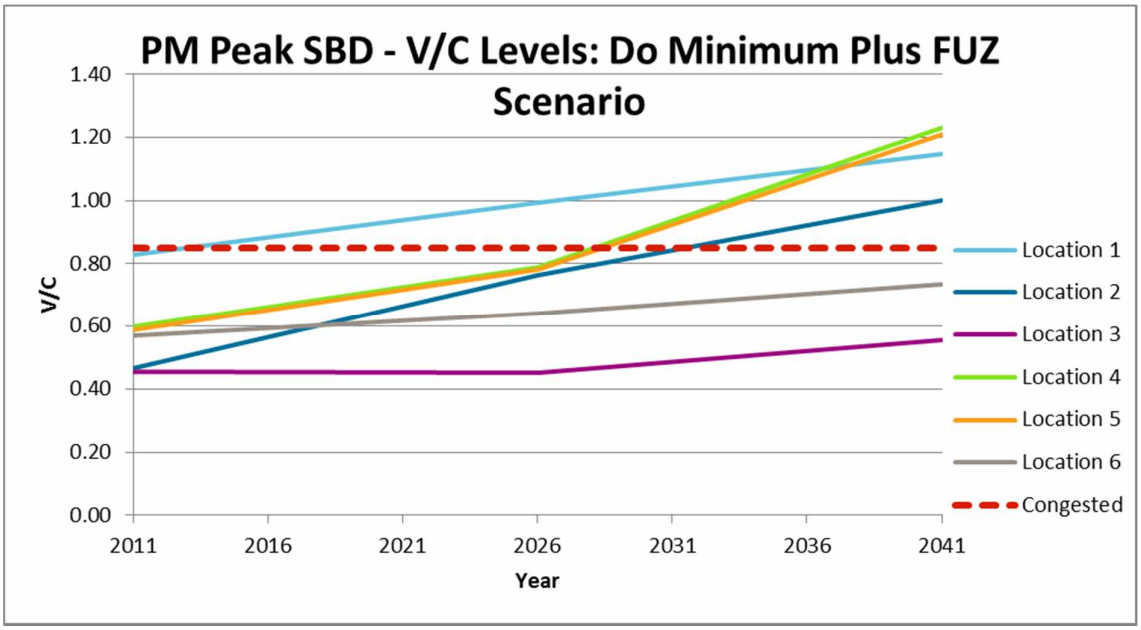
The addition of trips to the network as a result of potential growth within the FUZ area has significant impacts on the congestion levels along the corridor (see Figure 23).

These additional trips will enter the network incrementally once the FUZ is released. Under this scenario it appears the corridor will reach capacity in the northbound direction prior to 2020, one to two years earlier than under known land use conditions.

Corridor performance is also impacted in the southbound direction with levels of congestion in the PM peak approaching capacity prior to 2026, about ten years earlier than under known land use conditions.

Figure 23 Change in Midblock V/C Levels under Do Minimum plus FUZ Option



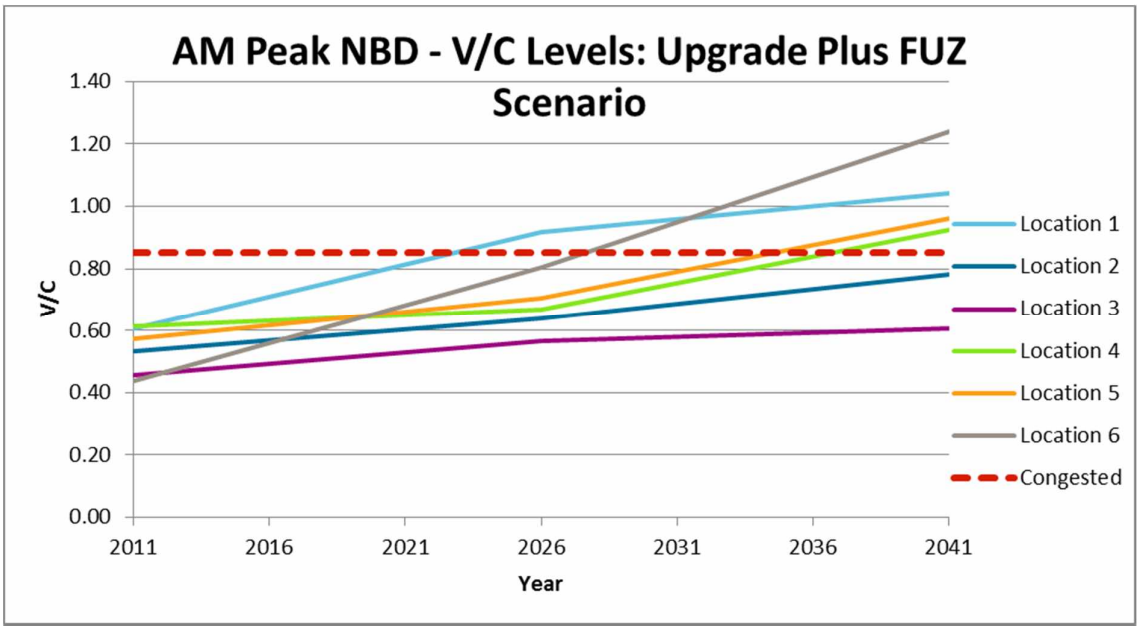


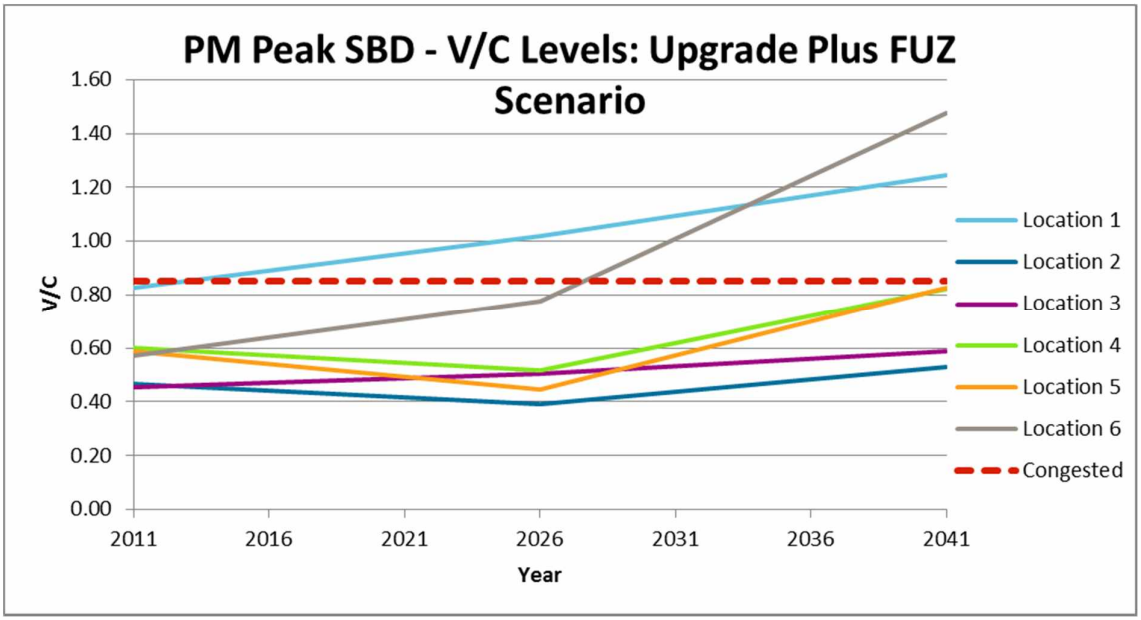
6.2.4 FUZ Scenario Corridor Performance (With Upgrade)

As shown in Figure 24, the corridor upgrade accommodates the forecast FUZ related trips to a much greater degree. Corridor performance remains acceptable through to 2031, when congestion issues may rise. The southbound direction shows spare capacity through to at least 2041.

It is noted that these figures do not include any mitigation of trip impacts on the corridor. While these mitigation measures would usually be identified for any future FUZ related ITA it is important to note that the Mill Road Upgrade does provide future proofing in support of future mode towards walking, cycling and public transport trips. These are explored in more detail in Section 8.

Figure 24 Change in Midblock V/C Levels Under Upgrade Plus FUZ Option





6.3 Road Safety

The Redoubt Road to Mill Road SAR examined the impact of the option on accident rates along the corridor. Accident costs and benefits were calculated using Accident-by-Accident analysis for the Do Minimum and the Option. *Economic Evaluation Manual* values were used to calculate the percentage reduction of the accidents. In cases where no *Manual* guidance was available common sense reduction rates were applied.

Table 11 shows the applied average reduction rates. The net present value of accident savings was $17M accounting for 4% of all benefits for the project.

Table 11 Accident reduction rates

Crash Type	Code	Reduction Rate
Head on	AB, B	90%
Hit object	E	33%
Lost control off road	AD, CB, CC, CO, D	40%
Overtaking	AA, AC, AE-AO, GE	33%
Rear end, crossing	FB, FC, GD	90%
Rear end, queuing	FD, FE, FF, FO	30%
Rear end, slow vehicle	FA, GA-GC, GO	45%
Crossing direct	H	70%
Crossing turning	J, K, L, M	90%

6.4 Impacts of Southern Growth Area

Initial testing of the impacts of the traffic generated by the Southern Growth area suggests that the Mill Road corridor is attractive for through car-based trips if there is travel time savings to be enjoyed. Alternative corridors used by car trips include SH1 and, to a lesser extent Porchester Road.

The finding generally indicate that any spare capacity on Mill Road will be taken up by Southern Growth Area traffic, most of which are destined for Flatbush. If the function of Mill Road is to cater for regional strategic trips this would be deemed acceptable, however the real opportunity for Mill Road lies in its use to trigger and cater for local development and local trips, such as that associated with the adjoining FUZ.

6.5 Summary of Traffic Impacts

Regional strategic assessment supports significant growth throughout the entire southern sector including the Takanini Structure Plan and FUZ, the Drury FUZ, the current and future SHA's (including those in the southern RUB)[2].

The Mill Road corridor between SH1 and Ranfurly Road, in its current state, reaches a level of unsatisfactory congestion during the morning peak period between 2020 and 2024. By 2024 this congestion is likely to involve trips being re-distributed onto the surrounding network due to unreliable or unreasonable travel times.

The evening peak period does increase in traffic volume however does not reach a congested state prior to 2026, when the section south of Alfriston experiences some congestion.

This indicates that due to growth within the wider area the Mill Road upgrade between SH1 and Redoubt Road (covered by NoR 1 and 2) are justified to some degree prior to 2024. The Redoubt Road to Alfriston section (covered by NoR 3) would suffer from increasing congestion, justifying an upgrade shortly after 2024. Anecdotally it could be problematic to provide these upgrades in separate years (i.e. delay the upgrade resultant from NoR 3) as the traffic redistributed from the upgrade itself would predicate the need for the NoR 3 upgrade.

[2] The scale of development in the southern sector including assessment of alternatives is described in the Auckland Council Document "Transport in Greenfield Areas" (TiGA).

In terms of capacity justification one question of the proposed four laning is the need to provide two lanes in the southbound direction south of Murphys Road. Analysis generally indicates this is not required between Murphys Road and Alfriston. However this forms part of the wider plans for the corridor including the provision of adequate functionality throughout, plus the future need to provide southbound capacity along the corridor towards Papakura as a Metropolitan Centre and access point to the rapid transit network (i.e. rail to Manukau and Auckland City Centre).

The implementation of the corridor upgrade option will relieve congestion throughout the corridor, with some lingering traffic issues on approach to SH1, most likely caused by the inevitable queuing from ramp signals in the morning and evening peak periods.

The upgrade itself does induce traffic from elsewhere from the network due to improved travel times along the corridor, which anecdotally could increase to the point that Mill Road is less able to cater for more local trips or trips generated from future adjoining residential zones. This indicates that the Mill Road upgrade could be used to trigger appropriate land use development such as the FUZ.

The potential impact of the FUZ on the corridor has also been assessed. If the FUZ develops in a manner that reflects adjacent suburban areas, there will be an increase number of trips on the network. Without any upgrade on Mill Road these trips will result in the corridor becoming congested upon the release of a relatively minor proportion of residential properties. Certainly within the first two years of release (at up to 250 units per year) the corridor will become congested. This could occur as early as 2018 – 2020.

The Mill Road upgrade does cater for the release of FUZ land and is almost certainly a strong strategic justification. One reason for this is that even with sensible land release and potential mitigation measures (see Section 7) the FUZ has the potential to utilise any spare capacity along the corridor. Modelling of the FUZ indicates that congestion of the upgraded corridor could result as early as 2030 (pre-mitigation).

7.0 Mitigation Measures

7.1 Mode Share

7.1.1 Public Transport

The trip volumes along the corridor under the do minimum and upgrade scenarios include the travel demand management assumptions stated above. This assumption has not been applied to the additional trips generated within the 'do minimum plus FUZ' and 'upgrade plus FUZ' scenarios.

The Regional Public Transport Network (2026) identifies two bus services that will either pass through or adjacent to the FUZ section of the corridor. The presence of these routes (which will operate at 20-30 minute frequencies in peak periods) will enable a mode shift towards public transport, and act as partial mitigation of trips generated from development of the FUZ area.

The capacity of these services is approximately 50 passengers. A conservative estimate of patronage being 50% of the available capacity would see 60 trips transferred to bus services. This is considered to at least double by 2041. This is summarised in Table 12.

Table 12 Approximate Difference in Vehicle Trips as a Result of Public Transport Mode Shift

Year	No Of Peak Hour Trips	Trips on Mill Road	Northbound Trips	Southbound Trips
2026	-60	-50	-30	-20
2041	-120	-100	-60	-40

7.1.2 Walking and Cycling

Under all the do minimum and upgrade scenarios, less than 1% of trips are between 0-4km in distance. A further 5-12% of trips are between 4-8km in distance. Trips of this distance start to fall within the range of typical walking and cycling trip lengths. Although a comparatively small number of trips are of this length, it is possible to cater for them through the provision of high quality walking and cycling infrastructure.

The upgrade option will see improvements for both pedestrians and cyclists. Footpaths will be installed either side of the corridor along the entirety of the Redoubt Road section of the corridor.

Segregated cycle facilities will run the length of the corridor. These improvements will make walking and cycling a more attractive and realistic option for trips 0-8km in length and as a result will reduce the total number of vehicle trips on the network.

It is assumed that as a result of the provision of high quality walking and cycling infrastructure, there will be up to 4% mode shift to walking and cycling for trips along the corridor, as shown in Table 13.

Table 13 Difference in Vehicle Trips as a Result of Walking and Cycling Mode Shift

Year	No Of Peak Hour Trips	Trips on Mill Road	Northbound Trips	Southbound Trips
2026	-40	-40	-30	-10
2041	-80	-80	-60	-20

7.2 Travel Demand Management

As stated in Section 5 the model assumes a 10% reduction in trips as a result of travel demand management measures. This reduction in trips has not been applied to the FUZ scenario. Table 14 displays the potential reduction in trips as a result of travel demand management measures.

Table 14 Difference in Vehicle Trips as a Result of TDM

Year	No Of Peak Hour Trips	Trips on Mill Road	Northbound Trips	Southbound Trips
2026	-40	-40	-30	-10
2041	-80	-80	-60	-20

7.2.1 Summary of Mitigation

Taking into account the mitigation of trips as a result of access to frequent public transport, improved walking and cycling facilities and travel demand management, a significant number of single vehicle trips may be removed from the network under the FUZ scenario. Table 15 displays the total number of single vehicle trips removed from the network and the Redoubt-Mill Road corridor as a result of the mitigation.

Table 15 Total Trip Mitigation

Year	No Of Peak Hour Trips	Trips on Mill Road	Northbound Trips	Southbound Trips
2026	-140	-130	-90	-40
2041	-280	-260	-180	-80

7.3 Employment

The pattern of land use development may also act as mitigation for trips along the corridor. The presence of local employment will reduce the need for trips along the corridor, or reduce the average trip length along the corridor. Providing for local employment within any development of the FUZ area would minimise the number of external trips generated by the development.

Increased access and availability of employment in areas south of the corridor may also minimise the impact of trips on the Redoubt-Mill Road corridor. With the development of the proposed Drury South Business Park and the emergence of Papakura as a Metropolitan centre, the likelihood of a redistribution of trips is reasonable.

The staggering of working hours for major employers within the area may reduce the impact of peak period trips on the corridor by redistributing trips throughout the day.

7.4 Summary

The justification for the Mill Road corridor upgrade relies on an increase in background traffic growth including traffic induced by the upgrade itself. The mitigating factors for this traffic is unlikely to improve mode share or reduce the impact on the corridor, not only as the effect of travel demand management is built into the model itself but the trip distance combined with origins and destinations indicates negligible valid alternative (e.g. too long for walking and cycling, too dispersed for public transport).

However the opportunity to mitigate the impacts of future traffic on the Mill Road corridor lies in the ability to influence future trips generated by the adjoining FUZ. The mitigating factors suggested in this section include both sensible land use development, resulting in higher internal trips, and shorter, more direct trips to places of employment, resulting in a higher portion of walking, cycling and public transport trips.

The outcomes of this is summarised in Section 8.

8.0 Post Mitigation Outcomes

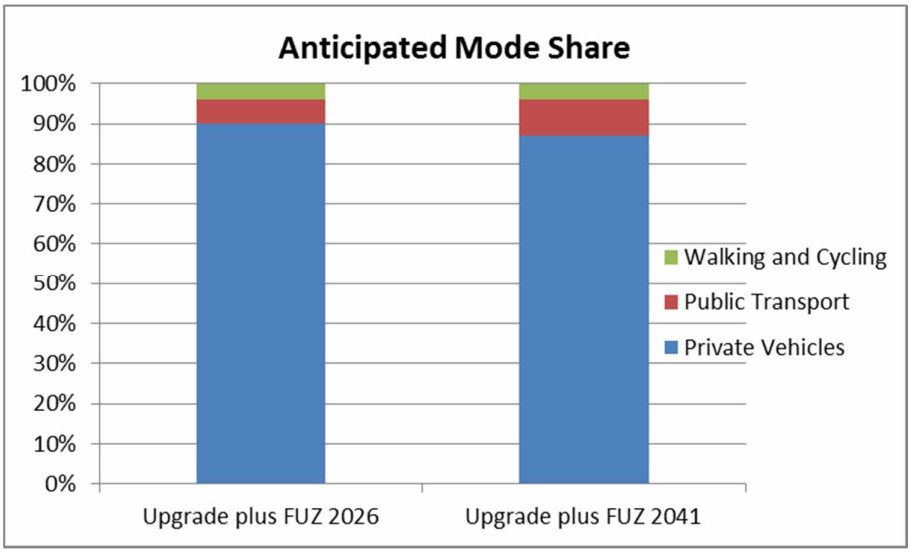
8.1 Future Mode Share (Target)

Applying the potential mitigation outlined in Section 7 will create a shift in the mode share for trips generated within the corridor. An analysis of the impacts of this mitigation alongside existing mode share provides the anticipated future mode share.

Figure 25 displays the projected mode share for trips along the corridor, including the FUZ scenario.

The current mode share of private vehicles is 93%. This is expected to reduce to about 90% by 2026 and 87% by 2041. Mode share of public transport is forecast to increase from 4% currently to 6% by 2026 and 9% by 2041. Mode share of walking and cycling trips is forecast to increase from 2% currently to 4% by 2026 and 2041.

Figure 25 Anticipated Mode Share of Trips generated by FUZ Scenario



8.2 Summary

The opportunity to mitigate the impacts of traffic growth on the Mill Road corridor is heavily influenced by the release of urban land, and with significant population and density to trigger increased bus services. Analysis indicates that increased walking, cycling and public transport trips would result with appropriate investment in high quality and connected facilities along the corridor.

While the corridor upgrade is warranted on the basis of strategic land use growth and the effects of redistributed traffic the addition of FUZ related trips provides significant justification and adds significant weighting to the need for the NoR 3 section. The mitigating factors of the FUZ will reduce the impacts of the FUZ on the corridor, further enhancing the economic life of the upgrade itself.

It is noted that section 3.2.7.9.1 of the PAUP provides a trigger for the preparation of an ITA for development such as that associated with the FUZ. This will provide mitigation of the development itself and manage the impacts of traffic on the Mill Road corridor.

9.0 Conclusion

9.1.1 Summary

This ITA was undertaken to support the three Notices of Requirement for the Mill Road Corridor Upgrade (the proposal), to assess the impacts of the proposal on the corridor and to assess the future land use assumptions of the Unitary Plan.

Key strategic land use change proposed by the Auckland Plan and Proposed Auckland Unitary Plan (PAUP) includes the opportunity for significant population and employment growth in the Flatbush area and the southern growth areas around Papakura and Drury (see ***Future Urban Zone***, below). As development occurs within these areas increased travel demand will result in existing levels of congestion resulting in longer and inconsistent travel times throughout the corridor.

Future travel demand at various locations along the corridor suggests that the Mill Road upgrade between SH1 and Redoubt Road - covered by NoR 1 and 2 - will result in congestion relief and more consistent travel times along this part of the corridor. The anticipated release and uptake of land both within Flatbush and the wider area would warrant an upgrade of the SH1 to Redoubt Road section prior to 2024. Certainly traffic issues increasing at the current rate would be more than likely to stifle development within these areas within this timeframe.

The Redoubt Road to Alfriston section (covered by NoR 3) is anticipated to suffer from increasing levels of congestion both in response to urban land release in the Flatbush area but more significantly the Takanini Future Urban Zone. Traffic issues anticipated from these land release areas warrants an upgrade between Redoubt Road and Alfriston prior to 2026.

The realignment and widening of the corridor, particularly the Murphys Road section and intersection with Reboubt Road, and the NoR 3 section will have a positive impact on the safety record of the corridor.

The implementation of the upgrade results in a greater demand for trips along the corridor than under base conditions. The upgrade will relieve congestion throughout the corridor well beyond 2041 under current land use conditions (i.e. no or minimal release of FUZ).

Justification for the upgrade does rely on the function of Mill Road as a regional and / or arterial route, but also as an alternative corridor to SH1. This does support the project objective of providing network resilience however may be questioned in terms of its future strategic function to trigger land use development and support more local trips, including access to public transport interchange.

However, the release of FUZ land will increase considerably the trips along the corridor. Without any upgrade on Mill Road these trips will result in the corridor becoming congested as early as 2018 – 2020.

The corridor upgrade can generally be justified on the basis of background and induced growth alone. However, the addition of FUZ related demand provides significant justification for the project on a more strategic level, including the ability to future proof for public transport, walking and cycling.

The mitigating factors of the FUZ will reduce the impacts of the FUZ on the corridor, further enhancing the economic life of the upgrade itself.

The opportunity to mitigate the impacts of traffic growth on the Mill Road corridor is heavily influenced by the release of FUZ land. Analysis indicates that increased walking, cycling and public transport trips would result with appropriate investment in high quality and connected facilities along the corridor.

9.1.2 Staging and Constructability

An assessment of the proposal staging and constructability concludes that the area proposed for designation will cater for the reasonable construction effects of the upgrade.

An assessment of construction traffic flows indicates that much of the corridor will need to be maintained in order to avoid serious queuing and delay. Options are limited to re-route or limit the quantum of trips along the corridor. However, providing one lane in each direction can be maintained with appropriate approach lanes at signalised intersections construction impacts can be managed.

9.1.3 Outcomes and Recommendations

The ITA identifies that without any upgrade:

- The Mill Road corridor will reach unreasonable levels of congestion by 2024
- The Mill Road corridor will continue to contribute to the high crash rate in the area
- Urban growth in locations with strategic support may be constrained to less than desirable levels.

The ITA consistently supports the designation of the corridor, particularly:

- The staging and timing defined by NoR 1 and NoR 2 sections
- The ability of NoR 3 to connect and support strategic land use development indicated by the Future Urban Zone land
- The ability to future proofing for public transport services, and walking and cycling infrastructure.

The upgrade supports the project objectives in terms of:

- providing reasonable capacity for a 30 year planning horizon
- improving safety for future users
- providing an appropriate degree of resilience to SH1
- supports a more connected environment (particularly the release of FUZ land)
- provides for walking, cycling and public transport use
- Manages potential negative impacts on the environment (through the SAR assessment)
- Is constructable within the foot print of the NoR's t and can be staged appropriately
- Supports national and regional strategic policy objectives.

While not matters to be considered by the current Notices of Requirement it is important to note the potential next steps in terms of connections to and from the south and the need for mitigating the impact of trips generating through urban land development.

A future upgrade to the central section of the Mill Road corridor (i.e. south of Alfriston) will be driven by the trip demands resulting from the FUZ, and is likely to be triggered by capacity increases in the southbound direction towards Papakura and the southern growth sector. Mitigation through provision of infrastructure for walking, cycling and access to public transport is required to minimise the impact of the FUZ on the corridor, and will extend the economic life of the upgrade.

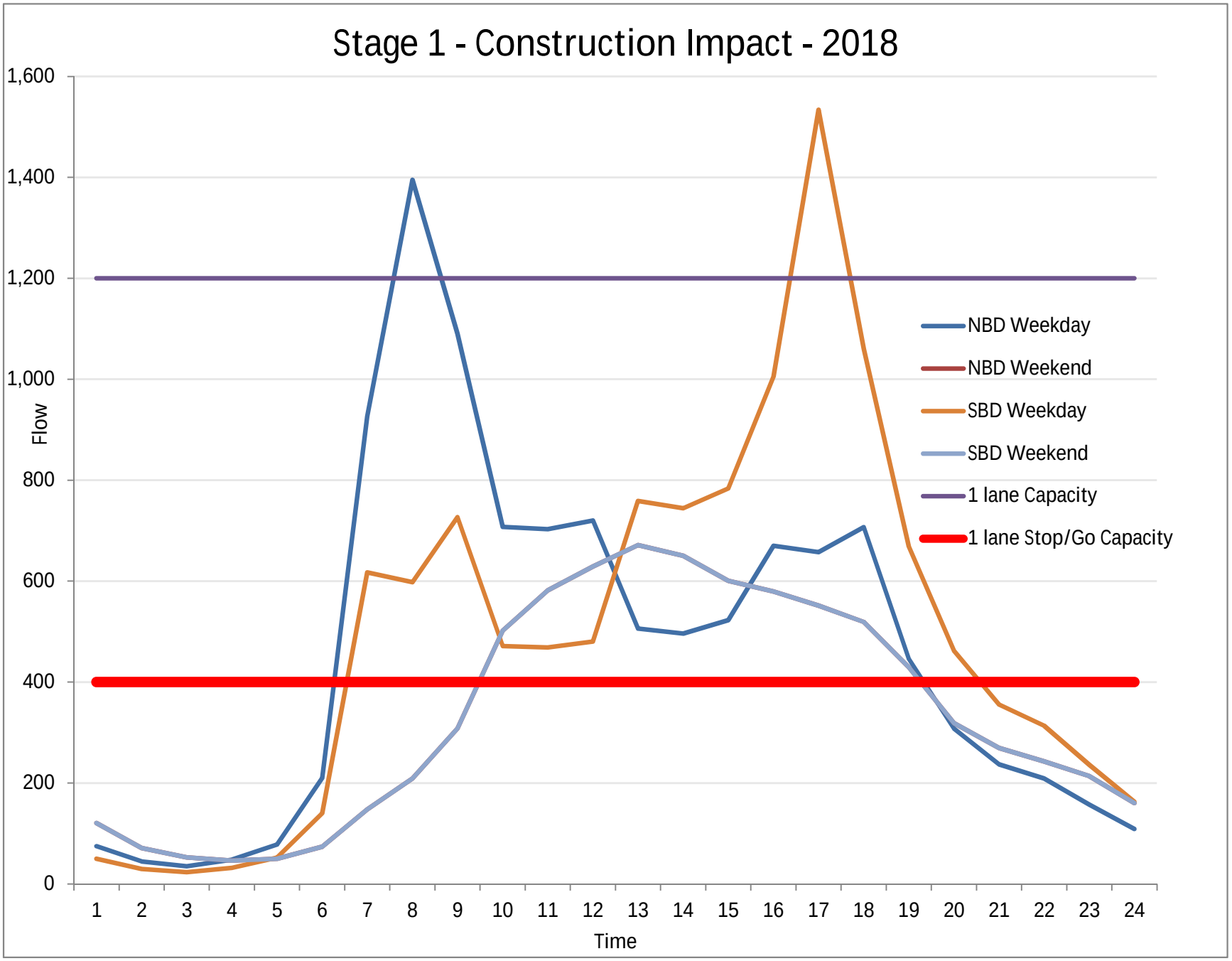
Further mitigation of appropriate land use development that supports travel demand management is required (for the FUZ) and should include such measures as local employment, local community facilities (schools, parks and reserve land), home based employment, car sharing and travel information (or other measures to be assessed as part of the FUZ release).While a degree of resilience is provided with the upgrade the release of FUZ land will erode this resilience over time, particularly during morning peak periods in the northbound direction.

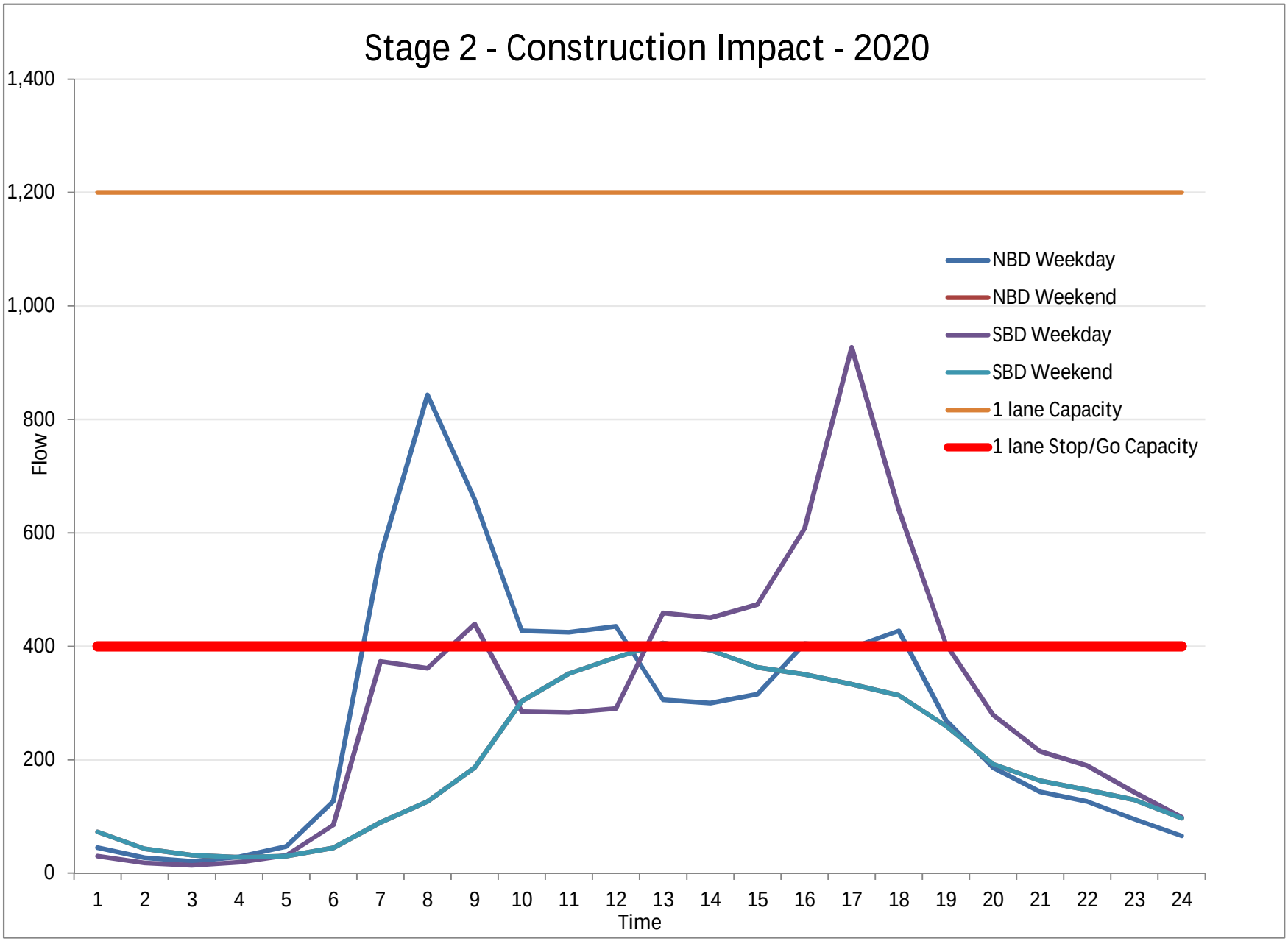
Appendix A

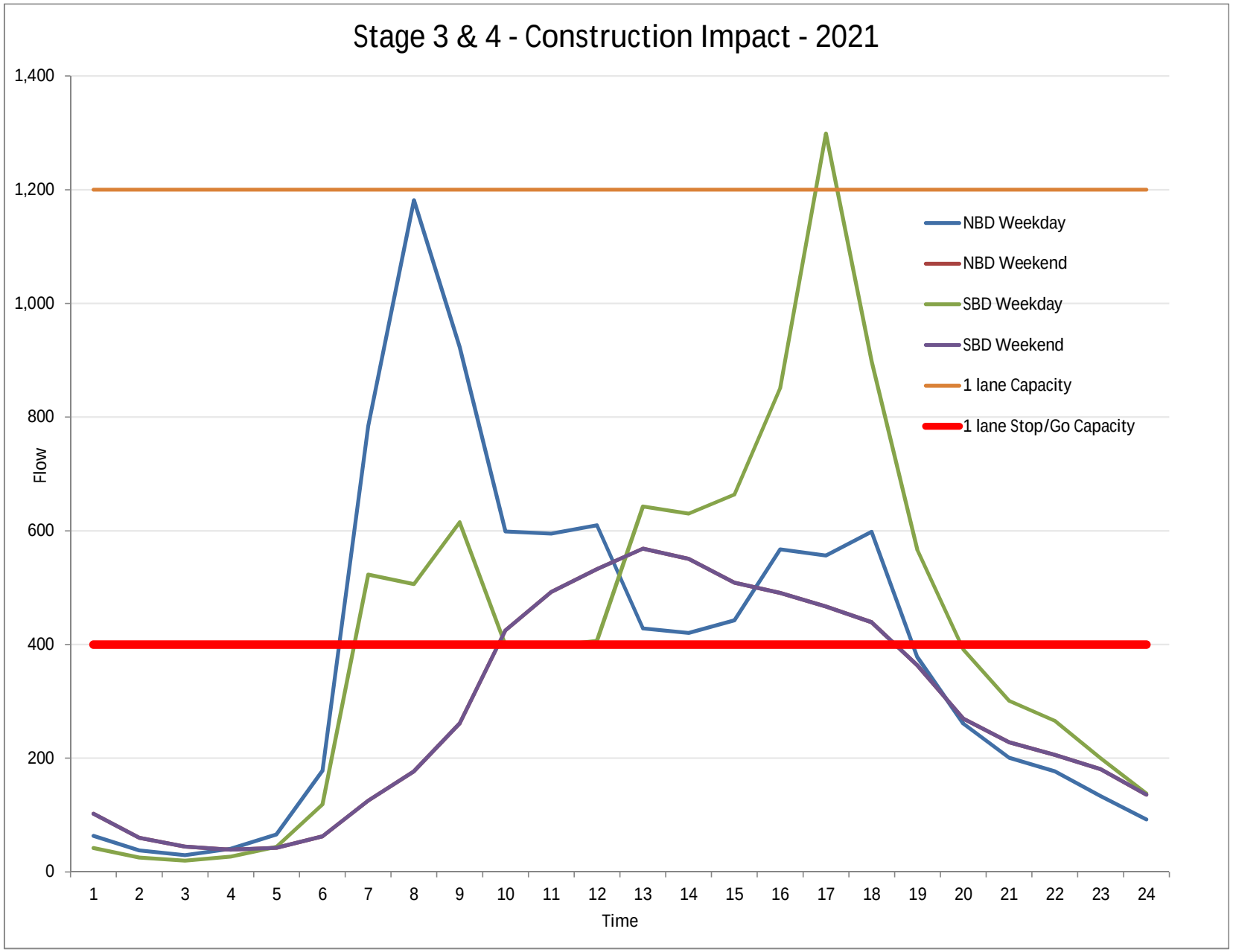
Traffic Management Supporting Analysis

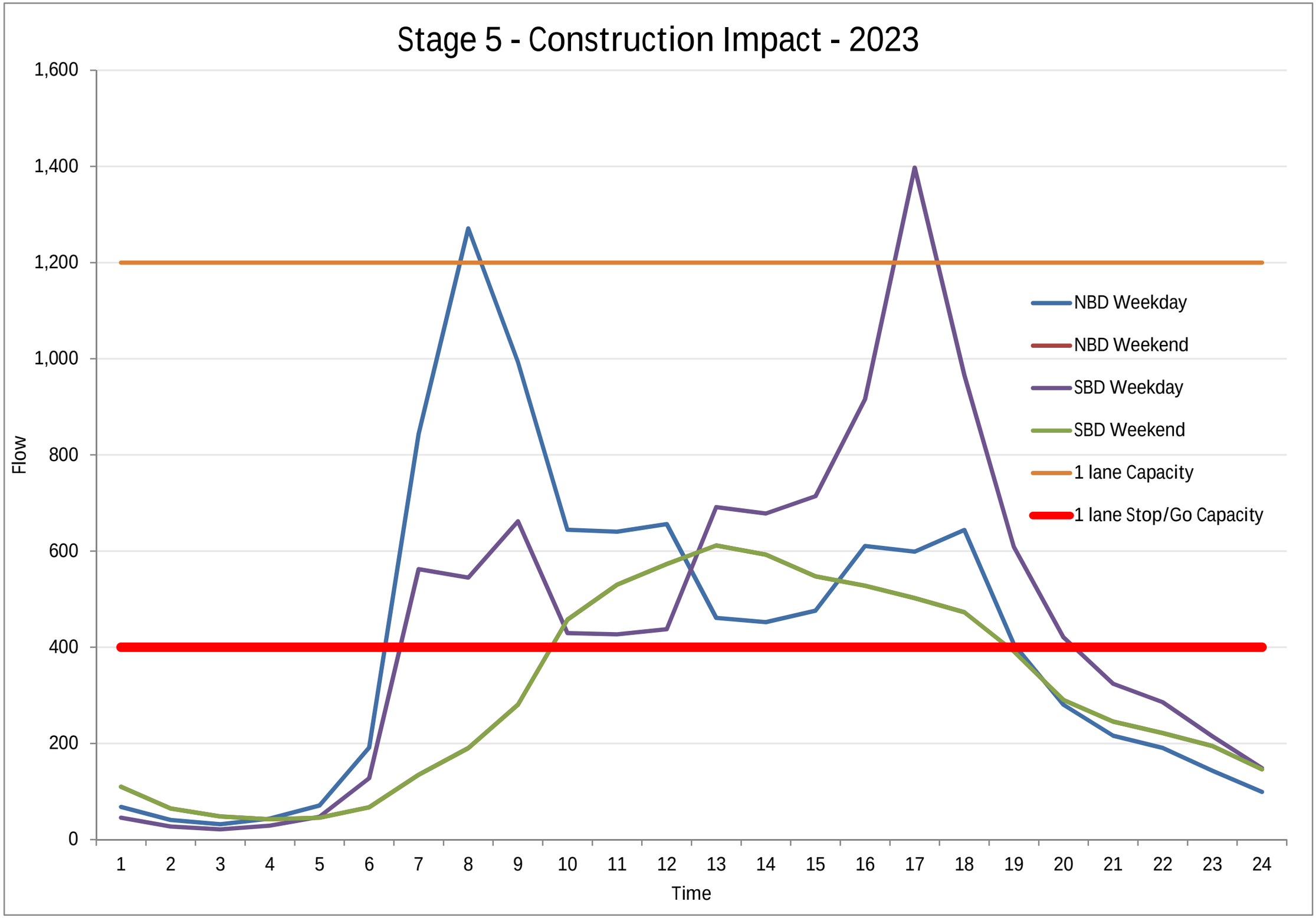
Mill Road Corridor - Construction Staging and AADT

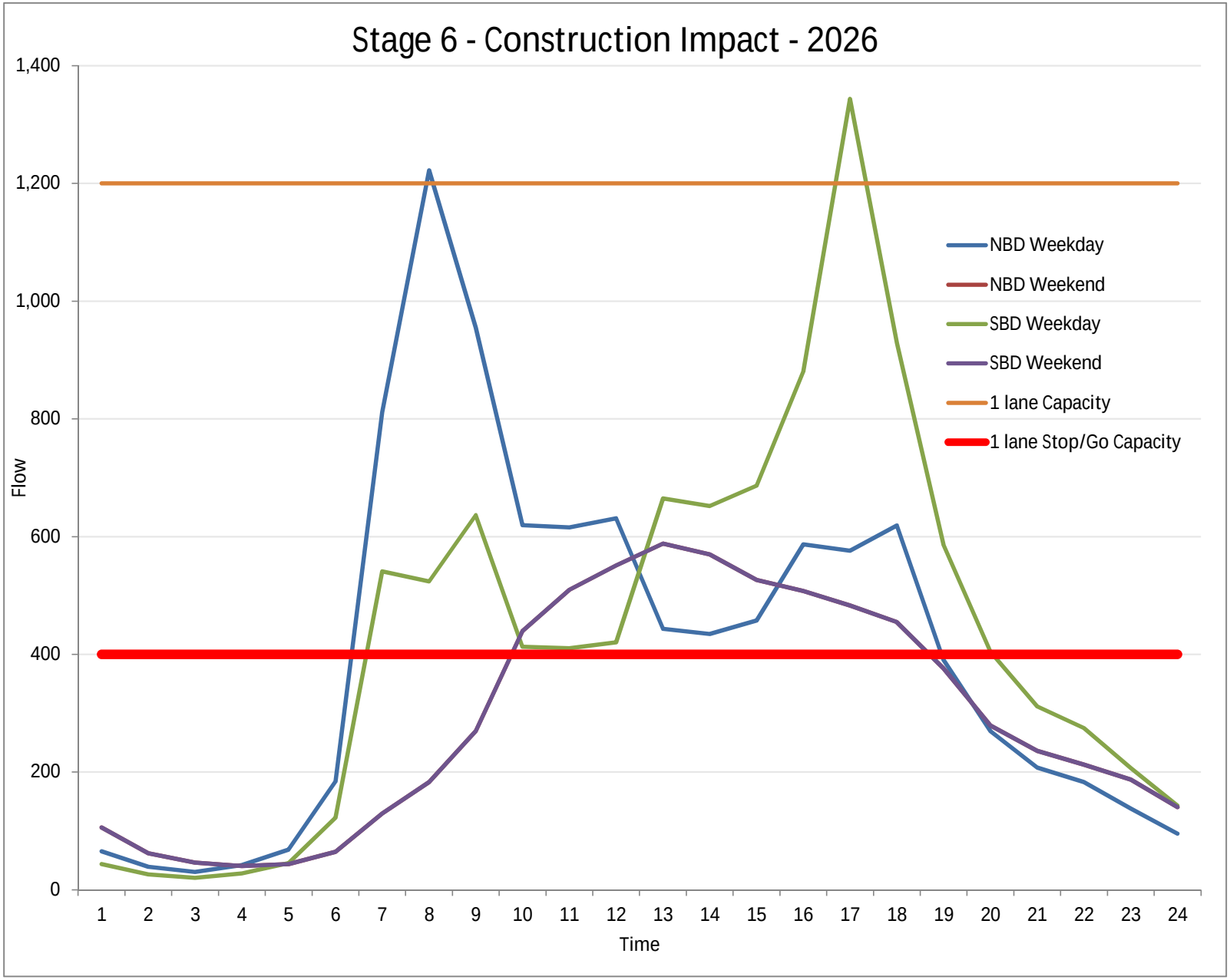
Stage	Section	Construction		Road Name	Location	AADT								
		Year	Duration			2011	2026	2026	2041	2018	2020	2021	2023	2026
1	1a	2018	12 months	Redoubt Rd	Between SH1 & Hollyford	20,500	25,500	31,500	32,200	22,833	23,500	23,833	24,500	25,500
1	1b			Redoubt Rd	Redoubt / Hollyford / Everglade Dr Intersection	20,500	25,500	31,500	32,200	22,833	23,500	23,833	24,500	25,500
1	1b			Hollyford Dr	Redoubt / Hollyford / Everglade Dr Intersection	15,000	15,000	20,000	20,000	15,000	15,000	15,000	15,000	15,000
1	1b			Everglade Dr	Redoubt / Hollyford / Everglade Dr Intersection	10,000	12,000	12,000	12,000	10,933	11,200	11,333	11,600	12,000
2	2a	2020	12 months	Redoubt Rd	Between Everglade & Hilltop	12,000	15,000	18,000	20,000	13,400	13,800	14,000	14,400	15,000
2	2b			Redoubt Rd	Between Everglade & Hilltop	12,000	15,000	18,000	20,000	13,400	13,800	14,000	14,400	15,000
2	2c			Redoubt Rd	Between Hilltop & Murphys	10,500	18,000	20,650	21,000	14,000	15,000	15,500	16,500	18,000
3	3a	2021	12 months	Murphys Rd	North of Flat Bush School Rd	12,500	15,000	16,000	17,000	13,667	14,000	14,167	14,500	15,000
3	3b			Murphys Rd	North of Thomas Rd	11,000	15,000	15,000	15,000	12,867	13,400	13,667	14,200	15,000
3	3c			Murphys Rd	North of Redoubt Rd	10,000	23,000	25,250	26,250	16,067	17,800	18,667	20,400	23,000
3	4a			Mill Rd	East of Murphys Rd	12,000	23,000	26,000	29,500	17,133	18,600	19,333	20,800	23,000
4	4b	2021	12 months	Mill Rd	South of Redoubt Rd	13,650	23,000	23,750	28,750	18,013	19,260	19,883	21,130	23,000
4	4c			Mill Rd	North of Ranfurly Rd	13,100	23,000	25,250	30,000	17,720	19,040	19,700	21,020	23,000
5	4d	2023	12 months	Mill Rd	Mill Rd / Ranfurly Rd Intersection	12,000	23,000	27,000	31,000	17,133	18,600	19,333	20,800	23,000
5	4d			Ranfurly Rd	Mill Rd / Ranfurly Rd Intersection	4,000	5,000	6,650	7,100	4,467	4,600	4,667	4,800	5,000
6	4e	2026	12 months	Mill Rd	Between Ranfurly & Alfriston Rd	12,000	20,000	24,000	29,000	15,733	16,800	17,333	18,400	20,000
6	5			Mill Rd	Between Alfriston & Phillip Rd	10500	18000	20500	25750	14,000	15,000	15,500	16,500	18,000


Stage 1 - Construction Impact - 2018
1,600
1,400
1,200
1,000
800
600
400
200
0
Flow
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time
NBD Weekday
NBD Weekend
SBD Weekday
SBD Weekend
1 lane Capacity
1 lane Stop/Go Capacity


Stage 2 - Construction Impact - 2020
1,400
1,200
1,000
800
600
400
200
0
Flow
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time
NBD Weekday
NBD Weekend
SBD Weekday
SBD Weekend
1 lane Capacity
1 lane Stop/Go Capacity


Stage 3 & 4 - Construction Impact - 2021
1,400
1,200
1,000
800
600
400
200
0
Flow
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Time
NBD Weekday
NBD Weekend
SBD Weekday
SBD Weekend
1 lane Capacity
1 lane Stop/Go Capacity


Stage 5 - Construction Impact - 2023
1,600
1,400
1,200
1,000
800
600
400
200
0
Flow
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time
NBD Weekday
NBD Weekend
SBD Weekday
SBD Weekend
1 lane Capacity
1 lane Stop/Go Capacity


Stage 6 - Construction Impact - 2026
1,400
1,200
1,000
800
600
400
200
0
Flow
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time
NBD Weekday
NBD Weekend
SBD Weekday
SBD Weekend
1 lane Capacity
1 lane Stop/Go Capacity