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Speed Limits along Airport to Botany Mass Rapid Transit Corridor

Appendix D

Speed Limits along Airport to Botany Mass Rapid Transit Corridor

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Technical Note

To	**Auckland Transport**	From	
Copy		Reference	**502334-7000-TEC-KK-0040**
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Subject	**Speed Limits Along the Airport to Botany Mass Rapid Transit Corridor**		

1 Introduction

The purpose of this technical note is to describe how the Airport to Botany (A2B) Mass Rapid Transit (MRT) project will change the function and form of this corridor and the importance of having appropriate speed limits and speed management to support for this change. It draws on the Draft Auckland Transport Roads and Streets Framework as a means to understand the future place and movement functions of this corridor and identify the aspirational typologies to provide context for proposed reductions to the posted speed limits along the corridor.

This consideration begins by describing the current speed and road safety environment along the A2B corridor. An internal runtime model of speeds and travel times for the proposed A2B service is then discussed to demonstrate the effects of the posted speed limits on the operation of the corridor. The changes that A2B will bring to the corridor in terms of the MRT corridor and active mode infrastructure, and the importance of implementing the most appropriate speed limits in that context is then discussed. This includes reflections on how to implement these changes in the context of the NZ Transport Agency 2016 Speed Management Guide and recent amendments to the Setting of Speed Limit Land Transport Rule 2017. Proposed changes to the speed limits along and adjacent to the A2B corridor are then presented. This technical note concludes with a summary of how these changes to the speed limits will assist in meeting the overall investment objectives of the A2B project.

For clarity and consistency this technical note divides the A2B corridor up into the same sections as the technical note 502334-7000-TEC-KK-0030 on the RTC Placement; these are summarised in Table 1 below.

Table 1: A2B sections

Section	Road	Extent	Current Street environment
1	Te Irirangi Drive	Botany Town Centre to Diorella Drive	▪ Single use arterial road ▪ 60-80km/h speed (existing) ▪ Limited right turn movements ▪ Non-direct and direct access to neighbouring property
2	Te Irirangi Drive	Diorella Drive to Great South Road	▪ Single use arterial road ▪ 60km/h speed (existing) ▪ Limited right turn movements ▪ Direct access to property on the south side ▪ Interaction with north-facing SH1 motorway ramps

Section	Road	Extent	Current Street environment
3	Great South Road	Te Irirangi Drive to Ronwood Avenue	▪ Mixed use arterial ▪ 60km/h speed (existing) ▪ Limited right turn movements ▪ Direct access to neighbouring property
4	Ronwood Avenue	Great South Road to Davies Avenue	▪ Mixed use arterial ▪ 50km/h speed (existing) ▪ Limited right turn movements ▪ Direct access to neighbouring property ▪ Parking on both sides of the street
5	Davies Avenue	Entire length	▪ Mixed use collector ▪ 50km/hr speed (existing) ▪ Right turn movements allowed ▪ Direct access to neighbouring property
6	Manukau Station Road	Davies Avenue to Lambie Drive	▪ Mixed use arterial ▪ 60km/h speed (existing) ▪ Right turn movements allowed ▪ Direct access to neighbouring property
7	Lambie Drive	Manukau Station Road to Puhinui Road	▪ Mixed use arterial ▪ 60km/h speed (existing) ▪ Limited right turn movements ▪ Direct access to neighbouring property
8	Puhinui Road	Lambie Drive to Cambridge Terrace	▪ Single use arterial road ▪ 50km/h speed (existing) ▪ Right turn movements allowed ▪ Direct access to neighbouring property
9	Puhinui Road	Kenderdine Road to SH20 interchange, including MRT bridge	▪ Single use arterial road ▪ 50km/h speed (existing) ▪ Right turn movements allowed ▪ Direct access to neighbouring property
10	Puhinui Road	Between SH20 Interchange and the Airport	Part of 20 Connect

1.1 Auckland Transport Roads and Streets Framework

The Draft Auckland Transport Roads and Streets Framework (the Draft Framework) sets out guidance for determining the appropriate typology for a road/street. It recognises that this typology can change if significant changes to the street are planned, as is the case for the A2B corridor. It is therefore important to not only identify the current typology but also the aspirational typology in these cases. The A2B project will result in changes to both the 'Place' and 'Movement' contexts. Figure 1 and Figure 2 below, from the Draft Framework, show the overall 'Road and Streets Family' and give guidance on examples of the elements to consider for these typologies respectively.

Figure 1: The Draft Auckland Transport Roads and Streets Framework - Roads and Streets family

1 RURAL OR URBAN	Rural	Urban			
PLACE Built form & function	Residential	Mixed use	Business	Centres	Industrial
2	Property access Low density Small scale, many crossings Good frontage Car parking on street	Smaller blocks Med-High density Multi level Active edge Walkable	Multi level Low-Med density Larger scale Some mixed use Car oriented Limited active edge	City Centre-destination High density, multi level Mixed use, active edge High pedestrian High quality pavement Multi modal access	Large scale Low density Vehicle oriented Wide access Poor active edge
3 PLACE Significance	Local	Neighbour-hood	District	Sub-regional	City
MOVEMENT Street form & function	Local Place	Local Street	Collector	Main Street	Arterial
4	<10 kph Varies shared space, square Restricted veh	20-30 kph 2 lanes, parking varies 10-20m <5,000 veh	25-50 kph 2-4 lanes parking 25m 5,000<15,000 veh	25-40 kph 2-4 lanes, Limited parking 20m <15,000veh	40-50 kph 4-6 lanes parking 25-30m >20,000 veh
5 MOVEMENT Significance	Local	Neighbour-hood	District	Sub-regional	City

Figure 2: The Draft Auckland Transport Roads and Streets Framework guidance on examples of the elements to consider when identifying future urban street types

The considerations and processes set out in the Draft Framework present a means to reconceptualize and identify the aspirational street typologies that are to be achieved through A2B. A core element of this is speed management and recognizing how these changes need to be supported by lower posted

speeds. The Draft Framework emphasises the importance of identifying what the place function and built form will be in the future and what step changes might be occurring, taking the modal priorities and potential modal conflicts into account. In identifying this movement form and function, consideration is given to several aspects including the current environment (speed limits and KiwiRAP road safety information), physical speed models, and the modal network and pedestrian accessibility. Each of these is now explored with a focus on how they effect, and can be supported by, changes to the speed limits.

2 Current environment

This section details the current environment along the A2B corridor in terms of the road classification, posted speed limits and current speed data, and the road safety aspects based on KiwiRAP.

2.1 Speed data

The posted speed limits and operating speeds along the A2B corridor vary extensively.

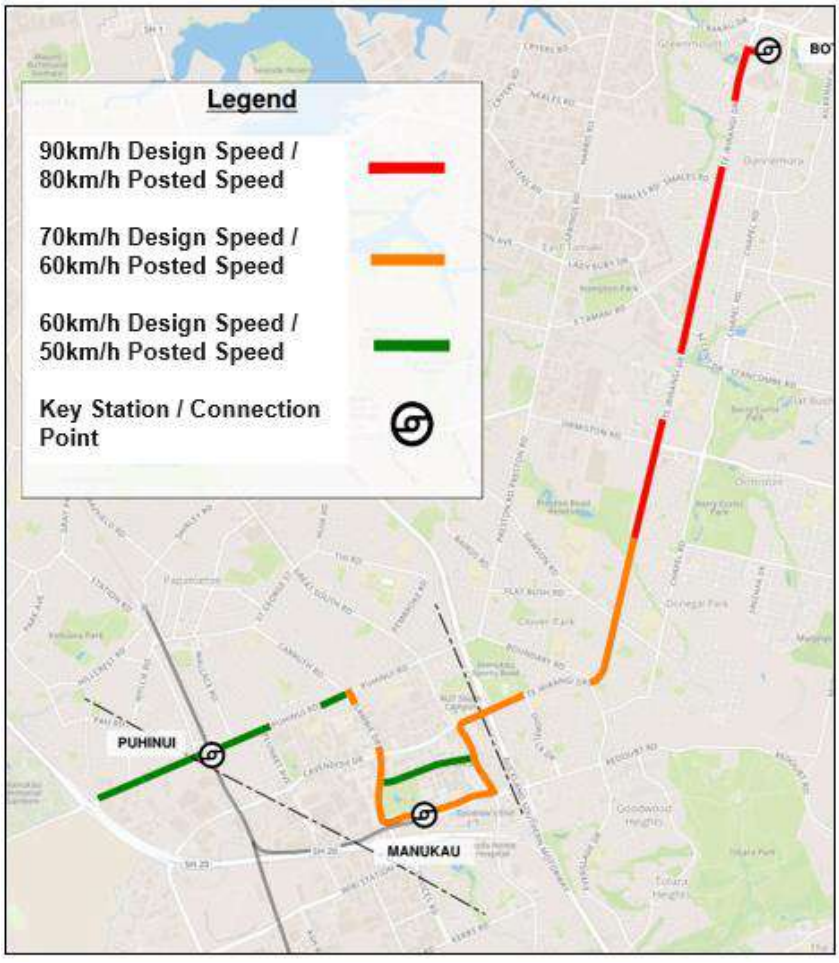


Figure 3 summarises the current speed environment identifying the existing posted speed limits along the corridor and the actual design speed. A large portion of the Te Irirangi Drive section of the corridor is currently posted 80km/h.

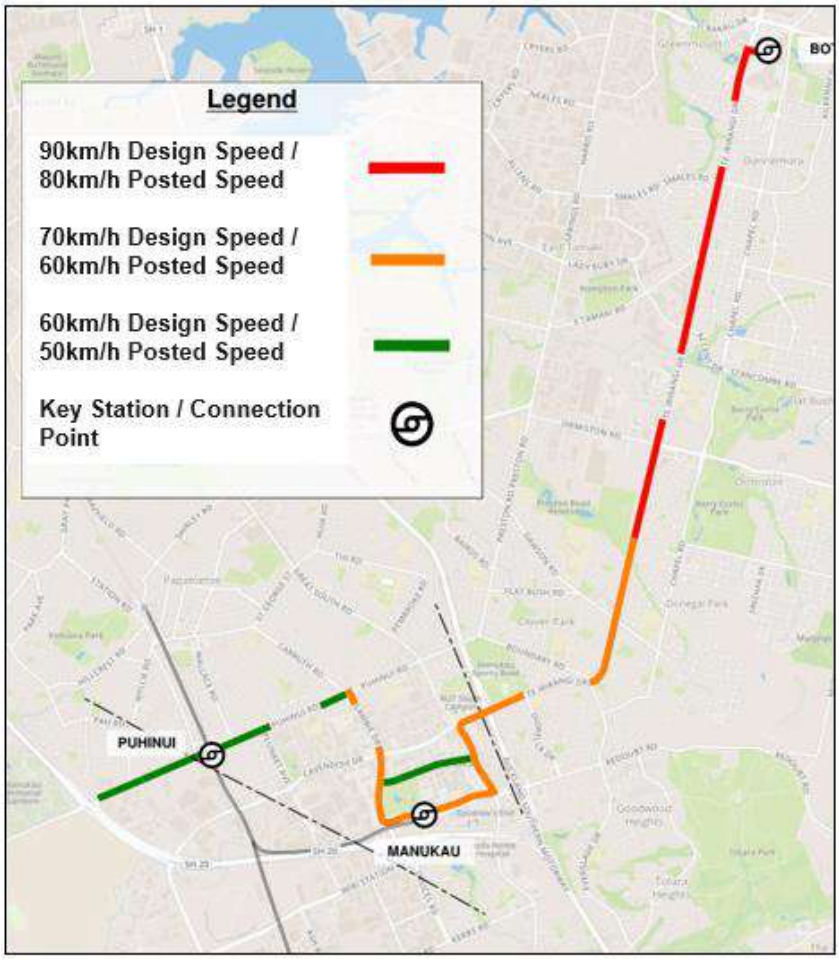


Figure 3: This image illustrators what speeds the corridor was originally designed for versus what speeds are presently posted along the corridor

Table 2 below summarises the current speed count data provided by Auckland Transport at various points along the A2B corridor, a map showing the locations of these traffic counts is included in Attachment 1 to this technical note. The speed data shows that there is a disconnect between the current posted speed limits and the speeds vehicles are actually travelling in various sections along the corridor. These anomalies have been highlighted in bold italics in the table. As can be seen in

Table 2, there are sections of the A2B corridor, particularly the northern end of Te Irirangi Drive where the 85th percentile vehicle speeds are significantly lower than the posted speed limit. This area comprises the Botany Town Centre and a number of retail outlets which generate high turning movements. This is in contrast to further along Te Irirangi Drive, where high percentages of vehicles are exceeding the posted speed limits. This, in part, could be due to the fact that the change in the posted speed limit at Whetstone Road, from 80km/h to 60km/h, does not correspond with a change in the road environment. This can be seen in Figure 4 below, in that the lane arrangements, solid median and land uses either side are not discernibly different after the 60km/h signs.

Table 2: The posted speed limit, 85th percentile speed and % of vehicles exceeding the posted speed limit at various points along the A2B corridor

Section	Map	Speed Count Location	Direction	Posted Speed Limit	85th Percentile Speed	% of Vehicles Exceeding Posted Speed
1	A	Te Irirangi Drive – Between Ti Rakua Drive and Te Koha Road	Both	80km/h	***56.6km/h***	***0.1%***
1	B	Te Irirangi Drive – Between Haven Drive and Smales Road	Both	80km/h	***62.2km/h***	***0.5%***
1	C	Te Irirangi Drive – Between Bishop Dunn Place and Accent Drive	Both	80km/h	***70.8km/h***	***3.0%***
1	D	Te Irirangi Drive – Between Balrath Road and Banville Road	Both	80km/h	77.3km/h	10.6%
1	E	Te Irirangi Drive – Between Florence Cater Avenue and Whetstone Road	Both	80km/h	76km/h	7.9%
1	F	Te Irirangi Drive – Between Boundary Road and Dawson Road	Both	60km/h	65.4km/h	***44.2%***
1	G	Te Irirangi Drive – Between Shelimar Place and Charntay Drive	Both	60km/h	61.0km/h	***24.0%***
4	H	Ronwood Avenue – 200m east of Lambie Drive	Eastbound only	50km/h	46.9km/h	8.4%
7	I	Lambie Drive - 95m south of the Ronwood Avenue roundabout	Southbound only	60km/h	55.2km/h	5.2%
9	J	Puhinui Road Outside #68A by Brooksway Street	Both	50km/h	46.3km/h	7.4%

Figure 4: Google Street View Image captured October 2018 showing where the posted speed limit on Te Irirangi Road changes from 80km/h to 60km/h at Whetstone Road

2.2 Road safety

When considering speed limits and speed management it is essential to consider the road safety environment. KiwiRAP provides a useful tool to understand the current road safety environment along the A2B corridor. Both collective risk and personal risk can be explored through KiwiRAP.

As shown in Figure 5, large portions of the A2B corridor have a medium high Collective Risk, particularly Te Irirangi Drive and Puhinui Road. This indicates that infrastructure improvements and potentially changes to the speed limits are needed to improve safety along these sections of the corridor.

Figure 5: Collective Risk - urban corridor risk levels along the A2B corridor

Figure 6 shows the Personal Risk along the A2B corridor and indicates that the majority of the corridor has a medium Personal Risk. Personal Risk considers the traffic volumes as well, unlike Collective Risk

and shows the likelihood of a driver, on average, being involved in a fatal or serious crash. Infrastructure improvements alone are unlikely to be effective in mitigating this type of risk; therefore exploring options for safe road use and safe speeds is advisable.

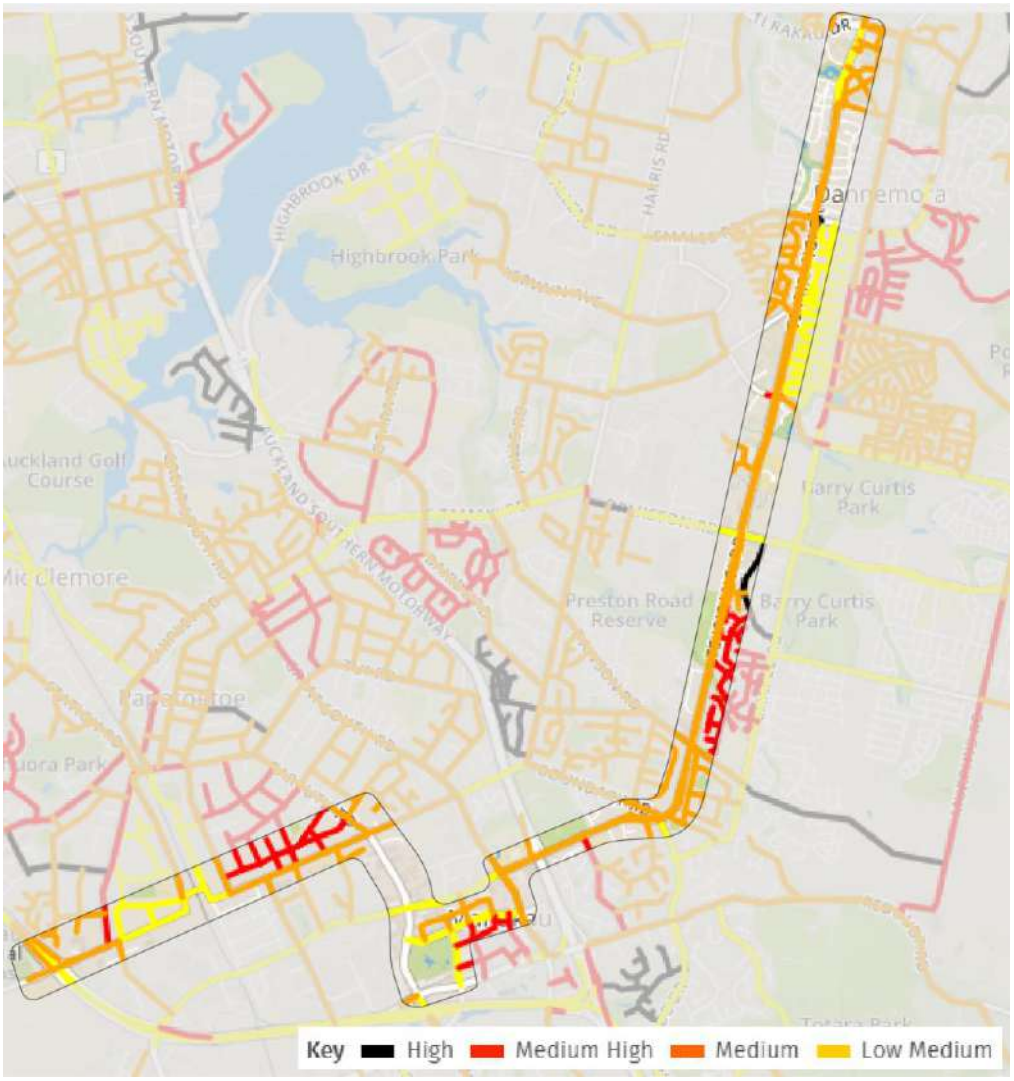


Figure 6: Personal Risk - urban corridor risk levels along the A2B corridor

3 Travel time estimates along the A2B corridor

The A2B runtime model took into consideration the following inputs and constraints:

1. Road segments (lengths, top speeds and acceleration/deacceleration rates)
2. Stations (location, likelihood of stopping and the expected dwell time)
3. Intersections (cycle time, random arrival time, phasing and whether signal priority is given to A2B)

The model found that the difference between running the line with a speed limit of 80km/h or 50km/h differed by only a few minutes, due to the amount of time spent accelerating/decelerating around stations and intersections. The model compared travel time estimates for A2B without signal priority and with signal priority at 50km/h and at 80km/h and compared these estimates to existing car travel times on the corridor, and bus travel times on equivalent corridors. The model found that when comparing speed limits of 50km/h with 80km/h, maximum and minimum travel time only differed by a couple of minutes – this small effect of differing speed limits was observed both with and without signal priority for A2B.

The effect of providing signal priority, on the other hand, is significant: with no signal priority the maximum travel time for a 80km/h posted speed was found to be 48 minutes, whereas if signal priority is provided the maximum travel time with a 80km/h was only 33 minutes. This is primarily due to the reduction in the instances of having to decelerate and accelerate again for red signals at intersections.

Note: the output of the model was a distribution of travel times and no congestion was applied to travel speeds.

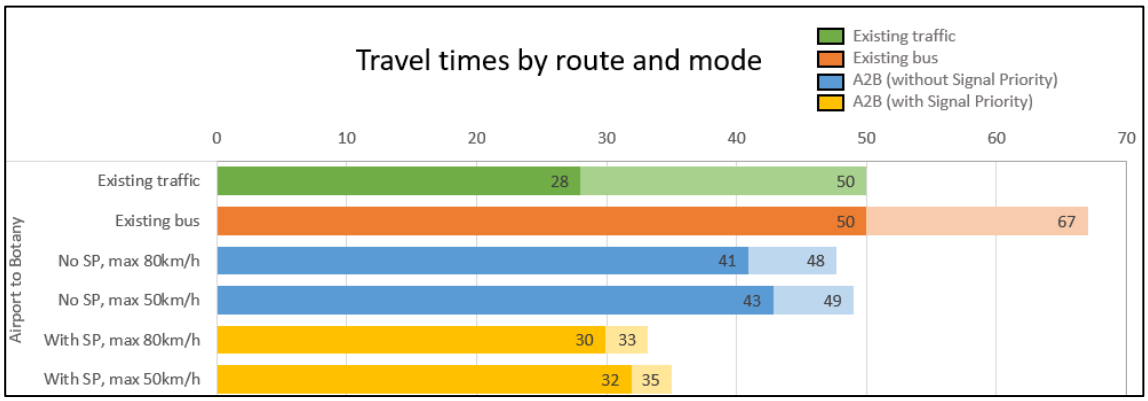


Figure 7: The A2B MRT runtime model results

The runtime model was also sensitivity tested on general traffic, by modelling the effect on travel times from the Airport to Botany and from Manukau to Botany, assuming no congestion, to understand the implications of altered speed limits alone on travel times. Even for journeys as long as the Airport to Botany (along the A2B corridor – an 18km route), the median travel time on uncongested roads is just 3 minutes slower with a maximum speed of 50km/h compared to the existing speed limits.

4 Change of form and function for Airport to Botany

A2B will shift the function of roads along its corridor from moving the private vehicle to providing overall access, choice and equity to users by enabling modes other than the private vehicle. With the A2B MRT the function will change to cater for a range of:

- Safe and equitable transport choices
- Infrastructure for people of all ages and abilities
- Support urban regeneration
- Minimise negative impacts on the environment

This project completely changes what this corridor's role and function is in the transport network and has implications for the adjacent roads as well. The management of speed is a key element of achieving this new function.

4.1 Changes along the corridor

The MRT will predominantly run down the centre of the A2B corridor, as outlined in the 502334-7000-TEC-KK-0030 (RTC Placement Technical Note). Further, this project proposes to install active mode infrastructure along either side of the corridor, please refer to technical note 502334-7000-TEC-KK-0022 for the Rationale and Design Principles for Active Modes and 502334-7000-REP-JJ-0024 for the Design Philosophy Statement. This will significantly change the cross section of the corridor and the interactions along it.

For example, currently the majority of Te Irirangi Drive has a central solid median with grass and trees and footpaths are mostly buffered from the roadside. This both supports the current 80km/h speed limit and encourages high speeds as drivers are separated both from opposing traffic and interactions with active modes. In places where the solid median is smaller and there are immediately adjacent footpaths,

like the northern part of Te Irirangi Drive near Botany Town Centre, the operating speeds are already lower than the posted speed limit, as demonstrated in

Table 2. This indicates that vehicle speeds are influenced by the cross section irrespective of the posted speed limit, something well established and outlined in the NZ Transport Agency Speed Management Guide 2016.

Along with the change in the form of the corridor, its use will also change. With multiple stations along the route, station access is a crucial element of the project. Public transport journeys are made up of several trip legs, mostly starting and/or finishing with some distance of active transport to connect between the origin/destination and the public transport stops. Vehicle speed is commonly a factor in people choosing to walk and cycle to stations, as it affects their comfort and perceptions of safety; therefore, speed management should be considered on key roads used by people accessing each station. It is generally assumed that people will walk up to 1km and cycle up to 3km to a rapid transit stop. Enabling walking and cycling to each station is important along the corridor and the large overlap between the multiple stations gives weight to why quality walking and cycling facilities are proposed to be continuous along the route. Given these proposed changes it is recommended that:

- Arterial routes that are important for access to stations will have posted speed limits of 50km/h.
- Internal town centre roads, areas close to the stations and neighbourhood areas through which active modes are being prioritised will have posted speed limits of 30km/h or less.

5 Setting speed limits

The NZ Transport Agency undertook a major overhaul of the speed limits setting process between 2016 and 2019. The new approach to speed management focused on having a consistent and evidence-based approach supported by community engagement and “better conversations of road risk”. This resulted in the 2016 Speed Management Guide and associated Infrastructure Risk Rating (IRR) Manual and subsequent changes to the Land Transport Setting of Speed Limits Rule which was revised in 2017 and amended recently in 2019. All of these changes were as a result of the Safer Speeds Programme. Collectively these changes are in recognition of the fact that the previous speed limit processes were insufficient to address the fact that speed is still a significant contributor to the road toll.

The proposed speed limit changes outlined in this technical note will need to go through the processes set out in the legislation. This includes assessing the road environment in terms of geometry, side hazards, lane widths, traffic volumes etc. and undertaking extensive consultation with the communities affected. To support a reduction in the posted speed limits, as proposed in this technical note, the design elements along the A2B corridor need to encourage lower speeds. As outlined previously, the cross section of the corridor will significantly alter, and the proposed speed limit changes should be considered in light of the future corridor design.

Further, the *Government Policy Statement (GPS) on land transport 2018/19 – 2027/28* that took effect on 1 July 2018 and the recently closed discussion document on the *Road to Zero: A new road safety strategy for New Zealand* both recognise the importance of appropriate speed management and lower urban speed limits. Additional details are outlined in Attachment 2.

Given the wider national scale change in approach to speed management and the changes to the form and function of this corridor, it is proposed that the maximum posted speed limit along the corridor be 50km/h. There are a number of benefits associated with this proposal as outlined in Table 3 below.

Table 3: Benefits of a maximum posted speed limit of 50km/h along the corridor

Benefits	Outcome
Enhances land use	More development likely to occur, more people choosing to live or set up business along the corridor
Survivable speeds	In line with Vision Zero & supporting the Government Policy Statement
Improve intersection safety	Safer interactions of all modes at these key conflict points
Support and enable safe transitions onto and off the A2B corridor for all modes	Ensuring vehicles speeds are low at key conflicts points with vulnerable modes, to ensure safe interactions
A more pleasant environment for people	People will feel more comfortable to move along, occupy and spend time on this road
Ability to safely install and operate mid-block at grade signal crossings	Providing crossing which are accessible and attractive for all ages and abilities, reducing severance of the large corridor
Speed consistent with surrounding network	Improved driver behaviour and expectations
Station platforms feel safe and comfortable places to wait	The experience of using the RTC will be attractive to everyone
Ability to have narrow lane widths	Support lower speeds, be self-reinforcing and reduce overall corridor width needed for motor vehicles
Trees directly adjacent to road corridor	Providing shade and shelter for people & visual narrowing of corridor for drivers
Vehicles can travel at the most efficient operating speed of 60-80km	Efficient use of energy, slightly less emissions, but need to consider time & energy it takes to reach the efficient speed

6 Recommended posted speed limits

The current speed data indicates that there are some current issues with the posted speed limits along the corridor. The road safety findings from KiwiRAP also indicate the need for infrastructure improvements and potential changes to the speed limits to improve safety. The runtime estimates indicate that the effects of reducing the maximum posted speed limit to 50km/h rather than 80km/h only had a limited effect on total travel times.

The A2B project will significantly change the form and function of the corridor, in particular it will increase the number and presence of public transport and active mode users both along and around the corridor. When these factors are considered along with the wider national change in the approach to the setting of speed limits and speed management, it is clear that careful consideration is needed of the design speeds and infrastructure to support the A2B project and that these should be reinforced by implementing suitable posted speed limits.

6.1 Proposed posted speed limits along the A2B corridor

Table 4 outlines the current and aspirational typologies for the various section of the A2B corridor based on the Draft Framework and the recommended changes to the posted speed limits as a result of these changes.

Table 4: Proposed posted and design speeds along A2B

Draft AT Roads and Streets Framework					
Section	Road	Current Typology	Aspirational Typology	Current Posted Speed Limit	Proposed Posted Speed Limit
1 & 2	Te Irirangi Drive	Single Use (Out of Centre) Arterial	Mixed Use Arterial	80 km/h	50 km/h
3	Great South Road	Mixed Use Arterial	Mixed Use Arterial	60 km/h	50 km/h
4	Ronwood Avenue	Mixed Use Arterial	Mixed Use Collector	60 km/h	30 km/h
5	Davies Avenue	Mixed Use Collector	Mixed Use Collector	60 km/h	30 km/h
6	Manukau Station Road	Mixed Use Arterial	Mixed Use Arterial	60 km/h	50 km/h
7	Lambie Drive (South of Cavendish Dr)	Mixed Use Arterial	Mixed Use Arterial	60 km/h	50 km/h
7	Lambie Drive (North of Cavendish Dr)	Mixed Use Arterial	Mixed Use Arterial	60 km/h	50 km/h
8	Puhinui Road	Single Use (Out of Centre) Arterial	Mixed Use Arterial	60 km/h	50 km/h
N/A	SH20B	NA	NA	50 km/h to 80 km/h	50 km/h to 80 km/h (no change)

6.2 Proposed posted speed limits on parallel local side streets

There are also a number of side streets that parallel Te Irirangi Drive which are proposed to be modified as 'bicycle streets' to better cater for active modes as part of the A2B corridor. The technical note on the Rationale and Design Principles for Active Modes along the A2B Corridor 502234-7000-TEC-KK-0022 provides principles and conceptual details of the changes proposed to these side streets. These include recommendations to create bicycle streets ie streets where bicycles are prioritised, and cars are 'visitors'. Priority is achieved with a combination of both physical design features and signage. These streets have low traffic volumes (<500 vehicles per day) and require low traffic speeds. It is therefore proposed that all of these bicycle streets be included in the speed limit changes proposed as part of the wider review of speed management. All of these sides streets currently have a posted speed limit of 50km/h and it is proposed that this be reduced to 30km/h with supporting infrastructure changes. The streets that are being proposed as bicycle streets are:

- Treneary Lane
- Moravale Lane
- Shingleton Lane

- Wando Lane
- Sheddings Lane
- Gransna Lane
- Cratloe Lane
- Aaronville Way
- Kellaway Drive
- Franco Lane
- Marlong Lane
- Leixlep Lane

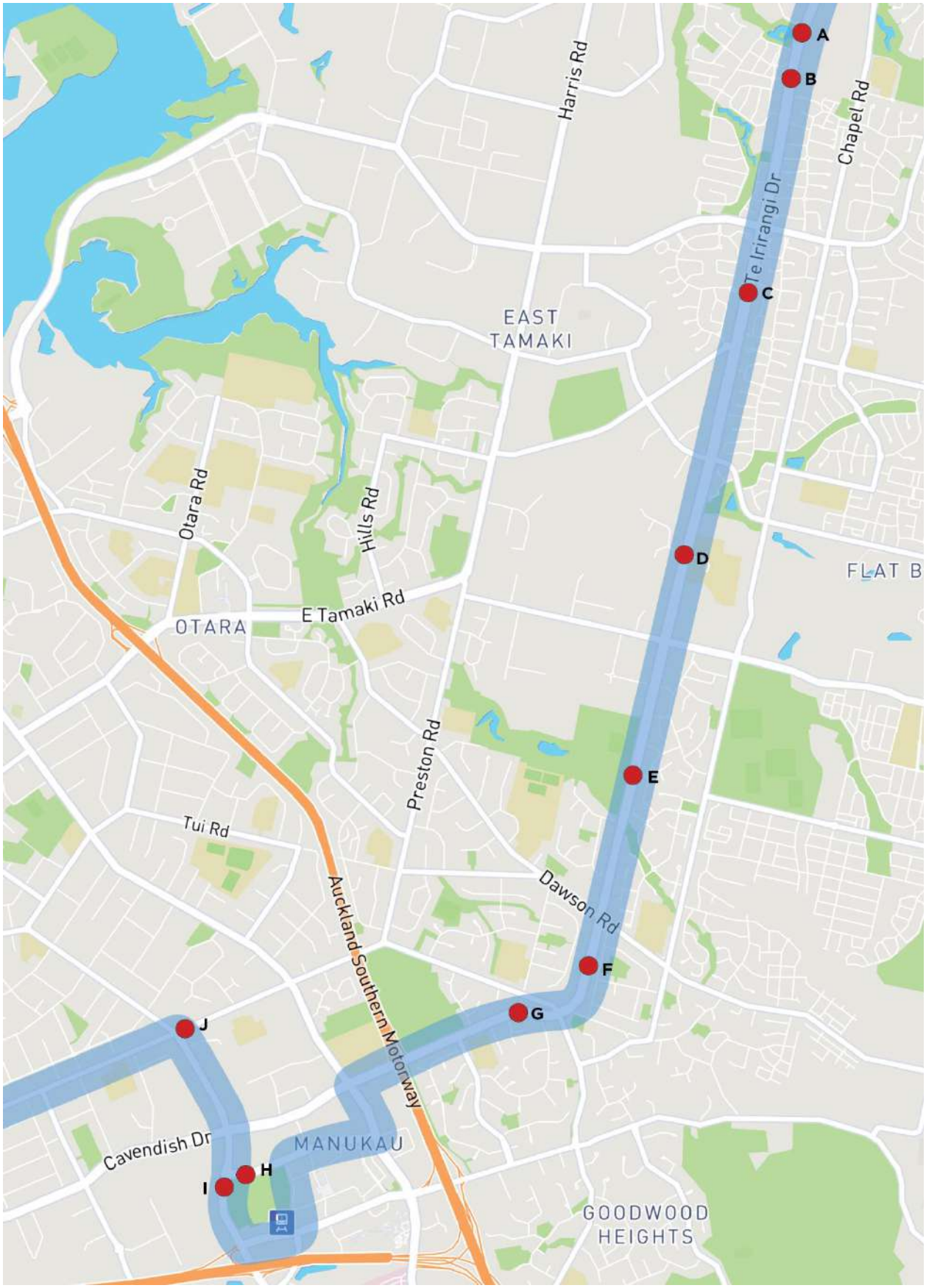
7 Summary

This technical note has outlined why the current posted speed limits need to be reconsidered in the context of the changes the A2B project will introduce both in form and function, and the wider national approach to the setting of speeds and road safety approach. The following points summarise how the proposed speed limits along the corridor align with and support the investment objectives of the A2B project.

- More equitable access and travel choices to jobs, learning, cultural and social activities in the south and East of Auckland
  - Equitable access (fair and impartial access) for all transport modes can include making existing dominating modes (like the private vehicle) slightly less convenient, in favour of making other modes more convenient.
  - Equitable access will be aiming to ensure the facilities provided by this project are safe, comfortable and can be used by anyone in the population. Adjacent vehicles travelling at high speeds can make streets uncomfortable for walking, and therefore people may forgo a walking trip, which would not be appropriate under goals of equitable access.
  - Supporting active mode infrastructure to bring people to the stations and move them around the corridor communities requires lower speeds to provide a safe operating environment.
- Reliable and resilient transport system in south and east Auckland that is easy to use
  - Travel time – clear and consistent speed limits create a more stable environment rather than large speed differentials between connecting roads.
  - Travel time reliability – slower speeds are typically more consistent and therefore reduce overall variability on travel times.
- Economic potential and opportunity increased for all
  - The attractiveness of a place to live will be directly affected by the speed at which adjacent vehicles are travelling, higher speed roads create higher levels of severance both physically and perceptually.
  - Attractive streets are where people want to spend time and money - attractive roads are not expressways, they are places where people feel safe and comfortable. The project needs to create walking environments which feel safe, comfortable and enjoyable to enjoy people to spend time at destinations along the corridor.

- Local Taonga enhanced
  - Lower speed environments are more conducive to travel by active modes, which in turn reduces overall air emissions from transport.
- Healthier and safer people
  - Walking access to the stations will be improved by infrastructure and lower speeds making it safer and creating better amenity, therefore encouraging more people to walk.
  - Extent of local walking and cycling connections is in part dependent on lower speeds on suitable roads such at the bicycle streets parallel to Te Irirangi Drive.

Attachment 1: Speed Data Count Locations



Attachment 2: National Strategic and Policy Context

Slow speed objectives relate to Vision Zero (AT and Government policy concern) and the Government Policy Statement.

Road to Zero

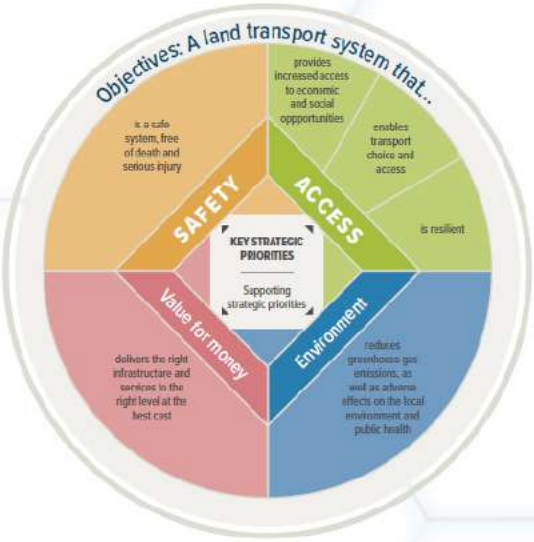
Road to Zero is based on the Vision Zero concept, which, believes that road design should be centred around ethics that say no one should die or be seriously injured on the roads. Vision Zero is enabled by principles of systematic safety. Our present system of safety in New Zealand may be concerned as reactive safety, that is we identify and fix black spots where an unusually large amount of crashes occurs. Systematic safety is the alternative to reactive safety, systematic safety is about eliminating the opportunities that create high crash and injury risk and designing the whole road network to be forgiving. A key element of creating a forgiving road network is speed management.

The alignment of A2B speed management and the Government Policy Statement Strategic Priorities

Speed reduction helps Airport to Botany better achieve the following GPS strategic priorities:

- Safety
  - Slower speeds reduce crash frequency and severity.
- Access
  - Perception of safety and access to other modes increases with slower speed which improves access to economic and social opportunities. Studies have shown that levels of walking and cycling increase on lower speed streets. The most common barrier to cycling is fear of traffic speeds and volumes. Slow streets give people more choice on how they move.
  - Reduced speed is expected to reduce community severance (caused by both high-speed and high traffic volume roads).
  - If slower speeds increase the chance of walking and cycling, then better economic outcomes may be achieved due to the fact that pedestrians and cyclists have been found to spend more money.
- Environment
  - Slower posted speeds reduce the need to accelerate and decelerate up to and down from the posted speed - fewer ‘bursts’ of acceleration/deceleration with associated air and noise pollution.
  - If slower speeds encourages replacing car trips with walking and cycling, physical activity and air quality can increase, and road crash deaths and injuries and community severance can decrease.

Strategic alignment with GPS



GPS Strategic Priorities	GPS Strategic Priority Objective	20Connect	A2B
		High Priority Problems →	Very High Priority Problems
SAFETY	A land transport system that is safe and free of death and serious injury.	Perceptions of poor personal safety limit uptake of public transport & active modes.	
ACCESS – LIVABLE CITIES	Provides increased access to economic and social oppportunities.	Lack of reliable and readily accessible travel choices limits access to the airport and surrounding area for customers and the reliable movement of people and goods	Poor east-west travel choices in southern area constrain current & future growth, undermining prosperity for Aucklanders .
ACCESS – LIVABLE CITIES	Provides increased access to economic and social oppportunities.	Inadequate transport system capacity, connections, and management to, from, and within the Airport precinct area risks economic growth and prosperity.	Costly, unreliable, long & complicated trips severely limit people's ability to meet daily needs for work, learning & socialising, reinforcing ongoing deprivation.
ENVIRONMENT	A land transport system that reduces greenhouse gas (GHG) emissions and adverse effects on the local environment and public health	Current transport system has adverse environmental effects and does not recognise cultural identity and taonga.	

Approvals:

	Author	Reviewer
Name		
Signature		
Designation		

E

Traffic lane Rearrangement/Reduction

Appendix E
Traffic lane Rearrangement/Reduction

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Technical Note

To	**Auckland Transport**	From	**A2B Project Team**
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Subject	**Traffic Lane Rearrangement / Reduction**		

1 Introduction

The purpose of this technical note is to identify locations along Airport to Botany (A2B) route where there is the potential to rearrange and/or reduce the number of traffic lanes to assist in achieving the projects expected benefits and KPIs, and the alignment to the Government Policy Statement (GPS) strategic priorities.

1.1 Potential benefits from traffic lane rearrangement/reduction

The A2B route could benefit from traffic lane rearrangements and reductions for several reasons. In particular, such changes can:

- Avoid land take, both at intersections and along the corridor itself.
- Improve the public realm including by:
  - Reducing the severance of this corridor both physically and perceptually for active modes travellers.
  - Providing more space for landscaped berms.
  - Allocating more space to provide better active mode facilities.
  - Reducing negative stormwater and amenity impacts of removing the existing landscaped median space for the A2B running way.

1.2 Current road conditions along the Airport to Botany corridor

In the past, the approach to transport planning in New Zealand has been dominated by providing access for private vehicles. This is self-evident in the lack of separated facilities and lanes for cycling and public transport, high posted speed limits, large intersections, multiple parallel routes all prioritising car travel, and the reactive approach to road safety improvements in New Zealand.

This level of priority provided for private vehicles is particularly evident in the environment and land uses surrounding the A2B corridor. For example, in the area around Te Irirangi Drive there are three parallel routes that are close together and have very similar forms and functions, ie the movement of cars. These are, from west to east, Harris Road (turns into Preston Road), Te Irirangi Drive and Chapel Road.

Table 1: Form/function of north-south roads between Manukau and Botany

Road name	Number of Lanes (per direction)	Posted Speeds	ADT (indicative)
Harris Road/ Springs Road/ East Tamaki Road/ Preston Road	2 lanes north of Preston Road, 1 lane on Preston Road	60km/h north of Preston Road, 50km/h on Preston Road	~25,000 on Harris Road, ~14,000 on Preston Road
Te Irirangi Drive	2	80km/h north of Whetstone Road, 60km/h south	~25,000 near Botany, ~30,000 around Ormiston, ~25,000 south of Dawson Road
Chapel Road/ Matthews Road	1 (with 2 lanes through most intersections)	60km/h on Chapel Road, 50km/h on Matthews Road	~20,000 north of Ormiston, ~15,000 south of Ormiston, ~15,000 on Matthews Road

Table 2 summarises the sections of the corridor, as per the technical note on the A2B placement within the corridor (502334-6000TEC-RR-0022). Potential for traffic lane rearrangements and reductions will be suggested for full sections, as each section has similar environments and therefore similar treatments are proposed.

Table 2: A2B sections and current street environment

Section	Road	Extent	Street environment
1	Te Irirangi Drive	Botany Town Centre to Diorella Drive	▪ Single use arterial road ▪ 60-80km/h speed (existing) ▪ Limited right turn movements ▪ Non-direct and direct access to neighbouring property
2	Te Irirangi Drive	Diorella Drive to Great South Road	▪ Single use arterial road ▪ 60km/h speed (existing) ▪ Limited right turn movements ▪ Direct access to property on the south side ▪ Interaction with north-facing SH1 motorway ramps
3	Great South Road	Te Irirangi Drive to Ronwood Avenue	▪ Mixed use arterial ▪ 60km/h speed (existing) ▪ Limited right turn movements ▪ Direct access to neighbouring property
4	Ronwood Avenue	Great South Road to Davies Avenue	▪ Mixed use arterial ▪ 50km/h speed (existing) ▪ Limited right turn movements ▪ Direct access to neighbouring property ▪ Parking on both sides of the street
5	Davies Avenue	Entire length	▪ Mixed use collector ▪ 50km/hr speed (existing) ▪ Right turn movements allowed ▪ Direct access to neighbouring property

Section	Road	Extent	Street environment
6	Manukau Station Road	Davies Avenue to Lambie Drive	▪ Mixed use arterial ▪ 60km/h speed (existing) ▪ Right turn movements allowed ▪ Direct access to neighbouring property
7	Lambie Drive	Manukau Station Road to Puhinui Road	▪ Mixed use arterial ▪ 60km/h speed (existing) ▪ Limited right turn movements ▪ Direct access to neighbouring property
8	Puhinui Road	Lambie Drive to Cambridge Terrace	▪ Single use arterial road ▪ 50km/h speed (existing) ▪ Right turn movements allowed ▪ Direct access to neighbouring property
9	Puhinui Road	Kenderdine Road to SH20 interchange, including MRT bridge	▪ Single use arterial road ▪ 50km/h speed (existing) ▪ Right turn movements allowed ▪ Direct access to neighbouring property
10	Puhinui Road	Between SH20 Interchange and the Airport	Not assessed within this technical note, as it is being designed separately, for the 20Connect project.

2 Where are traffic lane rearrangements and reductions possible?

There are three conditions that should trigger a review of whether traffic lane rearrangements or reductions is appropriate along the A2B route. These are:

1. At intersections, to improve the operation of and access to the A2B service by all modes.
2. Where property purchase may be required, as traffic lane reductions might mitigate this.
3. Where local access streets with slow speeds could be used for access to driveways and shared by cyclists (as 'bicycle streets'), to reduce driveway accesses directly onto the A2B corridor.

2.1 Intersection improvements

Table 3 summarises the changes proposed to the general traffic lanes at each of the intersection along A2B. The following operating principles have been applied to intersections along the A2B corridor:

- All existing signalised intersections will be maintained
- The level of service for general vehicles at most intersections is likely to drop below the current level. This is necessary to enable the Rapid Transit Network (RTN) runs efficiently and ensure RTN customers accessing the stations can do so safely and comfortably.
- Intersections should align with the intersection principles of the latest Transport Design Manual. These principles include making intersections safe for all users and considering Vision Zero.
- Slip lanes will be removed and replaced with left turn lanes that will be phased. Wherever possible left turns will be combined with a through lane to reduce the overall intersection size.

- Where there are currently two right turn vehicle lanes, one will be removed to make way for the rapid transit corridor. The only exception to this is at the Great South Road/Te Irirangi Drive intersection due to the demand for the motorway ramps.
- All vehicle approach and exit lanes at signalised intersections (including the rapid transit corridor) will be aligned.
- Where there are currently two right turn vehicle lanes, one will be removed to make way for the rapid transit corridor. The only exception to this is at the Great South Road/Te Irirangi Drive intersection due to the demand for the motorway ramps
- All existing unsignalised intersections that allow right turn movements will be converted into left-in, left-out junctions.

Table 3: Traffic Lane Changes by Intersection

Section	Intersection	General Traffic Lanes Removed	General Traffic Lanes Rearranged
1	Te Irirangi Drive/ Haven Drive	▪ Removal of all four left turn slip lanes at the intersection.	▪ Kerbside lanes on Te Irirangi Drive approaches become shared straight-ahead and left turn lanes. ▪ Separate left turn lanes retained on Haven Drive approaches, but these will be controlled by the signals.
	Te Irirangi Drive/ Smales Road	▪ Removal of all four left turn slip lanes at the intersection. ▪ Removal of one of the two right turn only lanes from both Te Irirangi Drive approaches	▪ Kerbside lanes on Te Irirangi Drive approaches become shared straight-ahead and left turn lanes. ▪ Separate left turn lanes retained on Smales Road approaches, but these will be controlled by the signals.
	Te Irirangi Drive/ Accent Drive	▪ Removal of all four left turn slip lanes at the intersection. ▪ Removal of one of the two right turn only lanes on the southbound Te Irirangi Drive approach. ▪ Removal of one of the two dedicated straight-ahead lanes on the northbound Te Irirangi Drive approach.	▪ Kerbside lanes on Te Irirangi Drive approaches become shared straight-ahead and left turn lanes. ▪ Separate left turn lanes retained on Accent Drive approaches, but these will be controlled by the signals.
	Te Irirangi Drive/ Bishop Dunn Place/ Sancta Maria Place	▪ Removal of all four left turn slip lanes at the intersection. ▪ Removal of one of the two dedicated straight-ahead lanes on both the northbound and southbound Te Irirangi Drive approaches.	▪ Kerbside lanes on Te Irirangi Drive approaches become shared straight-ahead and left turn lanes. ▪ Separate left turn lanes retained on Bishop Dunn Place and Sancta Maria Place approaches, but these will be controlled by the signals.
	Te Irirangi Drive /Ormiston Road	▪ Removal of all four left turn slip lanes at the intersection. ▪ Removal of one of the two dedicated straight-ahead lanes on both the northbound and southbound Te Irirangi Drive approaches.	▪ Kerbside lanes on Te Irirangi Drive approaches become shared straight-ahead and left turn lanes. ▪ Separate left turn lanes retained on Ormiston Road approaches, but these will be controlled by the signals.

Section	Intersection	General Traffic Lanes Removed	General Traffic Lanes Rearranged
		▪ Removal of one of the two right turn only lanes on both the northbound and southbound Te Irirangi Drive approaches.	
	Te Irirangi Drive/ Dawson Road	▪ Removal of all four left turn slip lanes at the intersection. ▪ Removal of one of the two dedicated straight-ahead lanes on both the northbound and southbound Te Irirangi Drive approaches.	▪ Kerbside lanes on Te Irirangi Drive approaches become shared straight-ahead and left turn lanes. ▪ Separate left turn lanes retained on the eastbound Dawson Road approach, but these will be controlled by the signals. ▪ The kerbside lane on the westbound Dawson Road approach will become a shared straight-ahead and left turn lane.
	Te Irirangi Drive/ Hollyford Drive/ Boundary Road	▪ Removal of all four left turn slip lanes at the intersection. ▪ Removal of one of the two dedicated straight-ahead lanes on both the eastbound and westbound Te Irirangi Drive approaches.	▪ Kerbside lanes on Te Irirangi Drive approaches become shared straight-ahead and left turn lanes. ▪ The kerbside lane on Boundary Road will become a shared straight-ahead and left turn lane controlled by the signals. ▪ The kerbside lane on Hollyford Drive will become a left turn lane controlled by the signals.
2	Te Irirangi Drive/ Diorella Drive/ Private Access	▪ Removal of the left turn slip lane on the Diorella Drive approach to the intersection.	▪ A separate left turn lane will be retained on Diorella Drive, but it will be controlled by the signals.
	Te Irirangi Drive/ Great South Road/ Cavendish Drive	▪ Removal of all four left turn slip lanes at the intersection.	▪ Kerbside lanes all approaches become shared straight-ahead and left turn lanes.
3	Great South Road/ Ronwood Avenue	▪ Removal of the left turn slip lane on the Great South Road northbound approach and the Ronwood Avenue approach to the intersection. ▪ Removal of one of the two right turn only lanes on the Great South Road southbound approach. ▪ Removal of the shared straight-ahead and right turn lane on Ronwood Avenue.	▪ Kerbside lane on the Great South Road northbound approach and the Ronwood Avenue become shared straight-ahead and left turn lanes. ▪ The remaining lane on Ronwood Avenue becomes a right turn only lane.
4	Ronwood Avenue/ Osterley Way/ Sharkey Street	▪ Removal of all right turn movements ▪ Removal of straight through movements between Osterley Way and Sharkey Street	▪ This roundabout is to be replaced with a signalised intersection, with the traffic lane movements to consist of:

Section	Intersection	General Traffic Lanes Removed	General Traffic Lanes Rearranged
			▪ Kerbside lanes on all approaches become shared straight-ahead, left and right turn lanes.
	Ronwood Avenue/ Davies Avenue	▪ None	▪ This intersection will be signalised with the traffic lane movements formalised to consist of: – One shared straight-ahead and left turn lane on the Ronwood Avenue westbound approach. – One shared straight-ahead and left turn lane and one right turn only lane on the Ronwood Avenue eastbound approach. ▪ One shared straight-ahead and left turn lane and one right turn only lane on the Davies Avenue approach.
5	Davies Avenue/ Putney Way	▪ Removal of the signalised intersection to create a shared space and: – the removal of the straight-ahead movement on the Davies Avenue southbound approach. – the removal of all northbound lanes on Davies Avenue between Putney Way and Manukau Station Road. – the removal of the left turn movement on the Putney Way approach	▪ The new traffic lane arrangement as this intersection will consist of: – A left turn only traffic lane on the Davies Avenue southbound approach. – A right turn only traffic lane on the Putney Way approach.
6	Manukau Station Road/ Davies Avenue/ Wiri Station Road	▪ Removal of the left turn movement from the kerbside lane on the Manukau Station Road eastbound approach. ▪ Removal of the right turn only lane on the Manukau Station Road westbound approach. ▪ Removal of the straight-ahead movement from the kerbside lane on the Wiri Station Road approach. ▪ Removal of the northbound receiving traffic lane on Davies Avenue.	▪ All other traffic lanes, except those being removed will function as current.
7	Lambie Drive/ Manukau Station Road	▪ Removal of all four left turn slip lanes at the intersection.	▪ Separate left turn lanes retained on the Manukau Station Road, Lambie Drive northbound and Lambie Drive Off-Ramp approaches, but these will be controlled by the signals.

Section	Intersection	General Traffic Lanes Removed	General Traffic Lanes Rearranged
			▪ Kerbside lane on the Lambie Drive southbound approach will become shared straight-ahead and left turn lane.
	Lambie Drive/ Ronwood Avenue	▪ Removal of the roundabout and installation of a signalised intersection. This will not result in any lane removals.	▪ The new signalised intersection will rearrange the traffic lane arrangements at this intersection to consist of the following: – Retention of the right turn only and shared straight-ahead and left turn lane on the Ronwood Avenue approach. – Two new lanes, a right turn only lane and a straight-ahead only lane on both the Lambie Drive approaches. – Retention of the kerbside shared straight-ahead and left turn lanes on both the Lambie Drive approaches.
	Lambie Drive/ Cavendish Drive	▪ Removal of all four left turn slip lanes at the intersection. ▪ Removal of one of the two straight-ahead lanes on both the Lambie Drive approaches.	▪ The kerbside lanes on all intersection approaches will become shared straight-ahead and left turn lanes.
8	Lambie Drive/ Puhinui Road/ Carruth Road	▪ Removal of the left turn slip lane on the Puhinui westbound approach to the intersection.	▪ Kerbside lane on the Puhinui Road westbound approach will become a shared straight-ahead and left turn lane.
9	Puhinui Road/ Noel Burnside Road	▪ New signalised intersection no traffic lane removals.	▪ Retain single approach lane on Noel Burnside Road permitting all traffic movements.
	Puhinui Road/ Wyllie Road	▪ Removal of both the left turn slip lanes at the intersection. ▪ Removal of the separate left turn only lane on Wyllie Road.	▪ The single remaining lane on Wyllie Road will provide for both left and right turn movements. ▪ The separate left turn only lane will be retained on the Puhinui Road eastbound approach, but it will be controlled by the signals.

2.2 Mitigation of property purchase

The table below provides a summary of the properties required per section of the current A2B concept design.

2.3 Opportunities for bicycle streets

Along the A2B corridor, there are already some parallel local access streets at various spots along Te Irirangi Drive. These local access streets can be designed as 'bicycle streets', as shared spaces between low-speed vehicles accessing properties, and bicyclists travelling along the corridor. There are other locations along the A2B corridor where there is potential as part of the redevelopment of the corridor for the RTN to build similar conditions for local access to houses. Additionally, some of the existing local access streets along Te Irirangi Drive also have access from other streets off Te Irirangi Drive itself, so some of these could be closed. The Rationale and Design Principles for Active Modes Tech Note (502334-7000-TEC-KK-0022) provides specific details on how local access streets could operate. Two key benefits of designing these streets for bicycles are that they require less land than if a separate cycle path was built between the main road and the local access streets themselves, and that overall safety outcomes improve by removing the conflict of a driveway onto a busy arterial. The general features of these bicycle access streets are:

- Driveway accesses:
  - Removal of direct access from properties onto the A2B corridor.
  - Replaced by a small, local street, parallel to the A2B corridor, with a single entry point and a single exit point, to be shared by all properties (an existing example of this along the A2B corridor is shown in Figure 1).
- Design of local access streets as bicycle streets:
  - The local access street will be designed as a key route for bicycles but a minor route for cars, providing a slow speed environment for safe travel by all.
  - Pedestrians and people on bicycles will have priority over cars at entry and exit points.
  - It should be parallel to the main corridor but will be separated from it by a vegetated berm.
  - It will have a speed limit of 30km/h.
- Footpath:

- The footpath should be continuous across the bicycle street and the footpath alongside the rest of the corridor.
- The design of these accesses will be carefully considered to be safe for the cars and bicycles using the local streets, as well as for pedestrians need to cross the entry and exit points.

Existing parallel local access streets that should be redesigned to promote the new function of these streets as bicycle streets:

- Leixlep Lane: entrance will be closed but exit onto Te Irirangi Drive will remain open
- Aaronville Way: entrance and exit will be closed from Te Irirangi Drive
- Kellaway Drive: entrance and exit will be closed from Te Irirangi Drive
- Gransna Lane: entrance and exit will remain open in its current form
- Sheddings Lane: entrance will be closed but exit onto Te Irirangi will remain open
- Wando Lane: entrance and exit will remain open in its current form
- Shingleton Lane: entrance will be closed but exit onto Te Irirangi will remain open
- Moravale Lane: entrance will be closed but exit onto Te Irirangi will remain open
- 203-213 Te Irirangi Drive: entrance and exit will remain open in its current form

Locations where the opportunity has been identified for creating new bicycle streets are:

- Te Irirangi Drive, between Belinda Avenue and Dawson Road (both sides of road)
- Te Irirangi Drive, between Dawson Road and Boundary Road (west side only)
- Te Irirangi Drive, between Boundary Road and the SH1 off ramp (both sides of road)
- Puhinui Road, between Lambie Drive and Puhinui Station (both sides of road)
- Puhinui Road, between Puhinui Station and Wyllie Road (north side only)
- Puhinui Road between 262 Puhinui Road and Vision Place (south side only)

Figure 1: Moravale Lane: example of existing parallel local access street alongside Te Irirangi Drive

Figure 2: Dissmeyer Drive: example of rear access lane to reduce direct driveway accesses

Approved by:

Title	Name	Position		
Author	[redacted]			/2020
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F

SH1 and Puhinui NIMT Over Bridge Structural Assessments

Appendix F

SH1 and Puhinui NIMT Over Bridge Structural Assessments

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Technical Note

To	**Auckland Transport**	From	
Copy		Reference	**502334-7000-TEC-SS-0031**
Date	**2021-03-11**	Pages (including this page)	**9**
Subject	**Puhinui Interchange Ramp Structure Assessment**		

1 INTRODUCTION

1.1 Reasons for the construction of the structures

Auckland Transport (AT), alongside investment partners, The Transport Agency and Auckland International Airport Limited (AIAL) are investigating improvements to customer journey experiences and access to and from Auckland International Airport (Auckland Airport) and the surrounding area. A key demand management element of the Preliminary Business Case was a rapid transit connection between the Airport and Botany in the form of a dedicated Rapid Transit Corridor (RTC), to provide a viable alternative to private vehicles for east and south Auckland, where one third of airport trips originate.

The preferred option route of the RTC runs down the entirety of Te Irirangi Drive, through Manukau passing Manukau bus and train station connecting to Puhinui Interchange along Puhinui Road and heads west towards Auckland Airport via State Highway (SH) 20B. Figure 1 below shows the route of the Auckland to Botany (A2B) RTC in relation to the surrounding network and SH20, SH20A and SH20B improvements (20Connect) Single-Stage Business Case (SSBC) study area.

The RTC considered in A2B SSBC project is just east of SH20 to Botany. As part of the SSBC investigation the need for a new ramp to elevated Puhinui Interchange was identified.

1.2 General site description

Currently, the existing Puhinui station consists of an island platform, accessed by a pedestrian overbridge connected to Puhinui Road on both the east and west side of the railway. However, the station will be soon upgraded to a bus-rail interchange, as an early deliverable for the A2B project (designed by Aurecon). The pedestrian overbridge will be demolished to allow for a concourse building above the railway corridor. Adjacent to the building on the west side will be combination bus interchange and park and ride.

The final form of the bus-rail interchange will incorporate the RTC, by an elevated platform adjacent to the concourse building. A ramp structure would be required to bring up the RTC carriageway from Puhinui to this platform.

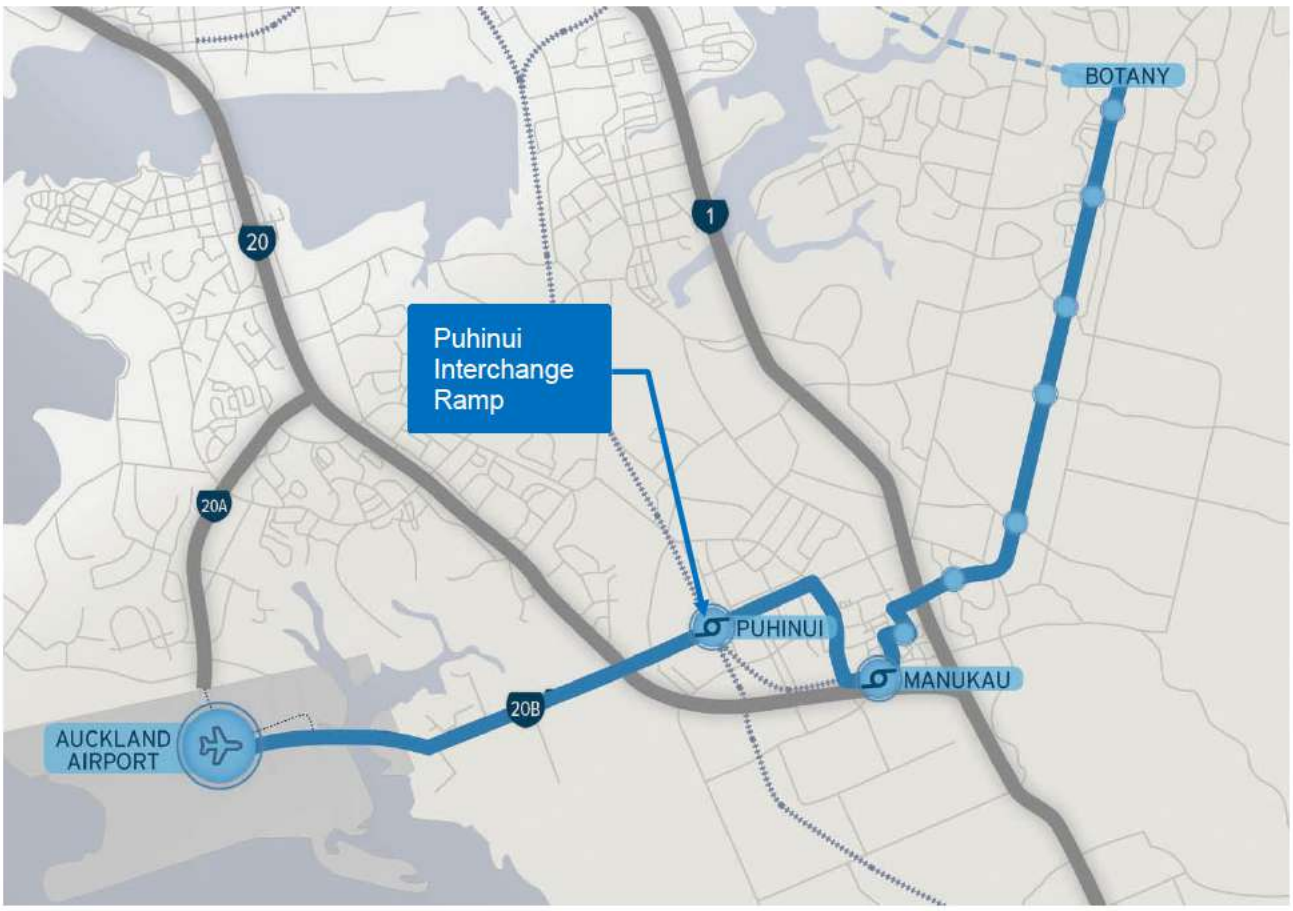


Figure 1: Puhinui Interchange Ramp

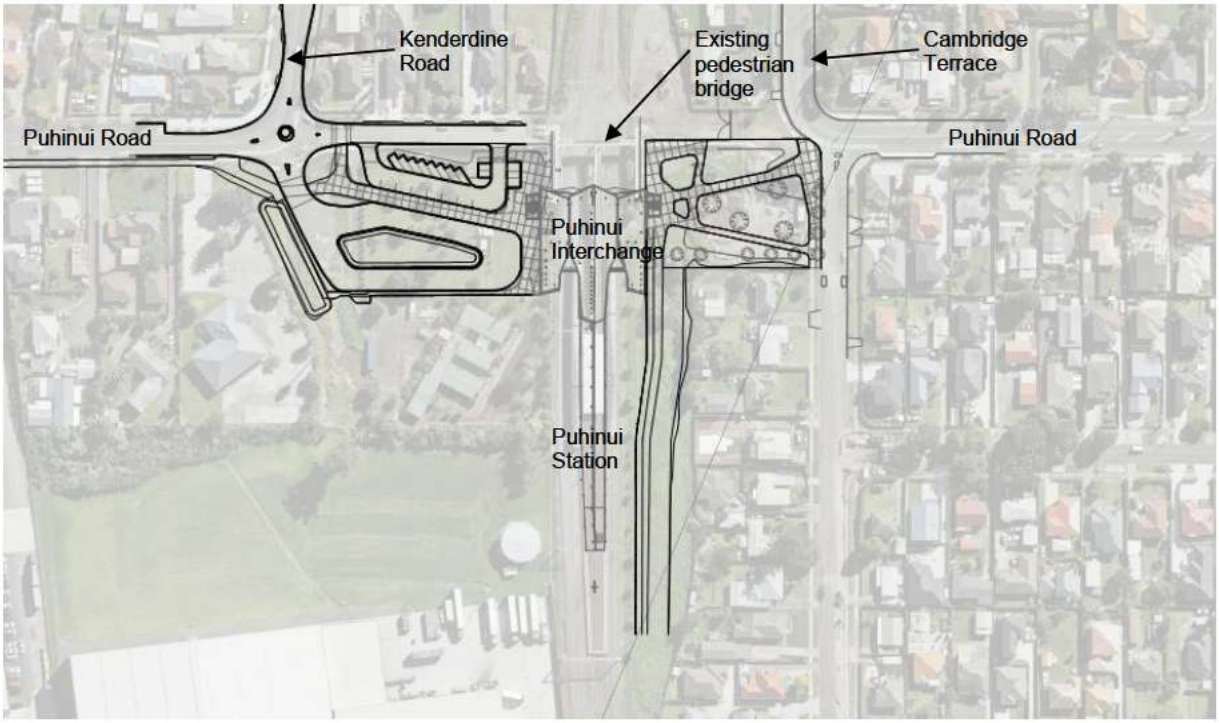


Figure 2 Existing Puhinui Station and proposed Puhinui Interchange overlay

2 FACTORS INFLUENCING DESIGN

2.1 Service requirements

The new ramp structure is required to provide 2 No. 3.5m wide RTC lanes, 2 No. 1.0m wide shoulder, for a total width of 9m. The design traffic speed for the road would be 50km/h.

The ramp leads up to the elevated platform over the railway. The platform is required to provide same RTC lanes, and 2 No. 5m footpath for users getting on and off the vehicles, and all associated drainage channels requirement for a total width of 18m.

The ramp will span across the local road intersection with Kederdine Rd on the western side of the railway, and with Cambridge Terrance on the eastern side.

2.2 Geometrics (vertical and horizontal alignment)

The road geometrics has been designed as part of a road alignment investigation stage. Over the bridge, it can be summarised below:

- Design Speed = 50km/h
- Horizontal Alignment: mostly straight but has a reversed curve of 500m radius western side of the platform, and another reversed curve of 200m radius eastern side.
- Vertical Alignment: maximum 5% longitudinal grade at ramps, and flat at the platform.
- Cross fall = 3%

2.3 Foundation (Subsurface) Conditions

Ground investigations have been carried out at the existing Puhinui station for the design of the bus-rail Interchange, and this information has been adopted for the proposed new ramp structure. The following is extracted from the Geotechnical Interpretive Report (504124-1000-REP-GG-0006) for the interchange:

“The natural site stratigraphy comprises three main geological units, Auckland volcanic field ash overlying Puketoke Formation alluvial soils comprising interbedded silts and sands and some peat, all underlain by Kaawa Formation dense sands and sandstone”.

Refer figure below for graphical representation of the soil layers. Based on the Puhinui investigations, competent bearing strata (Kawaa Formation rock) is expected to be encountered from an elevation of -2m RL (on the order of 22m below ground level). The underlying Kawaa Formation rock is expected to generally consist of highly weathered sandstone with UCS on the order of 1MPa. Interbedded layers of completely weathered, organic siltstone (lignite) with CPT q_c values on the order of 30MPa and up to 1m thick are likely to be present within the rock mass and will affect pile capacities. Any pile toe should not be founded within the organic siltstone and if the toe is founded within two pile diameters of the layer, consideration should be given to lowering the pile base capacity.

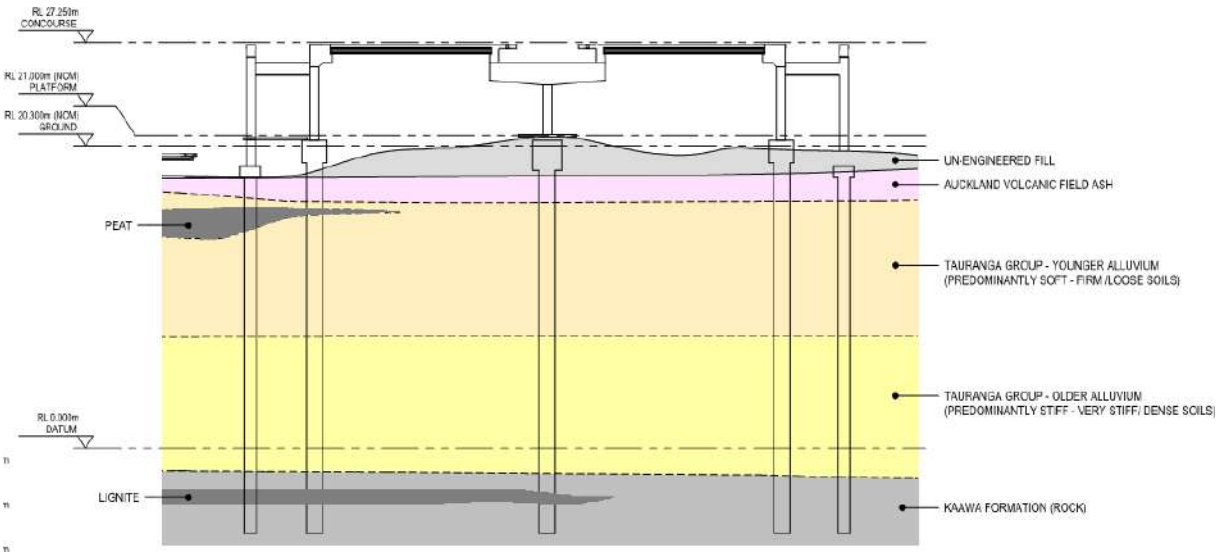


Figure 3: Geological layers at Punihui Interchange (from IFC drawings)

Based on the investigations at Puhinui Station, sandy layers within the Tauranga Group alluvium are expected to be encountered at the site and are likely to be susceptible to liquefaction under strong earthquake shaking. The liquefaction assessment at the Puhinui Station indicated:

- During a SLS earthquake event, no liquefaction is expected.
- In a ULS earthquake event, indexed settlements in the order of 75mm to 115mm are predicted. Ground damage and surface expression is possible. Negative skin friction should be applied in the pile design calculations for the soil above 11.0m RL due to settlements of the overlying liquefied soils.

It is understood that the bridge approach will require fill embankments and retaining walls up to 3m in height. Due to presence of soft silts, clays, and peat (typically on the order of 1m thick based on existing investigations) within the Tauranga Group soils at shallow depth, the fill embankments will be potentially susceptible to long-term consolidation and creep settlement. This will require a detailed geotechnical investigation and analysis for design.

2.4 Urban Design Considerations

The ramp structure is in middle of Puhinui road which has dense residential housing. It will have a visual impact on the area and the visually integrate with Puhinui Station and the surrounding residential and industrial landuse' . The span arrangement and structural depth of the bridge will be configured to minimise its impact on the environment.

Urban design opportunities exist to minimise effects on surrounding land uses. The detailed design will incorporate the urban design philosophy, the requirements of the Transport Agency Bridge Manual, (in particular, the requirements detailed in Section 2.6 and Table 2.5), and "Bridging the Gap" – the Transport Agency Urban Design guidelines.

2.5 Hydrology

The structure does not cross over any waterway and has no impact on hydrology.

2.6 Constraints on Span Arrangement

The new ramp structure has the following constraints to span arrangement and clearances.

- The ramp spans over local road intersections, and pier columns need to be 1.1m clear from the edge of the road, as required by the Transport Agency Bridge Manual. Maximum span length is 34.6m over the intersection with Cambridge Terrance.
- The platform spans over railway and need to be clear from the rail envelope as per Kiwirail requirement, both vertically and horizontally. The rail tracks have horizontal curvature at this location, as they transition from typical side by side tracks to being separated by an island platform. In the preliminary design report of the Puhinui Interchange, an arrangement of two spans 17m with shallow depth structure and a blade pier in the between tracks had been proposed, to satisfy the clearance requirements.

As the ramp will span over roads, a minimum clearance of 6.0m has been adopted from the Transport Agency Bridge Manual. This constraint been incorporated into the road geometric design.

2.7 Constraints on Construction Methods

The construction of the new ramp structure includes the following constraints on construction methods located both above and below the deck level.

The constraints above deck level include the following;

- Due to the height of the structure, expected span length, and potential limitations on lifting weight there will be a requirement to undertake work at heights.
- Due to proximity to electrified railway, careful consideration is required when determining piling and lifting methodology for cranage requirements.

The constraints below the deck level include the following;

- The piling and pier construction works will occur adjacent to the existing roads and the works will need to be separated to ensure the safety of road users and construction workers.
- Piling adjacent to railway will need to be carefully managed to avoid imposing settlement of the tracks.
- The Hunua No. 4 water transmission pipeline transverses under the railway along Puhinui Road, at approximately 2m below ground level. Following constraints would be placed on foundations (taken from Detailed Design Report for Puhinui Interchange 504124-1000-REP-CC-0005)
  - Piles, if proposed, are to have 2m horizontal clearance from the face of the pile to face of the watermain.
  - Piles within 5m of the watermain are to be drilled and not driven.
  - A works over approval from Watercare is required if within 10m of the transmission main.

2.8 Constraints on construction materials

The use of reinforced and prestressed concrete as the primary structural material is recommended for the following reasons:

- Concrete, reinforcement, and prestressing strand is readily available in Auckland without significant lead times.
- Concrete is highly durable with insignificant or no maintenance, if designed, detailed and constructed properly.
- It provides flexibility in that it allows for both in-situ and precast construction methods to be used

The materials selected should also be maintenance free where possible for the 100 year design life.

2.9 Interaction of construction with traffic flows

In order to construct the new ramp structure, careful interface planning between the design, construction methodology, and traffic management is required to minimise disruption to the existing Puhinui road and surrounding road traffic and provide safe access to the road users and construction personnel. Overnight lane closures, speed restrictions, lane width reductions, and traffic detours off peak are some of the traffic management solutions that may be required during pier construction and span installation.

Construction of the elevated platform adjacent and over the railway will require full safety procedure by Kiwirail, such as “Lock on, Lock off” and full time Protector on site, as well as careful planning with Block of Lines.

2.10 Site seismic hazard

The bridge site is in Auckland, where there is relatively low risk of seismic event. The structure would be designed to meet the current requirements.

- Importance Level: 3+
- Seismic Hazard (Z): 0.11
- Return Period: 1/1500
- Return Period Factor (Ru): 1.5
- Near Fault Factor (N,D): 1.0
- Site subsoil class is likely to be Class C.

It is expected that seismic won’t govern the preliminary design considering the low seismicity at Auckland.

2.11 Environmental considerations and constraints

The overall bridge configuration will be designed to ensure minimal environmental impact. This will be done by maximising the amount of prefabricated materials utilised in construction. Mitigation of noise, vibration, and air pollution will be implemented as part of the works.

3 Description of Preferred Structural Option (Preliminary)

3.1 Description of structure option

Initial investigations have identified the preference to a ramp structure and defined the geometric alignment. Only a single structural option has been developed at this investigation stage to inform the cost estimate. This a basic structural option and has not incorporated any special Urban design.

The proposed structural configuration for the ramp utilises precast prestressed girders, fully integral with piers. The superstructure comprises typically 1.2m deep super-T girders with a 180mm thick deck slab, for spans longer than 26.5m. Number of girders varies from 5 no. typically to 7 no. where span length exceeds 31m. For shorter spans, shallower 1.0m deep super-T girders is adopted.

Based on the geotechnical information available from the Puhinui Interchange project, a preliminary foundation option has been developed for the proposed design. The foundation comprised of reinforced concrete hammerhead headstocks supported by a single 1.5m diameter cast-insitu concrete column. The column is supported by single large 2.1m diameter reinforced concrete piles embedded

into rock. Vertical and lateral load will be transferred from the span to the foundation by the integral connections.

Similar to the ramp, the elevated platform utilised precast prestressed girders, with deck slab and fully integral with piers. The only difference is for the spans over railway, the girders are prestressed hollowcore girders, instead of Super-T girders.

3.2 How the Design Addresses the Factors Influencing the Design

The proposed structural configuration addresses the design constraints by the following;

- Single pile foundation at ramp piers to be clear from the Huana no. 4 watermain.
- Super-T girders are used to provide enough span length over the local road intersections.
- Hollowcore girders are used over railway to keep the same level as the Puhinui Interchange concourse, and still have enough vertical clearance over the track.
- Reinforced concrete will achieve a 100-year design life with minimal maintenance and not require in-situ repainting of the corrosion system.

3.3 Span Arrangements

The span arrangement has been selected to minimise the different number of span lengths, maintain a similar structural depth without significant inefficiencies all while positioning piers within the constraints. Eighteen spans are required and from West to East the span arrangement is as follows;

- 3 No. 31m Spans – ramping up along Puhinui Road
- 1 No. 33m Span – Over the Kenderdine Road Intersection
- 1 No. 29m Span
- 2 No. 18m Spans
- 1 No. 26m Span – First span of the platform
- 2 no. 17m Spans – Platform Over the railway
- 1 No. 11m Span – Last span of the platform
- 1 No. 26m Span
- 1 No. 29m Span
- 1 No. 35m Span – Over the Cambridge Terrace Intersection
- 3 No. 31m Spans - ramping down along Puhinui Road

3.4 Construction Materials and Durability

For reinforced and prestressed concrete structures, durability will be achieved by appropriate detailing and by complying with the concrete grade and requirements of NZS3101:2006.

All structural steelwork used will be protected against atmospheric corrosion in accordance with the Transport Agency ‘Protective Coatings for Steel Bridges’: 2014 and AS/NZS 2312: 2002 ‘Guide to Protection of Structural Steel against Atmospheric Corrosion by the Use of Protective Coating’. Local environmental effects will be assessed, using AS/NZS 2312 as the base in conjunction with HERA Report R4-133:2011 New Zealand Steelwork Corrosion Coatings Guide. This will be limited to the barrier rails and secondary steelwork for handrails and balustrades.

3.5 Proposed Arrangements for Construction

A high-level review of the construction methodology is as follows;

- Locate, divert and protect any impacted utilities
- Provide diversions and traffic management to facilitate phased construction and minimise disruption
- Establish central site laydown area and individual pier location laydown areas with associated access requirements.
- Construct foundations, piers, approach formations, and headstocks.
- Fabricate prestressed concrete girders off-site and transport and assembly on site.
- Lift concrete girders into place.
- Cast in-situ road deck, and associated road hardware.
- Tie in ramp structure to Puhinui Road.
- Demobilise from site and reinstate areas

3.6 Risks and Hazards Considered

The risks associated to these works are those that would be expected by and experienced, competent contractor. However, special attention is paid to the follow:

- Works adjacent to and above electrified rail
- Works adjacent to Hunua No. 4 water transmission pipeline
- Construction works within an existing residential community

3.7 Recommended Design Requirements and Standards

The design of all bridge structures will comply with the Transport Agency Bridge Manual and other standards referred to in the Bridge Manual.

Where the Transport Agency Bridge Manual and/or NZ Standards do not explicitly cover parts or issues related to the design or construction of specific structural forms, Australian, European or American codes or standards that are applicable may be proposed subject to the agreement of the Transport Agency.

No departures are currently envisaged.

4 Drawings and Documents

This Technical Note is to be read in conjunction with drawing 502334-0000-DRG-BB-0011 to 0013.

Approvals:

	Author	Reviewer
Name		
Signature		
Designation	Structural Engineer	Technical Director

G

Preliminary Geotechnical Appraisal Report

Appendix G
Preliminary Geotechnical Appraisal Report

AIRPORT TO BOTANY

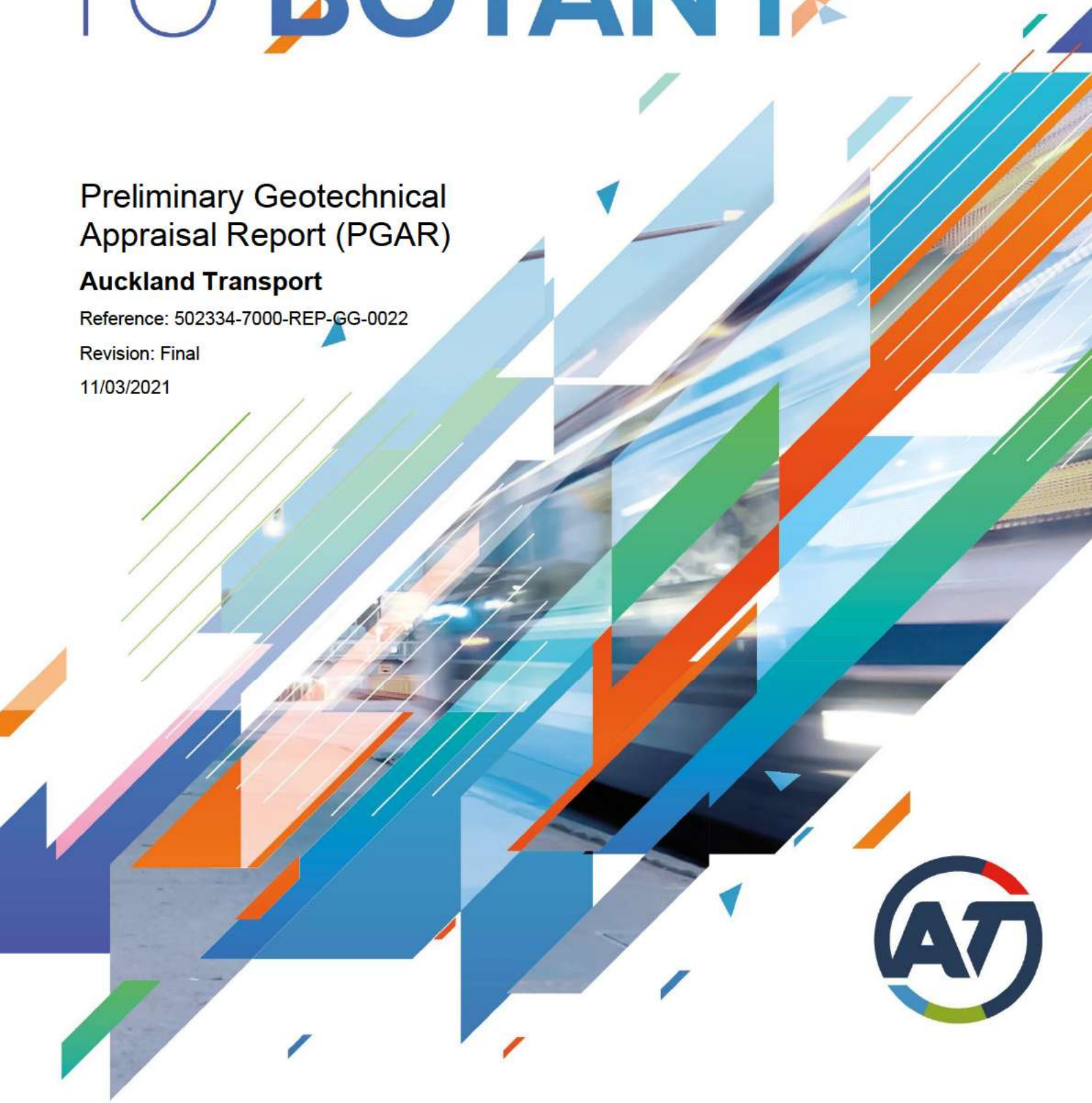
Preliminary Geotechnical Appraisal Report (PGAR)

Auckland Transport

Reference: 502334-7000-REP-GG-0022

Revision: Final

11/03/2021



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Approval			
Author signature		Approver signature	
Name	[redacted]	Name	[redacted]
Title	Geotechnical Engineer	Title	Project Director

Contents

Appendices

Figures

Tables

1 Introduction

1.1 Purpose

Airport to Botany is an Auckland Transport (AT) project that forms part of the wider Southwest Gateway programme. aims to provide *"more choice and reliability for people and freight travelling through southwest and southeast Auckland, including to and from the airport"* (NZTA, 2019) in response to population and job growth in the Southwest of Auckland.

Error! Reference source not found. shows the extent of the Airport to Botany Rapid Transit Corridor (RTC) in relation to the wider Southwest Gateway improvements. The Airport to Botany RTC is intended to connect Auckland Airport to the Botany Area, via the corridor shown in Figure 1-2.

Figure 1-1: Southwest Gateway improvements

This Preliminary Geotechnical Appraisal Report focuses on parts of the Airport to Botany RTC, as outlined in Section **Error! Reference source not found.**, in relation to long-term upgrades. The preferred option for the long-term upgrades is currently under development and working draft general arrangement drawings have been used to indicate the likely preferred option (see general arrangement drawings ref. 502334-6000-DRG-RR-0110-0117 [A], dated 27th May 2019). We understand that the risk information will be used to assist costing and future option development.

Further detail on the 20Connect works can be found in the *SH20/20A Preliminary Geotechnical Assessment Report (PGAR),* ref. 501094-5501-REP-KK-0002[0], dated 12 August 2019 prepared for the New Zealand Transport Agency (NZTA). The Airport to Botany RTC interfaces with the 20Connect works at the start of the upgrade alignment.

1.2 Scope

The scope of this Preliminary Geotechnical Appraisal Report (PGAR) and Contaminated Land Addendum was agreed in a Change Note dated 18 February 2019, ref 502334-8000-TSK-OO-0009. The study area is

shown in Figure 1-2 and the working draft preferred option general arrangement drawings are included in Appendix A.

The PGAR and Addendum include summaries of identified geotechnical risks. The preferred scheme is planned for delivery in ten or more years' time, therefore the recommendations for further ground investigation work are indicative and for the purpose of assisting with planning and cost estimating.

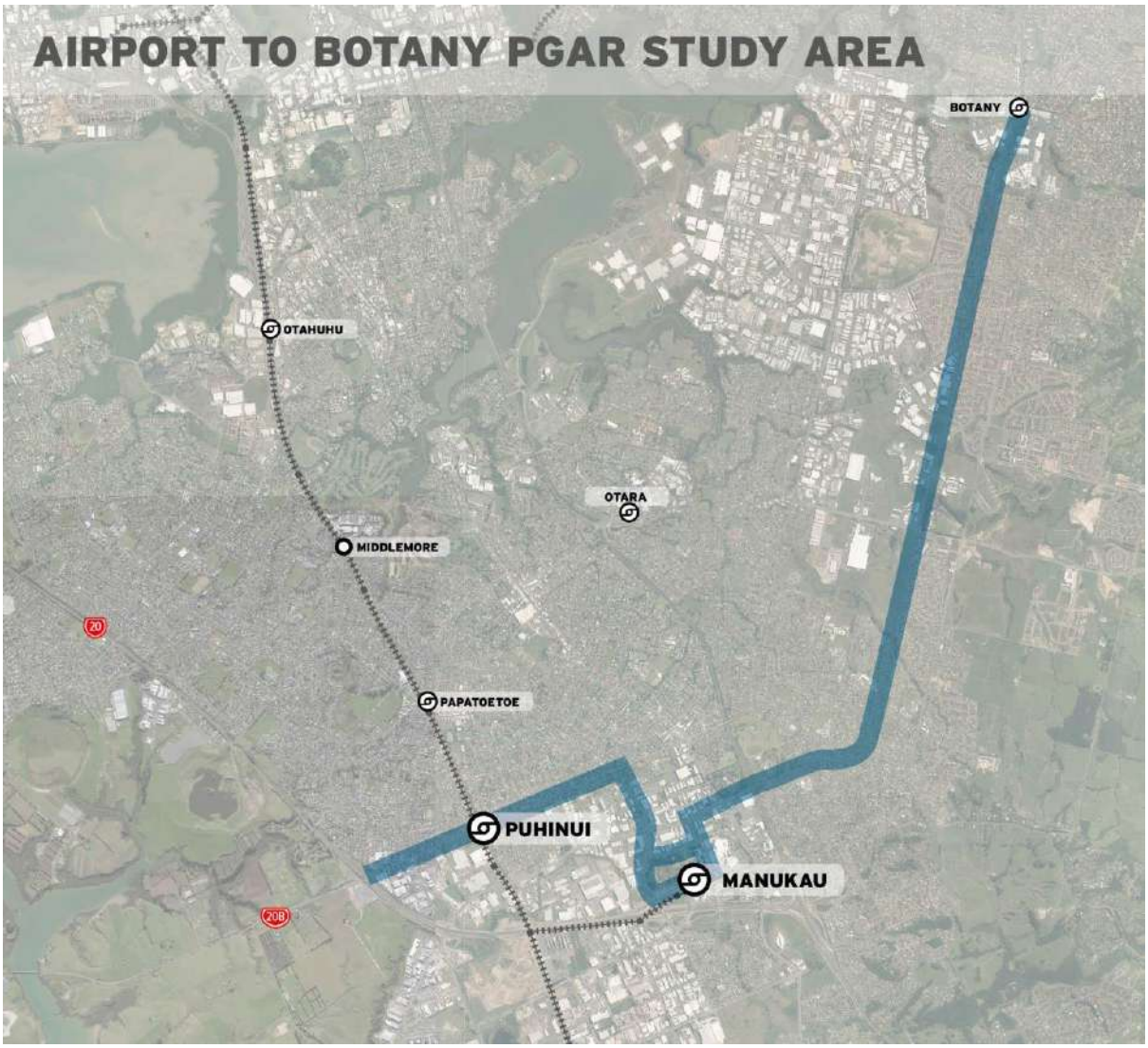

Figure 1-2: Airport to Botany PGAR study area

2 Geotechnical Appraisal

2.1 Introduction

A geotechnical and contaminated land desk study was completed through July 2019. The data sources used, and findings are summarised in the following section of this report.

2.2 Site Description

The key site features are summarised as follows:

- The total upgrade alignment is on the order of 13km.
- The wider site is in a region generally described as the Manukau Lowlands and the Auckland Volcanic Field (Edbrooke, 2001) and is predominantly flat or gently undulating.
- The ground surface level across the entire alignment varies by approximately 20m, between 20m and 40m above mean sea level (MSL).
- The entire alignment is currently a live traffic corridor.

2.3 Published Geological Setting

2.3.1 Regional Geology

The 1:50,000 scale Geological Map of the Auckland area (Kermode, 1992) indicates the alignment is predominantly underlain by sediments of the Plio-Pleistocene aged Puketoka Formation, which is part of the Tauranga Group. The Puketoka Formation is variably comprised of 'light-grey to orange-brown pumiceous mud, sand, and gravel with muddy peat and lignite'. Younger, Holocene-aged alluvial deposits have been mapped approximately mid-way along the alignment and are described as 'sand, silt mud and clay with local gravel and peat beds. In the wider area are volcanic deposits associated with the Manurewa, Papatoetoe and Crater Hill Volcanoes.

Older geologic formations are buried below alluvial deposits in this map extract but are interpreted as being Kaawa Formation (mapped in the Weymouth area, and known from multiple investigations in South Auckland), underlain by the East Coast Bays (ECB) Formation.

A summary of the regional geology is shown in Figure 2-1 below, with the proposed upgrade alignment shown in red.

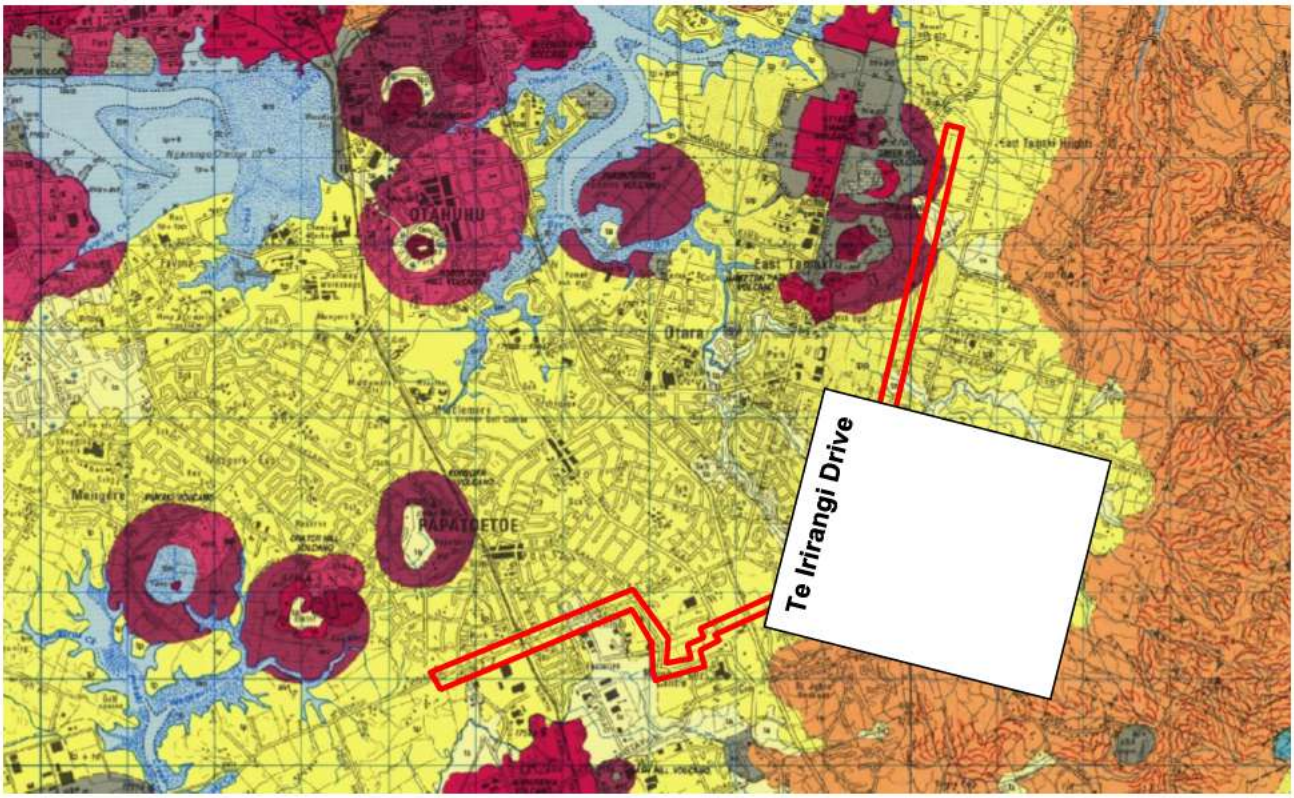

Figure 2-1: Kermode (1992) 1:50,000 Geological Map. Te Irirangi Drive was completed in 2000 and is not shown on the geological map.

The GNS Science active faults database shows the nearest fault to the project area to be the Waikopua Fault, approximately 10km to the east (at its closest extent). The fault parameters are unknown.

2.4 Previous Ground Investigations

2.4.1 Airport to Botany: Puhinui Bus Priority (Aurecon, 2019) (Auckland Transport)

Detailed design is currently underway for Puhinui Bus Priority, which comprises construction of bus priority lanes and cycling improvements along Puhinui Road and Lambie Drive. At the time of writing this report, the proposed works are presenting in the 50% Detailed Design Report (Ref. 506181-0002-REP-JJ-0200, dated 19th July 2019). A PGAR is being prepared, ref. 506181-0002-REP-GG-0201.

2.4.2 Puhinui Interchange (Aurecon, 2018 – 2019) (Auckland Transport)

Detail design is currently underway for Puhinui Interchange. Improvements include a new interchange at the location of the existing Puhinui Train station, approximately at the pedestrian overbridge on Puhinui Road. Construction is scheduled to commence late 2019.

The preliminary design has been completed and included the following geotechnical scope of work:

- Preliminary geotechnical appraisal (Aurecon Ref. 502334-4000-REP-GG-0006, July 2018);
- Ground investigation documented in Geotechnical Factual Report (GFR) (Aurecon Ref. 504124-1000-REP-GG-0008, Rev C, March 2019);
- Geophysical investigation report (Aurecon Ref. 504124-1000-REP-GG-0009, Rev A, Feb 2019)
- Geotechnical Interpretative Report (GIR) (Aurecon Ref. 504124-1000-REP-GG-0006, Rev A, March 2019)

The ground investigation completed to date includes:

- Five machine boreholes (BH) completed to a target depth of 30m below ground level (bgl);
- Six cone penetrometer tests (CPT) completed to depths in the range 20.9m – 29.0m bgl;
- Two seismic dilatometer tests (sDMT) completed to depths in the range 17.8m – 19.9m bgl;
- Sixteen test pits (TP) completed to depths in the range 1.5m – 4.0m bgl.
- Geophysical Refraction microtremor (Remi) surveys for assessing shear wave velocities and electrical resistivity surveys

Laboratory testing included particle size and Atterberg index testing and compressive strength testing. Dipped groundwater and piezometer measurements indicated groundwater in the depth range 0.5m to 2.0m below ground level (bgl).

2.4.3 Hunua 4 Watermain (Watercare, 2009)

Hunua 4 watermain was a large infrastructure project that involved trenching along Puhinui Road to install a 2m diameter watermain. The watermain continues along the full length of the Puhinui Road and continues along to Boundary Rd past the intersection with Te Irirangi Drive. All boreholes were drilled by DCN Drilling and logged by GHD for Watercare in 2009.

16 boreholes along Puhinui Road are within or adjacent to the PGAR project area and another two boreholes of interest are located at the Intersection of Boundary Road and Te Irirangi Road.

A summary of the borehole logs available on the NZGD of interest is presented in **Table 2-1**.

Table 2-1: Hunua 4 Watermain (Watercare) investigative positions (sourced from NZGD)

Investigation ID (NZGD)	Investigation ID (Log)	Approximate Location	Elevation (m RL)	Depth (m)	Pre-drill (m)	Water (m)
BH_67182	S46P	307 Puhinui Road	20.2	20.3	1.5	-
BH_67181	S45P3	151 Wyllie Road	16.3	8.0	1.6	-
BH_67180	S45P3	7 Golden Arches Place	15.6	8.0	1.5	2.32
BH_67179	S45P1	281 Puhinui Road	17.2	8.0	1.5	-
BH_67178	S44P	286 Puhinui Road	15.4	8.0	1.5	3.4
BH_67177	S43	250 Puhinui Road	20.0	20.0	1.5	-
BH_67176	S42	240 Puhinui Road	17.2	6.5	1.5	-
BH_67175	S41P	216 Puhinui Road	18.6	15.5	1.5	2.6
BH_67174	S40P	206 Puhinui Road	20.4	15.5	1.5	0.6
BH_67173	S39	184 Puhinui Road	23.7	7.0	1.5	3.5
BH_67172	S38	154 Puhinui Road	17.5	20.0	1.6	-
BH_67171	S37	138 Puhinui Road	17.4	6.5	0.4	1.5
BH_67170	S36	118 Puhinui Road	19.8	6.5	1.5	1.5
BH_67169	S35	104 Puhinui Road	20.6	6.5	1.5	1.0
BH_67168	S34	82 Puhinui Road	22.7	20.0	1.5	-
BH_67167	S33	72 Puhinui Road	23.1	10.5	1.5	-

Investigation ID (NZGD)	Investigation ID (Log)	Approximate Location	Elevation (m RL)	Depth (m)	Pre-drill (m)	Water (m)
BH_67151	S19P	Corner Boundary Rd and Te Irirangi Drive	39.1	15.5	1.5	1.31
BH_67152	S20P	Corner Boundary Rd and Te Irirangi Drive	38.4	15.1	1.5	4.14

2.4.4 Auckland Electrification Project (AEP, 2010, 2011)

The electrification of Auckland Rail Network from Papakura (South Auckland) to Swanson (west Auckland) was carried out by Ontrack and consisted of ground investigations within the PGAR project area.

Ontrack commissioned Aurecon to design Bridge 356 NIMT 659.12km at Bridge Street, Papatoetoe to raise the bridge deck to remove the headroom constraint for electrification works.

A Geotechnical Interpretative Report (Aurecon Ref. 203299-03-01, July 2010) associated with the proposed of the road bridge on Bridge Street (approximately 100m north of the Puhinui Road footbridge) has been reviewed. The ground investigation logs (summarised in Table 2-2) and laboratory test results consisting of 3 PSD and moisture content tests are presented in the corresponding geotechnical factual report (Aurecon Ref. 203299-03-01, July 2010).

Table 2-2: NIMT Bridge 356 (Bridge Street, Papatoetoe)

Investigation ID (NZGD)	Investigation ID (Log)	Approximate Location	Elevation (m RL)	Depth (m)	Pre-drill (m)	Water (m)
BH_76991	DH105	East abutment, 5m offset	23.84	25.95	1.2	(Note 1)
BH_76992	DH106	East abutment, 3m offset	22.90	33.45	1.2	(Note 1)
NA	DH108B	In carriageway, east abutment	26.05	6.0	0.3	(Note 1)
BH_76994	DH108C	In carriageway, east abutment	26.05	7.5	0.3	(Note 1)

Note 1: No groundwater measured on the day of drilling.

Subsequent investigations were carried out by Aecom for Kiwi Rail in 2011 and consisted of 4 machine augers – refer to Table 2-3 below:

Table 2-3: Aecom Kiwi Rail Auckland Electrification Third Main (2011)

Investigation ID (NZGD)	Investigation ID (Log)	Approximate Location	Elevation (m RL)	Depth (m)	Pre-drill (m)	Water (m)
BH_87550	MA1	(refer to NZGD)	20.3	4.0	–	1.1
BH_87551	MA2	(refer to NZGD)	20.27	4.0	–	2.0
BH_87552	MA3	(refer to NZGD)	20.3	4.0	–	2.0
BH_87553	MA4	(refer to NZGD)	20.17	4.5	–	–

Eight test pits were excavated at track level up and down chainage of Bridge 356 as part of a bridge clearance survey. All logs are restricted to a single NZGD position TP_98507. The pdf record includes all 8 test pit logs and a location plan showing the relative positions of the 8 individual test pits.

Table 2-4: Bridge 356 NIMT Bridge clearance survey (2010)

Investigation ID (NZGD)	Investigation ID (Log)	Approximate Location	Elevation (m RL)	Depth (m)	Pre-drill (m)	Water (m)
98507	TPBSB01	(refer to NZGD)	–	0.57	–	–
98507	TPBSB02	(refer to NZGD)	–	0.57	–	–
98507	TPBSB03	(refer to NZGD)	–	0.56	–	–
98507	TPBSB04	(refer to NZGD)	–	0.58	–	–
98507	TPBSB05	(refer to NZGD)	–	0.43	–	–
98507	TPBSB06	(refer to NZGD)	–	0.88	–	–
98507	TPBSB07	(refer to NZGD)	–	0.8	–	–
98507	TPBSB08	(refer to NZGD)	–	1.26	–	–

2.4.5 Puhinui Footbridge Replacement (2009, 2011)

Two logged boreholes and one hand auger were carried out by URS in 2009 to investigate foundations for a replacement to the Puhinui Station Footbridge. Factual Report reference: 42124673/R001/02. Subsequently, HA101 was drilled in June 2011 and logged by Peters and Cheung Ltd.

A summary of these borehole logs, sourced from the NZGD, is provided in Table 2-5. The factual reports documenting these investigations have not been sourced.

Table 2-5: Puhinui Footbridge Replacement investigative positions (sourced from NZGD)

Investigation ID (NZGD)	Investigation ID (Log)	Approximate Location	Elevation (m RL)	Depth (m)	Pre-drill (m)	Water (m)
BH_87520	BH1	(refer to NZGD)	20.36	30.13	1.5	5.5
BH_87521	BH2	(refer to NZGD)	19.82	33.0	1.2	4.0
HA_87522	HA1	(refer to NZGD)	19.35	4.0	–	0.4
HA_87523*	HA101	(refer to NZGD)	20.53	4.0	–	1.7

*HA101 drilled for Kiwi Rail for Puhinui Station Footbridge in June 2011, logged by Peters and Cheung Ltd.

2.4.6 ARTNL Puhinui Railway Station (2004)

GHD carried out a factual report for an extension of the Puhinui Station platform. The ground investigation consisted of two shallow test pits: TP1 to 0.39m BGL and TP2 to 0.825m BGL. No lab testing was carried out. The report was included with the Railway Station Geotechnical Report, ref 51/20265/00 (Rev 0), December 2004, GHD.

2.4.7 Historical SH20 Investigations (2000, 2005)

Several phases of ground investigation relating to SH20 and SH1 have been identified from records of the New Zealand Geotechnical Database (NZGD).

These investigations include but are not limited to:

- SH20 Motorway Extension – Puhinui Road to SH1 (Beca, 2000)
- SH20 to SH1 Extension Link Quarry Investigations (Meritec, 2001)
- SH20 to SH1 Link (Aecom, 2005)
- SH20 Extension Lambie Drive Bridge (Golder Associates, 2006)

The NZGD records are limited to logs of individual ground investigation positions and include boreholes, cone penetration tests and test pits. Complete factual investigation reports including lab test data have not been sourced.

2.4.8 East Tamaki Corridor Arterial Road (ETCART) (1998)

The East Tamaki Corridor Arterial Road was constructed to link Manukau City Centre to Botany Town Centre and was opened as Te Irirangi Drive in 2000. It continues northward as Botany Rd at the intersection of Tī Rākau Drive (the approximate extent of the PGAR project area).

The ETCART boreholes were drilled by Pro Drill in 1998 and were supervised by Worley Consultants (now Aecom). The investigative positions available on the NZGD are presented in Table 2-6. The factual reports containing these boreholes should be sourced to assess construction history.

Table 2-6: East Tamaki Corridor Arterial Road (ETCART) (sourced from NZGD)

Investigation ID (NZGD)	Investigation ID (Log)	Approximate Location	Elevation (m RL)	Depth (m)	Pre-drill (m)	Water (m)
BH_101732	DH09	Whetstone Rd Footbridge	17.9	27	–	<+0.5 (artesian)
BH_66211	DH10	East Tamaki Rd Footbridge	28.8	21.2	–	0.8
BH_66212	DH11	Brittas Place Pedestrian underpass (west)	19.7	17.2	–	2.4
BH_66213	DH12	Brittas Place Pedestrian underpass (east)	22.2	20.2	–	4.8
BH_66214	DH14	Accent Drive	37.6	10.5	–	Dry

A borehole (NZGD: BH_68021) was drilled by Drilwell to a depth of 16.6m and supervised by Opus at the Intersection of Tī Rākau Drive and Te Irirangi Drive in 2003. This borehole post-dates the ETCART ground investigation (1998) and predates the 2012 AMETI 4 ground investigation along Tī Rākau Drive.

2.4.9 Manukau Rail Interchange (2008)

The Manukau Rail Interchange boreholes were drilled by Boart Longyear in 2008 and were supervised by Opus. The investigative positions available on the NZGD are presented in Table 2-7. The factual reports containing these boreholes should be sourced to assess construction history.

Table 2-7: Manukau Rail Interchange investigative positions (sourced from NZGD)

Investigation ID (NZGD)	Investigation ID (Log)	Approximate Location	Elevation (m RL)	Depth (m)	Pre-drill (m)	Water (m)
BH_68135	(refer to NZGD)	(refer to NZGD)	28.7	18.2	-	-
BH_68136	(refer to NZGD)	(refer to NZGD)	28.1	16.6	-	-
BH_68137	(refer to NZGD)	(refer to NZGD)	28.7	16.8	-	-
BH_68138	(refer to NZGD)	(refer to NZGD)	29.6	16.6	-	-
BH_68139	(refer to NZGD)	(refer to NZGD)	28.7	13.6	-	-
BH_68140	(refer to NZGD)	(refer to NZGD)	29.5	15	-	-
BH_68141	(refer to NZGD)	(refer to NZGD)	27.4	12	-	-
BH_68142	(refer to NZGD)	(refer to NZGD)	29.1	18	-	-
BH_68143	(refer to NZGD)	(refer to NZGD)	28.6	16.5	-	-
BH_68144	(refer to NZGD)	(refer to NZGD)	29.1	16.5	-	-
BH_68145	(refer to NZGD)	(refer to NZGD)	30.1	15	-	-
BH_68146	(refer to NZGD)	(refer to NZGD)	27.7	15	-	-
BH_68147	(refer to NZGD)	(refer to NZGD)	30.6	15	-	-
BH_68148	(refer to NZGD)	(refer to NZGD)	32.1	13.5	-	-

2.4.10 Other NZGD investigations

Other investigative positions registered on the NZGD are typically for private developments and records from the old Auckland Regional Council (ARC, now amalgamated into Auckland Council) water bore database. These water bores are typically very deep (greater than 100m and up to 400m deep) and dispersed throughout the project area.

2.4.11 Aurecon Reports Database

The reports listed in Table 2-8 below are sourced from the Aurecon reports database and include reports produced by Aurecon and other parties. These reports have been prepared for private parties and their permission will need to be sought before ground investigation information can be made public.

Table 2-8: Aurecon internal investigation records

Report Title	Investigations	Client	Date	Location
New Zealand Communications Ltd. - Site No. AKL-008-044-E (Ref: 37806) (Aurecon)	1 x HA/DCP	New Zealand Communications Ltd.	September 2008	11 Reg Savoury Place (via Accent Drive)
Te Irirangi Dr Monopole (Ref: 20109) (Aurecon)	1 x Borehole	Vodafone New Zealand Ltd.	December 2002	East Tamaki Road / Te Irirangi Drive
Westfield Manukau Building and Carpark Extensions (Ref: 22722) (Tonkin & Taylor)	5 x Borehole 8 x CPT	MSC Consulting Group Ltd.	July 2005	Westfield Manukau

Report Title	Investigations	Client	Date	Location
Manukau Precinct Project (Ref: 206707) (Aurecon)	1 x Borehole 3 x CPT 8 x HA	Ministry of Justice	September 2011	Manukau District Court

2.4.12 Property files

Several property files either within or adjacent to the project area were obtained for properties adjacent to Puhinui Station as part of the contaminated ground Preliminary Site Investigation for Puhinui Interchange. Geotechnical data sourced from these files was included as Appendix B of the Puhinui Interchange PGAR (Aurecon Ref. 502334-4000-REP-GG-0006, July 2018).

2.4.13 Data sources for preliminary ground model

A significant amount of the investigation data available on the NZGD does not reference an elevation datum and as such has been excluded from this preliminary assessment however could be revisited during subsequent ground model development to inform an understanding of spatial distribution and variation of materials.

The suitable available testing has been summarised on location plans in Appendix A.

Given the NZGD is updated periodically, additional information may become available after this report is issued.

2.5 Previous Land Use

Previous land use is found in the Contaminated Land Amendment, *502334-7000-TEC-KF-0039*, attached to this report as Appendix B. The alignment has been constructed over numerous infilled gullies, predominantly found in the central and southwestern sections of the alignment. The geotechnical risk these infill gullies provide to the development is discussed further in Section 2.9.7.

2.6 Drainage

A desktop review of the drainage features of the proposed upgrade alignment has been undertaken. The key features are summarised as follows:

- The proposed upgrade alignment passes over three unnamed tributaries of Otara Creek.
- A section of the alignment between the proposed Puhinui Interchange and Lambie Drive lies within an area that is considered 'flood prone' (Brooker & Whitehead, 2017)
- The alignment passes through the following catchments:
  - Puhinui Creek (~ 2960ha) draining to Manukau Harbour
  - Otara Creek / Flat bush (~ 3480ha) draining to the Tamaki River
  - Pakuranga Creek (~ 2920ha) draining to the Tamaki River

A representation of overland flow paths and drainage patterns is shown in Figure 2-2.

Figure 2-2: Major overland flow paths (Auckland Council Geomaps, 2019)

2.7 Preliminary Ground Model

2.7.1 Introduction

The preliminary ground model for this appraisal report is based on:

- Our understanding of regional geology as presented by Kermode (1992) discussed above in Section **Error! Reference source not found.**.
- Review of the findings of recent ground investigations and subsequent interpretation.
- A review of selected borehole logs sourced from the New Zealand Geotechnical Database (NZGD) summarised in Section **Error! Reference source not found.**.

2.7.2 Fill

Fill material is common across the project area, predominantly associated with embankments constructed to support the roading alignment and abutments for bridges during the extension of SH20 and construction of arterial routes such as Te Irirangi Drive.

2.7.3 Recent Alluvium

Kermode (1992) has mapped recent alluvium along Puhinui Road between Plunket Avenue and York Street associated with natural drainage ultimately into Puhinui Stream. BH_67171 (Hunua 4 borehole S37) was drilled in this area and the material recovered is logged as Puketoka Formation with groundwater level at 1.6m in August 2009.

Recent alluvium has also been mapped at three watercourses crossing Te Irirangi Drive. BH_101732 was drilled near the southernmost watercourse near Whetstone Road and encountered peat from 4 to 13m and measured artesian water pressure greater than 0.5m.

2.7.4 Auckland Volcanic Field (AVF)

Some boreholes have recorded the presence of a stiff localised volcanic ash deposit. However, low SPT N values have been recorded (5-10) within this ash. Ash layers are likely to be sensitive and borehole photos commonly show a quick dilatant response.

Kermode maps AVF deposits from Green Hill Volcano and Otara Volcano along Te Irirangi Road. AVF deposits should be anticipated along Te Irirangi Drive.

ETCART borehole DH14 (BH_66214) was drilled at Accent Drive near Te Irirangi Drive to 10.5m and encountered 10.5m of welded tuff and was dry. AVF deposits were not encountered at any of the other four ETCART locations drilled along Te Irirangi Drive.

AVF ash(s) occurs sporadically ash a surficial layer. Younger ashes are typically silts while older ashes are typically clay-silt mixtures. Both can be allophanic and sensitive. Generally, these materials where problematic can be cut to waste.

2.7.5 Puketoka Formation

The Puketoka Formation is likely to be highly variable across the site, based on historic borehole data within the wider area. The Puketoka Formation is comprised of compressible peats/organic soils with variable thickness, clay-silt mixtures typically soft to firm, and dilatant loose to medium dense sands .

Boreholes DH105 and DH106 at the abutments of NIMT Bridge 356 (at Bridge Road near Puhinui Interchange) encountered 5.2m and 3.7m of material logged as peat and potentially sensitive, dilatant ash layers.

Puketoka Formation should be anticipated to be highly variable across the PGAR project area. Associated with the peats are silts and poorly consolidated sands. These peats present a risk due to their compressible nature, and the sands present a liquefaction risk.

2.7.6 Kaawa Formation

Underlying the Puketoka Formation is the Kaawa Formation. It is a marked lithology change from the Puketoka Formation soils. It is described on the Auckland 1:50,000 map as a ‘soft sandstone’ and commonly targeted as an aquifer in South Auckland. Kawaa Formation will form the likely founding material for bridge piles in the west of the PGAR project area where ECBF was not encountered. Water bores provide an indication of the depth of ECBF.

Near Puhinui Station, Kaawa formation was encountered in historical boreholes that reached a depth deeper that 25m below ground level (BGL). The Kaawa Formation shows typically dense to very dense sands (SPT N 50+)

Kaawa Formation typically occurs across the site as a dense sand (typically N50+) to very weak greenish grey sandstone with local bands with values as low as SPT N=20 and recovered loose. Also present are shelly bands and interbeds of silt and carbonaceous material.

2.7.7 East Coast Bays Formation (ECBF)

ECBF is a sequence of weakly-indurated sedimentary rock comprising decimetre to metre-bedded sandstone interbedded with subordinate decimetre-bedded siltstone.

The sandstone is usually very weak or weak, fine-grained with a significant clay and/or silt fraction (i.e. logged as silty fine sandstone). The sandstone beds may be massive or normally graded. Sandstone beds

are typically more resistant to erosion due to slightly better cementation (diagenetic clay and zeolite mineralization). In drilling, a small proportion of sandstones are recovered as loose sand, which is usually interpreted to be due to a lack of cementation (i.e. logged as uncemented sandstone).

The siltstone beds may be laminated and are usually very weak, clayey siltstone with minor fine sand. They are usually rich in smectite clay and are susceptible to slaking when exposed.

ECBF was not encountered in the west of the PGAR project area. In the east of the project area (i.e. east of the southern Section of Lambie Drive) Kaawa formation is generally not present and Puketoka formation is underlain by ECBF.

Hunua 4 boreholes BH_67151 and BH_67152 located at the intersection of Te Irirangi Drive and Boundary Road show approximately 12m of Puketoka Alluvium that contains peat and ash (likely sensitive) layers overlying ECBF.

2.8 Groundwater

Depth to groundwater is expected to be shallow across the alignment (within 5m of the ground surface) and has been recorded between 0.5m and 2.0m below ground level at the proposed Puhinui Interchange.

Groundwater levels, where reported on NZGD boreholes are presented in Table 2-1 through to Table 2-7 in Section **Error! Reference source not found.**.

Artesian water pressure estimated in excess of 0.5m was recorded in BH_101732 on the corner at Whetstone Road and Te Irirangi Drive.

We note groundwater is subject to change over prolonged periods of time due to seasonal changes or prolonged period of heavy or no rainfall.

2.9 Geotechnical Considerations

This section of the report identifies general geotechnical risks to the overall scheme area. Specific risks most likely to impact the proposed Airport to Botany works are summarised in Section 0.

We understand the proposed works largely require minor earthworks (cut and fill) and construction of new pavement areas. Some retaining structures may be required along parts of the alignment though details are not yet clear. At the time of writing it is understood that one new bridge structure at the Puhinui Interchange is proposed and three existing road bridges are to be widened or otherwise upgraded. The existing bridges requiring works are as follows:

- State Highway 1 Overbridge (Te Irirangi Drive)
- Otara Stream Bridge (Te Irirangi Drive)
- Dannemora Underpass (Te Irirangi Drive)

If it is identified that upgrades to, or construction of new, significant structures such as embankments, bridges or large retaining walls is required, then additional hazards not discussed in this report will need to be considered.

2.9.1 Settlement

Consolidation Settlement of Soft Soils

The Tauranga group contains thick, generally consistent deposits of cohesive silts and clays. These are likely to be susceptible to long term consolidation settlement if fill is placed. The Tauranga group also has organic silts and peats, which vary significantly in depth relative to the ground surface. Near surface deposits are likely to contain significant consolidation settlement potential. The potential effects are:

- Settlement, particularly differential settlement, of cohesive and organic soils of the Tauranga Group, resulting in poor pavement performance.
- Settlement of existing embankments if sidling fills are placed (subsequent poor performance of existing pavement or pile structures).
- Potentially long-term creep associated deformation.

Cyclic Softening and Liquefaction-induced Settlement

At shallow depths along the alignment are soft cohesive soils and loose granular soils of the Tauranga Group. Under cyclic loading, soft cohesive soils may experience cyclic softening and loose granular soils may experience liquefaction, leading to settlement and subsequent damage to pavements and retaining walls.

Based on the ground information reviewed, the site subsoil category is Class D “deep or soft soil site” in accordance with Clauses 3.1.3.2 to 3.1.3.6 of NZS 1170.5:2004, and Table 3.2 of NZS 1170.5:2004.

2.9.2 Slope Stability

New engineered fill associated with additional structures or embankment widening will be susceptible to slope instability and will require detailed design for stability. Existing cuts should be checked for local and global instability, even if they appear to be stable in a static case. Remediation measures may be required if existing slope cuttings are deemed to be instable. New cuts will need to be checked/designed as above.

All geological formations are prone to slope instability, where existing and planned embankments are. The potential effects are:

- Slope failure of existing cuts.
- Slope failure of new embankments or proposed cuttings.

2.9.3 Bearing Capacity

The construction of new elements such as embankments, bridges or retaining walls require consideration of bearing capacity. For embankments, bearing capacity is unlikely to be an issue, and design will be driven by settlement. Retaining wall elements and new bridge structures will require detailed bearing capacity assessments.

All geological formations are associated with this risk, where existing and planned embankments and structures are. The potential effects include settlement and ground instability resulting from bearing pressures exceeding available bearing capacities.

2.9.4 Negative Skin Friction

Placement of fill, and subsequent settlement of soft soils, next to existing structures could result in imposed down drag (i.e. negative skin friction loading) on existing piled foundations which has not been designed for. Existing piled foundation capacity will need to be assessed where new fill is being placed adjacent to existing piled structures. The geological formation associated with this risk are soft and organic, as well as liquefiable soils in the Tauranga Group.

2.9.5 Reactive Soils

Soil reactivity is a measure of the relative amount of soil shrinkage and swelling due to moisture changes. Residual soils occurring from weathered rock are typically expansive and are prone to shrink-swell action. This can have damaging effects on pavements and structures.

The ground conditions associated with this risk are typically associated with ECBF residual clay-silts rich in smectite and to a lesser degree, volcanic soils that have weathered to clay-silt mixtures. The potential effects are:

- Failure of retaining walls due to swelling.
- Pavement failures.

2.9.6 Acid Sulphate Soils

Organic soils can have the potential to exhibit acid-sulphate behaviours. Acid sulphate soils tend to react when exposed and produce sulfuric acid, which can cause significant environmental and sediment control problems. Acid sulphate soils can also affect the concrete strength of in ground concrete structures, such as piles.

The ground conditions associated with this risk are typically organic soils, and so are likely to be present in the Tauranga Group organic soils. The affected areas include the whole alignment. The potential effects are:

- Significant environmental risk when completing open earthworks.
- Damage to concrete piles used for structures if not accounted for in design.

2.9.7 Gully Infills

It is possible that gully infills are present at locations where there are waterways crossing the alignment, particularly along Te Irirangi Drive where historical streams cross the alignment (refer to Contaminated Land Addendum for details, Aurecon ref. 502334-7000-TEC-KF-0039). The geotechnical hazard associated with gully infills is the uncontrolled placement of fills which generally have the potential for settlement and instability if widening or other loading of the occurs in these areas.

2.9.8 Uncontrolled Fill

Considering the urban environment in which the proposed alignment is located, it is likely that excavations for new pavement or retaining walls may encounter non-engineered (uncontrolled) fill. Localised undercutting and replacement with engineered fill is likely to be required depending on the condition and depth of encountered materials. No areas of uncontrolled fill were identified in the existing readily available ground investigation logs.

2.9.9 Shallow Groundwater

Groundwater conditions across the entire alignment are expected to be shallow (i.e. within 5m of the ground surface). Depending on local groundwater conditions, seasonal and weather patterns, and depth of excavation, de-watering may be required during excavation.

2.9.10 Earthworks

Excavations within shallow volcanic rock materials will need to specifically be considered. Excavation within the Tauranga Group soils will be able to be completed using normal excavation techniques. The temporary bearing capacity of the underlying soils will need to be considered for the loading applied by heavy construction plant and machinery.

The affected areas include the whole alignment. The potential effects are:

- Unstable excavations;
- Incorrect plant on site for encountered ground conditions;
- Localised bearing capacity failures under plant/machinery;

- Cut to waste of material unsuitable for fill;
- Piping.

Other earthworks considerations:

- Sensitive ash material may not be suitable for reuse as placed fill and may need to be cut to waste.
- Significant undercut should be anticipated.
- Subgrade improvement may be required.

3 Proposed Geotechnical Testing Schedule

3.1 Scope

It should be noted that at the time of writing, the available level of detail on proposed upgrades is limited. Beyond the major structures listed in Section 1, no information on likely retaining walls, embankments etc. is known. For this reason, only a few simple investigations are proposed where existing available information is sparse to give a broad overview of ground conditions pending confirmation of proposed works. In any case, a staged ground investigation is proposed as the design moves through the concept, preliminary and detailed stages to deliver the best value.

3.2 Targeted Investigations (by Structure)

3.2.1 Overview

It is understood that the Airport to Botany preferred option will require:

1. Major structures associated with (either new or upgrade of existing) stations at Puhinui, Manukau and Botany.
2. A new bridge at the Puhinui Interchange site in the location of the existing pedestrian bridge.
3. Upgrades (e.g. widening) of existing bridges at SH1 Overbridge, Otara Stream, and Dannemora Underpass (all on Te Irirangi Drive).
4. Minor structures (e.g. raised platform or similar).
5. Embankments, retaining walls etc. associated with potential grading works.

In terms of their likely location and extents, the major structures and bridges (i.e. items 1, 2 and 3) are reasonably well constrained although specifics are not available at this early stage of the design. The locations of the remaining items (4) and (5) are not well constrained at this stage of the design and as such no recommendations for targeted ground investigation can be made and are therefore to be confirmed. Each of these elements are summarised in the following subsections.

3.2.2 Puhinui Interchange

The design of the Puhinui Interchange structure is covered in the Aurecon Geotechnical Factual Report, Ref. 504124-1000-REP-GG-0008 (Revision B), dated 15 March 2019. As this structure is treated separately recommendations for ground investigation at the Interchange is not in the scope of this PGAR.

3.2.3 New Bridge at Puhinui Interchange

The design of the Puhinui Interchange structure is covered in the Aurecon Geotechnical Factual Report, Ref. 504124-1000-REP-GG-0008 (Revision B), dated 15 March 2019. It is understood that at the Puhinui Interchange site the existing pedestrian bridge crossing the rail line is to be demolished and replaced with a new road bridge. Based on the existing set of early drawings it is understood the bridge will be hundreds of metres in length, consisting of 18 spans varying in length from at least Kenderine Road to Cambridge Terrace.

There is comprehensive investigation coverage of the Puhinui Interchange site as detailed in the Aurecon Geotechnical Interpretive Report (Aurecon Ref. 504124-1000-REP-GG-0006, Revision A, dated 29 March 2019). Based on the investigations to date, rock in the area is expected at approximately 25-30m depth and is generally considered weak. As such, piles will likely need to be designed to be friction piles (not relying on toe capacity in end bearing) and relying on the rock socket only for capacity given the weak bearing strata of

the overlying soils. However, the pile design will also need to consider the potential for liquefaction, and associated down-drag, in sand and silt layers within the Tauranga Group sediments.

No further recommendation for targeted ground investigation is made at this stage of the design considering the good coverage of information from the Puhinui Interchange report and available investigations on the NZGD.

3.2.4 Manukau Station

At the time of writing, no detail on any proposed additional structures at the existing Manukau Station are known.

There is decent ground information coverage available on both the NZGD and from internal Aurecon records which generally indicate rock of the East Coast Bays Formation at shallow depth, on the order of 5-10m below ground level depending on the exact location.

Based on the available investigation information, shallow founded structures will need to consider the potential for locally soft and liquefiable soils, though the investigations to date have generally indicated stiff Pleistocene sediments.

Once the details on the proposed station location and structures are known, a ground investigation programme should be confirmed. No investigation is recommended at this stage based on reasonable coverage of existing information and lacking further detail (including location) of proposed structures.

3.2.5 SH1 Overbridge Widening (Te Irirangi Drive)

At the time of writing, it is understood that the existing overpass at State Highway 1 on Te Irirangi Drive is to be widened as part of the improvement works. Discussions with the project structural engineer have indicated that in general new piles are likely to be required and piling is preferable where possible.

There is very limited geotechnical information of relevance available in close proximity to the site. A series of hand auger investigations are available along State Highway 1 at the bridge location. The hand augers generally show firm silts and clays to 5m depth. Groundwater was not encountered during drilling. While the investigations provide some detail on shallow ground conditions, further investigation will be required to confirm the encountered geology and particularly conditions at depth.

It is recommended that a targeted geotechnical investigation is carried out at the preliminary design stage, complemented with additional investigations at the developed and/or detailed design stage as required based off initial results. However, to provide an indication on (for example) likely depth to rock and by extension piling depths, the following is recommended:

- Two geotechnical boreholes drilled at least 5m into rock (one at each abutment);
- Two cone penetration tests drilled adjacent to the boreholes.

3.2.6 Otara Stream Bridge Widening (Te Irirangi Drive)

At the time of writing it is understood that the existing two bridges at Otara Stream (two, two-lane bridges, one for each traffic direction) are to be widened as part of the improvement works. Discussions with the project structural engineer have indicated that new piles are likely to be required and piling is preferable where possible.

There is limited geotechnical information available in close proximity to the site. One borehole, BH_68283, drilled to 10.0m depth, is available approximately 400m to the west of the site. The borehole generally indicates approximately 2.5m of fill and alluvial deposits over Tauranga Group sands and clays overlying rock of the East Coast Bays Formation at approximately 6.5m depth. Groundwater level was measured at approximately 3.5m depth on completion. While the borehole does provide an indication of the likely rockhead level in the wider area, additional targeted investigation will be required to confirm deep ground conditions.

It is recommended that a targeted geotechnical investigation is carried out at the preliminary design stage, complemented with additional investigations at the detailed design stage, if required. At this stage of the design, the proposed ground investigation is as follows:

- Two geotechnical boreholes drilled at least 5m into rock (in between the two bridges and one at each abutment);
- Two cone penetration tests drilled adjacent to the boreholes.

3.2.7 Dannemora Underpass Widening (Te Irirangi Drive)

As for the Otara Stream Bridge (refer to previous Section 3.2.6), the existing two bridges at Dannemora Underpass are to be widened as part of the improvement works. Discussions with the project structural engineer have indicated that new piles are likely to be required and piling is preferable where possible.

Two ETCART NZGD boreholes, BH_66212 and BH_66213, drilled to depths of 17.2m and 20.2m respectively, are available at the south abutments of each of the two structures (refer to for further details). The boreholes generally indicate up to 4m of silty fill over alluvium and Tauranga Group sediments over rock at approximately 15m depth.

Based on the existing ground investigation information, the following additional investigation is recommended:

- Two cone penetrometer investigations, adjacent NZGD boreholes at each abutment.

3.2.8 Botany Station

At the time of writing, no detail on any proposed additional structures at the Botany Station are known.

Three borehole locations are shown on the NZGD in the vicinity of the existing Botany Town Centre. The three locations are all approximately located 300m from the intersection of Te Irirangi Drive and Town Centre Drive. Two of these locations, BH_68021 and BH_117594 encountered fill and Tauranga Group sediments overlying weathered rock of the East Coast Bays Formation at depths of 6.5m and 8.8m respectively. Groundwater in each of the boreholes was measured at 3.4m and 2.5m bgl respectively. The other borehole location was terminated at a depth of 5.3m and is therefore not considered relevant.

Until further detail is developed, no further recommendation for ground investigation is made at this stage of the design.

3.2.9 Summary

A summary of the recommended preliminary ground investigations at each structure is included in Table 3-1. A staged ground investigation is recommended once more detail on the proposed scheme and ground conditions are known.

Table 3-1: Recommended ground investigations

Structure	Scope of Works	Existing GI Available	Recommended Investigations	Notes
Puhinui Bridge	New bridge to link Puhinui Road over the rail line likely in location of existing pedestrian bridge	Four NZGD boreholes and one hand auger; significant investigation as part of Puhinui Interchange (refer to Section 2.4)	None at this design stage	Good coverage of existing information

Structure	Scope of Works	Existing GI Available	Recommended Investigations	Notes
Manukau Station	Unknown	10+ NZGD boreholes within 100m of the site	None at this design stage	Proposed structure location is not known with accuracy; good coverage of existing information
SH1 Overbridge	Existing bridge to be widened	Two NZGD hand augers below the abutments	Two geotechnical boreholes drilled at least 5m into rock and two cone penetration tests	Confirm rock depth and assess soil for soft cohesive layers and liquefaction susceptibility
Otara Stream Bridge	Existing bridges to be infilled and widened	Limited	Two geotechnical boreholes drilled at least 5m into rock and two cone penetration tests	Confirm rock depth and assess soil for soft cohesive layers and liquefaction susceptibility
Dannemora Underpass	Existing bridges to be infilled and widened	Two NZGD boreholes drilled to rock	Two cone penetration tests	Confirm rock depth and assess soil for soft cohesive layers and liquefaction susceptibility
Botany Station	Unknown	Limited	None at this design stage	Proposed structure location is not known with accuracy

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A

Figures

Appendix A
Figures


LEGEND
NZGD Test Pit (TP)
NZGD Hand Auger (HA)
NZGD Borehole (BH)
Sheet Extent
SHEET 4
SHEET 3
SHEET 2
0 0.5 1 2 Kilometres
Coordinate System: NZGD 2000 New Zealand Transverse Mercator
Date: 15/09/2019
Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 4.0 New Zealand licence


BH_101732
BH_67152
BH_67151
BH_67168
BH_67167
BH_67169
BH_67170
BH_67171
HA_109035
HA_109036
BH_67173
BH_87521
BH_67174
BH_67176
HA_87523
BH_67177
BH_67175
BH_67181
BH_67178
BH_67182
BH_67179
HA_120732
Other_79427
BH_68148
BH_68146
BH_68148
BH_68143
BH_68147
TP_108971
BH_68145
BH_63390
LEGEND
NZGD Test Pit (TP)
NZGD Hand Auger (HA)
NZGD Borehole (BH)
0
0.25
0.5
1 Kilometres
Coordinate System: NZGD 2000 New Zealand Transverse Mercator
Date: 15/09/2019
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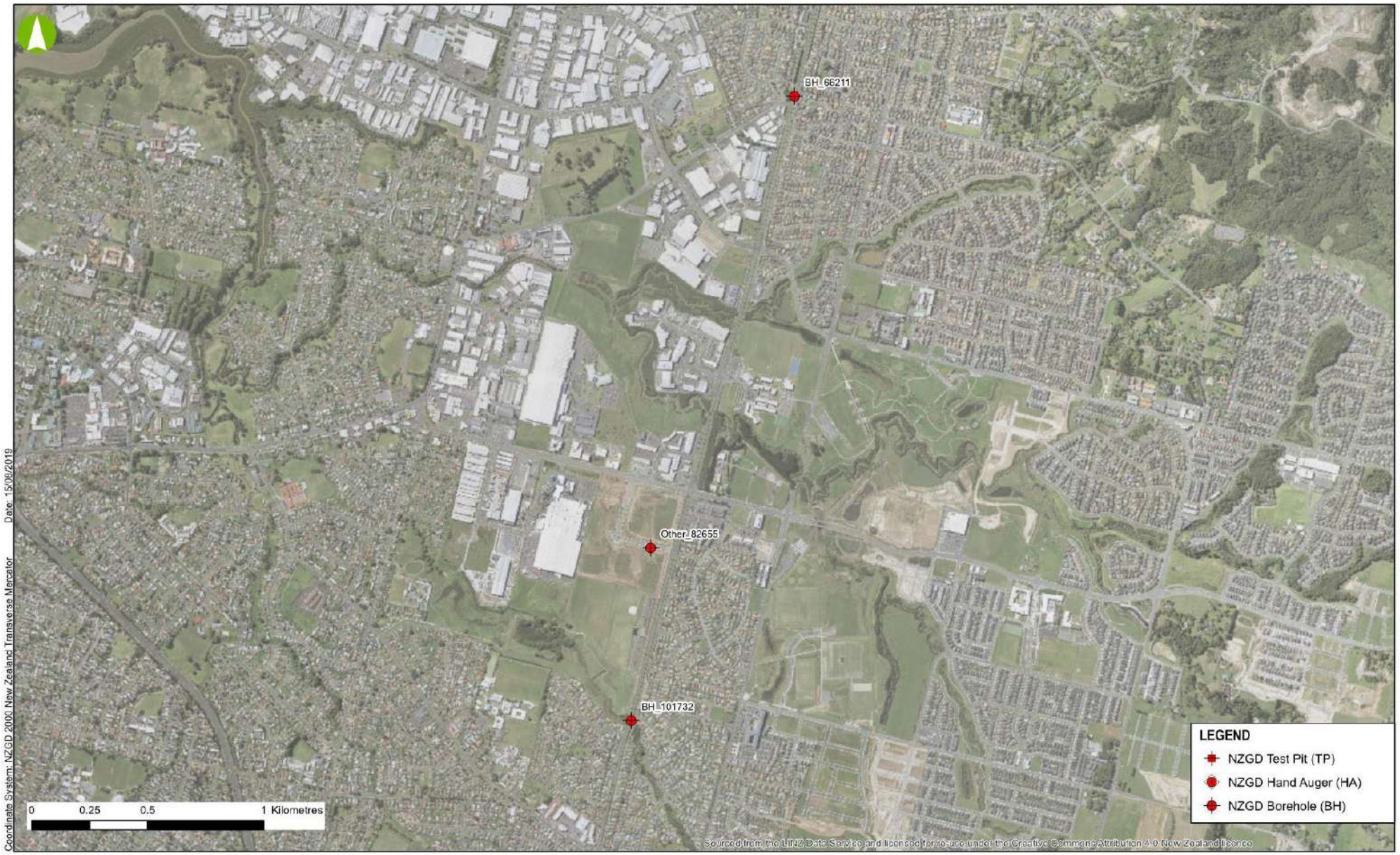
BH_66211
Other_82655
BH_101732
LEGEND
NZGD Test Pit (TP)
NZGD Hand Auger (HA)
NZGD Borehole (BH)
0 0.25 0.5 1 Kilometres
Coordinate System: NZGD 2000 New Zealand Transverse Mercator
Date: 15/08/2019
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BH_68021
BH_66212
BH_66213
BH_66211
LEGEND
NZGD Test Pit (TP)
NZGD Hand Auger (HA)
NZGD Borehole (BH)
0 0.25 0.5 1 Kilometres
Coordinate System: NZGD 2000 New Zealand Transverse Mercator
Date: 15/08/2019
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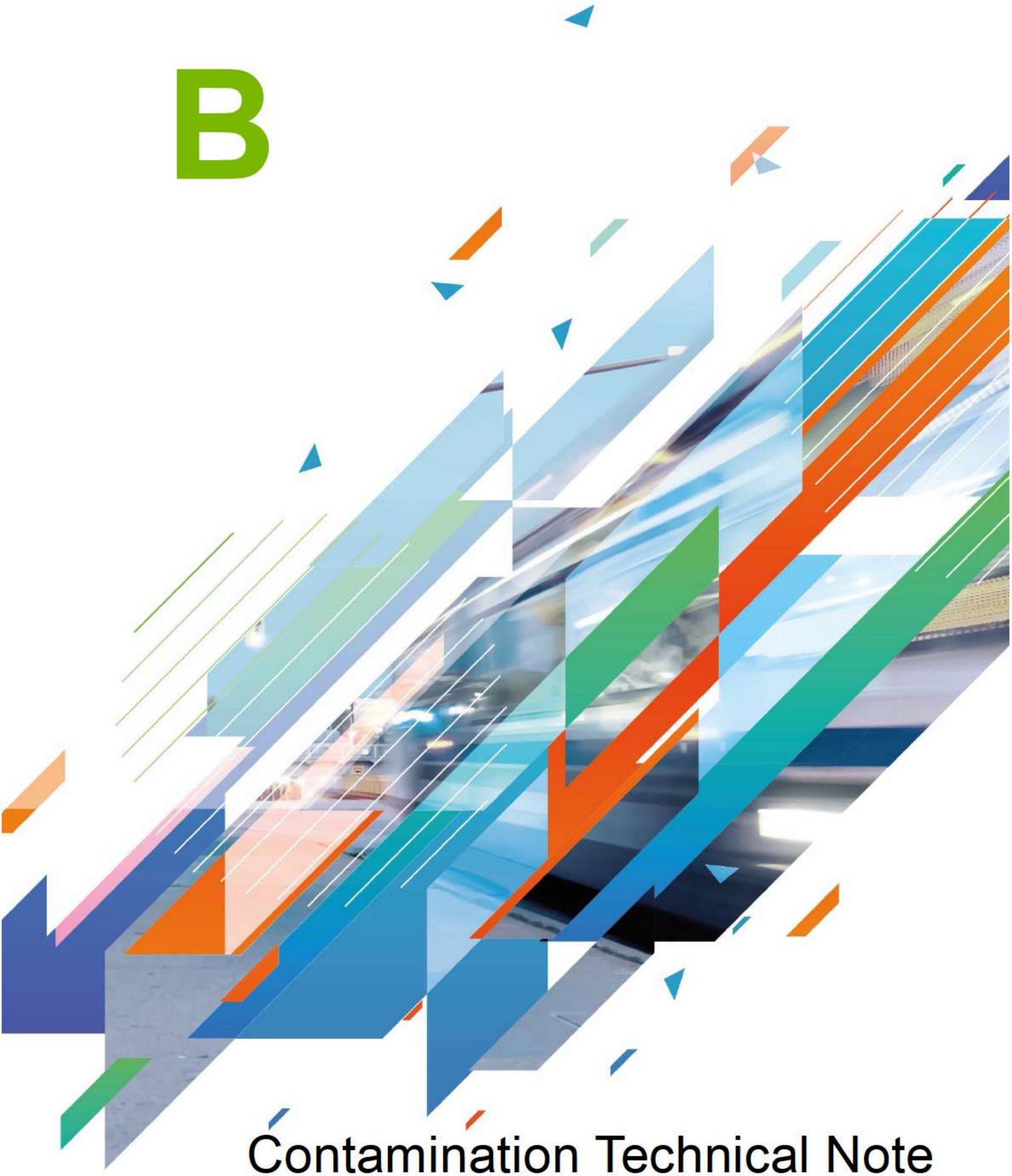
B



Contamination Technical Note

Appendix B
Contamination Technical Report

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Technical Note

To	**Auckland Transport**	From	**A2B Project Team**
Copy		Reference	**502334-7000-TEC-KF-0039**
Date	**2019-05-23**	Pages (including this page)	**6**
Subject	**A2B Contaminated Land Review**		

1 Introduction

Aurecon understands that Auckland Transport wishes to develop a preliminary appraisal of potential risks to upgrade works along the proposed 'A2B' route from Puhinui to Botany (Puhinui Road - Lambie Drive - Manukau Station Road – Great South Road – Cavendish Drive – Te Irirangi Drive). A final option for upgrade design has not been selected. Work in this area is not anticipated to be carried out within the next few years, therefore this assessment does not address risks to specific proposed development options, but rather identifies potential hazards present in the vicinity of the alignment to inform future design decision making.

This work is an addendum to the Preliminary Geotechnical Appraisal Report (PGAR) (Aurecon ref. 502334-7000-REP-GG-0022) as confirmed in a Change Note issued to Auckland Transport (AT) by Aurecon dated 18 February 2019. The study area is shown in Figure 1.

Figure 1: A2B PGAR and Contaminated Land Review Study Area

1.1 Objective

The objective of this contaminated land review is to identify current and historical activities in the immediate vicinity of the A2B alignment which may have resulted in soil and water contamination in the area.

This contaminated land review consists of the following intended scope of work:

- Desktop review of readily available current and historical information;
- Site walk-over to inspect areas of interest;
- Preparation of this letter report.

1.2 Previous reporting associated with study area

A site contamination investigation has been undertaken recently for Puhinui Interchange, located along the proposed A2B alignment. This was completed to inform short-term improvement works proposed for the Puhinui Interchange, prior to the proposed full A2B alignment upgrade works. The following site contamination reports have been produced for Puhinui Interchange:

- Short term airport access improvements: Puhinui Interchange – Preliminary Site Investigation (Reference: 50329-0070-REP-KF-0001)
- Puhinui Interchange: Early deliverable - Detailed Site Investigation Report (Reference: 504124-1000-REP-KF-0011)
- Puhinui Interchange: Early deliverable – Contaminated Land Management Plan (Reference: 504124-1000-PLN-KF-0001)
- Puhinui Interchange: Early deliverable – Technical Assessment of Effects – Site Contamination (Reference: 504124-1000-REP-KF-0012)

The reader is referred to these reports for detailed assessment of contaminated land issues in the Puhinui Interchange area.

2 Information Review

A summary of information considered as part of this contaminated land review is attached, and includes:

- Historical aerial photographs review (Attachment 2)
- Auckland Council geodatabase enquiry output (Attachment 3)

A site visit along the entire alignment could not be carried out due to the access constraints in the live highway corridors. A virtual walkover was conducted in Google Street view. This was validated with members of the design team familiar with the current highway layout.

3 Site identification

For this review, the relevant section of the A2B study area has been split into the following two sub-sections, which are indicated on drawing 502334-7000-DRG-KK-0001-A (included in Attachment 1):

A. SH20 to SH1 (Section A)

B. SH1 to Botany (Section B)

General descriptions of the nature of each area and relevant features identified from the desktop study are discussed below.

3.1 SH20 to SH1 (Section A)

The section of the alignment along Puhinui Road between SH20 and Kenderdine Road is bordered by business - light industry and various residential zoning to the north and south. A railway line crosses Puhinui Road between Cambridge Terrace and Kenderdine Road. The remainder of Puhinui Road between Cambridge Terrace and Lambie Drive is bordered by neighbourhood centre zones and various residential zoned areas including mixed housing suburban zones, mixed housing urban zones, and single house zones. Along Lambie Drive, the alignment passes through another section of business - light industry zone and general business zone, before passing through a metropolitan centre zone south of Cavendish Drive, along Manukau Station Road and Great South Road. Along Cavendish Road, it passes through a general business zone again.

Based on a review of historical aerial photographs, land use in this area included productive land use, with one possible orchard, before the land was developed for housing and commercial/industrial purposes. Current land use includes several potentially contaminating land uses, including service stations and car yards. Few images are available for some portions of this section, and some roads are visible in the earliest images available, therefore the date ranges over which roads may have been constructed are broad:

- Puhinui Road: pre-1939
- Great South Road: pre-1958
- Eastern portion of Manukau Station Road: pre-1960
- Northern section of Lambie Drive: constructed around 1972
- Southern section of Lambie Drive: constructed around 1996
- Cavendish Drive: between 1960 and 2001
- Western portion of Manukau Station Road: constructed around 2008

Drawing 502334-7000-DRG-KK-0002-A provides a schematic representation of current and historical land uses identified from inspection of aerial photographs and Council information reviewed (Attachment 1).

3.2 SH1 to Botany (Section B)

From SH1 to Rongomai Reserve, the alignment passes through predominantly residential zones (mixed housing suburban, mixed housing urban), with minor areas of open space (sport and active recreation and informal recreation zones) and a local centre zone also bordering the alignment. North of Rongomai Reserve, various land uses are present including business zones: light industry, mixed use, general business, local centre, neighbourhood centre, metropolitan centre, open space zones including a conservation zone and informal recreation zones, and residential zones: mixed housing suburban, mixed housing urban, terrace housing and apartment buildings, and one special purpose zone (school).

Historical land use in this area prior to motorway development was predominantly production land use with sporadic buildings. The road was constructed through this section of the alignment in stages between 1980 – 1988 (southern portion) and 1996 – 2001. Drawing 502334-7000-DRG-KK-0003-A

provides a schematic representation of current and historical land uses identified from inspection of aerial photographs and Council information reviewed (Attachment 1).

4 Identification of Areas of Concern

Based on our desktop review, current and historical activities/land uses have been identified as having potential to cause ground contamination issues which may impact on the project. These are summarised in Table 1 (page 5). Locations of particular interest are indicated on drawings 502334-7000-DRG-KK-0002 and 502334-7000-DRG-KK-0003 (Attachment 1).

5 Relationship between areas of interest and soil disturbance

The details of the preferred design have not been confirmed. Once details of the preferred design are known, the likely areas of soil disturbance can be cross-checked against the identified locations of potential sources of contamination. This can be used to guide the development of an intrusive soil investigation prior to works.

6 Conclusion

Generally, it is noted that potential contamination identified will require consideration during the construction phase to protect the health of construction workers, and residents and commercial workers in the immediate vicinity, and to inform disposal requirements for excess spoil. In some instances, there may be additional requirements for resource consent acquisition and WorkSafe notification.

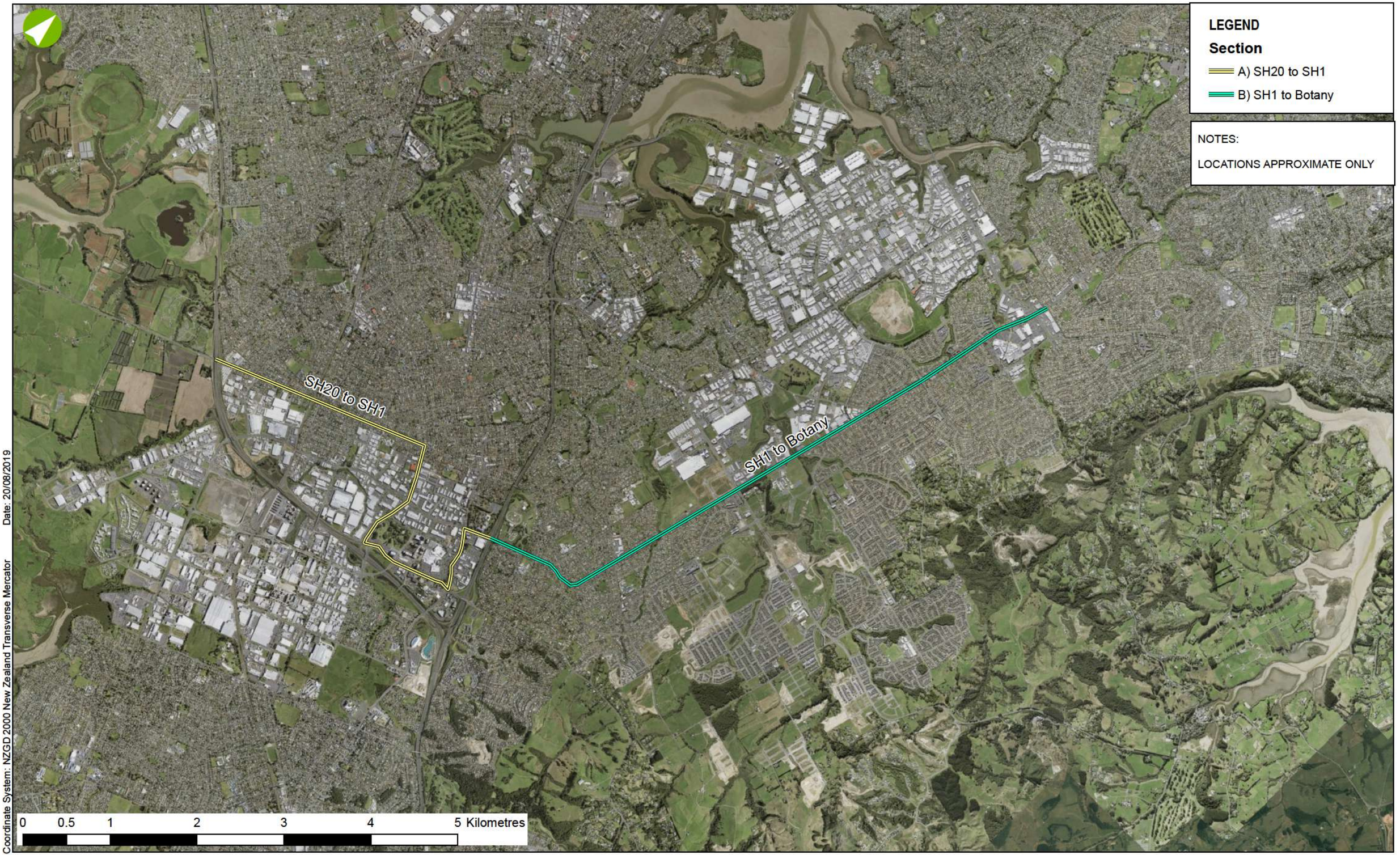
Table 1: Potential sources of contamination

Potential source of contamination	Locations within study area	Section of route	Comment
Landfill	A former municipal landfill is located on Smales Road (Greenmount Landfill)	B	The identified landfill is located greater than 200 m from the proposed alignment and is not expected to be intersected under the proposed upgrade works. If works will intersect a closed landfill, significant risks to health and safety, environment, and the project exist.
Farm dump, demolition waste from historical farm structures and wastes from agrichemical storage, preparation and use	May be present on former production land (most of the alignment)	A, B	Locations are not recorded and cannot be reliably identified on historical aerial photographs. Farm dumps can often contain 1 – 100 m^3 of mixed waste, and are not easily detected prior to bulk earthworks due to their discrete nature. Contaminated materials may be managed during construction through capping, or through excavating waste material and backfilling with alternate material if waste is unsuitable to remain in ground from an environmental or geotechnical perspective.
Historical fill material	Five potential gully infill locations were identified along the alignment. These were located along the Te Irirangi Drive where historical streams cross the alignment Fill material may have been used to construct embankments or to create an appropriate subgrade for the road	B	Gully infilling is thought to have occurred when the current road was initially constructed (date range 1980 – 2001 for different sections). As filling is assumed to have been carried out for the purposes of road construction, it may have occurred in a controlled manner with uncontaminated material. Uncontrolled filling may however have occurred prior to road construction, and / or unsuitable materials may have been included in the engineered fill material used in the gullies or for the motorway construction.
Discharge from contaminated site	Five discharge consents for contaminated sites were identified in the information provided by Auckland Council adjacent to the alignment Potential for contaminated groundwater to have migrated from offsite sources in other areas of the alignment	A, B	Contaminated groundwater may be present. Cannot confirm at present whether upgrade works are likely to intersect groundwater. If works are all shallow, groundwater is less likely to be encountered. If works will encounter potentially contaminated groundwater, considerations need to be taken around managing groundwater to protect health and safety and the environment which may including treatment of dewatering discharge to a more stringent standard than normal practices, disposal of dewatering discharge to trade waste or to wastewater (dependent on potential contaminants, treatment feasibility and discharge acceptance criteria). Works may also alter the groundwater regime of adjacent sites, which may impact offsite sources and receptors of contamination.
Encapsulated material	May be contaminated material encapsulated along the alignment.	A, B	Encapsulations of contaminated material (consented or unconsented) may exist within or adjacent to the alignment as council records cannot be assumed to be complete. Additionally, if a significant period of time elapses prior to A2B upgrade works occurring, additional encapsulations of contaminated material may be created during the interim.
Horticultural area	One potential orchard identified along Puhinui Road May be other areas impacted within former production areas along the alignment	A	May have resulted in soil contamination through pesticide storage, formulation and use. Horticultural land is defined as areas of intensive use of production land. This is relevant where the land use has been occurring historically, when persistent organochlorine pesticides were commonly used.
Asbestos in former and current residential, farming, and industrial/commercial properties	Potential for impact throughout much of the alignment	A, B	Widening the road into current or former residential land may result in works encountering asbestos contamination in soil from asbestos building materials in deteriorated condition or as a result of poor demolition practices. If demolitions are undertaken for this upgrade, care should be taken to ensure thorough pre-demolition asbestos surveys are completed and asbestos containing materials are removed in a controlled manner prior to main demolition works.
Acid soil	Acid soils may be encountered across the alignment	A, B	Acid sulphate soils (ASS) are associated with organic soils within the Tauranga Group formation, which is thought to underlie much of the alignment. ASS may be encountered or not during works, dependant on the specific locations of organic soils within the subsurface environment, which cannot be determined without intrusive investigation. ASS are stable in situ but have the potential to generate acid when exposed to air or to oxygenated (surface) water, This acid can then impact on environmental receptors, soil stability, and weaken structures in contact with soil such as piles, foundations, and pipes. ASS can be managed as necessary during earthworks. Management of ASS is simplified by knowledge of and planning around the ASS prior to uncovering ASS during bulk earthworks.
Car yards and service stations	Six current service stations have been identified and car yards are also present in several locations along the alignment	A, B	Car yards and service stations may have resulted in contamination of soil and groundwater. Shallow excavations outside the areas of the car yards / service stations are less likely to be impacted than excavations within these sites or deeper excavations nearby. These sites will need further assessment prior to works taking place close to them.
Sports fields/ turf grass/ golf course	Sports fields are present in Rongomai Reserve, adjacent to Te Irirangi Drive Auckland council records identify turf grass specialists/golf course at 79 Ormiston Road Auckland council records identify 4ha golf course and ornamental gardens at 640 Great South Road	A, B	Sports fields, turf grass and golf courses may have been subject to pesticide use, including persistent pesticides such as organochlorine pesticides. If land used for sports fields, turf grass or golf courses will be disturbed, these sites will need further assessment prior to works taking place.

Author	Reviewer	Verifier
Geo-environmental consultant	Associate, Contaminated Land Specialist CEnvP SC	Senior Contaminated Land Specialist CEnvP:SC

Attachments:

1. Study Area Layout Plans
2. Review of Historical Aerial Photographs
3. Auckland Council geodatabase enquiry response



Path: C:\Users\Sarah.McRae\Desktop\A2B-localtempVA2Bmap.mxd
Coordinate System: NZGD 2000 New Zealand Transverse Mercator
Date: 20/08/2019

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REV	DATE	REVISION DETAILS	ISSUED
A	01.08.18	ISSUE	Issuer

SCALE	SIZE
1:40000	A3

DRAWN
REVIEWED
VERIFIED

FOR INFORMATION
NOT FOR CONSTRUCTION

APPROVED
DATE 20.08.19
APPROVER
(signature not required)

PROJECT	AIRPORT TO BOTANY RTC SSBC
TITLE	STUDY AREA

DOCUMENT	PROJECT No.	WBS	TYPE	DISC	NUMBER	REVISION
	502334	7000	DRG	KK	0001	A

Historical aerial image review

Publicly available historical aerial photographs reviewed for this project are listed in Table 1.

Table 1: List of historical aerial photographs reviewed

Date	Source	Website
1939	Retrolens Online	http://retrolens.nz/
1940	Retrolens Online	http://retrolens.nz/
1958	Retrolens Online	http://retrolens.nz/
1960	Retrolens Online	http://retrolens.nz/
1961	Retrolens Online	http://retrolens.nz/
1967	Retrolens Online	http://retrolens.nz/
1968	Retrolens Online	http://retrolens.nz/
1972	Retrolens Online	http://retrolens.nz/
1973	Retrolens Online	http://retrolens.nz/
1977	Retrolens Online	http://retrolens.nz/
1979	Retrolens Online	http://retrolens.nz/
1980	Retrolens Online	http://retrolens.nz/
1981	Retrolens Online	http://retrolens.nz/
1985	Retrolens Online	http://retrolens.nz/
1988	Retrolens Online	http://retrolens.nz/
1996	Auckland Council GeoMaps	https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html
2001	Auckland Council GeoMaps	https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html
2003-04	Auckland Council GeoMaps	https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html
2006	Auckland Council GeoMaps	https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html
2008	Auckland Council GeoMaps	https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html
2010-11	Auckland Council GeoMaps	https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html
2015-16	Auckland Council GeoMaps	https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html
2017	Auckland Council GeoMaps	https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html

1.1 Section A) SH20 to SH1

Table 2: Historical aerial photograph notes for Section A

Year	Site	Surrounding area
1939 – note images only available for Puhinui Road section	Road visible - follows the present-day alignment	Predominantly rural, with some rural and semi-rural dwellings
1958 – note images only available for Puhinui Road and part of Great South Road/ Cavendish Drive	No changes to Puhinui Road Great South Road visible, and follows the present-day alignment. Cavendish Drive has not been constructed yet, and land use in this area consists of fields and some structures, presumed to be rural dwellings SH1 is present – current alignment	Mixed rural land use. Suburban developments now present in vicinity of site.
1960	No changes to Puhinui Road Lambie Drive has not yet been constructed and land use in this area is fields A road exists along the eastern part of the Manukau Station Road alignment, the rest of this area of the alignment consists of fields	Surrounding area more suburban/built up
1968	No significant changes noted	Some larger building present west of Lambie Drive and south of Puhinui Road – possibly commercial/industrial
1972	Lambie Drive (northern section) is under construction No other significant changes noted	Additional larger buildings present west of Lambie Drive and south of Puhinui Road and either side of Lambie Drive
1973 – close up images of parts of alignment	No significant changes noted	Possible orchard east of Noel Burnside Road
1979	No significant changes noted	Large building visible west of Great South Road (present-day Manukau Central area)
1980	No significant changes noted	Surrounding area has few open spaces remaining, predominantly built-up with suburban housing and larger commercial or industrial buildings Ronwood Avenue, connecting Lambie Drive and Great South Road now visible
1981	No significant changes noted	No significant changes noted

Year	Site	Surrounding area
1985	No significant changes noted	SH20 under construction adjacent to Puhinui Road
1996 – note, part of image from Great South Road to Cavendish Drive obscured under cloud	Lambie Drive extension south of Cavendish Drive under construction No other significant changes noted	Earthworks visible south of Cavendish Drive, west of Lambie Drive Some buildings visible in Manukau Central area – most of area obscured by cloud
2001	Lambie Drive now complete in present day alignment Cavendish Drive now visible in present day alignment No other significant changes noted	Manukau Central can be observed clearly – a number of large commercial or industrial buildings area present
2003 - 04	No significant changes noted	No significant changes noted
2008	Earthworks visible in area of Manukau Station Road	SH20 under construction to the south of the A2B alignment
2010-11	Manukau Station Road now visible in present day alignment	SH20 appears to be completed Manukau Station under construction
2015-16	No significant changes noted	Manukau Station appears to be completed
2017	No significant changes noted	No significant changes noted

1.2 Section B) SH1 to Botany

Table 3: Historical aerial photograph notes for Section B

Year	Site	Surrounding area
1939	Rural/productive land use (fields) with some roads crossing the alignment. Some streams cross the alignment	Rural/productive land use (fields) with occasional roads and some structures (presumed rural dwellings) Streams visible in the area
1940 – note images shows mostly area to the west of the section of the alignment north of Ormiston Road	Some structures visible (presumed rural dwellings) on the alignment near East Tamaki Road	Rural/productive land use (fields) with occasional roads and some structures (presumed rural dwellings) Some streams cross the area Small presumed volcano visible north of East Tamaki Road, another presumed volcano north of Smales Road

Year	Site	Surrounding area
1958 – images only show southern portion of SH1 – Botany section	Rural/productive land use (fields) with some roads crossing the alignment and some structures (presumed rural dwellings)	Rural/productive land use (fields) with occasional roads and some structures (presumed rural dwellings) SH1 visible at west of site
1960	No significant changes noted	No significant changes noted
1961	No significant changes noted	Earthworks visible in area of presumed volcano north of Smales Road Possible earth disturbance south of Smales Road
1967 – image only available for south of SH1 – Botany section	No significant changes noted	Surrounding area becoming more built-up with structures and roads more frequent
1968 – broad-scale image of area	No significant changes noted	No significant changes noted
1972	No significant changes noted	Areas of ground disturbance expanded both north and south of Smales Road
1977 – broad-scale image of area, low quality	Possible earthworks/development immediately east of SH1 No other significant changes noted	Possible earthworks/development between Boundary Road and Dawson Road
1979 – image only available for south of SH1 – Botany section	No significant changes noted	Substation between SH1 and Great South Road Area south of alignment immediately east of SH1 is built up, with residential/suburban properties and local roads
1980	Parts of alignment immediately east of SH1 are developed with residential/suburban properties and local roads Earthworks visible south of intersection with Boundary Road No other significant changes noted	Surrounding area from SH1 to Dawson Road is built up, with residential/suburban properties and local roads Areas of ground disturbance still extensive both north and south of Smales Road
1988	Road has been constructed on alignment from the south of Boundary Road to slightly north of Dawson Road No other significant changes noted	Additional suburban development visible in vicinity of southern end of section

Year	Site	Surrounding area
1996	Earthworks visible immediately south of Ti Rakau Drive No other significant changes noted	Earthworks in several areas: – East and west of the alignment near Ti Rakau Drvie – West of alignment, south of East Tamaki Road – West of alignment, north of Ormiston Road – East of alignment, north of Dawson Road Areas of ground disturbance still extensive both north and south of Smales Road Additional development of surrounding area, both presumed residential dwellings and larger buildings presumed ot be commercial or industrial buildings
2001	Te Irirangi Drive has been constructed along the full alignment	Earthworks now only visible north of Smales Road New suburban development visible: – East and west of the alignment near Ti Rakau Drive covering most of the area to East Tamaki Road – East of alignment, north of Dawson Road covering most of the area to Ormiston Road Presumed commercial/industrial buildings west of alignment, south of East Tamaki Road Large building visible in area west of alignment, north of Ormiston Road
2006	No significant changes noted	Additional suburban infill on both side of the alignment both north and south of Smales Road Additional larger presumed commercial/industrial buildings west of the alignment north of Ormiston Road Earthworks visible east of the alignment in the vicinity of Ormiston Road Earthworks still visible north of Smales Road

Year	Site	Surrounding area
2008	No significant changes noted	Earthworks still visible east of the alignment in the vicinity of Ormiston Road Earthworks still visible north of Smales Road
2015 – 16	No significant changes noted	Earthworks still visible east of the alignment in the vicinity of Ormiston Road, some of the area is developed as residential housing Earthworks still visible north of Smales Road Earthworks and additional larger buildings visible west of the alignment north and south of Ormiston Road.
2017	No significant changes noted	Earthworks still visible east of the alignment in the vicinity of Ormiston Road, more of the area is developed as residential housing Earthworks still visible north of Smales Road

Auckland Council Records

Table of contents:

Notes: Information cannot be assumed to be complete. Shaded cells indicate records which are displayed on drawings 502334-7000-DRG-KK-0002 and -003

Table 1: Land use and discharge consents for contaminated sites

AC Consent ID	Consent Reference	Consent Description	Form Type Description	Consent Status	Issued Date	X Coord	Y Coord
MCC0000050654	LUC60289431	REGIONAL CONTAMINATED LAND P49073 - REFER TO LANDUSE DISTRICT 48608	Land Use Consent Application	Complete	20151222	1769058.213	5907278.54
MCC0000050654	LUC60289431	REGIONAL CONTAMINATED LAND P49073 - REFER TO LANDUSE DISTRICT 48608	Land Use Consent Application	Complete	20151222	1769058.213	5907278.54
MCC0000050654	DIS60278581	REGIONAL CONTAMINATED LAND P49073 - REFER TO LANDUSE DISTRICT 48608	Discharge Consent Application	Complete	20151222	1769058.213	5907278.54
MCC0000050654	DIS60278581	REGIONAL CONTAMINATED LAND P49073 - REFER TO LANDUSE DISTRICT 48608	Discharge Consent Application	Complete	20151222	1769058.213	5907278.54
MCC0000050654	DIS60278581	REGIONAL CONTAMINATED LAND P49073 - REFER TO LANDUSE DISTRICT 48608	Discharge Consent	Construction Monitoring	20151222	1769058.213	5907278.54
MCC0000050654	DIS60278581	REGIONAL CONTAMINATED LAND P49073 - REFER TO LANDUSE DISTRICT 48608	Discharge Consent	Construction Monitoring	20151222	1769058.213	5907278.54
MCC0000045336	DIS60278067	REGIONAL CONTAMINATED LAND | RELATES TO 43435 DISTRICT LANDUSE TO ERECT A SERVICE STATION	Discharge Consent Application	Complete	20140213	1768884.281	5905936.943
MCC0000045336	DIS60278067	REGIONAL CONTAMINATED LAND | RELATES TO 43435 DISTRICT LANDUSE TO ERECT A SERVICE STATION	Discharge Consent Application	Complete	20140213	1768884.281	5905936.943
MCC0000045336	DIS60278067	To discharge contaminants to land and water from the installation of a new stormwater system.	Discharge Consent	Construction Monitoring	20140213	1768884.281	5905936.943
MCC0000045336	DIS60278067	To discharge contaminants to land and water from the installation of a new stormwater system.	Discharge Consent	Construction Monitoring	20140213	1768884.281	5905936.943

Table 2: Legacy bores information

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	EXPIRY DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	BORE USE	DATE DRILLED	TOTAL DEPTH	GROUND ELEVATION	STATIC WATER LEVEL	SCREEN FROM	SCREEN TO
0							1770100	5909700	Drilled pre-1987 for by *** DRILLER UNKNOWN ***.					20000101	46				
0							1770200	5911600	Drilled pre-1987 for NZ ELECTRICITY DEPT by CHASE DRILLING CO LTD.					19711028	67				
0							1767050	5904290	Drilled pre-1987 for MANAKAU CC by FAULKNER DRILLWELL NZ LTD. take file Ag 81 2536	MCC	cnr Ronwood Ave & Davies Ave, Manukau		Industrial	19810113	105	28	3.73		
0							1767360	5905115	Drilled pre-1987 for A.H.I INDUSTRIES LTD by DRILLING SPECIALTIES LTD.	AHI Bore No.2	640 Great South Rd, Manukau		Industrial	19800513	153	28	5.87		
0							1767420	5905030	Drilled pre-1987 for AHI INDUSTRIES LTD by DRILLING SPECIALTIES LTD.	AHI Bore No.1	640 Great South Rd, Manukau		Irrigation	19761201	64.6	29	2.74		
0							1769530	5908710	Drilled pre-1987 for BURNS & FERRALL HOLDINGS LTD by FAULKNER DRILLWELL NZ LTD.		East Tamaki Rd			19860514	111				
0							1769500	5908800	Drilled pre-1987 for BURNS & FERRALL LTD by BAKALICH G.					19740401	193.5				

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	EXPIRY DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	BORE USE	DATE DRILLED	TOTAL DEPTH	GROUND ELEVATION	STATIC WATER LEVEL	SCREEN FROM	SCREEN TO
31810	Shell New Zealand Limited	Expired	20051124	20061125	To authorise the construction of 3 bores for monitoring purposes.	Construction of a 50mm diameter bore to an approximate depth of 5m and casing depth of 5m. PEA Gravel screen: depth to top of screen 1m, and depth to bottom 5m. Proposed grouting length of 1m.	1768910	5905946	To authorise the construction of 3 bores for monitoring purposes.			136 Dawson Road Otara Manukau							
21906	C & D Holdings Limited	Expired	19981007	19991008	Authorise the construction of bores for groundwater level and/or chemistry monitoring.	Construction of three (3) 50mm diameter bores to a depth of 4m. Installation of PVC casing to 1m depth and PVC screen from 1-4m depth or as required.	1764200	5904400			285-305 Puhinui Rd, Papatoetoe	305 Puhinui Road Papatoetoe Manukau	Observation / Piezo	19981015	4			1.2	3.8
21482	Maunsell Limited	Expired	19980527	19990528	Authorise the construction of a bore for foundation investigation work.	Construction of a 100mm diameter bore to a depth of approximately 30m. Installation of PVC casing to approximately 20m depth and PVC screen as required.	1769066	5906474	Authorise the construction of a bore for foundation investigation work.		Northern end of Orlando drive.	5 Whetstone Road Flat Bush Manukau		19980604	27	17.99	0	14	27
21487	Maunsell Limited	Expired	19980528	19980528	Authorise the construction of bores for geotechnical investigation.	Construction of two (2) 100mm diameter bores to depth of approximately 30m. Installation of PVC casing to approximately 20m and PVC screen as required.	1769770	5909166	Authorise the construction of bores for foundation investigation.		400m North of Smales Rd, East Tamaki.	124 Guys Road East Tamaki Manukau		19980602	21.2	28.81	1		
21488	Maunsell Limited	Expired	19980528	19990528	Authorise the construction of a bore for foundation investigation.	Construction of a 100mm diameter bore to a depth of approximately 30m. Installation of PVC casing to approximately 20m depth and PVC screen as required.	1769490	5908080	Authorise the construction of a bore for foundation investigation.		Accent Drive, East Tamaki.	364 East Tamaki Road Otara Manukau		19980224	18	13.59	1	13	18

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	EXPIRY DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	BORE USE	DATE DRILLED	TOTAL DEPTH	GROUND ELEVATION	STATIC WATER LEVEL	SCREEN FROM	SCREEN TO
0							1769400	5907700	Foundation investigation. Associated with permit C512-12-2148*		Otara Stream			19980224	18	13.59	1	13	18
52250		Assessment Completed	20090805		To authorise the construction of two bores for groundwater investigation using piezometers.	The construction of two 20 and 30mm diameter bores to an approximate depth of 12 and13.6m.	1767095	5904155	To authorise the construction of two bores for groundwater investigation using piezometers.	Manukau City Council	Sites are located in road reserves along Davies avenue and Putney Way.	Putney Way Manukau Central Manukau City	Observation / Piezo						
46821	Tipuranga Investments Limited	Issued	20160818	20170818	To authorise the construction of one bore for use in a Laundromat.		1768951	5905602	To authorise the construction of one bore for use in a Laundromat.	18 Dissmeyer Drive		18 Dissmeyer Drive Flat Bush Manukau	Industrial	20161020	300	33	16		
44688	Auckland Greyhound Racing Club Inc	Expired	20150707	20160707	To authorise the construction of one bore for irrigation purposes.		1767711	5905333	To authorise the construction of one bore for irrigation purposes.	1 Boundary Road		1 Boundary Road Otara Manukau	Irrigation	20150728	190		3.2		
52760		Assessment Completed	20120712		The construction of four bores for groundwater investigation purposes.	The construction of four 100mm diameter bores to a maximum depth of 5m. Installation	1767473	5904757	The construction of four bores for groundwater investigation purposes.	Wiri Licensing Trust		254 Roscommon Road Manurewa Manukau	Observation / Piezo						
53506	Beca Limited	Assessment Completed	20170501		To authorise the drilling and construction of two bores for geotechnical investigation and groundwater investigation (observation/piezo bore)	The construction of two 100m diameter bores to an approximate depth of 20m. Puketoka formation, WG sandstone.	1767304	5904269	To authorise the drilling and construction of two bores for geotechnical investigation and groundwater investigation (observation/piezo bore)	33 Manukau Station Road			Geotechnical						
53165		Assessment Completed	20141110		The construction of five bores for geotechnical purposes.	The construction of five 120mm diameter bores to a maximum depth of 20m. Installation of casing material to an approximate depth of 12m.	1767190	5904204	The construction of five bores for geotechnical purposes.	Auckland Transport		Putney Way Manukau Manukau	Geotechnical						
25025	GHD Limited	Expired	20010319	20020319	Authorise the construction of two (2) bores for monitoring purposes.	Construction of two (2) piezometer bores to a depth of approximately 15-20m.	1767200	5904100				Wiri Station Road & Putney Place Manukau Manukau City	Observation / Piezo						

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	EXPIRY DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	BORE USE	DATE DRILLED	TOTAL DEPTH	GROUND ELEVATION	STATIC WATER LEVEL	SCREEN FROM	SCREEN TO
23837	C & D Holdings Limited	Expired	20000310	20010313	Authorise the construction of four (4) bores for groundwater quality monitoring.	Construction of four (4) 50mm diameter bores to a depth of approximately 6m. Installation of Pvc casing to depth of approximately 3m and PVC casing from approximately 3m to 6m.	1764200	5904400	3 bores drilled.	C & D Holdings Ltd	285 - 305 Puhinui Rd, Papatoetoe	305 Puhinui Road Papatoetoe Manukau	Observation / Piezo	20000309	7.2		6.9	3.6	7.2
25569	DANNEMORA HOLDINGS LIMITED	Expired	20010720	20020722	Authorise the construction of six (6) bores for gas monitoring purposes.	Construction of six (6) 200mm diameter bores to a depth of approximately 10m.	1770100	5909900		Dannemora Kellaway Block 6 Development	Greenmount Lanadfill	Greenmount Landfill Smales Road, East Tamaki Manukau City	Observation / Piezo						
27412	Wood & Partners Consultants Limited	Expired	20021119	20031120	Authorise the construction of up to ten (10) water level and gas sampling bores.	Construction of up to ten (10) 150mm diameter bores to a depth of approximately 8m. Installation of UPVC casing to a depth of approximately 8m.	1770100	5909900				Smales Road East Tamaki Manukau City	Observation / Piezo						
27412	Wood & Partners Consultants Limited	Expired	20021119	20031120	Authorise the construction of up to ten (10) water level and gas sampling bores.	Construction of up to ten (10) 150mm diameter bores to a depth of approximately 8m. Installation of UPVC casing to a depth of approximately 8m.	1770100	5909900				Smales Road East Tamaki Manukau City	Observation / Piezo						

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	EXPIRY DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	BORE USE	DATE DRILLED	TOTAL DEPTH	GROUND ELEVATION	STATIC WATER LEVEL	SCREEN FROM	SCREEN TO
32828	BP Oil New Zealand Limited *use 567*	Expired	20060715	20070716	To authorise the construction of 7 bores for environmental monitoring.	Construction of seven 100mm diameter bores to an approximate depth of 2m. Installation of grade D PVC casing to an approximate depth of 2m. Depth to top of screen to 0.5m and bottom to 2m. Proposed grouting length to 0.5m and screen material of PVC.	1767825	5904198	To authorise the construction of 7 bores for environmental monitoring.	BP Oil New Zealand Ltd	726 Great South Road, Manukau	726 Great South Road Manukau Central Manukau	Observation / Piezo	20060718	1.7		1.2	0.2	1.7
33456	BP Oil New Zealand Limited Attn: Asset Administrator	Expired	20061127	20071128	To authorise the construction of 12 bores for environmental monitoring purposes.	Construction of twelve 50mm diameter bores to an approximate depth of up to 4m. Installation of grade D PVC casing to an approximate depth of 4m. Depth to top of screen to 2m and bottom to 4m. Screen material of PVC and proposed grouting to 0.5m.	1767809	5904244	To authorise the construction of 7 bores for environmental monitoring purposes.			726 Great South Road Manukau Central Manukau	Observation / Piezo						
35664	Kiwirail Holdings Limited Attn: Snr RMA Adviser	Expired	20080411	20090413	To authorise the construction of 15 bores for geotechnical investigation.	The construction of 15 100mm diameter bore to an approximate depth of less than 20m. Installation of Class C PVC casing material to an approximate depth of less than 20m.	1767230	5904190	To authorise the construction of 15 bores for geotechnical investigation.	Ontrack (NZ Railways Corporation)		31 Manukau Station Road Manukau Central Manukau	Observation / Piezo						

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	EXPIRY DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	BORE USE	DATE DRILLED	TOTAL DEPTH	GROUND ELEVATION	STATIC WATER LEVEL	SCREEN FROM	SCREEN TO
13050	Pattle Delamore Partners Limited	Expired	19940816	19950816	Authorize the construction of three (3) bores for groundwater level and/or Chemistry investigations. Associated with BC 4509, 4510 and 4511	Construction of three (3) 100mm dia. bores to approx 6m depth. Installation of PVC casing to approx 3m and PVC screen from approx. 3m to 6m if required.	1764500	5904440	3 monitoring bores		286 Puhinui Road, Papatoetoe		Observation / Piezo	19940813	5		2	1	5
11862	TURF GRASS SPECIALISTS LTD	Expired	19931007	19941007	Authorize the construction of a bore for the extraction of groundwater for stock and domestic supply	Construction of a 100mm dia. bore to approx. 350m depth and installation of PVC casing as appropriate.	1769150	5907218	Construction of a 100mm dia. bore to approx. 350m depth and installation of PVC casing as appropriate.		Ormiston Road, Pakuranga, Location from 1996 GPS survey.			19931018	365.3	25.99			

Table 3: Legacy consent applications

PURPOSE	EASTING	NORTHING	ACTIVITY STATUS	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	DATE CREATED	PROPERTY ADDRESS	ACTIVITY	APPLICANT	APPLICATION STATUS	LODGED DATE
	1766872	5904266	Proposed	To divert and discharge stormwater associated with proposed redevelopment within the Manukau Commercial Centre at Hayman Park.	Hayman Park Sub-catchment	57 R Wiri Station Road	20170601172211		Comprehensive Stormwater Discharge		Not Accepted For Processing	20100813
	1769000	5907250	Occurring	Fuel & Chemical Spillage around Storage Area	Firmount Business Park		20170601172211	79 Ormiston Road Flat Bush Manukau	Contaminated Site Discharge		Not Accepted For Processing	20080529
	1769000	5907250	Occurring	Fuel & Chemical Spillage around Storage Area	Firmount Business Park		20170601172211	79 Ormiston Road Flat Bush Manukau	Contaminated Site Discharge	Firmount Investments Ltd Attn: Bruce Patterson	Withdrawn	20080710
	1768487	5905588	Proposed	To discharge stormwater from 12,600 square metres of impervious area associated with redevelopments at Clover Park Middle School.	Clover Park Middle School		20170601172211	S 51 Othello Drive Otara Manukau	Stormwater Discharge		Not Accepted For Processing	20070517

PURPOSE	EASTING	NORTHING	ACTIVITY STATUS	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	DATE CREATED	PROPERTY ADDRESS	ACTIVITY	APPLICANT	APPLICATION STATUS	LODGED DATE
MANUFACTURE WALLCOVERINGS-DRYING OF INKS WITH NATURAL GAS/CURING OF PVC PLASTICSOLS/DRYING OF STARCHED BASED ADHESIVES	1764240	5904440			VISION WALLCOVERINGS LTD	301 Puhinui Road, Papatoetoe	20170601172211	301-305 PUHINUI ROAD PAPATOETOE Manukau City	Discharge To Air		Withdrawn	19930528
	1769000	5907250	Proposed	41,500cubic metres cut 53500cubic metres fill of earthworks associated with the development of a commercial subdivision.	Firmount Business Park		20170601172211	79 Ormiston Road Flat Bush Manukau	Earthwork	Firmount Investments Ltd Attn: Bruce Patterson	Withdrawn	20080710
	1769234	5907863	Investigate	[redacted]		HLAKE_ DAM ID 9156	20170601172211	310 Te Irangi Drive Clover Park	Dam		Pre-Application	
To establish a service station and three retail units on the site including associated bulk earthworks, signs, vehicle access and parking areas and stormwater management devices.	1769105.42	5907558.46	Proposed	Various changes of condition 1.	2 Bishop Lenihan Place	Earthworks associated with the proposed commercial development comprising a service station and three retail units.	20170601172211	2 Bishop Lenihan Place East Tamaki Manukau	Earthwork	J & J Basra Limited	Processing	20161222
	1769493.11	5908413.63	Proposed	Earthworks consent - formation of building platform and yard establish new care sales lot, office workshop, warehouse and construct associated services.	8 Beale Place		20170601172211	8 Beale Place East Tamaki Auckland	Earthwork	East Tamaki Investments Limited	Withdrawn	20160324
To take groundwater for dewatering during the excavation of a two level basement and long-term diversion of the groundwater.	1767910.62	5904212.57	Proposed	To take groundwater for dewatering during the excavation of a two level basement and long-term diversion of the groundwater.	12 Lakewood Court		20170601172211	12 Lakewood Court Manukau Central Manukau	Groundwater Diversion	Infinity Enterprises NZ Limited	Processing	20160617

PURPOSE	EASTING	NORTHING	ACTIVITY STATUS	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	DATE CREATED	PROPERTY ADDRESS	ACTIVITY	APPLICANT	APPLICATION STATUS	LODGED DATE
	1767910.62	5904212.57	Occurring	Earthworks - for a 16 story apartment development which includes 2 underground levels for car parking.	12 Lakewood Court		20170601172211	12 Lakewood Court Manukau Central Manukau	Earthwork	Infinity Enterprises NZ Limited	Processing	20160617
	1769552.69	5908030.86	Proposed	Earthworks are required to obtain suitable platforms levels and driveway subgrades of desirable gradients in preparation for future development.	317 T irirangi Drive		20170601172211	317 Te Irirangi Drive Flat Bush Manukau	Earthwork	Roman Catholic Bishop of the Catholic Diocese of Auckland	Processing	20160802
	1769068.8	5907324.85	Proposed	Earthworks over 2.8ha for the creation of a building platform and parking area.	79 Ormiston Road		20170601172211	79 Ormiston Road Flat Bush Manukau	Earthwork	Ormiston Centre Limited	Processing	20160708
	1766095	5904969	Occurring	To discuss regarding the exisiting public sw network capacity, stormwater treatement requirements & ss attenuation requirements.	116 Puhinui Road, Papatoetoe.		20170601172211	116 Puhinui Road Papatoetoe Manukau	Stormwater Discharge	Puhinui School	No Longer Required	
	1766322.91	5904946.73	Proposed	To discharge contaminants from an Industrial or Trade Activity, namely a bus depot and from an activity area of an existing high risk.	8 Norman Spencer Drive	To discharge contaminants from an Industrial or Trade Activity, namely a bus depot and from an activity area of an existing high risk.	20170601172211	8 Norman Spencer Drive Manukau Central Manukau	Industrial or Trade Process	New Zealand Bus Limited	Processing	20151113
	1764399	5904228	Proposed	To discuss ITA application for auto dismantling business.	Watan Auto Parts Limited		20170601172211	10 Golden Arches Place Manukau Central Manukau	Industrial or Trade Process	Watan Auto Parts Limited	No Longer Required	
	1769493.11	5908413.63	Proposed	Earthworks consent - formation of building platform and yard establish new care sales lot, office workshop, warehouse and construct associated services.	8 Beale Place		20170601172211	8 Beale Place East Tamaki Auckland	Earthwork	East Tamaki Investments Limited	Not Accepted For Processing	20151222

PURPOSE	EASTING	NORTHING	ACTIVITY STATUS	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	DATE CREATED	PROPERTY ADDRESS	ACTIVITY	APPLICANT	APPLICATION STATUS	LODGED DATE
To allow for recreation and realignment of an ephemeral watercourse	1769690	5908140	Proposed	To allow for recreation and realignment of an ephemeral watercourse	Chapel Road School	Te Irirangi Drive Manukau	20170601172211	Te Irirangi Drive Manukau Manukau City	River/Stream Diversion	Roman Catholic Bishop of the Catholic Diocese of Auckland	Withdrawn	20011031
	1769968	5910366	Completed	Stages 10 - 13 of earthworks associated with the development of apartment blocks	Dannemora Gardens		20170601172211	30 Matarangi Road East Tamaki Manukau	Earthwork		Not Accepted For Processing	20051209
	1764480	5904220	Occurring	setting up wbs Industrial site	Ward Demolition		20170601172211	25 Noel Burnside Road Manukau Central Manukau	Contaminated Site Discharge	Ward Demolotion Limited	No Longer Required	
	1764172	5904414	Proposed	Stormwater Discharge associated with a homebase fuelling facility	Hirequip - Shell NZ Ltd		20170601172211	307 Puhinui Road Papatoetoe Manukau	Stormwater Discharge		Not Accepted For Processing	20050805

Table 4: Applications for consent to discharge to air

PURPOSE	EASTING	NORTHING	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	APPLICATION STATUS	LODGED DATE
MANUFACTURE WALLCOVERINGS-DRYING OF INKS WITH NATURAL GAS/CURING OF PVC PLASTICSOLS/DRYING OF STARCHED BASED ADHESIVES	1764240	5904440	VISION WALLCOVERINGS LTD	301 Puhinui Road, Papatoetoe	301-305 PUHINUI ROAD PAPATOETOE Manukau City	Withdrawn	19930528

Table 5: Applications for consent to discharge from contaminated site

EASTING	NORTHING	ACTIVITY STATUS	ACTIVITY DESCRIPTION	SITE NAME	ENVIRONMENT	DATE CREATED	PROPERTY ADDRESS	APPLICANT	APPLICATION STATUS	LODGED DATE
1769000	5907250	Occurring	Fuel & Chemical Spillage around Storage Area	Firmount Business Park	Unknown	20170601172147	79 Ormiston Road Flat Bush Manukau		Not Accepted For Processing	20080529
1769000	5907250	Occurring	Fuel & Chemical Spillage around Storage Area	Firmount Business Park	Unknown	20170601172147	79 Ormiston Road Flat Bush Manukau	Firmount Investments Ltd Attn: Bruce Patterson	Withdrawn	20080710
1764480	5904220	Occurring	setting up wbs Industrial site	Ward Demolition	Into ground - full year	20170601172147	25 Noel Burnside Road Manukau Central Manukau	Ward Demolotion Limited	No Longer Required	

Table 6: Applications for consent for industrial/trade site

EASTING	NORTHING	ACTIVITY STATUS	ACTIVITY DESCRIPTION	SITE NAME	ENVIRONMENT	DATE CREATED	PROPERTY ADDRESS	APPLICANT	APPLICATION STATUS	LODGED DATE
1764399	5904228	Proposed	To discuss ITA application for auto dismantling business.	Watan Auto Parts Limited	Unknown	20170601172148	10 Golden Arches Place Manukau Central Manukau	Watan Auto Parts Limited	No Longer Required	
1766322.91	5904946.73	Proposed	To discharge contaminants from an Industrial or Trade Activity, namely a bus depot and from an activity area of an existing high risk.	8 Norman Spencer Drive	Unknown	20170601172148	8 Norman Spencer Drive Manukau Central Manukau	New Zealand Bus Limited	Processing	20151113

Table 7: Legacy consents

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	ACTIVITY
38703	Manukau Institute of Technology	Superseded	20101222	To undertake approximately 2.1 hectares of earthworks associated with the proposed future MIT Manukau City Campus and Transport Interchange project.		1766812	5904031	Application to change condition 2, 7 and 12 of current resource consent 39035.	Manukau Institute of Technology		31 Manukau Station Road Manukau Central Manukau	Earthwork
38703	Manukau Institute of Technology	Superseded	20101222	To undertake approximately 2.1 hectares of earthworks associated with the proposed future MIT Manukau City Campus and Transport Interchange project.		1767003	5904200	Application to change condition 2, 7 and 12 of current resource consent 39035.	Manukau Institute of Technology		31 Manukau Station Road Manukau Central Manukau	Earthwork
38676	Auckland Transport (for regional consents)	Expired	20121025	To undertake approximately 0.5 hectares of earthworks associated with widening of a 380 metre long section of Ormiston Road, between Te Irirangi Drive and Chapel Road in Flat Bush.		1769585	5907548	Application for earthworks associated with proposed road widening.	Previously Manukau City Council		128 Ormiston Road Flat Bush Manukau	Earthwork
44006	Auckland Transport (for regional consents)	Issued	20150220	Proposal for subdivision and enabling works associated with the Manukau Bus Train Interchange.		1767235.77	5904189.66	Earthworks associated with subdivision and enabling works for the Manukau Bus Train Interchange.	31-33 Manukau Station Road	The site covers a total of 2.9381ha and is currently occupied by the Civic Building, Osterley Way, and a 1.76ha car parking area west of Osterley Way. Discharge from the site is currently via the stormwater network. Surrounding land uses are varied and in	31 Manukau Station Road Manukau Central Manukau	Earthwork

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	ACTIVITY
42541	Downey Construction Ltd	Issued	20140312	To undertake approximately 0.4ha of earthworks associated with the construction of residential apartments.		1767860.73	5904260.25	Earthworks associated with a subdivision and residential development.	8 Lakewood Court	Runoff from the site discharges to the reticulated stormwater network which, in turn, discharges to the Puhinui Stream.	8 Lakewood Court Manukau Central Manukau	Earthwork
42604	Z Energy Limited	Issued	20140213	To discharge contaminants to land and water from the installation of a new stormwater system.		1768888	5905940	Contaminated site discharge associated with disturbance from the site.	Shell - cnr Dawson Rd & Te Irangi Dr - Flat Bush		136 Dawson Road Otara Manukau	Contaminated Site Discharge
42468	Auckland University of Technology	Issued	20131216	To divert and discharge stormwater from 1161m2 of impervious area associated with a new footpath.		1767503.31	5905125.17	Stormwater Diversion & Discharge associated with upgrades to a university campus.	AUT Manukau Campus	Several footpaths on site	640 Great South Road Papatoetoe Manukau	Stormwater Discharge
38930	South Auckland Motors Limited	Issued	20110223	To discharge stormwater from an impervious area of 140m2 associated with the upgrade of a service station linked to an existing motor sales facility.		1767741.37	5904568.35	Discharge of stormwater from an impervious area of 140m2, associated with the upgrade of a service station linked to an existing motor sales facility	2 Gladding Place, Manukau		2 Gladding Place Manukau Central Manukau	Stormwater Discharge
39035	Manukau Institute of Technology	Superseded	20110316	To undertake approximately 2.1 hectares of earthworks associated with the proposed future MIT Manukau City Campus and Transport Interchange project.		1766812	5904031	Application to change condition 2, 7 and 12 of current resource consent 39035.	Manukau Institute of Technology		31 Manukau Station Road Manukau Central Manukau	Earthwork
39035	Manukau Institute of Technology	Superseded	20110316	To undertake approximately 2.1 hectares of earthworks associated with the proposed future MIT Manukau City Campus and Transport Interchange project.		1767003	5904200	Application to change condition 2, 7 and 12 of current resource consent 39035.	Manukau Institute of Technology		31 Manukau Station Road Manukau Central Manukau	Earthwork

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	ACTIVITY
39285	Cavalier Bremworth Limited	Issued	20150522	To authorise the discharge of contaminants to air from a carpet manufacturing process.		1765842	5904860	To authorise the discharge of contaminants to air from a carpet manufacturing process.	Cavalier Bremworth	LOT 1 DP 81624 & LOT 40 DP 48002	9 Grayson Avenue Papatoetoe Manukau	Discharge To Air
39507	Manukau Institute of Technology	Expired	20110909	To change the conditions of consent 39035 to allow for a decrease in the area of earthworks (from 2.9 to 2.2ha) necessary for the construction of the new MIT Manukau City Campus and Transport Interchange project at Hayman Park.		1766812	5904031	Application to change condition 2, 7 and 12 of current resource consent 39035.	Manukau Institute of Technology		31 Manukau Station Road Manukau Central Manukau	Earthwork
39507	Manukau Institute of Technology	Expired	20110909	To change the conditions of consent 39035 to allow for a decrease in the area of earthworks (from 2.9 to 2.2ha) necessary for the construction of the new MIT Manukau City Campus and Transport Interchange project at Hayman Park.		1767003	5904200	Application to change condition 2, 7 and 12 of current resource consent 39035.	Manukau Institute of Technology		31 Manukau Station Road Manukau Central Manukau	Earthwork
38922	Auckland Council	Expired	20110222	To undertake 3.3ha of earthworks associated with the construction of sports fields, spectator bund, car park and pavilion at 80R Rongomai Road, Otara.		1768944	5906907	Earthworks associated with sportsfields, clubrooms and carparking	Rongomai Reserve	3.3ha of earthworks associated with sportsfields, club rooms and carparking	R 80 Rongomai Road Otara Manukau	Earthwork

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	ACTIVITY
46393	Inghams Enterprises (NZ) Limited	Issued	20160602	To seek change of conditions to proposal 40688 (air discharge permit) granted 23 August 2012, The proposal will involve additional ingredient changes and increased volume of product.		1764384	5904317	Air discharge associated with the processing and frying of chicken.	9 Golden Arches Place	Discharges of contaminants to air from the frying of chicken	9 Golden Arches Place Manukau Central Manukau	Discharge To Air
46435	Ormiston Centre Limited	Issued	20160516	Stage two of earthworks associated with subdivision of 10 lots.		1769068.8	5907324.85	Stage two of earthworks associated with subdivision of 10 lots.	Stage 2 - 79 Ormiston Road		79 Ormiston Road Flat Bush Manukau	Earthwork
46290	J & J Basra Limited	Issued	20160907	To establish a service station and three retail units on the site including associated bulk earthworks, signs, vehicle access and parking areas and stormwater management devices.	To establish a service station and three retail units on the site including associated bulk earthworks, signs, vehicle access and parking areas and stormwater management devices.	1769105.42	5907558.46	Various changes of condition 1.	2 Bishop Lenihan Place	Earthworks associated with the proposed commercial development comprising a service station and three retail units.	2 Bishop Lenihan Place East Tamaki Manukau	Earthwork
46529	Ormiston Centre Limited	Issued	20160907	Construct retail buildings for large bulk trade activities, café and associated car parking areas in the south-western portion of the site over proposed Lots 7, covering ~2.0ha of area of the total (parent) site area of 16.5ha.	Construct retail buildings for large bulk trade activities, café and associated car parking areas in the south-western portion of the site over proposed Lots 7, covering ~2.0ha of area of the total (parent) site area of 16.5ha.	1769068.8	5907324.85	Earthworks - proposed a bulk trade retail development.	79 Ormiston Road		79 Ormiston Road Flat Bush Manukau	Earthwork

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	ACTIVITY
46561	Ormiston Centre Limited	Issued	20160818	To undertake 177,040m3 of earthworks over five separate areas totalling 15.27 hectares to eatablish building platforms and internal roading for future retial areas.	To undertake 177,040m3 of earthworks over five separate areas totalling 15.27 hectares to eatablish building platforms and internal roading for future retial areas.	1769068.8	5907324.85	Earthworks over 33,740m2 for the development of a mixed use commercial facility.	79 Ormiston Road		79 Ormiston Road Flat Bush Manukau	Earthwork
39663	Auckland Council	Issued	20120125	To divert and discharge stormwater associated with proposed redevelopment within the Manukau Commercial Centre at Hayman Park.		1766872	5904266	To divert and discharge stormwater associated with proposed redevelopment within the Manukau Commercial Centre at Hayman Park.	Hayman Park Sub-catchment	57 R Wiri Station Road		Comprehensive Stormwater Discharge
39745	Kiwirail Holdings Limited Attn: Snr RMA Adviser	Expired	20111013	To undertake approximately 1.5ha of earthworks associated with the upgrade of the NIMT rail line by installing a third line between Wiri Rd and Puhinui Rd.		1765058	5904953	To undertake approximately 1.5ha of earthworks associated with the addition of a 3rd main line through the Wiri/Puhinui section of rail corridor.	Kiwirail Network - Wiri 3rd Main Project		Auckland Metropolitan Rail Network Rail Corridor (Wiri) Manukau	Earthwork
46821	Tipuranga Investments Limited	Issued	20160818	To authorise the construction of one bore for use in a Laundromat.		1768951	5905602	To authorise the construction of one bore for use in a Laundromat.	18 Dissmeyer Drive		18 Dissmeyer Drive Flat Bush Manukau	Bore
46843	Ormiston Centre Limited	Issued	20160819	Construct eight building to be used as accommodation units and associated car parking areas in the eastern portion of the site over proposed Lots 3 and part of Lot 4, covering ~2.0ha of area of the total (parent) site area of 16.5ha.	Construct eight building to be used as accommodation units and associated car parking areas in the eastern portion of the site over proposed Lots 3 and part of Lot 4, covering ~2.0ha of area of the total (parent) site area of 16.5ha.	1769068.8	5907324.85	Earthworks over 1.9ha for the development of travellers accomodation.	79 Ormiston Road		79 Ormiston Road Flat Bush Manukau	Earthwork

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	ACTIVITY
46844	Ormiston Centre Limited	Issued	20160819	To undertake 177,040m3 of earthworks over five separate areas totalling 15.27 hectares to establish building platforms and internal roading for future retail areas.	To undertake 177,040m3 of earthworks over five separate areas totalling 15.27 hectares to establish building platforms and internal roading for future retail areas.	1769068.8	5907324.85	Earthworks over 4.6ha for the development of a hotel.	79 Ormiston Road		79 Ormiston Road Flat Bush Manukau	Earthwork
47321	Auckland Council	Issued	20160812	To install new and upgrade existing stormwater infrastructure within private properties and the road reserve, including installation of pipes using trenched excavations and directional drilling methods.		1765296	5904626	To install new and upgrade existing stormwater infrastructure, including installation of pipes using trenched excavations and directional drilling methods.	Ranfurly Road		Ranfurly Road Papatoetoe Manukau	Earthwork
42887	Howard Property Limited	Issued	20150218	Proposal to undertake approximately 0.7ha of Earthworks.		1769535.49	5908480.83	Proposal to undertake approximately 0.7ha of Earthworks.	4 Beale Place East Tamaki Manukau	4 Beale Place is currently vacant and covered in grass. The topography of the site is slightly elevated from the road level and slopes gently in a north-to-south direction until it reaches a ridge in the middle before flattening out towards the southern b	4 Beale Place East Tamaki Manukau	Earthwork
43071	Howard Property Limited	Issued	20150218	Discharge (which includes diversion & discharge, flow and quality) associated with a proposed motor vehicle sales and servicing centre with luxury hand car wash and retail tenancies.		1769535.49	5908480.83	Discharge (which includes diversion & discharge, flow and quality) associated with a proposed motor vehicle sales and servicing centre with luxury hand car wash and retail tenancies.	4 Beale Place, East Tamaki		4 Beale Place East Tamaki Manukau	Stormwater Discharge

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	ACTIVITY
40688	Inghams Enterprises (NZ) Limited	Superseded	20120823	To discharge contaminants into air from the processing and frying of chicken.		1764384	5904317	Air discharge associated with the processing and frying of chicken.	9 Golden Arches Place	Discharges of contaminants to air from the frying of chicken	9 Golden Arches Place Manukau Central Manukau	Discharge To Air
41161	Haydn & Rollett Limited	Issued	20121220	To undertake approximately 4.3 ha of earthworks associated with the construction of a new warehouse building.		1764940	5904440	To undertake approximately 4.3 ha of earthworks associated with the construction of a new warehouse building.	246 Puhinui Rd, Papatoetoe		246 Puhinui Road Papatoetoe Manukau	Earthwork
45534	Ormiston Centre Limited	Issued	20151222	Discharge of contaminants to land and water from the disturbance and potential remediation of contaminated land.		1769068.8	5907324.85	Discharge of contaminants to land and water from the disturbance and potential remediation of contaminated land	79 Ormiston Road		79 Ormiston Road Flat Bush Manukau	Contaminated Site Discharge
45315	Ormiston Centre Limited	Issued	20151222	To undertake 63,000m3 of cut to fill earthworks over an area of 16.5 hectares to provide a more level site for future development.		1769068.8	5907324.85	To undertake 63,000m3 of cut to fill earthworks over an area of 16.5 hectares to provide a more level site for future development.	79 Ormiston Road - Stage 1		79 Ormiston Road Flat Bush Manukau	Earthwork
44903	Golden State Foods Limited	Issued	20150924	Earthworks associated with the proposal to establish a new cool store, extension of the existing process building area for the purpose of a salad manufacturing plant onto the current vacant site.		1764448.22	5904347.92	Earthworks associated with the proposal to establish a new cool store, extension of the existing process building area for the purpose of a salad manufacturing plant onto the current vacant site.	9 Noel Burnside Rd & 5 Golden Arches Place		5 Golden Arches Place Manukau Central Manukau	Earthwork
44903	Golden State Foods Limited	Issued	20150924	Earthworks associated with the proposal to establish a new cool store, extension of the existing process building area for the purpose of a salad manufacturing plant onto the current vacant site.		1764487.38	5904365.12	Earthworks associated with the proposal to establish a new cool store, extension of the existing process building area for the purpose of a salad manufacturing plant onto the current vacant site.	9 Noel Burnside Rd & 5 Golden Arches Place		5 Golden Arches Place Manukau Central Manukau	Earthwork

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	ACTIVITY
45282	Cardinal Property Group Limited C/- Haydn & Rollett Construction	Issued	20151112	To undertake approximately 8,800m3 of cut to fill/waste earthworks over an area of 21,000m2 associated with the development of a new industrial building.		1764921.08	5904452.46	Earthworks associated with the proposed new industrial building.	240 Puhinui Road		240 Puhinui Road, Papatoetoe, Auckland	Earthwork
44535	Auckland University of Technology	Issued	20150724	To authorise the diversion and discharge of stormwater from university campus To authorise a high contaminant generating land use activity		1767459.7	5905098.4	Stormwater Discharge associated with the proposed Development of a new teaching building (M1) flanking the southern boundary together with a landscaped quad area.	640 Great South Road		640 Great South Road Papatoetoe Manukau	Stormwater Discharge
44766	Auckland Transport (for regional consents)	Issued	20161027	To authorise the diversion and discharge of stormwater from new impervious area (1,072m²) associated with upgrade and signalisation of existing road reserve.		1766945.42	5904464.79	Stormwater Discharge associated with the proposed maintenance, upgrade & signalisation.	Ronwood Ave & Davies Ave Intersection		Road Reserve, Ronwood Avenue and Davies Avenue, Manukau, Auckland	Stormwater Discharge
44205	Auckland University of Technology	Issued	20150413	To undertake approximately 10,865m2 of earthworks to develop access roads, raingardens and swales associated with new campus development works.		1767500	5905173	To undertake approximately 10,865m2 of earthworks to develop access roads, raingardens and swales associated with new campus development works.	640 Great South Road		640 Great South Road Papatoetoe Manukau	Earthwork
44619	Pal Construction 2014 Limited	Issued	20150917	To undertake approximately 3,290 m2 of earthworks across 6,984 m2 associated with a residential subdivsion, incuding works within the 100 ARI floodplain.		1766741.88	5905149.1	Earthworks associated with 22 new residential units, 3,290m3 across 6,984m2 for building platforms, roads and paths.	18 Lambie Drive & 19 Ihaka Place		19 Ihaka Place Manukau Central Manukau	Earthwork

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44253	Auckland University of Technology	Issued	20150413	• To authorise the diversion and discharge of stormwater from university campus • To authorise a high contaminant generating land use activity		1767500	5905173	divert and discharge stormwater from 17,895m2 of new impervious area associated with the redevelopment of the AUT Manukau campus	640 Great South Road, Papatoetoe		640 Great South Road Papatoetoe Manukau	Stormwater Discharge
44474	STIHL Limited	Issued	20150706	To undertake 950m2 of earthworks over an area of 2930m2 associated to create a building platform for a commercial warehouse extension.		1769194.7	5907964.96	Earthworks associated over an area of approximately 2,390m2, the bulk of this is for the warehouse extension.	9 Bishop Browne Place		9 Bishop Browne Place East Tamaki Manukau	Earthwork
44475	Housing New Zealand Corporation (and Limited)	Issued	20150429	58 lot residential subdivision incorporating 58 new dwellings, four jointly owned access ways, two proposed roads and associated infrastructure and works.		1769194.7	5907964.96	58 lot residential subdivision incorporating 58 new dwellings, four jointly-owned access ways, two proposed roads, and associated infrastructure and works.	1-5&7A-29 Fenchurch Street, Glen Innes		3 Fenchurch St Glen Innes Auckland Central	Earthwork
44481	Elevator Group Limited	Issued	20150622	To undertake approximately 8,200m2 earthworks for a warehouse and parking development.		1764905.24	5904574.47	Earthworks associated proposal will involve approximately 1,400m3 of cut to fill, a 500m3 strip to waste of top soil and asphalt, and the importation of approximately 2,000m3 of hard fill. The works will take place over an area of approximately 8,200m2.	246 Puhinui Road		246 Puhinui Road Papatoetoe Manukau	Earthwork
44688	Auckland Greyhound Racing Club Inc	Expired	20150707	To authorise the construction of one bore for irrigation purposes.		1767711	5905333	To authorise the construction of one bore for irrigation purposes.	1 Boundary Road		1 Boundary Road Otara Manukau	Bore

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44100	Supernova No.3 Limited	Issued	20150413	Earthworks across 3,746m2 associated with a residential subdivision.		1764690.51	5904652.52	Earthworks associated with the proposal to construct eight new residential units with associated engineering works.	247 Puhinui Rd & 8 Raymond Rd, Papatoetoe	The subject site is residential in nature, and surrounded by similarly residential land uses. The site is flat overall, sparsely vegetated and is not in the vicinity of any watercourses or floodplains. The immediate receiving environment is the public sto	247 Puhinui Road Papatoetoe Manukau	Earthwork
44100	Supernova No.3 Limited	Issued	20150413	Earthworks across 3,746m2 associated with a residential subdivision.		1764731.26	5904670.25	Earthworks associated with the proposal to construct eight new residential units with associated engineering works.	247 Puhinui Rd & 8 Raymond Rd, Papatoetoe	The subject site is residential in nature, and surrounded by similarly residential land uses. The site is flat overall, sparsely vegetated and is not in the vicinity of any watercourses or floodplains. The immediate receiving environment is the public sto	247 Puhinui Road Papatoetoe Manukau	Earthwork
44500	Auckland University of Technology	Issued	20150724	To undertake approximately 0.96ha of earthworks with the construction of a tertiary education building, quad area and services.		1767459.7	5905098.4	Development of a new teaching building flanking the southern boundary together with a landscaped quad area.	640 Great South Road		640 Great South Road Papatoetoe Manukau	Earthwork
44514	KPAC Limited	Issued	20150528	Approximately 4,000m2 of earthworks associated with the construction of a commercial building.		1764407.73	5904244.29	Construct new warehouse and parking with associated earthworks.	10 Golden Arches Place		10 Golden Arches Place Manukau Central Manukau	Earthwork
1174	Manukau City Council	Cancelled	19721012			1766700	5904400					Stormwater Discharge

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1230	NZ ROADMARKERS LTD	Issued	19740122	Discharge of stormwater from roofs and hard standing areas of a civil engineering contractor's depot.	Pipe drains and open channel drains discharging to creek.	1769800	5909900				R 20 Kelvin Hart Drive East Tamaki Manukau	Stormwater Discharge
1868	Carter Holt Harvey Limited	Expired	19760701	Take groundwater	100mm dia bore(no.1)	1767420	5905030	Take groundwater	AHI	640 Great South Rd, Manukau	640 Great South Road Papatoetoe Manukau	Take
1925	Manukau City Council	Cancelled	19770502			1767100	5903900				WIRI STATION RD WIRI Manukau City	River/Stream Diversion
1526	Auckland Council	Surrendered	19750601	SURFACE DRAINAGE FROM SUBDIVISION		1766600	5904400		Manukau City Centre - Stage 1		LAMBIE DRIVE WIRI Manukau City	Stormwater Discharge
969	WJ WILSON	Cancelled	19690228	DOMESTIC, STOCK,COWSHED, FIREFIGHTING~~~~		1769100	5905800				RD LEIGH Rodney District	Take
2708	BURNS & FERRALL (1990) LTD	Cancelled	19791017	To take from a Bore up to 20 cmpd for - Industrial Use		1769500	5908800	To take from a Bore up to 20 cmpd for - Industrial Use			EAST TAMAKI RD TAMAKI Manukau City	Take
2379	RAINBOW CORPORATION LTD	Surrendered	19780803			1767700	5904300		Rainbow's End Amusement park	transfer from Skateboard City NZ Ltd WIRI STATION ROAD, WIRI	WIRI STATION ROAD WIRI Manukau City	Stormwater Discharge
2511	Counties Manukau District Health Board	Expired (Not Replaced)	19781206	To discharge stormwater from 17 ha part of East Tamaki Hospital site into a ponding area upstream of road culvert on an unnamed tibutary of teh Pakuranga Creek	stormwater reticulation with two outfalls through 600mm diameter pipes into ponding area upstrem of botany road culvert=380mm.	1770400	5911400	stormwater reticulation with two outfalls through 600mm diameter pipes into ponding area upstrem of botany road culvert=380mm.	Auckland Hospital Board - Botany Downs hospital	Botany Rd HOWICK	266 Botany Road Manukau Manukau	Stormwater Discharge
3034	Carter Holt Harvey Limited	Replaced	19811118	TO TAKE GROUNDWATER FOR IRRIGATION OF GOLF COURSE~GREENS AND GARDEN~~~~	A 150MM DIAMETER BORE (No. 2)	1767360	5905115	Irrigation of 4 ha golf course & garden			640 Great South Road Papatoetoe Manukau	Take

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3043	Manukau City Council	Cancelled	19810617	TO TAKE GROUNDWATER WEST OF DAVIES AVE, WIRI, FOR MAINTAINING WATER LEVEL IN TWO ARTIFICIAL LAKES.	EXISTING 100MM DIAMETER BORE.	1767050	5904290				HAYMAN PARK DAVIES AVE, WIRI, Manukau City	Take
5350	BURNS & FERRALL (1990) LTD	Replaced	19861001	TO TAKE GROUNDWATER FROM THE WAITEMATA GROUP SANDSTONE ACQUIFER FOR STAFF FACILITIES IN FACTORY		1769530	5908710				EAST TAMAKI RD EAST TAMAKI Manukau City	Take
4667	Auckland Council	Surrendered	19850404	To divert and discharge stormwater from a 2.8 ha residential subdevision, being stage 5 of the Totara Heights subdevision, into an unnamed tributary of the Puhinui Stream		1769200	5907900		Totara Heights - Stage 5	Corokia Place TOTARA HEIGHTS	HAKEA PLACE TOTARA HEIGHTS Manukau City	Stormwater Discharge
4675	BURNS & FERRALL (1990) LTD	Surrendered	19851129	To divert and discharge stormwater from an existing factory and surrounding parking area and grounds into an unnamed tributary of the Otara Creek.		1769500	5908800	To divert and discharge stormwater from an existing factory and surrounding parking area and grounds.	renewal of water right B/248 - Burns & Ferrall	East Tamaki Rd OTARA	EAST TAMAKI ROAD OTARA Manukau City	Stormwater Discharge
5462	Orphan Stormwater Consent	Surrendered	19870430			1766500	5904400		Ford Motor Company	LAMBIE DRIVE, PUHINUI	R 57 Wiri Station Road Manukau Central Manukau	Stormwater Discharge
5270	Orphan Stormwater Consent	Surrendered	19860502	To divert and discharge stormwater ffrom a 4.3 hectare development into the Puhinui Stream.	A one metre diameter outfall.	1766500	5904000	To divert and discharge stormwater ffrom a 4.3 hectare development into the Puhinui Stream.	Ford Motor, Plunket Ave		PLUNKET AVE PAPATOETOE Manukau City	Stormwater Discharge

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7294	Roberts Holdings Limited C/- Paul Kenny	Expired	19901107	TO TAKE SURFACE WATER FROM THE OTARA STREAM FOR~IRRIGATION OF UP TO 12 HECTARES OF PASTURE~~~	ORMISTON ROAD EAST TAMAKI~~~~	1769260	5907840	Up to 12 ha pasture		ORMISTON ROAD, EAST TAMAKI	ORMISTON ROAD EAST TAMAKI Manukau City	Take
9750	Universal Homes Limited C/- Harrison Grierson	Expired	19930331	CONSENT TO CARRY OUT EARTHWORKS FOR A RESIDENTIAL SUBDIVISION		1768800	5906300		FERGUSON OAKS STAGE 4	BELINDA AVENUE, MANUKAU	BELINDA AVENUE MANUKAU Manukau City	Earthwork
8973	BURNS & FERRALL (1990) LTD	Cancelled	19921202	TO TAKE GROUNDWATER FOR STAFF AMENITIES IN A FACTORY	A 100 MM DIAMETER BORE	1769530	5908710				EAST TAMAKI RD EAST TAMAKI Manukau City	Take
12765	Bremworth Properties (Auckland) Ltd	Surrendered	19940720	TO TAKE GROUNDWATER FOR POTABLE SUPPLY, FACTORY AMENITIES AND WASH-DOWN IN A CARPET FACTORY	A 100MM DIAMETER BORE	1765860	5904910	Potable supply, factory amenities & wash down in a carpet factory			9 Grayson Avenue Papatoetoe Manukau	Take
11905	DML RESOURCES LTD- QUARRIES DIVISIO N	Expired	19931021	CLEANFILL AT ROSCOMMON QUARRY	FILLING OPERATIONS TO BE CARRIED OUT IN THE EASTERN END OF THE QUARRY OF BETWEEN 170,000 AND 330,000 CUBIC METERS.	1764900	5904500		ROSCOMMON QUARRY			Earthwork
12275	FULTON HOGAN HOLDINGS LTD	Expired	19940204	TO CARRY OUT EARTHWORKS ASSOCIATED WITH SITE DEVELOPMENT		1770600	5911500		CUMBRIA DOWNS EAST TAMAKI			Earthwork
12000	Firmount Golf Limited	Surrendered	19940608	TO TAKE SURFACE WATER FROM A DAM ON AN UNNAMED TRIBUTARY OF THE OTARA CREEK FOR IRRIGATION OF 17 HECTARES OF TURFGRASS.		1769110	5907400	17 ha turfgrass		79 Ormiston Rd, East Tamaki	79 Ormiston Road Flat Bush Manukau	Take

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12002	Firmount Golf Limited	Replaced	19940608	TO DAM AND DISCHARGE AN UNNAMED TRIBUTARY OF THE OTARA CREEK.	A 5M HIGH EARTH DAM, LOCATED APPROXIMATELY 100 METRES SOUTH OF ORMISTON ROAD, EAST TAMAKI	1769110	5907400	A replacement application to dam water with a 4m high dam impoundment surface area 6900m2 in the Otara Creek catchment for ornamental and irrigation use.	Firmount Golf Limited	79 ORMISTON RD, EAST TAMAKI	79 Ormiston Road Flat Bush Manukau	Dam
12375	SAFE STORE LTD	Expired	19940428	TO CARRY OUT EARTHWORKS ASSOCIATED WITH SITE DEVELOPMENT		1764200	5904270		Safe Store	316 Puhihui Rd, Papatoetoe	316 Puhinui Rd Papatoetoe Manukau City	Earthwork
11862	TURF GRASS SPECIALISTS LTD	Expired	19931007	Authorize the construction of a bore for the extraction of groundwater for stock and domestic supply	Construction of a 100mm dia. bore to approx. 350m depth and installation of PVC casing as appropriate.	1769150	5907218	Construction of a 100mm dia. bore to approx. 350m depth and installation of PVC casing as appropriate.		Ormiston Road, Pakuranga, Location from 1996 GPS survey.		Bore
12452	Manukau City Council	Expired	19940420	TO CARRY OUT EARTHWORKS ASSOCIATED WITH SITE DEVELOPMENT		1770400	5911300		TI RAKAU DRIVE			Earthwork
13050	Pattle Delamore Partners Limited	Expired	19940816	Authorize the construction of three (3) bores for groundwater level and/or Chemistry investigations. Associated with BC 4509, 4510 and 4511	Construction of three (3) 100mm dia. bores to approx 6m depth. Installation of PVC casing to approx 3m and PVC screen from approx. 3m to 6m if required.	1764500	5904440	3 monitoring bores		286 Puhinui Road, Papatoetoe		Bore
13758	Accent Management Ltd Level 1 FTC Building	Expired	19950405	TO CARRY OUT EARTHWORKS ASSOCIATED WITH SITE DEVELOPMENT		1769700	5909000		R SAVORY LTD			Earthwork
13177	Universal Homes Limited C/- Harrison Grierson	Expired	19941025	TO CARRY OUT EARTHWORKS ASSOCIATED WITH SITE DEVELOPMENT		1769000	5906300		FERGUSON OAKS STAGE 6			Earthwork
13203	NICHOLL MANAGEMENT CO LTD	Expired	19941027	TO CARRY OUT EARTHWORKS ASSOCIATED WITH SITE DEVELOPMENT		1770200	5911400		GLENEAGLES SUBDIVISION			Earthwork

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13591	Manukau City Council	Expired	19950215	TO CARRY OUT EARTHWORKS ASSOCIATED WITH SITE DEVELOPMENT		1766900	5904000		LAMBIE DRIVE EXTENSION			Earthwork
13932	Accent Management Ltd Level 1 FTC Building	Cancelled	19950721	Discharge in emergencies only, sewage from a sewage pumping station		1769800	5908800	D/c in emergencies only, sewage from a sewage pumping station	Accent Management Ltd		439 East Tamaki Road East Tamaki Manukau City	Wastewater Discharge
14798	HOWGATE HOLDINGS LTD	Expired	19960226	LANDUSE CONSENT IS SOUGHT TO CARRY OUT APPROXIMATELY 11.5 HECTARES OF CUT AND FILL EARTHWORKS ASSOCIATED WITH A COMMERCIAL SUBDIVISION DEVELOPMENT		1766700	5904200		HOWGATE CENTRE			Earthwork
14564	R SAVORY LTD	Expired	19970108	TO CARRY OUT 6.5 HA OF EARTHWORKS ASSOCIATED WITH SITE DEVELOPMENT		1769800	5908800		SAVORY - EAST TAMAKI			Earthwork
14884	SOUTH AUCKLAND HEALTH	Expired	19960516	TO CARRY OUT APPROXIMATELY 1.2 HECTARES OF EARTHWORKS ASSOCIATED WITH A MEDICAL CENTRE DEVELOPMENT		1770500	5911500		BOTANY ROAD, SUPERCLINIC	FLAT		Earthwork
14132	Universal Homes Limited C/- Harrison Grierson	Expired	19950927	TO CARRY OUT EARTHWORKS ASSOCIATED WITH SITE DEVELOPMENT		1769100	5905800		HOLLOWAY BLOCK			Earthwork
15809	BP Oil New Zealand Limited Attn: Asset Administrator	Issued	19970523	TO DIVERT AND DISCHARGE STORMWATER FROM A NEW SERVICE STATION, WITH STORMWATER FROM THE FORECOURT BEING DISCHARGED VIA A STORMWATER TREATMENT DEVICE INTO A PIPED STORMWATER SYSTEM.	CONSTRUCTION OF API TANK, STORMWATER PIPELINES AND MANHOLES.	1770500	5911800		BP East Tamaki	500 Ti Rakau Drive, East Tamaki	500 Ti Rakau Drive Pakuranga Manukau	Stormwater Discharge

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15596	Carter Holt Harvey Limited	Expired	19970107	TO TAKE GROUNDWATER FOR IRRIGATION OF 4 HECTARES OF GOLF COURSE AND GARDEN.	A 150 MM DIAMTER BORE LOCATED APPROXIMATELY 50 METRES EAST OF GREAT SOUTH ROAD.	1767360	5905115	Irrigation of 4 ha golf course & garden			640 Great South Road Papatoetoe Manukau	Take
15252	BP Oil New Zealand Limited Attn: Asset Administrator	Surrendered	19970520	To divert and discharge stormwater from a new service station, with stormwater from the forecourt being discharged via a stormwater treatment device into a piped stormwater system.	Construction of API tank, stormwater pipelines and manholes.	1770500	5911800				271 Botany Road Howick Manukau	Stormwater Discharge
20324	TI RAKAU VILLAGE	Expired	19971114	To undertake approximately 6.8 hectares of earthworks associated with a residential subdivision		1770500	5911400		Ti Rakau Village	Residential subdivision north end of Ti Rakau Road, East Tamaki, Manukau	Ti Rakau Road East Tamaki, Manukau City	Earthwork
16317	Manukau City Council	Expired	19971114	To undertake works within watercourses being 4 culvert crossings and 1 bridge crossing within Otara and Pakuranga Creek catchments associated with the construction of the East Tamaki Corridor Arterial Route		1769060	5906470		Cavendish Drive	Cavendish Drive, Manukau, Etcart alignment.		Stream Work
16317	Manukau City Council	Expired	19971114	To undertake works within watercourses being 4 culvert crossings and 1 bridge crossing within Otara and Pakuranga Creek catchments associated with the construction of the East Tamaki Corridor Arterial Route		1769410	5907800		Cavendish Drive	Cavendish Drive, Manukau, Etcart alignment.		Stream Work

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16317	Manukau City Council	Expired	19971114	To undertake works within watercourses being 4 culvert crossings and 1 bridge crossing within Otara and Pakuranga Creek catchments associated with the construction of the East Tamaki Corridor Arterial Route		1769540	5908240		Cavendish Drive	Cavendish Drive, Manukau, Etcart alignment.		Stream Work
16318	Manukau City Council	Expired	19971114	To undertake approximately 30 hectares of earthworks associated with the construction of the East Tamaki Corridor Arterial Route		1767800	5905080		ETCART EAST TAMAKI ARTERIAL ROUTE	From the eastern end of Cavendish Drive in Manukau Central, through the Clover Park residential suburb, through the East Tamaki Rural area terminating at the new residential suburb of Botany Down	East Tamaki Manukau City	Earthwork
16221	Universal Homes Limited C/- Harrison Grierson	Expired	19970702	To undertake works within a watercourse associated with the installation of a culvert crossing. Richmond Park - stage 3	Install a 33m length of 1950 mm Diam culvert pipe in a small perennial unnamed tributary of the Otara Creek.	1769200	5906100		Richmond Park	orlando Drive marks the edge of urban development to the west. To the east and north of the property the land use is pastoral, the bulk of the properties being small holdings.	Chapel Road East Tamaki Manukau City	Stream Work
20547	Lady Ruby Investments C/- HARRISON GRIERSON CONSULTANTS	Expired	19971211	Commercial subdivision at Lambie Drive Manukau	3.2 ha of earthworks associated with the Manukau Supa Centre	1766700	5904200		Manukau Supa Centa - Stage 4	Lambie Drive, Manukau.	Lambie Drive Manukau Manukau City	Earthwork
20806	Manukau City Council	Expired	19980311	To undertake approximately 980 metres of trenching (0.4 hectares of earthworks) associated with a sanitary sewer installation.	Land clearing operation to install sewer line	1770000	5910100		Manukau City Council	Smales Road, East Tamaki	Smales Road East Tamaki Manukau City	Vegetation Removal

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21906	C & D Holdings Limited	Expired	19981007	Authorise the construction of bores for groundwater level and/or chemistry monitoring.	Construction of three (3) 50mm diameter bores to a depth of 4m. Installation of PVC casing to 1m depth and PVC screen from 1-4m depth or as required.	1764200	5904400			285-305 Puhinui Rd, Papatoetoe	305 Puhinui Road Papatoetoe Manukau	Bore
21482	Maunsell Limited	Expired	19980527	Authorise the construction of a bore for foundation investigation work.	Construction of a 100mm diameter bore to a depth of approximately 30m. Installation of PVC casing to approximately 20m depth and PVC screen as required.	1769066	5906474	Authorise the construction of a bore for foundation investigation work.		Northern end of Orlando drive.	5 Whetstone Road Flat Bush Manukau	Bore
21487	Maunsell Limited	Expired	19980528	Authorise the construction of bores for geotechnical investigation.	Construction of two (2) 100mm diameter bores to depth of approximately 30m. Installation of PVC casing to approximately 20m and PVC screen as required.	1769770	5909166	Authorise the construction of bores for foundation investigation.		400m North of Smales Rd, East Tamaki.	124 Guys Road East Tamaki Manukau	Bore
21488	Maunsell Limited	Expired	19980528	Authorise the construction of a bore for foundation investigation.	Construction of a 100mm diameter bore to a depth of approximately 30m. Installation of PVC casing to approximately 20m depth and PVC screen as required.	1769490	5908080	Authorise the construction of a bore for foundation investigation.		Accent Drive, East Tamaki.	364 East Tamaki Road Otara Manukau	Bore
21764	Botany Downs Development Ltd	Expired	19981022	Shaw Block 451 Ti Rakau Dr Botany Downs		1770100	5911300		Shaw Block	Retail/commercial development at 451 Ti Rakau Drive, Botany Downs	451 TI RAKAU DRIVE BOTANY DOWNS Manukau City	Earthwork

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21086	The National Trading Company of New Zealand Limited	Expired	19961022	Land use consent sought for approx 650 metres of stream works associated with the construction of water quality pond, the piping of approx 500 metres of watercourse and contour smoothing to establish residential and commercial building platforms	Piping and filling a watercourse and construction of water quality pond.	1770300	5910720	Guys Rd Stormwater pond 2A	The National Trading Co. of NZ	204R Guys Rd & 588 Chapel Road, Manukau City	588 Chapel Road Flat Bush Manukau	Stream Work
22598	Taradale Properties Ltd	Expired	19990614	To undertake approximately 2.74 hectares of earthworks associated with the construction of a high density residential development.	2.7ha of earthworks on previous re-graded site.	1770300	5910400		Sacramento Stages 1A & 1B	Corner of Armoy Drive & Easte Tamaki Road, Botany Downs.	Armoy Drive/East Tamaki Road Manukau City	Earthwork
22836	Manukau City Council	Expired	19990802	Land use consent is sought to replace and extend an existing road culvert on a tributary of Otara Creek.		1769364	5907468		Manukau City Council	Ormiston Road, Otara	Ormiston Road Otara Manukau City	Stream Work
22839	Fulton Hogan Limited/ Dannemora Holdings Limited	Expired	19990921	Land use consent is sought to undertake an approximately total of 52 hectares of earthworks associated with the development of a residential subdivision.		1770000	5909500	Earthworks associated with a residential subdivision.	SUTTON BLOCK - East Tamaki Road	Earthworks for a residential subdivision between Smales Road and East Tamaki Road Manukau.	East Tamaki Road Manukau Manukau City	Earthwork
23100	Manukau City Council	Expired	19991020	WEIR CONSTRUCTION FOR STORMWATER TREATMENT POND.		1769998	5910984	Weir construction for stomwater treatment pond	Guys Road Weir		GUYS ROAD MANUKAU Manukau City	Earthwork

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23101	Manukau City Council	Expired	19991020	To construct a gabion weir to control water levels and obtain the required water quality volume in the existing stomwater treatment pond on a tributary of Pakuranga Creek.		1769998	5910984		Guys Road Weir	Gabion weir to control water levels.	GUYS ROAD EAST TAMAKI Manukau City	Stream Work
23837	C & D Holdings Limited	Expired	20000310	Authorise the construction of four (4) bores for groundwater quality monitoring.	Construction of four (4) 50mm diameter bores to a depth of approximately 6m. Installation of Pvc casing to depth of approximately 3m and PVC casing from approximately 3m to 6m.	1764200	5904400	3 bores drilled.	C & D Holdings Ltd	285 - 305 Puhinui Rd, Papatoetoe	305 Puhinui Road Papatoetoe Manukau	Bore
22937	Z Energy 2015 Limited (Formerly Chevron New Zealand)	Surrendered	19991011	To authorise the diversion and discharge of stormwater from a new service station with stormwater from refuelling areas being discharged via a stormwater treatment device in accordance with Section 15 of the Resource Management Act 1991.	Construction of an API tank and stormwater pipelines.	1770352	5911646	Stormwater discharge from Service Station	Caltex Botany Service Station		313 Botany Road Manukau	Stormwater Discharge
23460	Roman Catholic Bishop of the Catholic Diocese of Auckland	Expired	20000208			1769200	5907600		Ormiston Road - Stage 1	Industrial subdivision	Bishop Lenihan Place East Tamaki Manukau City	Earthwork
23462	Roman Catholic Bishop of the Catholic Diocese of Auckland	Expired	20000208			1769200	5907600		Ormiston Road Pakuranga	Industrial subdivision	Bishop Lenihan Place East Tamaki Manukau City	Stream Work

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	ACTIVITY
22995	Fulton Hogan Limited/ Dannemora Holdings Limited	Expired	19990921	Land use consent is sought to undertake the filling and piping of two sections of existing watercourse.		1770000	5909500	Land Use consent to undertake filling and piping of exising watercourse	Sutton Block Development	East Tamaki Road and Smales Road, East Tamaki.	EAST TAMAKI ROAD MANUKAU Manukau City	Stream Work
23752	NZ Transport Agency Attention: Tammy Muharemi	Expired	20000327	To authorise approximately 11 ha of earthworks associated with constructing the SH20/Puhinui Road Interchange in accordance with Section 9(3) of the Resource Management Act 1991.		1764100	5904300		Transit - SH20 & Puhinui Road	Grade separated interchange at SH20 & Puhinui Road Papatoetoe	SH20 & PUHINUI ROAD PAPATOETOE Manukau City	Earthwork
23212	Newhaven Property Trust Limited	Expired	19991201	To authorise earthworks associated with the development of a residential subdivision in accordance with Section 9(3) of the Resource Management Act 1991.		1770000	5910800	Earthworks associated with the development of an integrated residential housing subdivision	200 Guys Road, Botany Downs		200 Guys Road Botany Downs Manukau City	Earthwork
24190	Gull New Zealand Limited	Issued	20010208	To divert and discharge stormwater from a service station with stormwater from refuelling areas being discharged via a stormwater treatment device.	Construction of API tank and stormwater pipelines.	1769732	5909132		Gull Petroleum	457 East Tamaki Road Manukau	455 East Tamaki Road East Tamaki Manukau	Stormwater Discharge
24614	HUB INVESTMENTS LIMITED	Expired	20001221	To authorise approximately 5.14 hectares of earthworks associated with a commercial development in accordance with Section 9(3) of the Resource Management Act 1991.		1770100	5911300	To undertake earthworks for the development of a retail centre.	The Hub (ex Shaw Block)	451 Ti Rakau Drive, Botany Downs	451 Ti Rakau Drive, Botany Downs, Manukau City	Earthwork

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24646	C & D Holdings Limited	Expired	20001218	To authorise approximately 1.6ha of earthworks associated with developing an industrial subdivision in accordance with Section 9(3) of the Resource Management Act 1991.		1764120	5904420	1.6ha of earthworks associated with an industrial development.	305 Puhinui Road Manukau		307 Puhinui Road Papatoetoe Manukau	Earthwork
24666	Manukau City Council	Expired	20010123	To authorise approximately 8.1ha of earthworks associated with developing sports fields in accordance with Section 9(3) of the Resource Management Act 1991.		1769010	5906740	8.1ha earthworks for sports fields	Rongomai Reserve	80RRongomai Road East Tamaki	80R Rongomai Road East Tamaki Manukau City	Earthwork
24667	Manukau City Council	Expired	20010123	To authorise works within a watercourse associated with piping approximately 150m of an ephemeral watercourse in accordance with Section 13 of the Resource Management Act 1991.		1769010	5906740	150m pipeline extension length	Rongomai Reserve	80 Rongomai Road East Tamaki	80R Rongomai Road East Tamaki Manukau City	Stream Work
24313	Fulton Hogan Limited/ Dannemora Holdings Limited	Expired	20001025	To authorise approximately 13.5 ha of earthworks associated with developing a residential subdivision in accordance with Section 9(3) of the Resource Management Act 1991.		1770000	5909500	152 lot residential subdivision	Sayes Stage 6	Kellaway Block, Dannemora Subdivision, East Tamaki	Smales Road/Guys Road East Tamaki Manukau City	Earthwork

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24314	Fulton Hogan Limited/ Dannemora Holdings Limited	Expired	20001011	To authorise approximately 18 ha of earthworks associated with developing a residential subdivision in accordance with Section 9(3) of the Resource Management Act 1991.	Corner of East Tamaki Road (closed) and Chapel Road East Tamaki	1770000	5909500	108 lot residential Subdivision	Spencer Block	Spencer Block, Dannemora Subdivision, East Tamaki	Chapel Road East Tamaki Manukau City	Earthwork
24389	Fulton Hogan Limited/ Dannemora Holdings Limited	Expired	20001011	To authorise works within a watercourse associated with filling approximately 680 m of an ephemeral watercourse in accordance with Section 13 of the Resource Management Act 1991.	Corner of East Tamaki Road (closed) and Chapel Road East Tamaki	1770000	5909500		Spencer Block	Dannemora subdivision Chapel Road East Tamaki	Chapel Road East Tamaki Manukau City	Stream Work
25550	NZ Transport Agency Attention: Tammy Muharemi	Issued	20020809	To authorise the diversion and discharge of stormwater from a catchment size of approximately 385ha, comprising of industrial, residential, rural land and the SH1-SH20 Motorway Link in accordance with Sections 14(1)(a), 15(1)(a) and 15(1)(b) of the Resour	SH 20 & SH 1 Puhinui Road, Manukau, Manukau City	1766800	5903800		SH 20 - SH 1 Link	Manukau Central	SH 20 Manukau Central Manukau City	Stormwater Discharge

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25551	NZ Transport Agency Attention: Tammy Muharemi	Issued	20020809	To authorise the isolated diversion of the Puhinui Stream 1% Annual Exceedance Probability flood plain and the partial diversion of the Puhinui Stream in an engineered channel associated with the construction an operation of the SH1-SH20 Motorway Link in		1767500	5903970	Installation of motorway embankments	SH20 TO SH1 Puhinui Road		SH20 to SH1 Puhinui Road Papatoetoe Manukau City	River/Stream Diversion
24878	Progressive Enterprises Ltd	Expired	20010710	To authorise approximately 1.8ha of earthworks associated with constructing a supermarket in accordance with Section 9(3) of the Resource Management Act 1991.		1770100	5911300	Supermarket complex	Botany Downs Countdown	1.8ha earthworks	Cnr Te Rakau Dr & Te Irirangi Dr East Tamaki Manukau City	Earthwork
25362	Mobil Oil NZ Limited F&L CS Contract Team	Issued	20010601	To authorise the discharge stormwater from a partially redeveloped service station with stormwater from refuelling areas being discharged via a stormwater treatment device in accordance with Section 15 of the Resource Management Act 1991.	Construction of API tank and stormwater pipelines	1764500	5904400	Redevelopment of an existing service station	Mobil - Puhinui		286 Puhinui Road Papatoetoe Manukau	Stormwater Discharge
25569	DANNEMORA HOLDINGS LIMITED	Expired	20010720	Authorise the construction of six (6) bores for gas monitoring purposes.	Construction of six (6) 200mm diameter bores to a depth of approximately 10m.	1770100	5909900		Dannemora Kellaway Block 6 Development	Greenmount Lanadfill	Greenmount Landfill Smales Road, East Tamaki Manukau City	Bore

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24704	Fulton Hogan Limited/ Dannemora Holdings Limited	Expired	20001218	To authorise approximately 10.2ha of earthworks associated with developing a residential subdivision in accordance with Section 9(3) of the Resource Management Act 1991.		1770100	5910400	10.2ha earthworks	Sayes Block - Guys Road	Guys Road East Tamaki	GUYS ROAD EAST TAMAKI Manukau City	Earthwork
25025	GHD Limited	Expired	20010319	Authorise the construction of two (2) bores for monitoring purposes.	Construction of two (2) piezometer bores to a depth of approximately 15-20m.	1767200	5904100				Wiri Station Road & Putney Place Manukau Manukau City	Bore
26258	BP Oil New Zealand Limited Attn: Asset Administrator	Issued	20011224	To authorise the diversion and discharge of stormwater from a new service station being discharged via a stormwater treatment device in accordance with Sections 14 & 15 of the Resource Management Act 1991.		1769298	5907532	New service station	BP Flat Bush		300 Te Irirangi Drive Flat Bush Manukau City	Stormwater Discharge
25860	Auckland Council	Issued	20020218	To authorise the diversion of surface water and approximately 500m of streambed disturbance associated with constructing a stormwater quality pond, including a box culvert in an unnamed tributary of the Pakuranga Creek,in accordance with Section 14 and Se		1769850	5910330	To construct a stormwater treatment pond for the East Tamaki/Point View Drive Catchment	Stormwater Quality Pond 1, Guy	1 Guys Road, East Tamaki	R 20 Kelvin Hart Drive East Tamaki Manukau	Stream Work

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25861	Manukau City Council	Expired	20020218	To authorise approximately 1.5ha of earthworks associated with constructing a stormwater quality pond on an unnamed tributary of Pakuranga Creek, in accordance with Section 9(3) of the Resource Management Act 1991.	1 Guys Road, East Tamaki, Manukau City	1769870	5910320	To construct a stormwater treatment pond for the East Tamaki/Point View Drive Catchment	Stormwater Quality Pond 1, Guys Rd East Tamaki	1 Guys Road, East Tamaki	1 Guys Road East Tamaki Manukau City	Earthwork
25906	NZ Transport Agency Attention: Tammy Muharemi	Expired	20011205	A Land Use Consent: Sediment Control is sought to undertake approximately 13ha of earthworks associated with constructing the State Highway 20 - Puhinui Road Interchange.		1764100	5904300	Proposed grade separated interchange construction. Construction of an overbridge to carry SH20 motorway traffic over Puhinui Rd as well as the associated interchange on ramps and off ramps	Puhinui Grade Separater	Interchange / SH20 / Puhinui Road Papatoetoe	Puhinui Road / SH20 Papatoetoe Manukau City	Earthwork
25916	Vision Senior Living Ltd	Expired	20011108	To authorise approximately 2.1ha of earthworks associated with developing a retirement village in accordance with Section 9(3) of the Resource Management Act 1991	Te Irirangi Drive, East Tamaki	1769900	5910600	Multilevel retirement village	Dannemora Gardens Retirement Village	Te Irirangi Drive, Botany Downs	Te Irirangi Drive Botany Downs Manukau City	Earthwork
25962	Watercare Services Limited	Expired	20011113	To authorise 2.5ha of earthworks associated with geotechnical remedial works in accordance with Section 9 of the Resource Management Act 1991.	Accent Drive, East Tamaki.	1769400	5908200	To undertake works within 50 m of the watercourse	Chapel Road East Tamaki	Accent Drive, East Tamaki	Chapel Road East Tamaki Manukau City	Earthwork

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25963	Watercare Services Limited	Issued	20011113	To authorise approximately 34m of streambed disturbance associated with constructing a sewer pipe bridge and to occupy the area above an unnamed tributary of Otara Stream with that bridge, in accordance with Section 13 of the Resource Management Act 1991.		1769620	5908250	A section of the sewer pipe requires a pipebridge and streambed adjustments.	Chapel Road East Tamaki		Chapel Road East Tamaki Manukau City	Stream Work
25969	Jomac Construction Ltd*In Liq**	Expired	20011218	A Land Use Consent: Sediment Control is sought to carry out approximately 4.4 hectares of earthworks associated with the commercial property development.	500 Ti Rakau Drive, Botany Downs Approximate Map Reference NZMS 260 R11 808730	1770400	5911300	Earthworks associated with commercial subdivision	500 Ti Rakau Drive	Corner Ti Rakau Drive and Botany Road, East Tamaki	500 Ti Rakau Drive Pakuranga Manukau	Earthwork
25634	NZ Transport Agency Attention: Tammy Muharemi	Issued	20020207	To authorise the diversion and taking of groundwater for dewatering of State Highway 20 motorway cut in accordance with Section 14 of the Resource Management Act 1991.	An 800m long road cut and associtated drainage media, cess pits an pipe system located approximately 250 metres south of Wiri Station Road and leading to Lambie East Stormwater quality pond.	1767500	5903970		SH20	Lambie Drive to State Highway 1	State Highway 20 from Lambie Drive to State Highway 1 Manukau City	Take

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26040	Roman Catholic Bishop of the Catholic Diocese of Auckland	Expired	20020809	To authorise approximately 18.4ha of earthworks associated with developing an education facility and a residential subdivision, in accordance with Section 9(3) of the Resource Management Act 1991.	Te Irirangi Drive and Chapel Road, Flat Bush, Manukau City.	1769690	5908140	Primary and secondary School Development	Chapel Road School Manukau	Te Irirangi Drive Manukau	Te Irirangi Drive and Chapel Road Flat Bush Manukau City	Earthwork
26053	Auckland Council	Issued	20020809	To authorise the damming and discharge of an unnamed tributary of Otara Stream for a stormwater quality pond in accordance with Sections 14 and 15 of the Resource Management Act 1991.	A 4.2 metre high earth dam, crest length 30 metres, impoundment surface area 3140 square metres, catchment area 65 hectares.Low flow outlet: a 0.2m x 1.3m slot weir.Service spillway: a 3m x 3m riser connected to 30m long 1800mm diameter outlet pipe.Flood	1769588	5908222	The damming and discharge of an unnamed tributary of Otara Stream for a stormwater quality pond		100 Ormiston Rd, East Tamaki	100 Ormiston Road Manukau Manukau	Dam
27144	Fulton Hogan Limited/ Dannemora Holdings Limited	Expired	20021105	To authorise approximately 26ha of earthworks associated with the development of a residential subdivision in accordance with Section 9(3) of the Resource Management Act 1991		1769800	5908700	Cut to fill to reduce site's gradient.	Chapel Road East Tamaki		2 Stancombe Road Flat Bush Manukau	Earthwork
27158	Broadway Developments Limited	Issued	20030220	to authorise approximately 170m of streambed disturbance associated with the piping of a watercourse	170m of streambed disturbance	1769500	5907200	Piping of watercourse	125 Ormiston Road East Tamaki		125 Ormiston Road Manukau Manukau	Stream Work

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27159	Broadway Developments Limited	Expired	20030220	To authorise approximately 3.2ha of earthworks associated with the extension of Micheal Jones Drive and development of a future residential subdivision in accordance with Section 9(3) of the Resource Management Act 1991		1769500	5907200	Roading and construction of a building platform	125 Ormiston Road East Tamaki		125 Ormiston Road Flat Bush Manukau	Earthwork
27739	Newhaven Property Trust Limited	Expired	20030321	To authorise approximately 2.4 ha of earthworks associated with a residential subdivision in accordance with Section 9(3) of the Resource Management Act 1991	200 Guys Road East Tamaki	1770000	5910800	Residential subdivision	200 Guys Road East Tamaki		200 Guys Road East Tamaki Manukau City	Earthwork
27361	Victory Investment Properties Ltd	Issued	20030328	To authorise approximately 140m of streambed disturbance associated with the piping of a watercourse in accordance with Sections 13 and 14 of the Resource Management Act 1991.		1769400	5907200	Diverting and piping watercourse	125 Ormiston Road East Tamaki		125 Ormiston Road Flat Bush Manukau	Stream Work
27362	Victory Investment Properties Ltd	Expired	20030328	To authorise approximately 4.6ha of earthworks associated with the development of a residential subdivision in accordance with Section 9(3) of the Resource Management Act 1991.		1769400	5907200	To create building platforms	125 Ormiston Road East Tamaki		125 Ormiston Road Flat Bush Manukau	Earthwork

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27412	Wood & Partners Consultants Limited	Expired	20021119	Authorise the construction of up to ten (10) water level and gas sampling bores.	Construction of up to ten (10) 150mm diameter bores to a depth of approximately 8m. Installation of UPVC casing to a depth of approximately 8m.	1770100	5909900				Smales Road East Tamaki Manukau City	Bore
28677	C & D Holdings Limited	Expired	20040120	To authorise approximately 1.6ha of earthworks associated with a commercial subdivision in accordance with Section 9(3) of the Resource Management Act 1991.		1764120	5904420	Earthworks associated with a commercial subdivision	305 Puhinui Road Papatoetoe		305 Puhinui Road Papatoetoe Manukau City	Earthwork
28141	The National Trading Company of New Zealand Limited	Issued	20030922	To authorise the diversion and discharge of stormwater in accordance with Sections 14 and 15 of the Resource Management Act 1991		1767300	5904700	Proposed vehicle refuelling facility, adjacent to Pac 'n Save Manukau	67 Cavendish Drive Manukau		1 63 Cavendish Drive Manukau Central Manukau	Stormwater Discharge
28014	The National Trading Company of New Zealand Limited	Issued	20030716	To authorise the diversion and discharge of stormwater, from the provision of a new refuelling facility via a stormwater treatment device in accordance with Sections 14 & 15 of the Resource Management Act 1991		1770426	5911234	Development of a petrol fill station facility in a shopping carpark			588 Chapel Road Botany Downs Manukau City	Stormwater Discharge

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28553	Body Corporate 344027 C/- Crockers Body Corporate	Issued	20040114	To authorise the discharge of stormwater from 15 Bishop Lenihan Place, East Tamaki, Manukau City in accordance with Sections 14 and 15 of the Resource Management Act 1991.	Stormfilters have been installed instead of Sandfilters. No formal Managers Aprroval/Variation done.	1769200	5907600	To divert and discharge stormwater to the public system from a proposed commercial/residential development.	15 Ormiston Place Manukau		15 Bishop Lenihan Place East Tamaki Manukau City	Stormwater Discharge
29919	Cavalier Bremworth Limited	Replaced	20011119	To control the discharge of atmospheric contaminants to air		1765832	5904856		Cavalier Bremworth	C133	9 Grayson Avenue Papatoetoe Manukau	Discharge To Air
31029	Z Energy Limited	Issued	20110208	To discharge contaminants to land or water from land containing elevated levels of contaminants.		1768888	5905940	Spill of diesel from pumps entered ground, followed underground services and drained to stormwater system. Consent for residual SPH on site.	Shell - cnr Dawson Rd & Te Irangi Dr - Flat Bush	or 136 Dawson Rd PT Lot 3 DP 149321	136 Dawson Road Otara Manukau	Contaminated Site Discharge
30221	Van den Brink Poultry Limited	Expired	20050714	To authorise approximately 2.6ha of earthworks associated with the construction of a retail and office complex in accordance with Section 9(3) of the Resource Management Act 1991.		1767700	5904900	To undertake 2.6ha of earthworks associated with a retail and office development.	652 Great South Road		652 Great South Road Manukau Central Manukau	Earthwork
30752	STOP MONITORING Consent Ownership Unknown Or Co in Liquidation, Struck Off or in Receivership	Issued	20050906	To authorise the diversion and discharge of stormwater in accordance with Sections 14 (1)(a) and 15 (1)(a) and (b) of the Resource Management Act 1991.		1766816	5905090	Stormwater Discharge associated with developing an industrial/commercial subdivision.	18 Lambie Dr/17 Ryan Pl	100m2 Units	17 Ryan Place Manukau Central Manukau	Stormwater Discharge

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31810	Shell New Zealand Limited	Expired	20051124	To authorise the construction of 3 bores for monitoring purposes.	Construction of a 50mm diameter bore to an approximate depth of 5m and casing depth of 5m. PEA Gravel screen: depth to top of screen 1m, and depth to bottom 5m. Proposed grouting length of 1m.	1768910	5905946	To authorise the construction of 3 bores for monitoring purposes.			136 Dawson Road Otara Manukau	Bore
31844	Z Energy Limited	Issued	20060113	To authorise the diversion and discharge of stormwater from a heavy machinery hiring facility in accordance with Sections 14 (1)(a) and 15 (1)(a) and (b) of the Resource Management Act 1991.		1764114	5904416	Stormwater discharge associated with the installation of a 10,000 litre double skin above-ground diesel tank with an electric pump to be used to refuel Hirequip vehicles only.	Shell - 6 & 11 Vision Pl Manukau	API for 85m2 catchment - refuelling area only.	307 Puhinui Road Papatoetoe Manukau	Stormwater Discharge
32061	Vision Senior Living Ltd	Expired	20060214	To authorise approximately 0.4ha of earthworks associated with the final stages of a residential subdivision in accordance with Section 9 of the Resource Management Act 1991.		1769968	5910366	Stages 10 - 13 of earthworks associated with the development of apartment blocks	Dannemora Gardens		30 Matarangi Road East Tamaki Manukau	Earthwork

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32828	BP Oil New Zealand Limited *use 567*	Expired	20060715	To authorise the construction of 7 bores for environmental monitoring.	Construction of seven 100mm diameter bores to an approximate depth of 2m. Installation of grade D PVC casing to an approximate depth of 2m. Depth to top of screen to 0.5m and bottom to 2m. Proposed grouting length to 0.5m and screen material of PVC.	1767825	5904198	To authorise the construction of 7 bores for environmental monitoring.	BP Oil New Zealand Ltd	726 Great South Road, Manukau	726 Great South Road Manukau Central Manukau	Bore
32167	NZ Transport Agency Attention: Tammy Muharemi	Superseded	20060325	To authorise the ongoing diffuse discharge of contaminants to ground and groundwater from along the designated motorway route in accordance with Section 15 of the Resource Management Act 1991.	Site location: Within a corridor designated for Motorway Purposes in the Manukau City District Plan, including the severed quarry area. The motorway link will be approximately 4km long and extends from the unformed Nesdale Avenue approximately 600m south	1764054	5904275	Minor amendment to allow encapsulation of material from 29 Diversey Lane.	Transit-SH 20 to SH 1	Embankment, close to 29 Diversey Lane.	State Highway 20 to State Highway 1	Contaminated Site Discharge
33456	BP Oil New Zealand Limited Attn: Asset Administrator	Expired	20061127	To authorise the construction of 12 bores for environmental monitoring purposes.	Construction of twelve 50mm diameter bores to an approximate depth of up to 4m. Installation of grade D PVC casing to an approximate depth of 4m. Depth to top of screen to 2m and bottom to 4m. Screen material of PVC and proposed grouting to 0.5m.	1767809	5904244	To authorise the construction of 7 bores for environmental monitoring purposes.			726 Great South Road Manukau Central Manukau	Bore

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33713	Lady Ruby Investments Limited	Expired	20070917	To authorise approximately 2.64ha of earthworks associated with a commercial development in accordance with Section 9(3) of the Resource Management Act 1991.		1766696	5904021	15,200 cubic metres of earthworks associated with a commercial development	61 Lambie Drive		61 Lambie Drive Manukau Central Manukau	Earthwork
33890	Firmount Golf Limited	Surrendered	20070413	To authorise the damming of water with , the use of, and the discharge of water from, a dam on the bed of a tributary of Otara Creek in accordance with Sections 13, 14 and 15 of the Resource Management Act 1991.	A 4 metre high earth dam, crest length 75 metres, crest width 3 metres, impoundment surface area 6900 square metres, impoundment volume 11,000 cubic metres, catchment area 3.2 hectares, service spillway 1050 mm drop inlet into 400mm diameter culvert pipe,	1769110	5907400	A replacement application to dam water with a 4m high dam impoundment surface area 6900m2 in the Otara Creek catchment for ornamental and irrigation use.	Firmount Golf Limited	79 ORMISTON RD, EAST TAMAKI	79 Ormiston Road Flat Bush Manukau	Dam
34939	Auckland Council	Issued	20071117	To authorise approximately 6 metres of stream works associated with the extension of a culvert and subsequent diversion of surface water in accordance with Sections 13 and 14 of the Resource Management Act 1991.		1766500	5904600	Application to undertake works in a watercourse to extend existing culvert by approx 6m.	Cavendish Drive	Application to undertake road improvements for a four lane arterial road.	R 50 Plunket Avenue Manukau Central Manukau	Stream Work
34319	Van Den Brink 652 Limited	Issued	20091111	To authorise the diversion and discharge of stormwater from a commercial subdivision.		1767600	5904900	To discharge stormwater from 2.6 square metres of impervious area associated with a proposed retail development.	Windermere Holdings		652 Great South Road Manukau Central Manukau	Stormwater Discharge

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34201	Ministry of Education	Issued	20071002	To authorise the diversion and discharge of stormwater in accordance with Sections 14 (1)(a) and 15 (1)(a) and (b) of the Resource Management Act 1991.		1768487	5905588	To discharge stormwater from 12,600 square metres of impervious area associated with redevelopments at Clover Park Middle School.	Clover Park Middle School		S 51 Othello Drive Otara Manukau	Stormwater Discharge
34859	Foodstuffs North Island Limited	Expired	20071212	To authorise approximately 2.1ha of earthworks associated with the construction of a freezer/coolstore in accordance with Section 9(3) of the Resource Management Act 1991.		1765095	5904518	to create a level building platform adjacent to the existing facility associated with the extension of a freezer/coolstore building.	20 Nesdale Ave, Manukau		17 Nesdale Avenue Manukau Central Manukau	Earthwork
36120	NZ Transport Agency Attention: Tammy Muharemi	Issued	20080818	To authorise the ongoing diffuse discharge of contaminants to ground and groundwater from along the designated motorway route.	Within a corridor designated for Motorway Purposes in the Manukau City District Plan, including the severed quarry area. The motorway link will be approximately 4km long and extends from the unformed Nesdale Avenue approximately 600m south-east of the Pu	1764054	5904275	Minor amendment to allow encapsulation of material from 29 Diversey Lane.	Transit-SH 20 to SH 1	Embankment, close to 29 Diversey Lane.	State Highway 20 to State Highway 1	Contaminated Site Discharge
35664	Kiwirail Holdings Limited Attn: Snr RMA Adviser	Expired	20080411	To authorise the construction of 15 bores for geotechnical investigation.	The construction of 15 100mm diameter bore to an approximate depth of less than 20m. Installation of Class C PVC casing material to an approximate depth of less than 20m.	1767230	5904190	To authorise the construction of 15 bores for geotechnical investigation.	Ontrack (NZ Railways Corporation)		31 Manukau Station Road Manukau Central Manukau	Bore

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	ACTIVITY
36501	Kiwirail Holdings Limited Attn: Snr RMA Adviser	Issued	20090528	To authorise the diversion of stormwater into the Lambie West Pond from an impervious surface of approximately 8,200m2 associated with the Manukau Rail Link in accordance with the Proposed Auckland Regional Plan: Air, Land & Water and Section 14, of the R		1766980	5903900	Excavate a trench 28m wide, 11m deep, 350m long backfill & concrete line trench. Discharge stormwater & groundwater after settlement and treatment to Puhinui stream.	Hayman Park		R 57 Wiri Station Road Manukau Manukau	Stormwater Discharge
36502	Kiwirail Holdings Limited Attn: Snr RMA Adviser	Expired	20090528	To authorise approximately 2.5ha of earthworks associated with the construction of the rail trench for the Manukau Rail Link in accordance with the Auckland Regional Plan: Sediment Control and Section 9(3), of the Resource Management Act 1991.		1766980	5903900	Excavate a trench 28m wide, 11m deep , 350m long backfill & concrete line trench. Stockpile backfill in Hayman Park & transport other spoil to exisitng consented stockpile area. Earthworks +/- 120,000 m3.	Hayman Park		R 57 Wiri Station Road Manukau Manukau	Earthwork
36503	Kiwirail Holdings Limited Attn: Snr RMA Adviser	Superseded	20090528	To authorise the taking of an average of 18 m3/day of groundwater and diversion of groundwater in order to dewater construction site to enable the construction of a concrete rail trench that will occupy an area of 0.6ha. Also to divert groundwater around		1766980	5903900	Excavate a trench 28m wide, 11m deep, 350m long backfill & concrete line trench. Discharge stormwater & groundwater after settlement and treatment to Puhinui stream.	Hayman Park		R 57 Wiri Station Road Manukau Manukau	Groundwater Diversion

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	ACTIVITY
37106	Kiwirail Holdings Limited Attn: Snr RMA Adviser	Issued	20090911	To authorise the taking of an average of 18 m3/day of groundwater and diversion of groundwater in order to dewater construction site to enable the construction of a concrete rail trench that will occupy an area of 0.6ha.		1766980	5903900	Excavate a trench 28m wide, 11m deep, 350m long backfill & concrete line trench. Discharge stormwater & groundwater after settlement and treatment to Puhinui stream.	Hayman Park		R 57 Wiri Station Road Manukau Manukau	Groundwater Diversion
38263	Kiwirail Holdings Limited Attn: Snr RMA Adviser	Expired	20101029	To undertake approximately 1 hectare of earthworks associated with a rapid transport interchange at Hayman Park, Manukau Central.		1767003	5904200	Application to undertake 1 ha enabling works for a rapid transit activity (bus & rail interchange)	Manukau Interchange		R 57 Wiri Station Road Manukau Manukau	Earthwork

Table 8: Consents for discharge to air

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	PURPOSE	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS
46393	Inghams Enterprises (NZ) Limited	Issued	20160602	To seek change of conditions to proposal 40688 (air discharge permit) granted 23 August 2012, The proposal will involve additional ingredient changes and increased volume of product.	1764384	5904317	Air discharge associated with the processing and frying of chicken.	9 Golden Arches Place	Discharges of contaminants to air from the frying of chicken	9 Golden Arches Place Manukau Central Manukau
39285	Cavalier Bremworth Limited	Issued	20150522	To authorise the discharge of contaminants to air from a carpet manufacturing process.	1765842	5904860	To authorise the discharge of contaminants to air from a carpet manufacturing process.	Cavalier Bremworth	LOT 1 DP 81624 & LOT 40 DP 48002	9 Grayson Avenue Papatoetoe Manukau
40688	Inghams Enterprises (NZ) Limited	Superseded	20120823	To discharge contaminants into air from the processing and frying of chicken.	1764384	5904317	Air discharge associated with the processing and frying of chicken.	9 Golden Arches Place	Discharges of contaminants to air from the frying of chicken	9 Golden Arches Place Manukau Central Manukau
29919	Cavalier Bremworth Limited	Replaced	20011119	To control the discharge of atmospheric contaminants to air	1765832	5904856		Cavalier Bremworth	C133	9 Grayson Avenue Papatoetoe Manukau

Table 9: Consents for discharge from contaminated site

CONSENT NUMBER	CONSENT HOLDER	CONSENT STATUS	GRANTED DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS
31029	Z Energy Limited	Issued	20110208	To discharge contaminants to land or water from land containing elevated levels of contaminants.		1768888	5905940	Spill of diesel from pumps entered ground, followed underground services and drained to stormwater system. Consent for residual SPH on site.	Shell - cnr Dawson Rd & Te Irangi Dr - Flat Bush	or 136 Dawson Rd PT Lot 3 DP 149321	136 Dawson Road Otara Manukau
45534	Ormiston Centre Limited	Issued	20151222	Discharge of contaminants to land and water from the disturbance and potential remediation of contaminated land.		1769068.8	5907324.85	Discharge of contaminants to land and water from the disturbance and potential remediation of contaminated land	79 Ormiston Road		79 Ormiston Road Flat Bush Manukau
42604	Z Energy Limited	Issued	20140213	To discharge contaminants to land and water from the installation of a new stormwater system.		1768888	5905940	Contaminated site discharge associated with disturbance from the site.	Shell - cnr Dawson Rd & Te Irangi Dr - Flat Bush		136 Dawson Road Otara Manukau
36120	NZ Transport Agency Attention: Tammy Muharemi	Issued	20080818	To authorise the ongoing diffuse discharge of contaminants to ground and groundwater from along the designated motorway route.	Within a corridor designated for Motorway Purposes in the Manukau City District Plan, including the severed quarry area. The motorway link will be approximately 4km long and extends from the unformed Nesdale Avenue approximately 600m south-east of the Pu	1764054	5904275	Minor amendment to allow encapsulation of material from 29 Diversey Lane.	Transit-SH 20 to SH 1	Embankment, close to 29 Diversey Lane.	State Highway 20 to State Highway 1
32167	NZ Transport Agency Attention: Tammy Muharemi	Superseded	20060325	To authorise the ongoing diffuse discharge of contaminants to ground and groundwater from along the designated motorway route in accordance with Section 15 of the Resource Management Act 1991.	Site location: Within a corridor designated for Motorway Purposes in the Manukau City District Plan, including the severed quarry area. The motorway link will be approximately 4km long and extends from the unformed Nesdale Avenue approximately 600m south	1764054	5904275	Minor amendment to allow encapsulation of material from 29 Diversey Lane.	Transit-SH 20 to SH 1	Embankment, close to 29 Diversey Lane.	State Highway 20 to State Highway 1

Table 10: Legacy permitted activities

FILE REFERENCE	CONSENT STATUS	GRANTED DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	ACTIVITY	PERMITTED ACTIVITY HOLDER
6-04-3866	Assessment Completed		File ref: 6-04-3866. Removal of UST and redevelopment of a former BP site.	URS site assess found TPH's & BTEX's associated with a commercial petrol station site to be above env G/L's. Remed reqrd.	1767829	5904217	File ref: 6-04-3866. Removal of UST and redevelopment of a former BP site.		URS site assess found TPH's & BTEX's associated with a commercial petrol station site to be above env G/L's. Remed reqrd.	726 Great South Road Manukau Central Manukau	Contaminated Site Discharge	
6-03-3868	Assessment Completed	20070713	File ref: 6-03-3868. Decomm of UPSS at a Caltex Site.	URS found TPH & BTEX to be present in soils on site below tier one G/L's.	1770357	5911650	File ref: 6-03-3868. Decomm of UPSS at a Caltex Site.	309 Botany Rd	Lot 1 and 2 DP316968	309 Botany Road Howick Manukau	Contaminated Site Discharge	Chevron New Zealand ***USE 751***
7-37-3405	Assessment Completed		redevelop site for commercial property	PO Peter Kavanagh prev PO Emma Trembath	1766762	5905084	commercial development on vacant site	Sita Developments Ltd	18 lambie drive, Manukau	18 Lambie Drive Manukau Central Manukau	Contaminated Site Discharge	
9301	Assessment Completed		17 ha turfgrass		1769110	5907400	17 ha turfgrass		79 Ormiston Rd, East Tamaki	79 Ormiston Road Flat Bush Manukau	Take	
6-02-3436	Assessment Completed		To assess potential impacts on ground and groundwater as a consequence of diesel spill	remedial works by MWH PO Kylie Eckersly consent reqd c31029/1 use. Requested groundwater monitoring for dissolved phase, update of removal of stained sed, and product thickness (1 Dec 05)	1768888	5905940	Spill of diesel from pumps entered ground, followed underground services and drained to stormwater system. Consent for residual SPH on site.	Shell - cnr Dawson Rd & Te Irangi Dr - Flat Bush	or 136 Dawson Rd PT Lot 3 DP 149321	136 Dawson Road Otara Manukau	Contaminated Site Discharge	
7-37-4384	Assessment Completed		One 3,300 litre UST was removed from site. Seven soil samples representing soil remaining on site were analysed for TPH and one sample was further analysed for PAH. All soil results comply with the oil industry guidelines.		1767745	5904482	Tank Pull report provided to AC on 23 april 2010.	1 Gladding Place, Manukau	Tank Pull report provided to AC on 23 april 2010.	1 Gladding Place Manukau Central Manukau	Contaminated Site Discharge	

FILE REFERENCE	CONSENT STATUS	GRANTED DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	ACTIVITY	PERMITTED ACTIVITY HOLDER
7-37-4193	Assessment Completed		One 10,000 litre petrol UST removed from site, tank pit backfilled. 11 Soil samples were collected and analysed for TPH and BTEX. All samples returnedn results below the level of analytical detection. Complies with the ARP: ALW PA criteria.		1767623	5904084	Tank removal validation report provided to AC on 16 March 2010.	2 Clist Crescent, Manukau	Tank removal validation report provided to AC on 16 March 2010.	2 Clist Crescent Manukau Central Manukau	Contaminated Site Discharge	
M096-37-1103	Assessment Completed		Two 20,000L petrol USTs were removed from the site. 25 samples were collected from 'in-situ' soils on site, all samples analysed for TPH and BTEX had concentrations below the relevant tier 1 soil acceptance criteria for a commercial/industrial site.		1767707	5904563	Tank removal soil validation report provided to AC in October 2010.	2 Gladding Place, Manukau	Tank removal soil validation report provided to AC in October 2010.	2 Gladding Place Manukau Central Manukau	Contaminated Site Discharge	
C512-12-4936*	Assessment Completed		The construction of four bores for groundwater investigation purposes.	The construction of four 100mm diameter bores to a maximum depth of 5m. Installation casing material to an approximate depth of 5m.	1767473	5904757	The construction of four bores for groundwater investigation purposes.	Wiri Licensing Trust		254 Roscommon Road Manurewa Manukau	Bore	52760

FILE REFERENCE	CONSENT STATUS	GRANTED DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	ACTIVITY	PERMITTED ACTIVITY HOLDER
	Assessment Completed		file 7-37-4177	Soils within PA levels. Groundwater above ANZECC 95% G/Ls. Nos CS discharge consent is required but conditions RE proposed discharge of S/W & G/W from the construction site to the Puhinui stream will be incorporated within the G/W take & Divert consent.-S	1766950.4	5904016.4		Manukau Rail Link Box	Hayman Park 57 Wiri Station Rd	R 57 Wiri Station Road Manukau Manukau	Contaminated Site Discharge	
C512-12-4473*	Assessment Completed		To authorise the construction of two bores for groundwater investigation using piezometers.	The construction of two 20 and 30mm diameter bores to an approximate depth of 12 and13.6m.	1767095	5904155	To authorise the construction of two bores for groundwater investigation using piezometers.	Manukau City Council	Sites are located in road reserves along Davies avenue and Putney Way.	Putney Way Manukau Central Manukau City	Bore	
6-02-2208	Assessment Completed		File ref: 6-02-2208. Ex pastoral site/golf course with potential contamination.	PSI received 14/05/08 indicating potential contamination with TPH/hort chemicals. Intrusive investigation required.	1769068	5907323	Ex pastoral site/golf course with potential contamination	79 Ormiston Rd	Ex pastoral site/golf course with potential contamination	79 Ormiston Road Flat Bush Manukau	Contaminated Site Discharge	
17882	Assessment Completed				1764480	5904220	setting up wbs Industrial site	Ward Demolition		25 Noel Burnside Road Manukau Central Manukau	Contaminated Site Discharge	30019
M096-37-1732	Assessment Completed		Remediation of former Shell Service Station		1767338	5904578	Remediation of former Shell Service Station	6 Ronwood Avenue, Manukau City	Lot 29 DP 75412	6 Ronwood Avenue Manukau Central Manukau	Contaminated Site Discharge	
KR504267	Assessment Completed				1766820	5904320	PURPOSE UNKNOWN	Rainbows End		2 Clist Crescent Manukau Central Manukau	Dam	18
KR504268	Assessment Completed		PURPOSE UNKNOWN		1766820	5904320	PURPOSE UNKNOWN	Hayman Park Pond	16 Ronwood Dr, Wiri		Dam	19
KR504354	Assessment Completed		PURPOSE UNKNOWN		1767850	5904145	PURPOSE UNKNOWN		738 Great South Rd, Manukau	738 Great South Road Manukau Central Manukau	Dam	

FILE REFERENCE	CONSENT STATUS	GRANTED DATE	PURPOSE	WORKS DESCRIPTION	EASTING	NORTHING	ACTIVITY DESCRIPTION	SITE NAME	SITE DESCRIPTION	PROPERTY ADDRESS	ACTIVITY	PERMITTED ACTIVITY HOLDER
KR504355	Assessment Completed		PURPOSE UNKNOWN		1767850	5904145	PURPOSE UNKNOWN		738 Great South Rd, Manukau	738 Great South Road Manukau Central Manukau	Dam	
C512-12-6017*	Assessment Completed		To authorise the drilling and construction of two bores for geotechnical investigation and groundwater investigation (observation/piezo bore)	The construction of two 100m diameter bores to an approximate depth of 20m. Puketoka formation, WG sandstone.	1767304	5904269	To authorise the drilling and construction of two bores for geotechnical investigation and groundwater investigation (observation/piezo bore)	33 Manukau Station Road			Bore	
C512-12-5476*	Assessment Completed		The construction of five bores for geotechnical purposes.	The construction of five 120mm diameter bores to a maximum depth of 20m. Installation of casing material to an approximate depth of 12m.	1767190	5904204	The construction of five bores for geotechnical purposes.	Auckland Transport		Putney Way Manukau Manukau	Bore	53165
27494	Assessment Completed		To take and use upto 10m3/day and 3600m3/year of groundwater for use in a laundromat.		1768951	5905602		18 Dissmeyer Drive		18 Dissmeyer Drive Flat Bush Manukau	Take	

[redacted]

Site Description	Primary Address	Site Name	AC Property ID	CONDITION TYPE DESCRIPTION	X Coord	Y Coord
[redacted]			MCC0006431/31	No Contamination Issues Recorded	1768869.271	5905546.65
			MCC006162/158	No Contamination Issues Recorded	1768837.991	5905697.306
			MCC000H201121	Remediated to Background	1769815.859	5908909.847
			MCC000H144509	No Contamination Issues Recorded	1769421.571	5907141.28
			MCC0006430/10	No Contamination Issues Recorded	1768510.393	5905063.704
			MCC000H200617	Remediated to Background	1769983.482	5908881.186
			MCC006101/175	No Contamination Issues Recorded	1769032.857	5905743.582
			MCC000H150629	No Contamination Issues Recorded	1769247.813	5906389.627
			MCC0006405/43	No Contamination Issues Recorded	1768701.252	5905631.326
			MCC000H144564	No Contamination Issues Recorded	1769254.553	5907100.563
			MCC000H201427	Remediated to Background	1770009.671	5908985.371
			MCC000H200926	Remediated to Background	1769841.621	5908655.297
			MCC000H201259	Remediated to Background	1769713.038	5908554.981
			MCC000H138913	No Contamination Issues Recorded	1769253.748	5906607.902
			MCC0006431/43	No Contamination Issues Recorded	1768843.52	5905439.088
			MCC000H150647	No Contamination Issues Recorded	1769129.635	5906379.927
			MCC00006430/4	No Contamination Issues Recorded	1768540.517	5905081.657
			MCC06111/104B	No Contamination Issues Recorded	1768770.2	5905335.459
			MCC000H200936	Remediated to Background	1769913.623	5908617.667
			MCC000H145801	No Contamination Issues Recorded	1769448.282	5907111.913
			MCC000H163537	Remediated to Background	1770008.594	5909078.256
			MCC0006137/43	No Contamination Issues Recorded	1768798.833	5905129.782

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	MCC0006137/66	No Contamination Issues Recorded	1768657.4	5905212.156
	MCC000H200919	Remediated to Background	1769833.617	5908546.953
	MCC000H201152	Remediated to Background	1769836.947	5908860.715
	MCC006111/116	No Contamination Issues Recorded	1768929.98	5905272.261
	MCC0006432/13	No Contamination Issues Recorded	1769037.574	5905350.637
	MCC000H143513	No Contamination Issues Recorded	1769235.058	5906670.226
	MCC000H150952	No Contamination Issues Recorded	1769213.483	5906460.128
	MCC0006421/68	No Contamination Issues Recorded	1768526.39	5905223.779
	MCC006162/140	No Contamination Issues Recorded	1768806.664	5905589.966
	MCC0006432/44	No Contamination Issues Recorded	1768952.384	5905298.661
	MCC006101/181	No Contamination Issues Recorded	1769076.132	5905707.198
	MCC000H130555	No Contamination Issues Recorded	1768989.894	5906047.822
	MCC0006111/66	No Contamination Issues Recorded	1768315.701	5905518.04
	MCC006162/126	No Contamination Issues Recorded	1768785.256	5905517.525
	MCC000H201182	Remediated to Background	1769703.523	5908722.315
	MCC000H130561	No Contamination Issues Recorded	1769013.787	5906147.593
	MCC0006431/10	No Contamination Issues Recorded	1768962.71	5905709.526
	MCC0006433/31	No Contamination Issues Recorded	1768961.324	5905516.405
	MCC000H144572	No Contamination Issues Recorded	1769263.812	5907001.974
	MCC000H150653	No Contamination Issues Recorded	1769279.568	5906452.686
	MCC006111/145	No Contamination Issues Recorded	1768920.201	5905219.351
	MCC0006431/27	No Contamination Issues Recorded	1768878.051	5905583.285
	MCC000H145645	No Contamination Issues Recorded	1769394.948	5906724.647
	MCC0006435/20	No Contamination Issues Recorded	1769119.868	5905632.126
	MCC006162/128	No Contamination Issues Recorded	1768759.227	5905538.401
	MCC000H201231	Remediated to Background	1769734.737	5908619.414
	MCC00006431/9	No Contamination Issues Recorded	1768917.526	5905748.178
	MCC000H143493	No Contamination Issues Recorded	1769345.51	5906705.494
	MCC000H150616	No Contamination Issues Recorded	1769276.247	5906249.937
	MCC006101/157	No Contamination Issues Recorded	1768800.852	5905917.598
	MCC0006111/94	No Contamination Issues Recorded	1768598.77	5905405.442
	MCC0006402/17	No Contamination Issues Recorded	1768720.281	5905791.153
	MCC006111/104	No Contamination Issues Recorded	1768677.749	5905374.274
	MCC000H163512	Remediated to Background	1769819.725	5908936.879
	MCC006101/173	No Contamination Issues Recorded	1769013.652	5905755.704
	MCC000H150617	No Contamination Issues Recorded	1769278.798	5906276.623
	MCC0006402/14	No Contamination Issues Recorded	1768679.992	5905849.338
	MCC000H143480	No Contamination Issues Recorded	1769235.614	5906787.795
	MCC00006438/6	No Contamination Issues Recorded	1768450.756	5905256.288
	MCC000H150638	No Contamination Issues Recorded	1769170.621	5906351.977
	MCC000H144530	No Contamination Issues Recorded	1769289.17	5907178.238
	MCC000H143498	No Contamination Issues Recorded	1769314.093	5906673.627

	MCC006111/133	No Contamination Issues Recorded	1768821.169	5905260.494
	MCC006162/168	No Contamination Issues Recorded	1768848.38	5905804.294
	MCC0006137/64	No Contamination Issues Recorded	1768664.519	5905194.542
	MCC006162/124	No Contamination Issues Recorded	1768780.41	5905501.125
	MCC000H136583	No Contamination Issues Recorded	1769303.345	5906546.176
	MCC000H201156	Remediated to Background	1769796.085	5908837.439
	MCC006111/141	No Contamination Issues Recorded	1768897.958	5905228.594
	MCC006162/164	No Contamination Issues Recorded	1768848.668	5905736.191
	MCC0006430/15	No Contamination Issues Recorded	1768486.914	5905111.143
	MCC006101/139	No Contamination Issues Recorded	1768679.284	5906011.224
	MCC000H201171	Remediated to Background	1769818.414	5908790.428
	MCC000H144532	No Contamination Issues Recorded	1769287.43	5907142.664
	MCC000H163521	Remediated to Background	1769893.56	5909030.609
	MCC0006431/16	No Contamination Issues Recorded	1768945.31	5905632.343
	MCC006162/106	No Contamination Issues Recorded	1768733.715	5905399.116
	MCC006111/100	No Contamination Issues Recorded	1768646.375	5905386.654
	MCC0006432/23	No Contamination Issues Recorded	1769019.735	5905325.486
	MCC000H144523	No Contamination Issues Recorded	1769307.778	5907133.031
	MCC000H150624	No Contamination Issues Recorded	1769163.417	5906288.859
	MCC00006437/8	No Contamination Issues Recorded	1768406.353	5905197.2
	MCC000H143443	No Contamination Issues Recorded	1769186.513	5906748.993
	MCC000H150646	No Contamination Issues Recorded	1769139.623	5906393.772
	MCC00006430/8	No Contamination Issues Recorded	1768530.337	5905039.79
	MCC006162/174	No Contamination Issues Recorded	1768863.193	5905819.026
	MCC0006431/26	No Contamination Issues Recorded	1768903.976	5905464.223
	MCC006101/185	No Contamination Issues Recorded	1769105.133	5905684.872
	MCC00006430/3	No Contamination Issues Recorded	1768553.586	5905134.093
	MCC000H144508	No Contamination Issues Recorded	1769411.65	5907174.255
	MCC000H143466	No Contamination Issues Recorded	1769291.875	5906784.321
	MCC000H201181	Remediated to Background	1769708.007	5908740.765
	MCC000H201208	Remediated to Background	1769819.507	5908696.138
	MCC000H163569	Remediated to Background	1769977.114	5909011.534
	MCC006111/139	No Contamination Issues Recorded	1768878.552	5905236.656
	MCC006162/145	No Contamination Issues Recorded	1768988.336	5905908.091
	MCC00006136/8	No Contamination Issues Recorded	1768833.395	5905137.538
	MCC0006405/62	No Contamination Issues Recorded	1768732.958	5905557.559
	MCC000H145815	No Contamination Issues Recorded	1769494.302	5907147.371
	MCC000H145784	No Contamination Issues Recorded	1769420.196	5906991.777
	MCC000H201172	Remediated to Background	1769837.256	5908789.023
	MCC000H143891	No Contamination Issues Recorded	1769277.356	5906197.549

	MCC00006437/2	No Contamination Issues Recorded	1768385.65	5905288.485
	MCC0006402/12	No Contamination Issues Recorded	1768662.162	5905844.109
	MCC0006404/13	No Contamination Issues Recorded	1768611.832	5905527.295
	MCC000H201175	Remediated to Background	1769794.042	5908765.249
	MCC000H130556	No Contamination Issues Recorded	1768993.876	5906064.45
	MCC0006137/72	No Contamination Issues Recorded	1768633.692	5905270.585
	MCC000H201233	Remediated to Background	1769698.734	5908624.442
	MCC000H130560	No Contamination Issues Recorded	1769009.803	5906130.962
	MCC0006401/58	No Contamination Issues Recorded	1768495.024	5905458.183
	MCC000H201240	Remediated to Background	1769659.371	5908550.925
	MCC000H164954	Remediated to Background	1769926.705	5908997.953
	MCC0006136/15	No Contamination Issues Recorded	1768866.525	5905206.943
	MCC006162/130	No Contamination Issues Recorded	1768793.386	5905545.04
	MCC006101/187	No Contamination Issues Recorded	1769119.634	5905673.706
	MCC000H150953	No Contamination Issues Recorded	1769197.936	5906444.482
	MCC000H140357	No Contamination Issues Recorded	1769286.095	5906393.941
	MCC0006137/56	No Contamination Issues Recorded	1768690.873	5905122.684
	MCC000H144474	No Contamination Issues Recorded	1769307.952	5906842.257
	MCC000H143453	No Contamination Issues Recorded	1769258.65	5906858.66
	MCC000H201190	Remediated to Background	1769821.862	5908720.002
	MCC000H201235	Remediated to Background	1769674.073	5908617.061
	MCC00006430/6	No Contamination Issues Recorded	1768528.139	5905072.4
	MCC0006405/46	No Contamination Issues Recorded	1768776.449	5905687.674
	MCC000H201245	Remediated to Background	1769791.204	5908491.836
	MCC000H144491	No Contamination Issues Recorded	1769310.222	5906871.9
	MCC000H143463	No Contamination Issues Recorded	1769362.6	5906798.736
	MCC0006404/18	No Contamination Issues Recorded	1768685.478	5905580.452
	MCC000H201224	Remediated to Background	1769799.424	5908658.016
	MCC000H150702	No Contamination Issues Recorded	1769217.119	5906517.621
	MCC0006421/87	No Contamination Issues Recorded	1768594.665	5905261.324
	MCC000H200980	Remediated to Background	1769770.502	5909003.172
	MCC0006432/52	No Contamination Issues Recorded	1768884.39	5905325.764
	MCC00006434/3	No Contamination Issues Recorded	1768957.74	5905439.568
	MCC0006431/17	No Contamination Issues Recorded	1768899.98	5905674.888
	MCC000H139414	No Contamination Issues Recorded	1768562.96	5905337.859
	MCC000H144478	No Contamination Issues Recorded	1769352.328	5906891.033
	MCC000H163502	Remediated to Background	1769882.544	5909071.677
	MCC0006431/39	No Contamination Issues Recorded	1768852.041	5905474.68
	MCC0006404/17	No Contamination Issues Recorded	1768625.673	5905551.475
	MCC00006434/6	No Contamination Issues Recorded	1769012.968	5905408.034
	MCC006162/148	No Contamination Issues Recorded	1768821.697	5905641.556
	MCC000H144561	No Contamination Issues Recorded	1769354.438	5907075.326

	MCC000H163551	Remediated to Background	1770007.441	5909009.607
	MCC000H200935	Remediated to Background	1769886.553	5908621.29
	MCC000H201025	Remediated to Background	1769894.489	5908951.405
	MCC000H163511	Remediated to Background	1769801.223	5908942.984
	MCC000H144529	No Contamination Issues Recorded	1769311.188	5907165.694
	MCC000H163589	Remediated to Background	1769789.84	5909074.859
	MCC000H144551	No Contamination Issues Recorded	1769373.308	5906983.509
	MCC000H140354	No Contamination Issues Recorded	1769326.493	5906427.347
	MCC0006435/17	No Contamination Issues Recorded	1769089.167	5905592.835
	MCC000H200916	Remediated to Background	1769837.223	5908592.881
	MCC000H145800	No Contamination Issues Recorded	1769461.435	5907126.12
	MCC0006431/35	No Contamination Issues Recorded	1768860.562	5905510.272
	MCC000H163509	Remediated to Background	1769789.364	5908977.093
	MCC00006431/3	No Contamination Issues Recorded	1768930.682	5905803.138
	MCC000H130568	No Contamination Issues Recorded	1769041.659	5906264.012
	MCC0006431/32	No Contamination Issues Recorded	1768920.662	5905409.322
	MCC006101/152	No Contamination Issues Recorded	1768989	5905847.59
	MCC0006111/70	No Contamination Issues Recorded	1768351.479	5905503.912
	MCC000H144481	No Contamination Issues Recorded	1769335.053	5906943.151
	MCC000H163555	Remediated to Background	1769985.657	5909046.434
	MCC0006438/11	No Contamination Issues Recorded	1768481.603	5905204.896
	MCC006162/105	No Contamination Issues Recorded	1768506.501	5905293.791
	MCC0006421/85	No Contamination Issues Recorded	1768601.074	5905245.726
	MCC000H201162	Remediated to Background	1769738.914	5908831.389
	MCC00006431/5	No Contamination Issues Recorded	1768926.298	5905784.826
	MCC000H144472	No Contamination Issues Recorded	1769342.208	5906855.812
	MCC0006431/29	No Contamination Issues Recorded	1768873.657	5905564.969
	MCC000H150637	No Contamination Issues Recorded	1769183.101	5906365.205
	MCC006162/122	No Contamination Issues Recorded	1768749.025	5905505.988
	MCC000H144517	No Contamination Issues Recorded	1769399.702	5907160.696
	MCC00006434/9	No Contamination Issues Recorded	1768962.11	5905388.062
	MCC0006437/14	No Contamination Issues Recorded	1768439.935	5905148.524
	MCC000H163583	Remediated to Background	1769982.619	5908922.573
	MCC000H163523	Remediated to Background	1769853.446	5909028.267
	MCC000H138765	No Contamination Issues Recorded	1768821.686	5905158.786
	MCC06111/129R	No Contamination Issues Recorded	1768643.825	5905339.362
	MCC000H144548	No Contamination Issues Recorded	1769396.303	5907071.334
	MCC006162/160	No Contamination Issues Recorded	1768842.517	5905715.123
	MCC0006111/90	No Contamination Issues Recorded	1768567.063	5905417.986
	MCC000H143483	No Contamination Issues Recorded	1769269.253	5906756.326
	MCC000H144533	No Contamination Issues Recorded	1769261.174	5907126.155
	MCC0006404/11	No Contamination Issues Recorded	1768580.907	5905532.207

	MCC000H200941	Remediated to Background	1769892.616	5908576.936
	MCC000H201174	Remediated to Background	1769813.333	5908762.905
	MCC000H150632	No Contamination Issues Recorded	1769252.763	5906345.15
	MCC0006137/53	No Contamination Issues Recorded	1768731.696	5905216.852
	MCC006431/18R	No Contamination Issues Recorded	1768993.74	5905569.204
	MCC0006432/27	No Contamination Issues Recorded	1768985.185	5905339.265
	MCC0006111/86	No Contamination Issues Recorded	1768535.373	5905430.622
	MCC00006435/8	No Contamination Issues Recorded	1769032.499	5905701.856
	MCC0006438/13	No Contamination Issues Recorded	1768501.743	5905218.312
	MCC000H201169	Remediated to Background	1769780.606	5908790.36
	MCC000H201122	Remediated to Background	1769797.174	5908918.645
	MCC0006111/88	No Contamination Issues Recorded	1768551.218	5905424.304
	MCC0006405/86	No Contamination Issues Recorded	1768629.885	5905448.656
	MCC006162/176	No Contamination Issues Recorded	1768867.643	5905834.156
	MCC000H201120	Remediated to Background	1769833.924	5908904.122
	MCC0006136/17	No Contamination Issues Recorded	1768848.16	5905214.967
	MCC0006405/82	No Contamination Issues Recorded	1768660.376	5905423.602
	MCC000H145806	No Contamination Issues Recorded	1769454.544	5907079.179
	MCC000H143488	No Contamination Issues Recorded	1769282.969	5906733.053
	MCC000H200614	Remediated to Background	1769925.278	5908863.676
	MCC000H145640	No Contamination Issues Recorded	1769410.046	5906740.525
	MCC006101/147	No Contamination Issues Recorded	1768733.313	5905969.611
	MCC000H201150	Remediated to Background	1769799.047	5908864.128
	MCC000H144506	No Contamination Issues Recorded	1769466.63	5907175.74
	MCC0006431/41	No Contamination Issues Recorded	1768847.78	5905456.884
	MCC000H143496	No Contamination Issues Recorded	1769301.098	5906704.804
	MCC0006433/29	No Contamination Issues Recorded	1768978.96	5905512.184
	MCC000H130553	No Contamination Issues Recorded	1768981.502	5906014.542
	MCC000H150461	No Contamination Issues Recorded	1769237.597	5906210.679
	MCC0006401/44	No Contamination Issues Recorded	1768514.75	5905535.298
	MCC000H164061	Remediated to Background	1769946.457	5909086.583
	MCC0006403/16	No Contamination Issues Recorded	1768679.082	5905680.412
	MCC000H201222	Remediated to Background	1769762.69	5908650.744
	MCC00006438/7	No Contamination Issues Recorded	1768467.134	5905169.015
	MCC000H145790	No Contamination Issues Recorded	1769416.181	5907027.712
	MCC000H201123	Remediated to Background	1769776.609	5908937.479
	MCC00006404/9	No Contamination Issues Recorded	1768587.184	5905563.984
	MCC000H143506	No Contamination Issues Recorded	1769240.55	5906707.038
	MCC0006405/56	No Contamination Issues Recorded	1768749.267	5905606.351
	MCC000H163581	Remediated to Background	1769948.054	5908934.461
	MCC000H201219	Remediated to Background	1769715.564	5908671.128
	MCC000H200625	Remediated to Background	1769907.276	5908795.556

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	MCC000H201284	Remediated to Background	1769780.138	5908675.198
	MCC000H201223	Remediated to Background	1769781.636	5908656.05
	MCC000H144471	No Contamination Issues Recorded	1769364.115	5906855.477
	MCC000H145776	No Contamination Issues Recorded	1769410.137	5906868.447
	MCC000H145808	No Contamination Issues Recorded	1769490.121	5907074.799
	MCC000H150644	No Contamination Issues Recorded	1769145.097	5906420.222
	MCC0006432/33	No Contamination Issues Recorded	1768933.359	5905359.935
	MCC000H200613	Remediated to Background	1769920.524	5908845.197
	MCC000H145785	No Contamination Issues Recorded	1769429.108	5907001.804
	MCC000H201253	Remediated to Background	1769813.335	5908558.249
	MCC000H136565	No Contamination Issues Recorded	1769280.666	5906508.681
	MCC000H201238	Remediated to Background	1769665.977	5908580.082
	MCC006162/142	No Contamination Issues Recorded	1768811.493	5905606.302
	MCC0006430/21	No Contamination Issues Recorded	1768439.781	5905090.812
	MCC0006137/54	No Contamination Issues Recorded	1768700.973	5905104.379
	MCC0006433/23	No Contamination Issues Recorded	1769051.222	5905494.886
	MCC000H143508	No Contamination Issues Recorded	1769266.242	5906675.183
	MCC000H145656	No Contamination Issues Recorded	1769380.785	5906635.701
	MCC00006403/7	No Contamination Issues Recorded	1768600.338	5905653.008
	MCC006111/137	No Contamination Issues Recorded	1768859.893	5905244.407
	MCC0006433/16	No Contamination Issues Recorded	1769065.043	5905440.151
	MCC0006435/15	No Contamination Issues Recorded	1769074.665	5905603.995
	MCC000H143438	No Contamination Issues Recorded	1769143.519	5906667.76
	MCC006101/177	No Contamination Issues Recorded	1769047.132	5905729.517
	MCC000H200178	Remediated to Background	1769898.839	5908977.965
	MCC000H201153	Remediated to Background	1769859.723	5908842.179
	MCC00006404/3	No Contamination Issues Recorded	1768548.844	5905540.116
	MCC000H145781	No Contamination Issues Recorded	1769405.99	5906963.992
	MCC000H140231	No Contamination Issues Recorded	1769293.187	5906461.127
	MCC0006435/10	No Contamination Issues Recorded	1769047.368	5905687.945
	MCC000H201230	Remediated to Background	1769748.9	5908621.92
	MCC000H201177	Remediated to Background	1769760.512	5908766.565
	MCC000H143478	No Contamination Issues Recorded	1769220.359	5906768.649
	MCC006101/189	No Contamination Issues Recorded	1769134.136	5905662.541
	MCC0006137/57	No Contamination Issues Recorded	1768716.031	5905251.422
	MCC0006137/60	No Contamination Issues Recorded	1768676.971	5905159.313
	MCC000H143511	No Contamination Issues Recorded	1769294.813	5906626.153
	MCC000H200177	Remediated to Background	1769899.161	5908989.508
	MCC000H145798	No Contamination Issues Recorded	1769492.05	5907102.121

	MCC00006136/6	No Contamination Issues Recorded	1768832.116	5905117.295
	MCC0006137/47	No Contamination Issues Recorded	1768752.562	5905160.576
	MCC000H201242	Remediated to Background	1769761.116	5908515.952
	MCC0006401/56	No Contamination Issues Recorded	1768499.533	5905475.809
	MCC000H163568	Remediated to Background	1769981.45	5909028.929
	MCC000H201218	Remediated to Background	1769684.569	5908648.986
	MCC0006405/42	No Contamination Issues Recorded	1768787.322	5905720.202
	MCC000H145648	No Contamination Issues Recorded	1769367.833	5906682.543
	MCC000H136586	No Contamination Issues Recorded	1769256.891	5906547.961
	MCC0006421/62	No Contamination Issues Recorded	1768573.402	5905133.475
	MCC0006430/12	No Contamination Issues Recorded	1768512.99	5905028.038
	MCC000H200918	Remediated to Background	1769834.852	5908562.579
	MCC000H201215	Remediated to Background	1769706.941	5908686.769
	MCC000H144514	No Contamination Issues Recorded	1769370.619	5907114.144
	MCC000H143484	No Contamination Issues Recorded	1769279.29	5906770.873
	MCC000H201184	Remediated to Background	1769728.014	5908729.773
	MCC000H201192	Remediated to Background	1769752.263	5908930.546
	MCC0006405/19	No Contamination Issues Recorded	1768751.948	5905846.482
	MCC000H201164	Remediated to Background	1769745.388	5908814.691
	MCC000H144573	No Contamination Issues Recorded	1769241.214	5907007.366
	MCC000H201317	Remediated to Background	1769851.144	5908966.904
	MCC0006431/55	No Contamination Issues Recorded	1768817.971	5905332.345
	MCC000H143445	No Contamination Issues Recorded	1769198.518	5906714.952
	MCC000H201207	Remediated to Background	1769736.17	5908932.044
	MCC0006162/93	No Contamination Issues Recorded	1768401.221	5905293.932
	MCC0006432/11	No Contamination Issues Recorded	1769060.699	5905364.516
	MCC006162/162	No Contamination Issues Recorded	1768825.639	5905748.405
	MCC000H163499	Remediated to Background	1769941.253	5909063.139
	MCC0006402/15	No Contamination Issues Recorded	1768713.695	5905758.976
	MCC006111/147	No Contamination Issues Recorded	1768945.338	5905180.037
	MCC0006431/30	No Contamination Issues Recorded	1768926.879	5905435.285
	MCC000H163515	Remediated to Background	1769873.394	5908917.691
	MCC000H140362	No Contamination Issues Recorded	1769305.173	5906315.754
	MCC000H201225	Remediated to Background	1769820.926	5908657.433
	MCC000H144563	No Contamination Issues Recorded	1769268.507	5907078.129
	MCC000H163518	Remediated to Background	1769911.662	5909025.885
	MCC0006432/48	No Contamination Issues Recorded	1768918.387	5905312.212
	MCC000H201155	Remediated to Background	1769810.973	5908833.03
	MCC00006436/4	No Contamination Issues Recorded	1768646.818	5905071.777
	MCC000H130554	No Contamination Issues Recorded	1768985.912	5906031.194
	MCC000H201151	Remediated to Background	1769818.054	5908861.521
	MCC000H163508	Remediated to Background	1769795.98	5908996.04

	MCC000H150954	No Contamination Issues Recorded	1769178.474	5906454.622
	MCC000H200927	Remediated to Background	1769935.49	5908706.624
	MCC000H144570	No Contamination Issues Recorded	1769320.744	5906998.823
	MCC000H144489	No Contamination Issues Recorded	1769322.698	5906896.35
	MCC006101/155	No Contamination Issues Recorded	1768787.344	5905928.001
	MCC000H144513	No Contamination Issues Recorded	1769367.741	5907097.061
	MCC0006137/70	No Contamination Issues Recorded	1768643.16	5905247.385
	MCC0006430/11	No Contamination Issues Recorded	1768504.45	5905155.174
	MCC0006405/94	No Contamination Issues Recorded	1768564.552	5905464.213
	MCC000H144567	No Contamination Issues Recorded	1769279.749	5907043.372
	MCC00006438/8	No Contamination Issues Recorded	1768473.568	5905264.468
	MCC000H163539	Remediated to Background	1770026.509	5909073.112
	MCC000H145684	No Contamination Issues Recorded	1769366.425	5906764.345
	MCC000H136564	No Contamination Issues Recorded	1769299.898	5906514.398
	MCC0006162/82	No Contamination Issues Recorded	1768525.089	5905349.413
	MCC000H136576	No Contamination Issues Recorded	1769312.957	5906463.481
	MCC000H143464	No Contamination Issues Recorded	1769321.113	5906796.984
	MCC000H150633	No Contamination Issues Recorded	1769235.783	5906330.846
	MCC000H144505	No Contamination Issues Recorded	1769454.38	5907193.357
	MCC0006421/70	No Contamination Issues Recorded	1768544.581	5905237.365
	MCC000H143494	No Contamination Issues Recorded	1769328.928	5906686.305
	MCC000H201255	Remediated to Background	1769774.187	5908560.739
	MCC0006437/16	No Contamination Issues Recorded	1768450.548	5905123.581
	MCC000H163513	Remediated to Background	1769837.615	5908930.483
	MCC006137/61R	No Contamination Issues Recorded	1768706.234	5905305.409
	MCC0006432/35	No Contamination Issues Recorded	1768916.084	5905366.825
	MCC000H201228	Remediated to Background	1769778.933	5908627.236
	MCC000H144574	No Contamination Issues Recorded	1769239.268	5906983.273
	MCC0006111/74	No Contamination Issues Recorded	1768384.051	5905491.045
	MCC000H143516	No Contamination Issues Recorded	1769255.8	5906638.59
	MCC000H153982	Hazardous Activities and Industries List (HAIL) Si	1769418.432	5907656.569
	MCC000H200982	Remediated to Background	1769763.483	5908974.368
	MCC000H144483	No Contamination Issues Recorded	1769323.731	5906977.309
	MCC006111/143	No Contamination Issues Recorded	1768912.69	5905192.738
	MCC0006430/13	No Contamination Issues Recorded	1768481.113	5905144.126
	MCC000H201178	Remediated to Background	1769745.797	5908769.459
	MCC000H143894	No Contamination Issues Recorded	1769231.94	5906173.78
	MCC0006405/44	No Contamination Issues Recorded	1768781.886	5905703.939
	MCC000H143512	No Contamination Issues Recorded	1769238.732	5906687.01

	MCC000H201211	Remediated to Background	1769768.648	5908696.867
	MCC000H143901	No Contamination Issues Recorded	1769263.578	5906130.141
	MCC006162/152	No Contamination Issues Recorded	1768827.401	5905660.774
	MCC000H145816	No Contamination Issues Recorded	1769504.483	5907165.983
	MCC0006435/11	No Contamination Issues Recorded	1769044.21	5905627.437
	MCC000H201186	Remediated to Background	1769763.432	5908722.886
	MCC000H144473	No Contamination Issues Recorded	1769325.449	5906849.431
	MCC000H150643	No Contamination Issues Recorded	1769157.473	5906405.428
	MCC0006431/34	No Contamination Issues Recorded	1768894.031	5905422.706
	MCC0006405/47	No Contamination Issues Recorded	1768691.42	5905598.217
	MCC0006435/22	No Contamination Issues Recorded	1769134.369	5905620.963
	MCC000H145803	No Contamination Issues Recorded	1769440.205	5907066.791
	MCC0006405/26	No Contamination Issues Recorded	1768808.229	5905863.347
	MCC000H150630	No Contamination Issues Recorded	1769262.619	5906377.465
	MCC000H144565	No Contamination Issues Recorded	1769258.598	5907056.3
	MCC000H143451	No Contamination Issues Recorded	1769209.293	5906829.914
	MCC000H200917	Remediated to Background	1769836.021	5908577.53
	MCC000H201167	Remediated to Background	1769740.689	5908794.375
	MCC0006111/84	No Contamination Issues Recorded	1768519.185	5905437.078
	MCC0006403/10	No Contamination Issues Recorded	1768638.231	5905696.073
	MCC000H163517	Remediated to Background	1769930.71	5909023.425
	MCC06101/157W	No Contamination Issues Recorded	1768797.597	5905897.908
	MCC06111/104A	No Contamination Issues Recorded	1768683.277	5905402.345
	MCC000H145771	No Contamination Issues Recorded	1769446.526	5906934.463
	MCC000H130557	No Contamination Issues Recorded	1768997.858	5906081.077
	MCC000H201191	Remediated to Background	1769748.594	5908915.486
	MCC006112/37R	No Contamination Issues Recorded	1768292.072	5905656.504
	MCC000H201221	Remediated to Background	1769742.202	5908646.985
	MCC000H201124	Remediated to Background	1769769.824	5908914.425
	MCC000H143446	No Contamination Issues Recorded	1769204.862	5906734.509
	MCC006162/104	No Contamination Issues Recorded	1768722.261	5905425.429
	MCC0006404/12	No Contamination Issues Recorded	1768631.148	5905605.081
	MCC000H144539	No Contamination Issues Recorded	1769335.671	5907201.372
	MCC0006401/66	No Contamination Issues Recorded	1768464.127	5905361.239
	MCC000H144526	No Contamination Issues Recorded	1769326.656	5907133.069
	MCC0006432/40	No Contamination Issues Recorded	1768986.38	5905285.111
	MCC0006137/51	No Contamination Issues Recorded	1768739.191	5905198.313
	MCC006101/153	No Contamination Issues Recorded	1768773.836	5905938.403
	MCC000H136563	No Contamination Issues Recorded	1769320.871	5906516.27
	MCC000H144541	No Contamination Issues Recorded	1769351.106	5907194.673

	MCC000H150622	No Contamination Issues Recorded	1769196.907	5906287.848
	MCC0006435/23	No Contamination Issues Recorded	1769120.589	5905568.646
	MCC000H163505	Remediated to Background	1769813.691	5909066.039
	MCC000H143892	No Contamination Issues Recorded	1769262.827	5906188.723
	MCC006111/102	No Contamination Issues Recorded	1768662.247	5905380.389
	MCC000H201213	Remediated to Background	1769737.811	5908700.063
	MCC000H138763	No Contamination Issues Recorded	1768823.916	5905178.432
	MCC000H143459	No Contamination Issues Recorded	1769235.759	5906926.798
	MCC0006405/45	No Contamination Issues Recorded	1768696.69	5905615.189
	MCC000H201161	Remediated to Background	1769724.13	5908850.951
	MCC000H138918	No Contamination Issues Recorded	1769341.848	5906587.686
	MCC000H136566	No Contamination Issues Recorded	1769262.048	5906498.55
	MCC006162/108	No Contamination Issues Recorded	1768745.15	5905412.83
	MCC0006433/21	No Contamination Issues Recorded	1769066.597	5905527.47
	MCC000H200612	Remediated to Background	1769946.006	5908844.723
	MCC0006111/78	No Contamination Issues Recorded	1768415.67	5905478.554
	MCC0006433/25	No Contamination Issues Recorded	1769033.59	5905499.107
	MCC00006405/8	No Contamination Issues Recorded	1768684.529	5905962.137
	MCC06111/104D	No Contamination Issues Recorded	1768789.975	5905328.8
	MCC000H143497	No Contamination Issues Recorded	1769309.344	5906690.211
	MCC0006434/11	No Contamination Issues Recorded	1768978.79	5905382.079
	MCC006162/136	No Contamination Issues Recorded	1768769.445	5905570.867
	MCC0006433/27	No Contamination Issues Recorded	1769015.958	5905503.328
	MCC00006403/8	No Contamination Issues Recorded	1768622.091	5905701.372
	MCC000H145805	No Contamination Issues Recorded	1769470.098	5907055.593
	MCC0006431/19	No Contamination Issues Recorded	1768895.594	5905656.566
	MCC0006405/34	No Contamination Issues Recorded	1768809.15	5905788.969
	MCC000H143474	No Contamination Issues Recorded	1769175.734	5906786.582
	MCC000H201279	Remediated to Background	1769761.864	5908583.904
	MCC0006433/19	No Contamination Issues Recorded	1769071.822	5905489.955
	MCC00006402/5	No Contamination Issues Recorded	1768629.986	5905798.16
	MCC0006405/39	No Contamination Issues Recorded	1768711.832	5905662.953
	MCC0006401/55	No Contamination Issues Recorded	1768451.552	5905512.482
	MCC000H130571	No Contamination Issues Recorded	1769053.769	5906314.033
	MCC06101/173A	No Contamination Issues Recorded	1769007.453	5905728.03
	MCC0006136/12	No Contamination Issues Recorded	1768802.391	5905162.997
	MCC000H150635	No Contamination Issues Recorded	1769203.201	5906373.698
	MCC0006421/59	No Contamination Issues Recorded	1768621.379	5905050.999
	MCC000H150640	No Contamination Issues Recorded	1769162.372	5906311.748
	MCC0006137/50	No Contamination Issues Recorded	1768714.932	5905069.854
	MCC0006438/10	No Contamination Issues Recorded	1768498.446	5905260.001
	MCC0006401/62	No Contamination Issues Recorded	1768475.955	5905398.538

	MCC0006433/32	No Contamination Issues Recorded	1768932.104	5905471.976
	MCC0006431/38	No Contamination Issues Recorded	1768881.079	5905380.353
	MCC000H201278	Remediated to Background	1769743.661	5908580.594
	MCC0006137/59	No Contamination Issues Recorded	1768714.43	5905274.049
	MCC0006431/49	No Contamination Issues Recorded	1768830.739	5905385.709
	MCC000H140359	No Contamination Issues Recorded	1769310.994	5906368.948
	MCC000H144569	No Contamination Issues Recorded	1769313.455	5907039.304
	MCC000H150639	No Contamination Issues Recorded	1769166.168	5906334.779
	MCC000H145802	No Contamination Issues Recorded	1769437.311	5907089.92
	MCC000H130563	No Contamination Issues Recorded	1769021.751	5906180.856
	MCC000H201236	Remediated to Background	1769670.609	5908602.487
	MCC000H201159	Remediated to Background	1769747.738	5908847.162
	MCC000H140365	No Contamination Issues Recorded	1769315.038	5906313.157
	MCC000H201262	Remediated to Background	1769723.013	5908578.037
	MCC000H143452	No Contamination Issues Recorded	1769195.146	5906832.669
	MCC0006137/52	No Contamination Issues Recorded	1768707.809	5905087.469
	MCC000H150951	No Contamination Issues Recorded	1769195.593	5906476.553
	MCC000H200175	Remediated to Background	1769874.545	5908994.692
	MCC000H143465	No Contamination Issues Recorded	1769306.676	5906789.814
	MCC000H144519	No Contamination Issues Recorded	1769314.911	5907097.788
	MCC006101/179	No Contamination Issues Recorded	1769061.632	5905718.357
	MCC000H163504	Remediated to Background	1769835.919	5909065.299
	MCC000H164957	Remediated to Background	1769878.762	5908996.986
	MCC006162/147	No Contamination Issues Recorded	1768956.794	5905911.641
	MCC000H144524	No Contamination Issues Recorded	1769321.606	5907118.651
	MCC000H201260	Remediated to Background	1769698.162	5908558.605
	MCC000H144484	No Contamination Issues Recorded	1769298.578	5906973.73
	MCC000H144522	No Contamination Issues Recorded	1769281.67	5907121.586
	MCC0006405/58	No Contamination Issues Recorded	1768743.831	5905590.087
	MCC0006404/10	No Contamination Issues Recorded	1768615.093	5905610.45
	MCC000H143456	No Contamination Issues Recorded	1769209.087	5906872.967
	MCC000H150651	No Contamination Issues Recorded	1769247.798	5906487.422
	MCC000H150634	No Contamination Issues Recorded	1769215.356	5906351.582
	MCC000H136562	No Contamination Issues Recorded	1769335.601	5906513.802
	MCC006101/149	No Contamination Issues Recorded	1768746.82	5905959.209
	MCC000H201742	Remediated to Background	1769695.752	5908499.908
	MCC000H144494	No Contamination Issues Recorded	1769257.497	5906900.815
	MCC000H130570	No Contamination Issues Recorded	1769049.626	5906297.273

	MCC000H150623	No Contamination Issues Recorded	1769224.047	5906293.68
	MCC000H201280	Remediated to Background	1769779.621	5908587.015
	MCC0006431/53	No Contamination Issues Recorded	1768822.226	5905350.132
	MCC0006432/46	No Contamination Issues Recorded	1768935.386	5905305.437
	MCC0006421/81	No Contamination Issues Recorded	1768613.669	5905214.665
	MCC0006433/20	No Contamination Issues Recorded	1769041.582	5905406.794
	MCC0006404/15	No Contamination Issues Recorded	1768610.012	5905556.715
	MCC000H200176	Remediated to Background	1769886.942	5908991.992
	MCC000H143454	No Contamination Issues Recorded	1769248.642	5906879.54
	MCC000H201194	Remediated to Background	1769759.388	5908959.696
	MCC006101/151	No Contamination Issues Recorded	1768760.328	5905948.806
	MCC0006111/60	No Contamination Issues Recorded	1768268.831	5905536.551
	MCC0006405/54	No Contamination Issues Recorded	1768754.703	5905622.615
	MCC000H150649	No Contamination Issues Recorded	1769163.71	5906468.064
	MCC000H200933	Remediated to Background	1769886.673	5908655.481
	MCC000H143448	No Contamination Issues Recorded	1769257.507	5906814.683
	MCC000H144544	No Contamination Issues Recorded	1769357.799	5907218.512
	MCC000H144552	No Contamination Issues Recorded	1769398.757	5906987.16
	MCC0006431/14	No Contamination Issues Recorded	1768948.841	5905651.609
	MCC000H144550	No Contamination Issues Recorded	1769389.642	5907032.879
	MCC00006435/3	No Contamination Issues Recorded	1768978.218	5905661.606
	MCC000H130565	No Contamination Issues Recorded	1769029.714	5906214.118
	MCC000H145650	No Contamination Issues Recorded	1769388.646	5906657.473
	MCC006162/157	No Contamination Issues Recorded	1768976.455	5905993.733
	MCC00006431/8	No Contamination Issues Recorded	1768967.322	5905728.799
	MCC0006136/16	No Contamination Issues Recorded	1768772.916	5905192.76
	MCC0006421/60	No Contamination Issues Recorded	1768570.773	5905093.052
	MCC0006162/80	No Contamination Issues Recorded	1768494.506	5905359.777
	MCC0006405/31	No Contamination Issues Recorded	1768736.527	5905736.765
	MCC00006438/3	No Contamination Issues Recorded	1768431.983	5905191.32
	MCC0006421/67	No Contamination Issues Recorded	1768661.248	5905110.371
	MCC000H140356	No Contamination Issues Recorded	1769275.963	5906412.667
	MCC000H143482	No Contamination Issues Recorded	1769256.521	5906741.909
	MCC000H150704	No Contamination Issues Recorded	1769255.173	5906516.91
	MCC0006431/36	No Contamination Issues Recorded	1768889.472	5905403.663
	MCC0006404/19	No Contamination Issues Recorded	1768643.358	5905548.695
	MCC0006431/11	No Contamination Issues Recorded	1768913.14	5905729.856
	MCC000H201179	Remediated to Background	1769731.142	5908772.656
	MCC000H136589	No Contamination Issues Recorded	1769246.067	5906596.496

	MCC000H201216	Remediated to Background	1769691.786	5908678.619
	MCC006162/154	No Contamination Issues Recorded	1768831.817	5905677.486
	MCC000H145788	No Contamination Issues Recorded	1769458.833	5907018.471
	MCC0006405/60	No Contamination Issues Recorded	1768738.394	5905573.823
	MCC000H201318	Remediated to Background	1769865.738	5908961.684
	MCC000H144537	No Contamination Issues Recorded	1769315.848	5907230.035
	MCC0006137/45	No Contamination Issues Recorded	1768759.87	5905142.501
	MCC000H143476	No Contamination Issues Recorded	1769221.361	5906800.153
	MCC0006435/16	No Contamination Issues Recorded	1769090.867	5905654.453
	MCC006162/138	No Contamination Issues Recorded	1768778.246	5905598.821
	MCC000H150701	No Contamination Issues Recorded	1769179.084	5906491.099
	MCC000H130567	No Contamination Issues Recorded	1769037.675	5906247.381
	MCC000H145813	No Contamination Issues Recorded	1769482.03	5907188.08
	MCC00006404/1	No Contamination Issues Recorded	1768527.753	5905586.127
	MCC006101/141	No Contamination Issues Recorded	1768692.791	5906000.821
	MCC00006437/4	No Contamination Issues Recorded	1768401.312	5905263.142
	MCC000H150250	No Contamination Issues Recorded	1769195.309	5906236.431
	MCC0006405/28	No Contamination Issues Recorded	1768803.667	5905834.157
	MCC000H144477	No Contamination Issues Recorded	1769357.874	5906874.304
	MCC000H150641	No Contamination Issues Recorded	1769183.446	5906309.565
	MCC0006421/79	No Contamination Issues Recorded	1768619.425	5905197.858
	MCC000H150620	No Contamination Issues Recorded	1769207.543	5906258.106
	MCC00006435/9	No Contamination Issues Recorded	1769029.71	5905638.6
	MCC000H144556	No Contamination Issues Recorded	1769363.221	5907017.123
	MCC006162/120	No Contamination Issues Recorded	1768774.711	5905481.842
	MCC000H144562	No Contamination Issues Recorded	1769286.706	5907070.448
	MCC006162/110	No Contamination Issues Recorded	1768758.558	5905435.49
	MCC000H201158	Remediated to Background	1769766.677	5908845.12
	MCC000H163500	Remediated to Background	1769921.794	5909067.891
	MCC000H144527	No Contamination Issues Recorded	1769339.144	5907152.077
	MCC000H144488	No Contamination Issues Recorded	1769314.774	5906912.06
	MCC000H200931	Remediated to Background	1769926.679	5908640.326
	MCC006101/143	No Contamination Issues Recorded	1768706.298	5905990.418
	MCC000H201250	Remediated to Background	1769814.639	5908489.074
	MCC0006405/38	No Contamination Issues Recorded	1768798.193	5905752.73
	MCC0006111/82	No Contamination Issues Recorded	1768491.418	5905440.679
	MCC0006437/12	No Contamination Issues Recorded	1768431.07	5905164.401
	MCC000H143435	No Contamination Issues Recorded	1769178.996	5906651.132
	MCC006111/110	No Contamination Issues Recorded	1768878.962	5905292.605
	MCC000H140355	No Contamination Issues Recorded	1769304.607	5906432.326

	MCC000H136582	No Contamination Issues Recorded	1769321.464	5906546.886
	MCC000H143437	No Contamination Issues Recorded	1769157.914	5906664.197
	MCC0006435/19	No Contamination Issues Recorded	1769085.299	5905557.508
	MCC000H163579	Remediated to Background	1769981.863	5908951.935
	MCC000H144542	No Contamination Issues Recorded	1769366.434	5907189.665
	MCC0006421/73	No Contamination Issues Recorded	1768623.537	5905147.093
	MCC0006402/11	No Contamination Issues Recorded	1768678.813	5905783.921
	MCC000H201209	Remediated to Background	1769799.739	5908696.92
	MCC000H150642	No Contamination Issues Recorded	1769210.878	5906311.692
	MCC0006433/28	No Contamination Issues Recorded	1768968.606	5905463.239
	MCC000H144512	No Contamination Issues Recorded	1769398.864	5907092.287
	MCC000H163510	Remediated to Background	1769786.036	5908958.741
	MCC000H144557	No Contamination Issues Recorded	1769353.002	5907041.308
	MCC000H143469	No Contamination Issues Recorded	1769324.216	5906770.697
	MCC000H144511	No Contamination Issues Recorded	1769399.9	5907114.181
	MCC000H201282	Remediated to Background	1769816.476	5908587.305
	MCC00006435/6	No Contamination Issues Recorded	1769012.543	5905701.279
	MCC000H144575	No Contamination Issues Recorded	1769260.807	5906977.636
	MCC000H144485	No Contamination Issues Recorded	1769300.811	5906956.609
	MCC000H145685	No Contamination Issues Recorded	1769375.554	5906746.402
	MCC000H163580	Remediated to Background	1769959.014	5908957.996
	MCC0006421/65	No Contamination Issues Recorded	1768628.453	5905106.699
	MCC000H145657	No Contamination Issues Recorded	1769363.198	5906616.903
	MCC00006431/6	No Contamination Issues Recorded	1768971.582	5905746.595
	MCC0006404/21	No Contamination Issues Recorded	1768671.142	5905544.494
	MCC000H201183	Remediated to Background	1769698.849	5908703.129
	MCC000H144531	No Contamination Issues Recorded	1769285.723	5907163.22
	MCC0006405/33	No Contamination Issues Recorded	1768728.311	5905712.208
	MCC0006402/10	No Contamination Issues Recorded	1768659.149	5905877.885
	MCC000H201426	Remediated to Background	1769994.348	5908988.247
	MCC000H150463	No Contamination Issues Recorded	1769223.669	5906190.946
	MCC000H163536	Remediated to Background	1769990.274	5909082.879
	MCC0006437/10	No Contamination Issues Recorded	1768412.852	5905177.442
	MCC000H144553	No Contamination Issues Recorded	1769393.558	5907007.416
	MCC000H138915	No Contamination Issues Recorded	1769293.057	5906599.538
	MCC000H200981	Remediated to Background	1769767.03	5908988.92
	MCC000H144497	No Contamination Issues Recorded	1769257.523	5906954.197
	MCC0006111/72	No Contamination Issues Recorded	1768368.241	5905497.29
	MCC0006435/18	No Contamination Issues Recorded	1769105.367	5905643.289
	MCC000H138916	No Contamination Issues Recorded	1769310.05	5906595.351

	MCC0006438/12	No Contamination Issues Recorded	1768502.495	5905243.379
	MCC0006162/95	No Contamination Issues Recorded	1768431.057	5905272.277
	MCC0006421/56	No Contamination Issues Recorded	1768568.335	5905058.746
	MCC006162/166	No Contamination Issues Recorded	1768853.174	5905755.008
	MCC00006136/9	No Contamination Issues Recorded	1768918.512	5905160.794
	MCC000H143444	No Contamination Issues Recorded	1769169.193	5906760.972
	MCC0006431/33	No Contamination Issues Recorded	1768864.885	5905528.33
	MCC000H144555	No Contamination Issues Recorded	1769367.141	5907003.004
	MCC000H144571	No Contamination Issues Recorded	1769297.958	5906995.738
	MCC000H130566	No Contamination Issues Recorded	1769033.686	5906230.75
	MCC000H201113	Remediated to Background	1769839.784	5908628.766
	MCC006111/127	No Contamination Issues Recorded	1768589.72	5905345.141
	MCC0006137/55	No Contamination Issues Recorded	1768722.204	5905235.392
	MCC000H144498	No Contamination Issues Recorded	1769236.497	5906953.942
	MCC006111/122	No Contamination Issues Recorded	1768980.998	5905251.921
	MCC000H145817	No Contamination Issues Recorded	1769506.952	5907141.515
	MCC000H145775	No Contamination Issues Recorded	1769404.456	5906886.125
	MCC000H201180	Remediated to Background	1769713.455	5908774.554
	MCC000H163553	Remediated to Background	1770008.039	5909036.802
	MCC000H201257	Remediated to Background	1769743.889	5908555.07
	MCC006111/112	No Contamination Issues Recorded	1768895.967	5905285.824
	MCC000H163514	Remediated to Background	1769855.504	5908924.087
	MCC000H200942	Remediated to Background	1769907.572	5908575.765
	MCC000H144535	No Contamination Issues Recorded	1769288.822	5907214.568
	MCC000H201234	Remediated to Background	1769675.683	5908633.577
	MCC0006405/11	No Contamination Issues Recorded	1768696.79	5905886.593
	MCC006101/159	No Contamination Issues Recorded	1768815.807	5905906.084
	MCC000H163522	Remediated to Background	1769873.899	5909029.787
	MCC000H145767	No Contamination Issues Recorded	1769438.032	5906867.379
	MCC00006434/2	No Contamination Issues Recorded	1769004.273	5905454.693
	MCC000H144475	No Contamination Issues Recorded	1769289.778	5906831.484
	MCC000H201281	Remediated to Background	1769798.615	5908585.97
	MCC0006405/30	No Contamination Issues Recorded	1768800.981	5905821.51
	MCC000H144492	No Contamination Issues Recorded	1769294.218	5906867.987
	MCC0006433/33	No Contamination Issues Recorded	1768943.688	5905520.627
	MCC000H201024	Remediated to Background	1769880.187	5908956.518
	MCC000H201227	Remediated to Background	1769795.639	5908629.699
	MCC0006401/52	No Contamination Issues Recorded	1768537.681	5905488.418
	MCC0006405/21	No Contamination Issues Recorded	1768753.012	5905824.545
	MCC00006403/9	No Contamination Issues Recorded	1768616.47	5905647.636
	MCC000H144479	No Contamination Issues Recorded	1769346.29	5906909.25
	MCC000H201210	Remediated to Background	1769783.658	5908697.089

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	MCC0006111/68	No Contamination Issues Recorded	1768331.324	5905511.872
	MCC000H144577	No Contamination Issues Recorded	1769309.667	5907066.192
	MCC000H145768	No Contamination Issues Recorded	1769433.308	5906886.123
	MCC000H150645	No Contamination Issues Recorded	1769132.318	5906431.432
	MCC00006436/6	No Contamination Issues Recorded	1768672.203	5905080.359
	MCC000H145769	No Contamination Issues Recorded	1769437.832	5906904.287
	MCC0006430/19	No Contamination Issues Recorded	1768455.757	5905098.09
	MCC00006404/5	No Contamination Issues Recorded	1768554.721	5905572.292
	MCC000H150465	No Contamination Issues Recorded	1769223.242	5906268.248
	MCC0006403/18	No Contamination Issues Recorded	1768677.983	5905655.38
	MCC006111/149	No Contamination Issues Recorded	1768975.291	5905198.354
	MCC000H144507	No Contamination Issues Recorded	1769432.842	5907155.359
	MCC000H200930	Remediated to Background	1769930.73	5908663.577
	MCC000H201252	Remediated to Background	1769826.957	5908516.307
	MCC000H201165	Remediated to Background	1769721.224	5908806.369
	MCC000H145787	No Contamination Issues Recorded	1769451.336	5907001.537
	MCC000H143509	No Contamination Issues Recorded	1769264.982	5906658.967
	MCC000H200509	Remediated to Background	1769928.697	5908776.706
	MCC0006405/66	No Contamination Issues Recorded	1768723.78	5905521.806
	MCC000H163525	Remediated to Background	1769838.695	5908994.811
	MCC00006434/8	No Contamination Issues Recorded	1769008.841	5905384.759
	MCC0006405/68	No Contamination Issues Recorded	1768717.544	5905505.048
	MCC0006405/57	No Contamination Issues Recorded	1768629.747	5905502.908
	MCC000H201176	Remediated to Background	1769775.775	5908763.894
	MCC000H145639	No Contamination Issues Recorded	1769400.552	5906754.963
	MCC006101/169	No Contamination Issues Recorded	1768980.552	5905787.256
	MCC000H163516	Remediated to Background	1769891.856	5908912.256
	MCC000H201173	Remediated to Background	1769832.336	5908760.735
	MCC000H144482	No Contamination Issues Recorded	1769328.9	5906961.715
	MCC000H144516	No Contamination Issues Recorded	1769389.061	5907146.275
	MCC000H201112	Remediated to Background	1769843.724	5908693.566
	MCC000H201241	Remediated to Background	1769737.556	5908515.523
	MCC000H150618	No Contamination Issues Recorded	1769261.481	5906275.225
	MCC000H145814	No Contamination Issues Recorded	1769480.666	5907167.109
	MCC006162/156	No Contamination Issues Recorded	1768812.554	5905706.776
	MCC000H143455	No Contamination Issues Recorded	1769232.925	5906867.181
	MCC000H145774	No Contamination Issues Recorded	1769402.1	5906901.825
	MCC0006431/25	No Contamination Issues Recorded	1768882.439	5905601.602
	MCC0006137/58	No Contamination Issues Recorded	1768683.375	5905141.226
	MCC000H200940	Remediated to Background	1769877.146	5908578.147
	MCC0006431/20	No Contamination Issues Recorded	1768922.266	5905540.541
	MCC0006404/16	No Contamination Issues Recorded	1768663.255	5905594.345
	MCC000H201256	Remediated to Background	1769758.633	5908557.835

	MCC000H144518	No Contamination Issues Recorded	1769311.926	5907081.803
	MCC0006431/28	No Contamination Issues Recorded	1768899.713	5905446.429
	MCC0006403/11	No Contamination Issues Recorded	1768631.252	5905642.444
	MCC0006435/13	No Contamination Issues Recorded	1769058.71	5905616.274
	MCC000H143477	No Contamination Issues Recorded	1769194.79	5906773.551
	MCC0006435/14	No Contamination Issues Recorded	1769076.367	5905665.616
	MCC000H200508	Remediated to Background	1769903.012	5908775.872
	MCC0006136/19	No Contamination Issues Recorded	1768830.051	5905223.911
	MCC006111/118	No Contamination Issues Recorded	1768946.985	5905265.482
	MCC0006401/48	No Contamination Issues Recorded	1768509.645	5905515.335
	MCC000H145789	No Contamination Issues Recorded	1769464.562	5907034.178
	MCC0006405/76	No Contamination Issues Recorded	1768686.92	5905438.087
	MCC006162/170	No Contamination Issues Recorded	1768861.899	5905788.436
	MCC000H145804	No Contamination Issues Recorded	1769441.54	5907050.429
	MCC006162/155	No Contamination Issues Recorded	1768970.058	5905967.021
	MCC000H143499	No Contamination Issues Recorded	1769322.524	5906655.407
	MCC000H150631	No Contamination Issues Recorded	1769275.833	5906365.156
	MCC000H200514	Remediated to Background	1769893.437	5908737.505
	MCC00006430/5	No Contamination Issues Recorded	1768537.519	5905131.655
	MCC006101/171	No Contamination Issues Recorded	1769000.76	5905766.849
	MCC000H201261	Remediated to Background	1769703.947	5908581.895
	MCC006111/114	No Contamination Issues Recorded	1768912.973	5905279.043
	MCC00006431/7	No Contamination Issues Recorded	1768921.912	5905766.502
	MCC0006435/25	No Contamination Issues Recorded	1769110.709	5905539.369
	MCC000H201226	Remediated to Background	1769817.846	5908630.447
	MCC000H145638	No Contamination Issues Recorded	1769390.098	5906774.308
	MCC000H201185	Remediated to Background	1769744.944	5908727.099
	MCC000H201119	Remediated to Background	1769851.394	5908899.533
	MCC000H143510	No Contamination Issues Recorded	1769275.659	5906634.41
	MCC000H201294	Remediated to Background	1769819.984	5908465.313
	MCC000H143441	No Contamination Issues Recorded	1769167.879	5906702.953
	MCC0006405/72	No Contamination Issues Recorded	1768687.363	5905479.844
	MCC0006403/12	No Contamination Issues Recorded	1768658.317	5905692.602
	MCC0006136/13	No Contamination Issues Recorded	1768883.728	5905200.194
	MCC000H143481	No Contamination Issues Recorded	1769244.741	5906801.117
	MCC0006431/37	No Contamination Issues Recorded	1768856.301	5905492.476
	MCC006162/114	No Contamination Issues Recorded	1768732.257	5905453.053
	MCC00006438/4	No Contamination Issues Recorded	1768431.77	5905242.048
	MCC000H150652	No Contamination Issues Recorded	1769262.371	5906434.577
	MCC000H201118	Remediated to Background	1769866.709	5908894.351
	MCC0006405/40	No Contamination Issues Recorded	1768792.759	5905736.466

	MCC000H145733	No Contamination Issues Recorded	1769426.737	5906808.74
	MCC0006405/35	No Contamination Issues Recorded	1768722.476	5905694.768
	MCC000H143475	No Contamination Issues Recorded	1769197.705	5906799.586
	MCC006162/118	No Contamination Issues Recorded	1768769.882	5905465.505
	MCC0006401/64	No Contamination Issues Recorded	1768468.315	5905379.003
	MCC000H163582	Remediated to Background	1769965.35	5908928.413
	MCC006136/20R	No Contamination Issues Recorded	1768769.516	5905257.469
	MCC000H201244	Remediated to Background	1769804.964	5908517.038
	MCC0006401/40	No Contamination Issues Recorded	1768523.225	5905568.429
	MCC000H163507	Remediated to Background	1769806.199	5909029.896
	MCC000H143449	No Contamination Issues Recorded	1769239.289	5906825.786
	MCC0006431/51	No Contamination Issues Recorded	1768826.481	5905367.92
	MCC000H150462	No Contamination Issues Recorded	1769253.299	5906216.754
	MCC0006421/74	No Contamination Issues Recorded	1768531.271	5905275.623
	MCC0006405/16	No Contamination Issues Recorded	1768738.857	5905920.923
	MCC000H143471	No Contamination Issues Recorded	1769358.734	5906734.471
	MCC000H201251	Remediated to Background	1769821.167	5908502.353
	MCC000H201249	Remediated to Background	1769804.225	5908476.693
	MCC0006432/37	No Contamination Issues Recorded	1768898.808	5905373.715
	MCC000H145647	No Contamination Issues Recorded	1769368.468	5906701.997
	MCC0006402/13	No Contamination Issues Recorded	1768698.113	5905777.107
	MCC000H200515	Remediated to Background	1769912.398	5908734.291
	MCC00006402/9	No Contamination Issues Recorded	1768662.818	5905789.757
	MCC000H144486	No Contamination Issues Recorded	1769304.796	5906940.32
	MCC0006421/69	No Contamination Issues Recorded	1768651.431	5905146.795
	MCC000H145646	No Contamination Issues Recorded	1769371.006	5906718.707
	MCC000H200938	Remediated to Background	1769884.723	5908597.866
	MCC000H201212	Remediated to Background	1769753.762	5908698.458
	MCC000H144487	No Contamination Issues Recorded	1769309.663	5906925.089
	MCC000H151349	No Contamination Issues Recorded	1769184.425	5906251.507
	MCC0006435/21	No Contamination Issues Recorded	1769106.088	5905579.81
	MCC000H163506	Remediated to Background	1769810.872	5909049.118
	MCC000H144568	No Contamination Issues Recorded	1769295.158	5907040.57
	MCC000H136561	No Contamination Issues Recorded	1769351.116	5906510.007
	MCC000H145772	No Contamination Issues Recorded	1769421.622	5906926.821
	MCC000H201189	Remediated to Background	1769757.485	5908746.446
	MCC006162/116	No Contamination Issues Recorded	1768738.977	5905474.064
	MCC00006436/8	No Contamination Issues Recorded	1768678.125	5905063.853
	MCC000H138917	No Contamination Issues Recorded	1769326.313	5906591.34
	MCC00006431/4	No Contamination Issues Recorded	1768974.272	5905765.353
	MCC000H201283	Remediated to Background	1769748.031	5908534.762
	MCC0006434/10	No Contamination Issues Recorded	1769000.574	5905367.594
	MCC000H140358	No Contamination Issues Recorded	1769299.516	5906382.508

	MCC000H144493	No Contamination Issues Recorded	1769276.001	5906874.998
	MCC000H201214	Remediated to Background	1769720.379	5908700.98
	MCC000H143514	No Contamination Issues Recorded	1769223.073	5906650.936
	MCC000H201193	Remediated to Background	1769755.822	5908945.12
	MCC000H143440	No Contamination Issues Recorded	1769193.491	5906696.882
	MCC06111/104C	No Contamination Issues Recorded	1768791.03	5905361.327
	MCC000H201217	Remediated to Background	1769688.236	5908664.045
	MCC00006435/5	No Contamination Issues Recorded	1768998.927	5905656.649
	MCC000H163503	Remediated to Background	1769856.444	5909068.108
	MCC000H200615	Remediated to Background	1769937.027	5908897.117
	MCC000H143450	No Contamination Issues Recorded	1769224.596	5906826.099
	MCC000H144490	No Contamination Issues Recorded	1769329.722	5906878.044
	MCC000H138764	No Contamination Issues Recorded	1768841.739	5905164.059
	MCC00006430/9	No Contamination Issues Recorded	1768505.198	5905120.097
	MCC006111/108	No Contamination Issues Recorded	1768861.49	5905299.571
	MCC0006401/57	No Contamination Issues Recorded	1768447.329	5905496.015
	MCC000H130569	No Contamination Issues Recorded	1769045.644	5906280.643
	MCC000H144504	No Contamination Issues Recorded	1769436.672	5907199.8
	MCC000H143504	No Contamination Issues Recorded	1769314.18	5906626.082
	MCC0006421/89	No Contamination Issues Recorded	1768587.346	5905279.132
	MCC00006437/6	No Contamination Issues Recorded	1768406.808	5905240.566
	MCC0006432/31	No Contamination Issues Recorded	1768950.635	5905353.046
	MCC000H144499	No Contamination Issues Recorded	1769218.446	5906956.428
	MCC0006421/83	No Contamination Issues Recorded	1768607.665	5905229.539
	MCC000H150627	No Contamination Issues Recorded	1769244.513	5906419.1
	MCC000H145777	No Contamination Issues Recorded	1769415.6	5906851.45
	MCC000H139415	No Contamination Issues Recorded	1768549.499	5905370.679
	MCC000H200510	Remediated to Background	1769946.396	5908772.714
	MCC000H163526	Remediated to Background	1769834.604	5908973.584
	MCC000H145799	No Contamination Issues Recorded	1769473.85	5907109.854
	MCC0006433/22	No Contamination Issues Recorded	1769041.308	5905445.829
	MCC000H140363	No Contamination Issues Recorded	1769279.273	5906324.943
	MCC0006433/35	No Contamination Issues Recorded	1768917.55	5905520.839
	MCC0006430/14	No Contamination Issues Recorded	1768492.647	5905055.01
	MCC000H144534	No Contamination Issues Recorded	1769288.978	5907236.708
	MCC0006401/46	No Contamination Issues Recorded	1768544.154	5905513.711
	MCC006111/120	No Contamination Issues Recorded	1768963.991	5905258.702
	MCC0006405/37	No Contamination Issues Recorded	1768717.153	5905678.853
	MCC0006111/76	No Contamination Issues Recorded	1768399.861	5905484.8
	MCC000H201243	Remediated to Background	1769781.954	5908521.204
	MCC0006136/11	No Contamination Issues Recorded	1768891.358	5905164.664
	MCC0006430/17	No Contamination Issues Recorded	1768471.863	5905103.771

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MCC000H201026	Remediated to Background	1769909.365	5908946.932
MCC0006402/20	No Contamination Issues Recorded	1768719.299	5905812.101
MCC0006437/18	No Contamination Issues Recorded	1768423.614	5905116.878
MCC006111/129	No Contamination Issues Recorded	1768609.89	5905343.691
MCC000H136575	No Contamination Issues Recorded	1769328.53	5906460.027
MCC000H143473	No Contamination Issues Recorded	1769323.303	5906716.585
MCC000H130572	No Contamination Issues Recorded	1769058.034	5906330.858
MCC000H143436	No Contamination Issues Recorded	1769182.484	5906665.394
MCC006111/115	No Contamination Issues Recorded	1768511.015	5905384.429
MCC000H144536	No Contamination Issues Recorded	1769310.156	5907209.478
MCC0006111/92	No Contamination Issues Recorded	1768582.908	5905411.702
MCC006162/144	No Contamination Issues Recorded	1768788.965	5905633.11
MCC000H144510	No Contamination Issues Recorded	1769411.664	5907126.26
MCC0006402/16	No Contamination Issues Recorded	1768700.908	5905845.078
MCC00006435/1	No Contamination Issues Recorded	1768953.596	5905671.459
MCC000H201187	Remediated to Background	1769782.155	5908722.912
MCC06101/170S	No Contamination Issues Recorded	1769233.027	5905795.504
MCC0006432/38	No Contamination Issues Recorded	1769003.377	5905278.335
MCC0006435/12	No Contamination Issues Recorded	1769061.867	5905676.78
MCC0006405/64	No Contamination Issues Recorded	1768726.808	5905539.942
MCC000H143447	No Contamination Issues Recorded	1769212.436	5906753.599
MCC000H144528	No Contamination Issues Recorded	1769324.681	5907159.674
MCC000H144515	No Contamination Issues Recorded	1769378.415	5907130.45
MCC000H145773	No Contamination Issues Recorded	1769395.285	5906918.67
MCC0006405/24	No Contamination Issues Recorded	1768801.127	5905879.236
MCC000H144476	No Contamination Issues Recorded	1769279.347	5906849.101
MCC0006162/97	No Contamination Issues Recorded	1768431.761	5905301.052
MCC0006405/90	No Contamination Issues Recorded	1768592.091	5905443.154
MCC000H138914	No Contamination Issues Recorded	1769276.008	5906603.741
MCC00006136/7	No Contamination Issues Recorded	1768914.948	5905124.502
MCC0006404/14	No Contamination Issues Recorded	1768647.202	5905599.714
MCC0006431/15	No Contamination Issues Recorded	1768904.366	5905693.209
MCC000H201254	Remediated to Background	1769792.54	5908561.599
MCC000H205509	Remediated to Background	1769811.289	5908263.181
MCC0006405/17	No Contamination Issues Recorded	1768737.415	5905855.676
MCC0006433/15	No Contamination Issues Recorded	1769093.378	5905515.831
MCC00006438/5	No Contamination Issues Recorded	1768452.59	5905195.967
MCC000H201127	Remediated to Background	1769779.225	5908868.104
MCC0006433/17	No Contamination Issues Recorded	1769089.454	5905485.734
MCC0006431/57	No Contamination Issues Recorded	1768812.95	5905313.421

	MCC000H136585	No Contamination Issues Recorded	1769269.928	5906532.686
	MCC00006435/7	No Contamination Issues Recorded	1769016.29	5905651.598
	MCC0006111/64	No Contamination Issues Recorded	1768300.077	5905524.21
	MCC0006405/84	No Contamination Issues Recorded	1768633.98	5905421.491
	MCC0006432/50	No Contamination Issues Recorded	1768901.388	5905318.989
	MCC0006433/30	No Contamination Issues Recorded	1768949.803	5905467.739
	MCC000H150705	No Contamination Issues Recorded	1769235.394	5906503.5
	MCC000H163524	Remediated to Background	1769842.666	5909015.541
	MCC0006430/16	No Contamination Issues Recorded	1768472.553	5905051.419
	MCC0006431/45	No Contamination Issues Recorded	1768839.26	5905421.295
	MCC000H201188	Remediated to Background	1769800.579	5908721.194
	MCC0006403/15	No Contamination Issues Recorded	1768671.114	5905629.502
	MCC000H144538	No Contamination Issues Recorded	1769334.218	5907225.408
	MCC00006434/5	No Contamination Issues Recorded	1768953.331	5905421.116
	MCC000H145770	No Contamination Issues Recorded	1769455.106	5906921.215
	MCC0006431/21	No Contamination Issues Recorded	1768891.21	5905638.245
	MCC000H130562	No Contamination Issues Recorded	1769017.768	5906164.224
	MCC00006434/7	No Contamination Issues Recorded	1768949.025	5905392.213
	MCC000H150460	No Contamination Issues Recorded	1769215.489	5906206.064
	MCC000H201157	Remediated to Background	1769781.512	5908841.509
	MCC000H144559	No Contamination Issues Recorded	1769363.905	5907069.912
	MCC0006401/54	No Contamination Issues Recorded	1768532.72	5905469.042
	MCC006401/28R	No Contamination Issues Recorded	1768629.554	5905737.397
	MCC00006435/4	No Contamination Issues Recorded	1768989.944	5905706.688
	MCC000H200179	Remediated to Background	1769916.939	5908967.601
	MCC006101/183	No Contamination Issues Recorded	1769090.631	5905696.036
	MCC000H145778	No Contamination Issues Recorded	1769421.651	5906830.234
	MCC00006430/7	No Contamination Issues Recorded	1768520.145	5905127.77
	MCC0006136/18	No Contamination Issues Recorded	1768766.534	5905217.045
	MCC000H200609	Remediated to Background	1769970.954	5908841.3
	MCC000H144520	No Contamination Issues Recorded	1769292.17	5907101.016
	MCC000H144480	No Contamination Issues Recorded	1769340.502	5906926.711
	MCC000H201258	Remediated to Background	1769729.436	5908553.226
	MCC0006175/23	No Contamination Issues Recorded	1768904.419	5906516.399
	MCC006162/190	No Contamination Issues Recorded	1768921.407	5906038.801
	MCC0006174/10	No Contamination Issues Recorded	1768751.635	5906153.176
	MCC006162/151	No Contamination Issues Recorded	1768995.993	5905940.06
	MCC000H143500	No Contamination Issues Recorded	1769350.51	5906648.899

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	MCC0006173/16	No Contamination Issues Recorded	1768853.546	5906214.621
	MCC00006173/5	No Contamination Issues Recorded	1768899.736	5906160.95
	MCC0006173/30	No Contamination Issues Recorded	1768889.233	5906366.826
	MCC0006173/19	No Contamination Issues Recorded	1768912.678	5906254.391
	MCC00006161/9	No Contamination Issues Recorded	1768798.654	5906420.457
	MCC0006175/43	No Contamination Issues Recorded	1768818.191	5906572.04
	MCC006162/192	No Contamination Issues Recorded	1768927.758	5906068.415
	MCC06162/125R	No Contamination Issues Recorded	1768826.699	5905460.36
	MCC00006175/9	No Contamination Issues Recorded	1768951.892	5906458.771
	MCC000H200937	Remediated to Background	1769911.76	5908599.421
	MCC000H201246	Remediated to Background	1769774.521	5908484.015
	MCC0006173/38	No Contamination Issues Recorded	1768897.494	5906405.411
	MCC0006173/34	No Contamination Issues Recorded	1768864.292	5906397.714
	MCC0006175/24	No Contamination Issues Recorded	1768794.863	5906519.968
	MCC0006175/47	No Contamination Issues Recorded	1768813.937	5906609.142
	MCC0006173/14	No Contamination Issues Recorded	1768844.878	5906105.67
	MCC000H130579	No Contamination Issues Recorded	1768967.023	5906234.887
	MCC0006175/22	No Contamination Issues Recorded	1768808.939	5906507.574
	MCC0006176/11	No Contamination Issues Recorded	1768826.344	5906246.252
	MCC000H143501	No Contamination Issues Recorded	1769348.91	5906624.499
	MCC0006173/20	No Contamination Issues Recorded	1768865.349	5906267.103
	MCC00006161/5	No Contamination Issues Recorded	1768808.421	5906462.629
	MCC00006174/2	No Contamination Issues Recorded	1768813.572	5906122.681
	MCC0006173/21	No Contamination Issues Recorded	1768940.141	5906245.651
	MCC0006173/35	No Contamination Issues Recorded	1768931.946	5906334.845
	MCC0006173/23	No Contamination Issues Recorded	1768947.385	5906275.897
	MCC000H130583	No Contamination Issues Recorded	1768983.364	5906303.11
	MCC000H130593	No Contamination Issues Recorded	1768970.523	5906363.269
	MCC00006173/1	No Contamination Issues Recorded	1768942.857	5906131.448
	MCC0006175/49	No Contamination Issues Recorded	1768825.935	5906594.139
	MCC0006175/55	No Contamination Issues Recorded	1768820.27	5906638.902
	MCC000H159834	No Contamination Issues Recorded	1768749.95	5906294.592

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	MCC000H143503	No Contamination Issues Recorded	1769325.9	5906625.737
	MCC0006161/21	No Contamination Issues Recorded	1768768.453	5906363.017
	MCC006101/124	No Contamination Issues Recorded	1768774.29	5906009.897
	MCC0006175/31	No Contamination Issues Recorded	1768877.108	5906545.744
	MCC006101/104	No Contamination Issues Recorded	1768726.46	5906093.534
	MCC000H145807	No Contamination Issues Recorded	1769475.073	5907079.871
	MCC000H130581	No Contamination Issues Recorded	1768975.192	5906268.998
	MCC0006161/27	No Contamination Issues Recorded	1768795.478	5906364.889
	MCC0006175/53	No Contamination Issues Recorded	1768839.92	5906628.673
	MCC0006173/25	No Contamination Issues Recorded	1768918.22	5906277.537
	MCC000H140366	No Contamination Issues Recorded	1769312.456	5906311.466
	MCC00005990/9	Hazardous Activities and Industries List (HAIL) Si	1765834.035	5904862.132
	MCC0006175/15	No Contamination Issues Recorded	1768929.031	5906471.008
	MCC006162/186	No Contamination Issues Recorded	1768905.103	5905992.867
	MCC006101/112	No Contamination Issues Recorded	1768791.545	5906063.362
	MCC0006161/11	No Contamination Issues Recorded	1768777.326	5906423.901
	MCC000H140361	No Contamination Issues Recorded	1769309.813	5906341.324
	MCC0006175/33	No Contamination Issues Recorded	1768859.632	5906528.925
	MCC000H159835	No Contamination Issues Recorded	1768758.079	5906309.6
	MCC0006175/41	No Contamination Issues Recorded	1768832.794	5906559.062
	MCC00006175/3	No Contamination Issues Recorded	1769012.054	5906448.784
	MCC006162/194	No Contamination Issues Recorded	1768933.536	5906092.533
	MCC00006161/8	No Contamination Issues Recorded	1768844.703	5906429.71
	MCC000H130578	No Contamination Issues Recorded	1768962.941	5906217.834
	MCC0006173/22	No Contamination Issues Recorded	1768870.533	5906288.739
	MCC006101/130	No Contamination Issues Recorded	1768859.971	5906005.864
	MCC0006173/10	No Contamination Issues Recorded	1768877.269	5906100.155
	MCC0006161/13	No Contamination Issues Recorded	1768751.25	5906426.16
	MCC00006173/7	No Contamination Issues Recorded	1768898.104	5906191.309
	MCC000H130577	No Contamination Issues Recorded	1768958.856	5906200.779
	MCC0006173/31	No Contamination Issues Recorded	1768956.034	5906311.997

	MCC000H200928	Remediated to Background	1769918.135	5908708.908
	MCC0006173/11	No Contamination Issues Recorded	1768931.78	5906210.744
	MCC000H159836	No Contamination Issues Recorded	1768777.912	5906307.567
	MCC0006175/35	No Contamination Issues Recorded	1768846.271	5906547.76
	MCC0006173/18	No Contamination Issues Recorded	1768860.184	5906242.327
	MCC0006173/33	No Contamination Issues Recorded	1768961.502	5906334.828
	MCC0006174/12	No Contamination Issues Recorded	1768730.982	5906169.987
	MCC0006173/43	No Contamination Issues Recorded	1768946.101	5906416.477
	MCC000H130574	No Contamination Issues Recorded	1768946.747	5906149.488
	MCC0006175/29	No Contamination Issues Recorded	1768889.165	5906532.702
	MCC0006175/25	No Contamination Issues Recorded	1768887.745	5906500.372
	MCC000H130575	No Contamination Issues Recorded	1768950.688	5906166.674
	MCC000H130597	No Contamination Issues Recorded	1769010.807	5906402.521
	MCC0006175/27	No Contamination Issues Recorded	1768874.469	5906518.201
	MCC0006161/17	No Contamination Issues Recorded	1768776.111	5906396.849
	MCC0006173/27	No Contamination Issues Recorded	1768922.669	5906296.111
	MCC0006173/24	No Contamination Issues Recorded	1768875.597	5906309.889
	MCC000H200280	No Contamination Issues Recorded	1768905.103	5905992.867
	MCC0006161/10	No Contamination Issues Recorded	1768838.314	5906406.63
	MCC00006175/7	No Contamination Issues Recorded	1768974.617	5906453.879
	MCC0006175/17	No Contamination Issues Recorded	1768902.308	5906478.363
	MCC0006161/12	No Contamination Issues Recorded	1768832.861	5906383.641
	MCC000H200870	Verification Required	1769208.045	5908061.96
	MCC00006175/6	No Contamination Issues Recorded	1768985.159	5906408.494
	MCC00006176/3	No Contamination Issues Recorded	1768762.395	5906242.142
	MCC0006175/20	No Contamination Issues Recorded	1768827.96	5906498.133
	MCC00006161/6	No Contamination Issues Recorded	1768847.325	5906449.599
	MCC000H130594	No Contamination Issues Recorded	1768974.52	5906380.846
	MCC000H130598	No Contamination Issues Recorded	1769030.633	5906443.741
	MCC000H143515	No Contamination Issues Recorded	1769238.19	5906644.619
	MCC0006173/15	No Contamination Issues Recorded	1768903.778	5906217.245
	MCC0006173/26	No Contamination Issues Recorded	1768879.616	5906326.663
	MCC00006176/9	No Contamination Issues Recorded	1768816.753	5906216.699
	MCC000H200611	Remediated to Background	1769954.183	5908867.927

	MCC06101/102R	No Contamination Issues Recorded	1768664.861	5906138.629
	MCC000H130576	No Contamination Issues Recorded	1768954.773	5906183.725
	MCC00006173/4	No Contamination Issues Recorded	1768905.468	5906096.481
	MCC0006175/11	No Contamination Issues Recorded	1768960.223	5906473.028
	MCC000H130580	No Contamination Issues Recorded	1768971.109	5906251.942
	MCC00006173/6	No Contamination Issues Recorded	1768898.259	5906063.814
	MCC006173/28R	No Contamination Issues Recorded	1768849.259	5906338.882
	MCC000H144521	No Contamination Issues Recorded	1769274.396	5907104.419
	MCC0006175/39	No Contamination Issues Recorded	1768848.654	5906574.009
	MCC000H164955	Remediated to Background	1769880.903	5908995.679
	MCC00006176/7	No Contamination Issues Recorded	1768795.109	5906233.715
	MCC000H130582	No Contamination Issues Recorded	1768979.28	5906286.056
	MCC000H130592	No Contamination Issues Recorded	1768998.574	5906355.897
	MCC0006161/23	No Contamination Issues Recorded	1768770.409	5906335.286
	MCC000H159833	No Contamination Issues Recorded	1768740.412	5906285.227
	MCC0006173/29	No Contamination Issues Recorded	1768927.118	5906314.685
	MCC00006175/5	No Contamination Issues Recorded	1768995.096	5906453.042
	MCC000H130584	No Contamination Issues Recorded	1768987.449	5906320.163
	MCC00006161/3	No Contamination Issues Recorded	1768814.894	5906483.479
	MCC0006173/40	No Contamination Issues Recorded	1768908.867	5906427.028
	MCC0006175/21	No Contamination Issues Recorded	1768929.266	5906504.212
	MCC00006161/7	No Contamination Issues Recorded	1768802.322	5906443.095
	MCC00006173/9	No Contamination Issues Recorded	1768926.476	5906186.455
	MCC0006175/37	No Contamination Issues Recorded	1768861.641	5906562.539
	MCC00006174/8	No Contamination Issues Recorded	1768777.622	5906141.541
	MCC00006187/6	No Contamination Issues Recorded	1768782.069	5906500.694
	MCC0006176/13	No Contamination Issues Recorded	1768833.498	5906277.862
	MCC0006161/25	No Contamination Issues Recorded	1768787.271	5906339.362
	MCC000H130585	No Contamination Issues Recorded	1768991.582	5906337.198
	MCC0006173/39	No Contamination Issues Recorded	1768941.561	5906374.976
	MCC0006920/87	No Contamination Issues Recorded	1768911.264	5906607.034

	MCC006162/143	No Contamination Issues Recorded	1768982.363	5905883.151
	MCC0006175/51	No Contamination Issues Recorded	1768847.013	5906611.055
	MCC000H150703	No Contamination Issues Recorded	1769231.559	5906537.811
	MCC00006173/3	No Contamination Issues Recorded	1768914.936	5906144.44
	MCC000H159837	No Contamination Issues Recorded	1768793.674	5906310.074
	MCC006920/80R	No Contamination Issues Recorded	1768967.386	5906887.722
	MCC0006161/15	No Contamination Issues Recorded	1768748.719	5906404.625
	MCC0006173/37	No Contamination Issues Recorded	1768937.111	5906356.402
	MCC00006176/5	No Contamination Issues Recorded	1768792.607	5906249.665
	MCC0006176/14	No Contamination Issues Recorded	1768825.17	5906306.014
	MCC00006175/8	No Contamination Issues Recorded	1768965.301	5906411.629
	MCC000H200281	No Contamination Issues Recorded	1768905.103	5905992.867
	MCC0006173/32	No Contamination Issues Recorded	1768859.848	5906375.073
	MCC0006161/19	No Contamination Issues Recorded	1768773.348	5906376.83
	MCC006162/149	No Contamination Issues Recorded	1768964.37	5905943.263
	MCC0006174/14	No Contamination Issues Recorded	1768711.073	5906186.705
	MCC000H145649	No Contamination Issues Recorded	1769367.621	5906670.489
	MCC00006173/8	No Contamination Issues Recorded	1768873.552	5906084.637
	MCC000H130595	No Contamination Issues Recorded	1769005.249	5906382.333
	MCC0006175/13	No Contamination Issues Recorded	1768944.121	5906493.075
	MCC0006173/41	No Contamination Issues Recorded	1768945.945	5906393.276
	MCC000H144558	No Contamination Issues Recorded	1769362.141	5907044.761
	MCC0006175/19	No Contamination Issues Recorded	1768913.071	5906495.651
	MCC0006173/17	No Contamination Issues Recorded	1768908.228	5906235.817
	MCC0006173/36	No Contamination Issues Recorded	1768892.871	5906386.108
	MCC000H201438	No Contamination Issues Recorded	1768803.475	5905103.766
	MCC000H208594	No Contamination Issues Recorded	1769477.349	5907211.473
	MCC000H204596	No Contamination Issues Recorded	1769402.739	5907384.818
	MCC000H208629	No Contamination Issues Recorded	1769528.889	5907249.364
	MCC000H205049	Remediated to Background	1769761.561	5908458.419
	MCC000H205047	Remediated to Background	1769583.665	5908273.506

	MCC000H208596	No Contamination Issues Recorded	1769496.417	5907206.833
	MCC000H205816	No Contamination Issues Recorded	1769063.173	5905390.494
	MCC000H205053	Remediated to Background	1769726.164	5908411.503
	MCC000H208608	No Contamination Issues Recorded	1769528.889	5907249.364
	MCC000H208627	No Contamination Issues Recorded	1769528.889	5907249.364
	MCC000H202430	Remediated to Background	1769722.664	5908646.626
	MCC000H205464	Remediated to Background	1769582.381	5908253.473
	MCC000H206165	Remediated to Background	1769823.834	5908310.114
	MCC000H208611	No Contamination Issues Recorded	1769539.721	5907246.728
	MCC000H208610	No Contamination Issues Recorded	1769534.922	5907248.017
	MCC000H208609	No Contamination Issues Recorded	1769531.82	5907248.998
	MCC000H202201	Remediated to Background	1769762.44	5908886.775
	MCC000H208612	No Contamination Issues Recorded	1769542.879	5907245.959
	MCC000H208624	No Contamination Issues Recorded	1769528.889	5907249.364
	MCC000H208593	No Contamination Issues Recorded	1769467.824	5907213.792
	MCC000H217345	No Contamination Issues Recorded	1768714.943	5905299.315
	MCC000H156805	No Contamination Issues Recorded	1768774.318	5906191.562
	MCC000H208618	No Contamination Issues Recorded	1769504.217	5907257.138
	MCC000H205055	Remediated to Background	1769704.467	5908449.568
	MCC000H205299	Remediated to Background	1769825.755	5908222.292
	MCC000H205815	No Contamination Issues Recorded	1769064.565	5905412.733
	MCC000H205052	Remediated to Background	1769722.296	5908497.245
	MCC000H205467	Remediated to Background	1769835.853	5908357.271
	MCC000H205508	Remediated to Background	1769831.071	5908291.216
	MCC000H208621	No Contamination Issues Recorded	1769524.517	5907250.428
	MCC000H205450	Remediated to Background	1769816.959	5908241.625
	MCC000H205463	Remediated to Background	1769690.08	5908286.132
	MCC000H217346	No Contamination Issues Recorded	1768732.32	5905294.795
	MCC000H205060	Remediated to Background	1769661.417	5908462.2
	MCC000H205054	Remediated to Background	1769716.018	5908431.595
		No Contamination Issues Recorded	1769542.665	5907349.704
	MCC000H156802	No Contamination Issues Recorded	1768756.727	5906211.374
	MCC000H206162	Remediated to Background	1769795.208	5908307.346
	MCC000H208595	No Contamination Issues Recorded	1769486.87	5907209.157

	MCC000H205065	Remediated to Background	1769643.291	5908403.911
	MCC000H205465	Remediated to Background	1769671.262	5908339.381
	MCC000H208630	No Contamination Issues Recorded	1769533.312	5907301.397
	MCC000H205067	Remediated to Background	1769664.805	5908378.588
	MCC000H206164	Remediated to Background	1769816.62	5908309.416
	MCC000H208623	No Contamination Issues Recorded	1769532.372	5907249.364
	MCC000H205298	Remediated to Background	1769806.957	5908284.255
	MCC000H205056	Remediated to Background	1769697.471	5908401.767
	MCC000H205062	Remediated to Background	1769631.318	5908446.966
	MCC000H205066	Remediated to Background	1769656.017	5908396.531
	MCC000H202429	Remediated to Background	1769706.535	5908648.782
	MCC000H205057	Remediated to Background	1769693.399	5908415.483
	MCC000H205051	Remediated to Background	1769739.069	5908487.275
	MCC000H205076	Remediated to Background	1769622.964	5908378.369
	MCC000H208592	No Contamination Issues Recorded	1769458.3	5907216.11
	MCC000H205048	Remediated to Background	1769601.04	5908268.802
	MCC000H205050	Remediated to Background	1769753.866	5908475.282
	MCC000H204598	No Contamination Issues Recorded	1769373.315	5907301.555
	MCC000H208625	No Contamination Issues Recorded	1769528.889	5907249.364
	MCC000H156804	No Contamination Issues Recorded	1768766.102	5906203.487
	MCC000H205058	Remediated to Background	1769683.019	5908435.379
	MCC000H208591	No Contamination Issues Recorded	1769448.235	5907219.477
	MCC000H208628	No Contamination Issues Recorded	1769528.889	5907249.364
	MCC000H201437	No Contamination Issues Recorded	1768782.534	5905098.596
	MCC000H208569	No Contamination Issues Recorded	1769492.597	5907293.954
	MCC000H205064	Remediated to Background	1769619.457	5908403.141
	MCC000H208622	No Contamination Issues Recorded	1769528.889	5907249.364
	MCC000H156806	No Contamination Issues Recorded	1768785.664	5906187.264
	MCC000H226914	Low Level Contamination	1767000.771	5904000.666
	MCC000H219958	Low Level Contamination	1766886.172	5904006.729
	MCC000H205068	Remediated to Background	1769645.712	5908368.945
	MCC000H208598	No Contamination Issues Recorded	1769515.437	5907202.204
	MCC000H205061	Remediated to Background	1769638.237	5908464.813
	MCC000H205469	Remediated to Background	1769887.764	5908530.868
	MCC000H208613	No Contamination Issues Recorded	1769546.905	5907244.979
	MCC000H202202	Remediated to Background	1769756.537	5908868.879
	MCC000H208590	No Contamination Issues Recorded	1769433.527	5907222.101

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	MCC000H208607	No Contamination Issues Recorded	1769528.889	5907249.364
	MCC000H208619	No Contamination Issues Recorded	1769508.756	5907254.296
	MCC000H205462	Remediated to Background	1769886.161	5908461.318
	MCC000H208597	No Contamination Issues Recorded	1769505.939	5907204.515
	MCC000H156801	No Contamination Issues Recorded	1768738.566	5906217.547
	MCC000H208620	No Contamination Issues Recorded	1769518.697	5907251.845
	MCC000H206166	Remediated to Background	1769834.139	5908310.634
	MCC000H205059	Remediated to Background	1769684.354	5908460.084
	MCC000H205063	Remediated to Background	1769622.868	5908420.737
	MCC000H225145	Verification Required	1767172.646	5904024.331
	MCC000H204597	No Contamination Issues Recorded	1769406.759	5907262.729
	MCC000H205507	Remediated to Background	1769834.181	5908276.031
	MCC000H208626	No Contamination Issues Recorded	1769528.889	5907249.364
	MCC000H156800	No Contamination Issues Recorded	1768748.367	5906227.918
	MCC000H205466	Remediated to Background	1769776.842	5908223.16
	MCC000H206163	Remediated to Background	1769805.431	5908308.269
	MCC000H208568	No Contamination Issues Recorded	1769476.509	5907262.057
	MCC000H201170	Remediated to Background	1769799.634	5908792.642
	MCC000H145779	No Contamination Issues Recorded	1769377.839	5906969.347
	MCC000H143460	No Contamination Issues Recorded	1769211.702	5906930.797
	MCC0006111/98	No Contamination Issues Recorded	1768630.507	5905392.917
	MCC0006421/77	No Contamination Issues Recorded	1768624.038	5905181.154
	MCC0006431/23	No Contamination Issues Recorded	1768886.825	5905619.924
	MCC006111/135	No Contamination Issues Recorded	1768841.447	5905252.073
	MCC000H140364	No Contamination Issues Recorded	1769256.716	5906316.151
	MCC0006136/14	No Contamination Issues Recorded	1768779.973	5905161.045
	MCC000H143507	No Contamination Issues Recorded	1769264.032	5906697.272
	MCC00006402/7	No Contamination Issues Recorded	1768646.408	5905793.957
	MCC000H136580	No Contamination Issues Recorded	1769356.664	5906539.184
	MCC00006434/4	No Contamination Issues Recorded	1769015.709	5905427.275
	MCC000H201166	Remediated to Background	1769717.43	5908790.827
	MCC006162/100	No Contamination Issues Recorded	1768716.506	5905380.361
	MCC000H136581	No Contamination Issues Recorded	1769338.209	5906543.698
	MCC0006401/42	No Contamination Issues Recorded	1768518.988	5905551.864
	MCC000H143458	No Contamination Issues Recorded	1769229.677	5906907.2
	MCC0006111/96	No Contamination Issues Recorded	1768614.639	5905399.18
	MCC0006405/52	No Contamination Issues Recorded	1768760.14	5905638.879
	MCC000H201154	Remediated to Background	1769828.009	5908831.195
	MCC000H200929	Remediated to Background	1769892.163	5908712.036

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	MCC000H144566	No Contamination Issues Recorded	1769255.197	5907039.949
	MCC0006421/58	No Contamination Issues Recorded	1768569.523	5905075.464
	MCC000H200934	Remediated to Background	1769885.357	5908638.685
	MCC0006405/36	No Contamination Issues Recorded	1768803.707	5905769.222
	MCC00006404/8	No Contamination Issues Recorded	1768599.236	5905615.619
	MCC0006403/14	No Contamination Issues Recorded	1768687.514	5905695.7
	MCC000H143893	No Contamination Issues Recorded	1769248.068	5906180.253
	MCC000H136587	No Contamination Issues Recorded	1769238.19	5906559.263
	MCC0006421/63	No Contamination Issues Recorded	1768629	5905089.55
	MCC0006421/61	No Contamination Issues Recorded	1768622.801	5905071.058
	MCC006162/146	No Contamination Issues Recorded	1768817.061	5905625.478
	MCC000H201285	Remediated to Background	1769673.034	5908671.221
	MCC000H200616	Remediated to Background	1769961.41	5908888.571
	MCC000H150628	No Contamination Issues Recorded	1769231.066	5906403.851
	MCC000H164956	Remediated to Background	1769884.579	5908997.196
	MCC000H143467	No Contamination Issues Recorded	1769294.697	5906747.859
	MCC0006421/71	No Contamination Issues Recorded	1768625.721	5905130.912
	MCC000H145783	No Contamination Issues Recorded	1769439.536	5906979.118
	MCC0006137/62	No Contamination Issues Recorded	1768671.824	5905176.465
	MCC0006402/18	No Contamination Issues Recorded	1768718.947	5905831.849
	MCC000H144495	No Contamination Issues Recorded	1769262.79	5906914.677
	MCC0006421/75	No Contamination Issues Recorded	1768621.293	5905163.699
	MCC000H201125	Remediated to Background	1769756.925	5908901.103
	MCC000H200925	Remediated to Background	1769933.255	5908687.031
	MCC000H136588	No Contamination Issues Recorded	1769243.613	5906579.005
	MCC000H144496	No Contamination Issues Recorded	1769257.311	5906934.046
	MCC0006136/21	No Contamination Issues Recorded	1768811.759	5905232.949
	MCC000H163578	Remediated to Background	1770001.924	5908947.826
	MCC000H201237	Remediated to Background	1769666.159	5908591.786
	MCC000H150619	No Contamination Issues Recorded	1769239.108	5906279.875
	MCC000H163570	Remediated to Background	1769972.238	5908992.651
	MCC00006404/7	No Contamination Issues Recorded	1768570.913	5905568.148
	MCC0006137/49	No Contamination Issues Recorded	1768745.065	5905179.116
	MCC000H130558	No Contamination Issues Recorded	1769001.84	5906097.704
	MCC000H145780	No Contamination Issues Recorded	1769382.964	5906953.346
	MCC000H143468	No Contamination Issues Recorded	1769309.809	5906758.797
	MCC000H201422	Remediated to Background	1769909.806	5908688.276
	MCC0006433/24	No Contamination Issues Recorded	1769023.507	5905450.091
	MCC006101/145	No Contamination Issues Recorded	1768719.805	5905980.015
	MCC0006137/68	No Contamination Issues Recorded	1768650.279	5905229.771
	MCC000H163501	Remediated to Background	1769903.415	5909071.962

	MCC000H130564	No Contamination Issues Recorded	1769025.733	5906197.486
	MCC0006431/18	No Contamination Issues Recorded	1768943.712	5905612.801
	MCC0006432/42	No Contamination Issues Recorded	1768969.382	5905291.886
	MCC0006137/41	No Contamination Issues Recorded	1768769.325	5905119.107
	MCC000H201232	Remediated to Background	1769715.975	5908620.333
	MCC000H143442	No Contamination Issues Recorded	1769173.749	5906723.883
	MCC000H136584	No Contamination Issues Recorded	1769288.579	5906541.891
	MCC00006404/6	No Contamination Issues Recorded	1768581.512	5905620.183
	MCC006162/101	No Contamination Issues Recorded	1768468.953	5905299.375
	MCC000H144543	No Contamination Issues Recorded	1769379.404	5907210.083
	MCC006162/134	No Contamination Issues Recorded	1768800.543	5905569.259
	MCC000H145791	No Contamination Issues Recorded	1769440.122	5907027.874
	MCC000H150621	No Contamination Issues Recorded	1769174.082	5906267.842
	MCC0006405/18	No Contamination Issues Recorded	1768752.366	5905910.522
	MCC000H201229	Remediated to Background	1769763.671	5908624.535
	MCC000H130573	No Contamination Issues Recorded	1769062.447	5906347.638
	MCC000H201239	Remediated to Background	1769662.853	5908565.314
	MCC0006405/53	No Contamination Issues Recorded	1768661.231	5905522.48
	MCC0006431/13	No Contamination Issues Recorded	1768908.752	5905711.532
	MCC0006431/47	No Contamination Issues Recorded	1768835	5905403.503
	MCC0006405/32	No Contamination Issues Recorded	1768806.03	5905808.677
	MCC000H201160	Remediated to Background	1769732.919	5908881.739
	MCC000H150464	No Contamination Issues Recorded	1769273.248	5906224.893
	MCC000H150648	No Contamination Issues Recorded	1769120.178	5906410.391
	MCC0006403/13	No Contamination Issues Recorded	1768649.936	5905634.22
	MCC000H144549	No Contamination Issues Recorded	1769390.824	5907053.751
	MCC0006432/25	No Contamination Issues Recorded	1769002.459	5905332.376
	MCC000H201163	Remediated to Background	1769725.077	5908822.155
	MCC000H201168	Remediated to Background	1769761.742	5908792.365
	MCC00006402/8	No Contamination Issues Recorded	1768642.773	5905849.073
	MCC006162/150	No Contamination Issues Recorded	1768800.637	5905670.087
	MCC0006111/62	No Contamination Issues Recorded	1768284.454	5905530.378
	MCC000H145782	No Contamination Issues Recorded	1769424.99	5906970.069
	MCC000H130559	No Contamination Issues Recorded	1769005.822	5906114.333
	MCC000H143457	No Contamination Issues Recorded	1769218.569	5906890.127
	MCC000H138919	No Contamination Issues Recorded	1769357.925	5906585.032
	MCC000H201247	Remediated to Background	1769785.488	5908465.758
	MCC0006401/50	No Contamination Issues Recorded	1768505.319	5905498.43
	MCC00006136/5	No Contamination Issues Recorded	1768888.1	5905132.628
	MCC000H143472	No Contamination Issues Recorded	1769338.954	5906724.788
	MCC0006432/54	No Contamination Issues Recorded	1768867.359	5905332.553
	MCC000H200932	Remediated to Background	1769906.89	5908643.099
	MCC0006432/29	No Contamination Issues Recorded	1768967.91	5905346.155

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	MCC0006405/23	No Contamination Issues Recorded	1768753.289	5905807.546
	MCC0006405/80	No Contamination Issues Recorded	1768652.926	5905457.04
	MCC0006405/92	No Contamination Issues Recorded	1768568.103	5905449.67
	MCC0006405/22	No Contamination Issues Recorded	1768779.383	5905889.719
	MCC0006421/64	No Contamination Issues Recorded	1768567.202	5905156.483
	MCC0006405/27	No Contamination Issues Recorded	1768748.071	5905771.271
		No Contamination Issues Recorded	1768869.787	5906433.912
	MCC0006405/41	No Contamination Issues Recorded	1768706.518	5905647.068
	MCC0006405/50	No Contamination Issues Recorded	1768765.575	5905655.145
	MCC0006405/20	No Contamination Issues Recorded	1768765.874	5905900.12
	MCC0006405/29	No Contamination Issues Recorded	1768742.678	5905755.151
	MCC0006405/88	No Contamination Issues Recorded	1768612.726	5905442.388
	MCC0006405/25	No Contamination Issues Recorded	1768752.636	5905786.45
	MCC0006405/63	No Contamination Issues Recorded	1768568.526	5905493.554
	MCC0006175/18	No Contamination Issues Recorded	1768863.352	5906460.091
	MCC0006405/55	No Contamination Issues Recorded	1768647.291	5905510.927
	MCC00006438/9	No Contamination Issues Recorded	1768491.642	5905189.622
	MCC0006405/14	No Contamination Issues Recorded	1768725.351	5905931.327
	MCC0006405/78	No Contamination Issues Recorded	1768668.712	5905463.038
	MCC0006405/15	No Contamination Issues Recorded	1768723.726	5905865.853
	MCC00006405/5	No Contamination Issues Recorded	1768656.387	5905917.709
	MCC0006405/13	No Contamination Issues Recorded	1768710.258	5905876.224
	MCC0006405/74	No Contamination Issues Recorded	1768703.532	5905460.243
	MCC00006405/7	No Contamination Issues Recorded	1768669.854	5905907.334
	MCC0006405/48	No Contamination Issues Recorded	1768771.013	5905671.412
	MCC00006405/6	No Contamination Issues Recorded	1768672.447	5905977.32
	MCC00006405/9	No Contamination Issues Recorded	1768683.323	5905896.965
	MCC0006920/30	No Contamination Issues Recorded	1768342.919	5906934.305
		No Contamination Issues Recorded	1768880.609	5906446.431
	MCC0006405/61	No Contamination Issues Recorded	1768584.464	5905502.892
	MCC0006175/14	No Contamination Issues Recorded	1768890.522	5906434.243
	MCC0006405/59	No Contamination Issues Recorded	1768608.472	5905500.629
	MCC0006405/12	No Contamination Issues Recorded	1768711.844	5905941.731
	MCC0006405/10	No Contamination Issues Recorded	1768698.337	5905952.135
	MCC0006405/70	No Contamination Issues Recorded	1768701.463	5905493.743
	MCC0006431/24	No Contamination Issues Recorded	1768908.421	5905482.786

[redacted]

Road Safety Audit Report

Appendix H
Road Safety Audit Report

CONCEPT DESIGN ROAD SAFETY AUDIT

AIRPORT TO BOTANY RTC SSBC

PREPARED FOR AUCKLAND TRANSPORT

22 October 2019

This document has been prepared for the benefit of Auckland Transport. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

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QUALITY STATEMENT

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[redacted]	22 October 2019
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Abbreviations

RTC	rapid transit corridor
SAT	road safety audit team

Auckland Transport

Airport to Botany RTC SSBC

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1 Introduction

1.1 Safety Audit Definition and Purpose

A road safety audit is a term used internationally to describe an independent review of a future road project to identify any safety concerns that may affect the safety performance. The audit team considers the safety of all road users and qualitatively reports on road safety issues or opportunities for safety improvement.

A road safety audit is therefore a formal examination of a road project, or any type of project which affects road users (including cyclists, pedestrians, mobility impaired etc.), carried out by an independent competent team who identify and document road safety concerns.

A road safety audit is intended to help deliver a safe road system and is not a review of compliance with standards.

The primary objective of a road safety audit is to deliver a project that achieves an outcome consistent with Safer Journeys and the Safe System approach, which is a safe road system increasingly free of death and serious injury. The road safety audit is a safety review used to identify all areas of a project that are inconsistent with a Safe System and bring those concerns to the attention of the client so that the client can make a value judgement as to appropriate action(s) based on the risk guidance provided by the safety audit team.

The key objective of a road safety audit is summarised as:

'to deliver completed projects that contribute towards a safe road system that is increasingly free of death and serious injury by identifying and ranking potential safety concerns for all road users and others affected by a road project.'

A road safety audit should desirably be undertaken at project milestones such as:

- concept stage (part of business case);
- scheme or preliminary design stage (part of pre-implementation);
- detail design stage (pre-implementation or implementation); or
- pre-opening or post-construction stage (implementation or post-implementation).

A road safety audit is not intended to be a technical or financial audit and does not substitute for a design check of standards or guidelines. Any recommended treatment of an identified safety concern is intended to be indicative only, and to focus the designer on the type of improvements that might be appropriate. It is not intended to be prescriptive and other ways of improving the road safety or operational problems identified should also be considered.

In accordance with the procedures set down in the NZTA Road Safety Audit Procedures for Projects Guidelines - Interim release May 2013 the audit report should be submitted to the client who will instruct the designer to respond. The designer should consider the report and comment to the client on each of any concerns identified, including their cost implications where appropriate, and make a recommendation to either accept or reject the audit report recommendation.

For each audit team recommendation that is accepted, the client will make the final decision and brief the designer to make the necessary changes and/or additions. As a result of this instruction the designer shall action the approved amendments. The client may involve a safety engineer to provide commentary to aid with the decision.

Decision tracking is an important part of the road safety audit process. A decision tracking table is embedded into the report format at the end of each set of recommendations. It is to be completed by the designer, safety engineer, and client for each issue, and should record the designer's response, client's decision (and asset manager's comments in the case where the client and asset manager are not one and the same) and action taken.

A copy of the report including the designer's response to the client and the client's decision on each recommendation shall be given to the road safety audit team leader as part of the important feedback loop. The road safety audit team leader will disseminate this to team members.

1.2 The Project

The project is to construct a rapid transit corridor (RTC) between the Auckland International Airport and Botany. The preferred option for the route is a bus connection that follows Puhinui Road from SH20 to Lambie Drive, through the Manukau central business district past the Manukau bus and train stations, and along Te Irirangi Drive to Botany Town Centre. RTC bus stations are shown above Puhinui train station, on Lambie Drive, on Davies Avenue and Ronwood Avenue in the Manukau central business district, and at Diorella Drive, Dawson Road, Ormiston Road, Accent Drive, and Smales Road along Te Irirangi Drive. An additional station is being contemplated at the intersection of Puhinui Road and Lambie Drive

The preferred option shows the RTC in the median, except for a short length along Davies Avenue, and includes a one-way cycle path and a footpath on either side of the road. Each signalised intersection is shown as a fully protected intersection, which would be designed in accordance with the Auckland Transport Technical Design Manual - Urban Streets and Roads Guide Chapter 6. Puhinui Road is proposed to have one general traffic lane in each direction. All other sections of the RTC would have two general traffic lanes in each direction.

1.3 The Road Safety Audit Team

This road safety audit has been carried out in accordance with the NZTA Road Safety Audit Procedure for Projects Guidelines – Interim release May 2013, by:

- [redacted] Principal Transportation Engineer, Stantec, Auckland, and
- [redacted] ANZ Market Sector Leader, Transportation Delivery, Stantec, Auckland.

[redacted] and [redacted] of Aurecon, and Claire

[redacted] MR Cagney briefed the road safety auditors on 9 October 2019.

The road safety auditors visited the site twice—on 9 October 2019 and on 10 October 2019.

The auditors held an exit meeting with [redacted] and [redacted] of Aurecon and Melanie Taylor of Auckland Transport on 10 October 2019.

1.4 Previous Road Safety Audits

No previous safety audits have been undertaken on this section of the Airport to Botany RTC east of SH20. Road safety audits of both short- and long-term proposals have however been undertaken recently on the section of the RTC along SH20B west of SH20 to the airport. (Stantec, 2018) (Stantec, 2018) (Stantec, 2019) (Stantec, 2019)

1.5 Scope of this Road Safety Audit

This is a concept stage road safety audit of the proposed rapid transit corridor between the Puhinui interchange on SH2 and Botany Town Centre as far as, but not including, the Haven Drive and Parkway Drive intersection with Te Irirangi Drive.

1.6 Report Format

The potential road safety problems identified have been ranked as follows.

The expected crash frequency is qualitatively assessed on the basis of expected exposure (how many road users will be exposed to a safety issue) and the likelihood of a crash resulting from the presence of the issue. The severity of a crash outcome is qualitatively assessed on the basis of factors such as expected speeds, type of collision, and type of vehicle involved.

Reference to historic crash rates or other research for similar elements of projects, or projects as a whole, have been drawn on where appropriate to assist in understanding the likely crash types, frequency and likely severity that may result from a particular concern.

The frequency and severity ratings are used together to develop a combined qualitative risk ranking for each safety issue using the concern assessment rating matrix in Table 1-1. The qualitative assessment requires professional judgement and a wide range of experience in projects of all sizes and locations.

Table 1-1: Concern Assessment Rating Matrix

Severity (likelihood of death or serious injury)	**Frequency** (probability of a crash)			
	Frequent	Common	Occasional	Infrequent
Very likely	Serious	Serious	Significant	Moderate
Likely	Serious	Significant	Moderate	Moderate
Unlikely	Significant	Moderate	Minor	Minor
Very unlikely	Moderate	Minor	Minor	Minor

While all safety concerns should be considered for action, the client or nominated project manager will make the decision as to what course of action will be adopted based on the guidance given in this ranking process with consideration to factors other than safety alone. As a guide a suggested action for each concern category is given in Table 1-2.

Table 1-2: Concern Categories

Concern	Suggested action
Serious	Major safety concern that must be addressed and requires changes to avoid serious safety consequences.
Significant	Significant safety concern that should be addressed and requires changes to avoid serious safety consequences.
Moderate	Moderate safety concern that should be addressed to improve safety.
Minor	Minor safety concern that should be addressed where practical to improve safety.

In addition to the ranked safety issues it is appropriate for the safety audit team to provide additional comments with respect to items that may have a safety implication but lie outside the scope of the safety audit. A comment may include items where the safety implications are not yet clear due to insufficient detail for the stage of project, items outside the scope of the audit such as existing issues not impacted by the project or an opportunity for improved safety but not necessarily linked to the project itself. While typically comments do not require a specific recommendation, in some instances suggestions may be given by the auditors.

1.7 Documents Provided

The SAT was provided with the following documents for this audit.

502334-7000-DRG-RR-0101 to 0117	Rev C	Preferred Option General arrangement plan Sheets 1 to 17
502334-7000-DRG-RR-0201 to 0204	Rev A	Preferred Option Plan and long section (MCP0) Sheets 1 to 4
502334-7000-DRG-RR-0205 to 0206	Rev A	Preferred Option Plan and long section (MCL0) Sheets 1 to 2
502334-7000-DRG-RR-0208	Rev A	Preferred Option Plan and long section (MCD0)
502334-7000-DRG-RR-0209	Rev A	Preferred Option Plan and long section (MCR0)
502334-7000-DRG-RR-0210	Rev A	Preferred Option Plan and long section (MCG0)
502334-7000-DRG-RR-0211 to 0220	Rev A	Preferred Option Plan and long section (MCT0) Sheets 1 to 10
502334-7000-DRG-RR-0301 to 0305	Rev A	Preferred Option Plan and long section (MCT0) Sheets 1 to 5
502334-7000-REP-JJ-0024	Rev 0	Design Philosophy Statement

1.8 Disclaimer

The findings and recommendations in this report are based on an examination of available relevant plans, the specified road and its environs, and the opinions of the SAT. However, it must be recognised that eliminating safety concerns cannot be guaranteed since no road can be regarded as absolutely safe and no warranty is implied that all safety issues have been identified in this report. Safety audits do not constitute a design review nor are they an assessment of standards with respect to engineering or planning documents.

Readers are urged to seek specific technical advice on matters raised and not rely solely on the report.

While every effort has been made to ensure the accuracy of the report, it is made available on the basis that anyone relying on it does so at their own risk without any liability to the safety audit team or their organisations.

2 Safety Concerns

This section documents the safety concerns noted during this road safety audit. Each is given a ranking as described in Section 1.6.

This section also includes comments that are either:

- of a general nature; or
- cannot be related to any specific safety concern; or
- relate to previous safety concerns that may have been misinterpreted; or
- relate to subsequent design developments that could become safety concerns in a future safety audit; or
- relate to safety concerns that the designers are already aware of; or
- relate to design elements where the safety implications are not yet clear due to insufficient detail for the stage of the project.

These comments are included for the consideration of the designers and the client. Decision tracking tables are included for selected comments where a record of responses might be appropriate.

2.1 General Safety Concerns

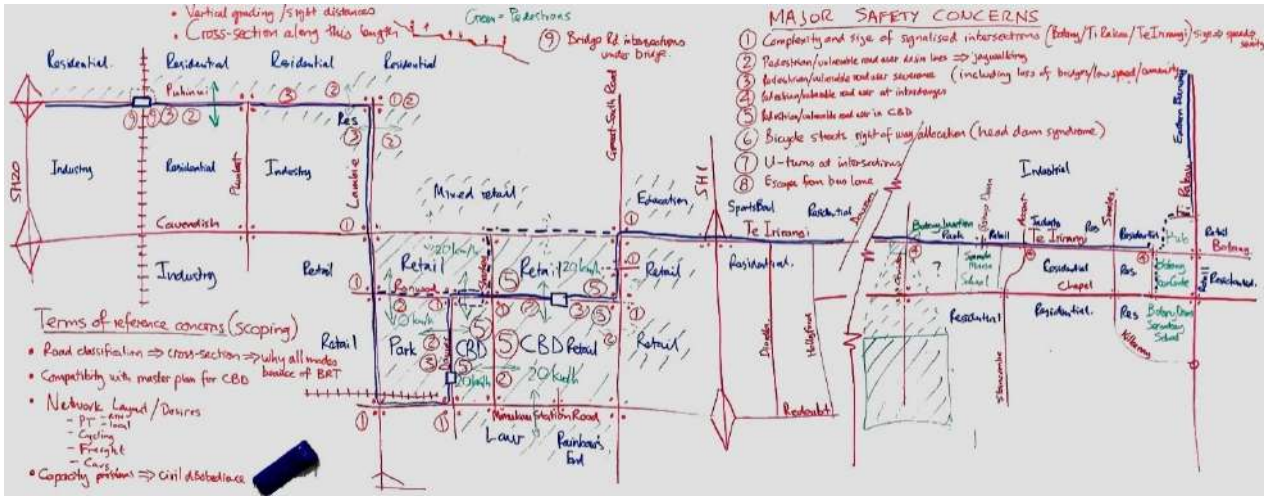
2.1.1 Comment – Terms of reference and scoping

The layering of various land uses, desire lines, future development etc., normally embodied in a master plan for the city, should underpin the rapid transit corridor so that it integrates seamlessly with all aspects of daily life and business in the areas through which is passes.

However, the same road classification and cross-section has been applied along the entire rapid transit corridor from Puhinui interchange with SH 20 to Botany Town centre. This approach does not seem to have taken cognisance of the different adjacent land uses such as industrial, residential, commercial, recreation, and retail, each with its different speed environment, numbers of vulnerable road users and pedestrian and cyclist desire lines and expectations.

The uniform and formulaic treatment of the rapid transit corridor has led to the SAT identifying a number of safety concerns relating principally to severance of vulnerable road user desire lines and low-speed pedestrian- and cyclist-friendly precincts, which are expanded upon in this report. It will be apparent from the safety concerns raised that many of the safety issues identified could be eliminated or at least mitigated by approaching the rapid transit corridor in a more sympathetic and flexible manner, especially through the Manukau city centre, so that it integrates with overall walking and cycling routes and the adjacent land use, both of which should be underpinned by a structure or master plan for each precinct.

The SAT used such an approach, as shown below, when conducting the road safety audit. This assisted greatly in identifying the areas of disconnect between the RTC and surrounding land use.



2.1.2 Bicycle streets

Minor

The safety audit team was asked to comment on the safety of the proposed bicycle streets 'where bikes are prioritised, and cars are visitors' as proposed in Section 2.3.3 of the Design Philosophy Statement provided. Typically, bicycle streets would be created where the cycle paths coincided with existing or new service roads providing access to residential properties along Te Irirangi Drive and Puhinui Road.

The road safety auditors spent some time driving in and out of all the service roads and stopping to observe the use of the roads. The service roads are very low volume roads, presumably used mostly in the morning and evening by residents leaving and returning home during the week. There is possibly additional traffic during the weekend. Most, if not all the traffic observed was generated by parents collecting children from the childcare centres in Cratloe Lane, Shingleton Lane, and Treneary Lane. It was interesting to note that the streets are such low volume streets that some motorists travel quite safely the wrong way down the one-way portion of some of the service roads presumably to avoid a circuitous route to or from the child care centres.

Most of the properties along the service roads have minimal or no front fence and rely on the substantial and mature verge planting to screen them from Te Irirangi Drive as shown in Figure 1. This leads the safety audit team to believe that the service roads are being and can be used as a relatively safe extensions of the play areas of each property, provided that the entry speeds into the service roads were low.

Figure 1: Typical residential frontage onto service road

Assigning priority to one mode of transport, i.e. cyclists over all other users, along what is basically a shared use extension of recreational space raises safety concerns. A typical scenario would be a child running after a ball or a driver reversing out of the driveway. Generally, motorists, especially those living in the street, would be on the lookout for children and reversing cars, but a head-down commuter cyclist riding at 30 km/h to 40 km/h might not be, particularly if cyclists are expecting everyone else legally to give way to them.

The safety audit team sees no issue with routing cyclists along the service roads, provided that the area is clearly a shared use area where all travelling road users, including cyclists, adhere to low-speed protocols and give way under all circumstances to pedestrians, especially children. Improvements can be made to enhance the shared use message and assign an even lower priority to cars than is currently the case. Typically, these could be the introduction of raised tables at the entry points and breaking up the linearity

of the roadway and kerbing by build-outs and chicanes. In essence, the service roads should be converted to the Dutch woonerf principle, similar to what has been provided in Hobsonville, complete with lowered speed limit e.g. 30 km/h. Corresponding threshold treatments should apply to the intersections along Wayne Francis Drive.

Section 2.5 contains further safety discussions regarding individual improvements that could be made to the service roads.

Recommendation(s)

1. Construct a raised table at the entrance threshold to each service road clearly demarcating the change in environment and accompanying change in behaviour that drivers would need to adopt when entering the area.
2. For the existing service roads, reduce the current apparent priority of motorized vehicles over other road users by considering design features like breaking up the linearity of the roadway with build-outs and chicanes, or using alternative (non-road) surfacing like pavers for example.
3. Avoid introducing high-speed cyclists into the service streets, and do not assign priority to cyclists over all other road users, including those who might be playing in the road.

Frequency Crashes are likely to be occasional	Severity Death or serious injury is unlikely	Rating The safety concern is minor
Designer response	1. Agree - Threshold treatment in the form of a raised table for entrances to these access roads / bicycle streets that are proposed to remain open (3 out of 10 streets) onto Te Irirangi or Puhinui Road would be a key feature to ensure these streets function as they are intended to, with slow speeds, and where cars feel like they are guests. 2. Agree - All these examples of design features could be used. A surface treatment would be most effective with some build outs to visually narrow the street - providing indented parking where these fit. 3. Agree in Parts - We will adjust some of the wording in the PDPS in response to this as we do not intend for high speed people on bikes to have unrestricted priority over other active modes. However, we did not envisage these to become complete shared spaces along their length either. While sections of these streets are likely to become attractive and function as an extension of the pedestrian space to play on or learning to ride a scooter on perhaps, it is still accepted this will be an access street/ route through which people on bikes will travel along safely and motor vehicles will also use, but only as 'guests'. Posted speed will be 30km/hr – but through the clever use of design features, actual speeds for all users will be even lower.	
Safety Engineer comment	Agree with designer and SAT. Agree with designer's response for point 3 with regards to motor vehicles using these spaces as 'guests'.	
Client decision	Agree with SAT and designer on points 1 & 2. Agree with designer's response to point 3. Note also suggestion that a bidirectional cycle lane could be provided on one side of Te Irirangi Drive (to provide for high-speed commuter cyclists) with intermittent bidirectional cycle lanes/access streets on the eastern side.	
Action taken	Noted suggestion from Client. Further investigations should be undertaken in the pre-implementation phase to determine where a bidirectional cycle lane can fit without affecting additional property along Te Irirangi Drive. Contingency will be allowed for within the cost estimate to accommodate.	

2.1.3 One-way separated cycle paths

Moderate

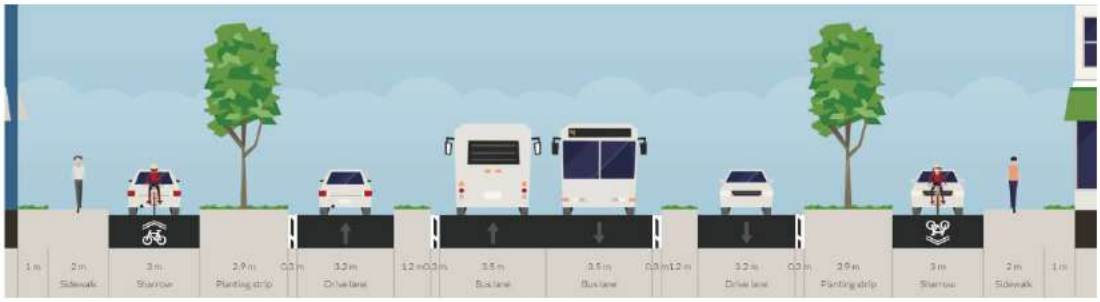
Throughout the project, all cycle paths are shown as one-way separated facilities either side of the RTC. This means that cyclists would have to turn left into and left out of the properties and may face a long ride in the opposite direction of their desired destination to the next available crossing. This is particularly

relevant where the separated cycle paths pass by residential properties along Puhinui Road, part of Lambie Drive, and the whole length of Te Irirangi Drive, and where there is a long distance to the next available safe crossing place.

While it could be argued that the left-in and left-out inconvenience would be similar to that experienced by motorised vehicle drivers, unlike general traffic it is very likely that cyclists will ignore the one-way separated cycle paths. Although the wrong way operation has a safety implication, the major safety concern is that drivers exiting driveways will not expect to look to the left for oncoming cyclists when they are used to it being a one-way facility.

Recommendation(s)

1. Along Puhinui Road and along sections of the RTC where there are many driveways and accesses, provide more closely spaced safe crossing places across the RTC.
2. Along Te Irirangi Drive and along sections where there are no driveways or accesses, make provision for two-way operation along the cycle paths.

Frequency Crashes are likely to be occasional	Severity Death or serious injury is likely	Rating The safety concern is moderate
Designer response	1. Agree in Parts - Rather than provide additional crossings across Puhinui Rd (noting we do need an adequate number of these) it is proposed that bidirectional cycle infrastructure is provided by creating access streets/ bicycle streets, whereby motor vehicles can access their properties from adjacent to Puhinui Road - these streets function as low speed, low volume (only vehicles accessing properties) streets, separate from Puhinui Rd which would be suitable for bidirectional cycle movements. These access streets would have vegetated buffers between them and Puhinui Rd as well. It is envisaged where the bidirectional cycle path needs to cross a side street or busy driveway, in the first case access is rationalised as much as possible then if access is still required an appropriate design including setbacks, will be in place to minimise risks to people on bikes.  2. Agree – because bidirectional operation of the cycle facility is able to be achieved over the majority of the route along Te Irirangi Drive due to the use of the bicycle street/ access streets it makes sense to find width to extend the bidirectional facility between these streets too. This may require some reduction in the berm adjacent to the cycle path in some cases, but this is intended to be minimised as much as possible. As ideally specimen trees will be able to be planted into these berm areas to provide human scale for the active mode users moving along this huge corridor.	
Safety Engineer comment	The change proposed in the designer's response from one way separated cycle paths to access streets / bicycle streets allowing two way cyclist movement (as shown in the cross section above) is significantly different from the design presented for audit. I agree in principle that this arrangement is worthwhile investigating and might prove to be the preferred arrangement, however more work needs to be done to determine if this is the case. Areas which need to be considered include but are not limited to: 1. How with the access streets / bicycle streets intersect with the main traffic lanes? 2. What will be the cross section near major intersections? Presumably additional auxiliary lanes will be needed for turn movements near signalised intersections.	

	Can they be accommodated while retaining the access street or would the cycle route be compromised in these locations? 3. At first look the 3 m width shown is a potential safety risk if it is intended to be used both by motorised traffic (even if they are slow moving and few in number) and cyclists travelling in the opposing direction. If rubbish collection were also from this lane this may mean cyclists trying to pass rubbish trucks travelling in the opposing direction in a 3 m space. A wider lane may provide space to pass, but may also encourage higher vehicle speeds. 4. Stronger justification is needed if these access streets / bicycle streets are intended to serve commuter cyclists. In many cases providing separate space for these cyclists is the safest and most appropriate option. 5. Can this arrangement be implemented under the Land Transport Rule: Traffic Control Devices 2004? Counter-flow cycle lanes are possible, but it may not be possible to create a lane compliant with the rule where cyclists can travel in both directions but drivers may only travel in one direction. 6. Has the designer considered providing a separate cycle lane/path between the access street / bicycle road and the planting strip? I acknowledge this would reduce the with of the strip and impact the space available for planting. If the proposed change is adopted then I recommend that it is audited before proceeding to the next design stage.
Client decision	Designer to provide brief analysis of unidirectional vs. bidirectional cycle lanes vs. access streets, including interaction with intersections for each layout. Follow up session with Safety Engineer to close out. Is it possible to accommodate bidirectional cycle facilities on Puhinui Road without access lanes, or is this a hazard with drivers entering and exiting driveways? If both bidirectional cycle lanes and access streets can be accommodated in the same footprint on Puhinui Road, do not necessarily need to decide at concept design stage, but should articulate a philosophy and general reasoning. Puhinui Road: Due to the similar footprint of either bi-directional cycle facilities or access streets, for this SSBC-phase concept design, the more typical bi-directional cycle facility is proposed to replace the unidirectional facilities on Puhinui Road. Access streets may be more suited to Te Irirangi Drive where they upgrade existing service roads. Te Irirangi Drive: Bi-directional cycle facilities on both sides of the road are proposed, except those sections where access streets are proposed to upgrade existing service roads. However, cycling design elements should be looked at in more detail during the next project design phase. This design change has not been re-audited due to the likelihood this will be assessed further in the future, alongside changing cycle design standards.
Action taken	Both bidirectional cycle lane and access streets can fit into the existing cross section if the planting strip/buffer strip is slightly reduced in width. This was discussed in a meeting with AT, dated 12 Feb 2020 and no further analysis will be done under his design stage. The typical cross sections have been updated.

2.1.4 Parking provisions

Minor

No on-street parking provision is shown along the RTC. Generally, the 2 m wide separator shown in Figure 2 would be wide enough to park on, so it is very likely that people will park on it.

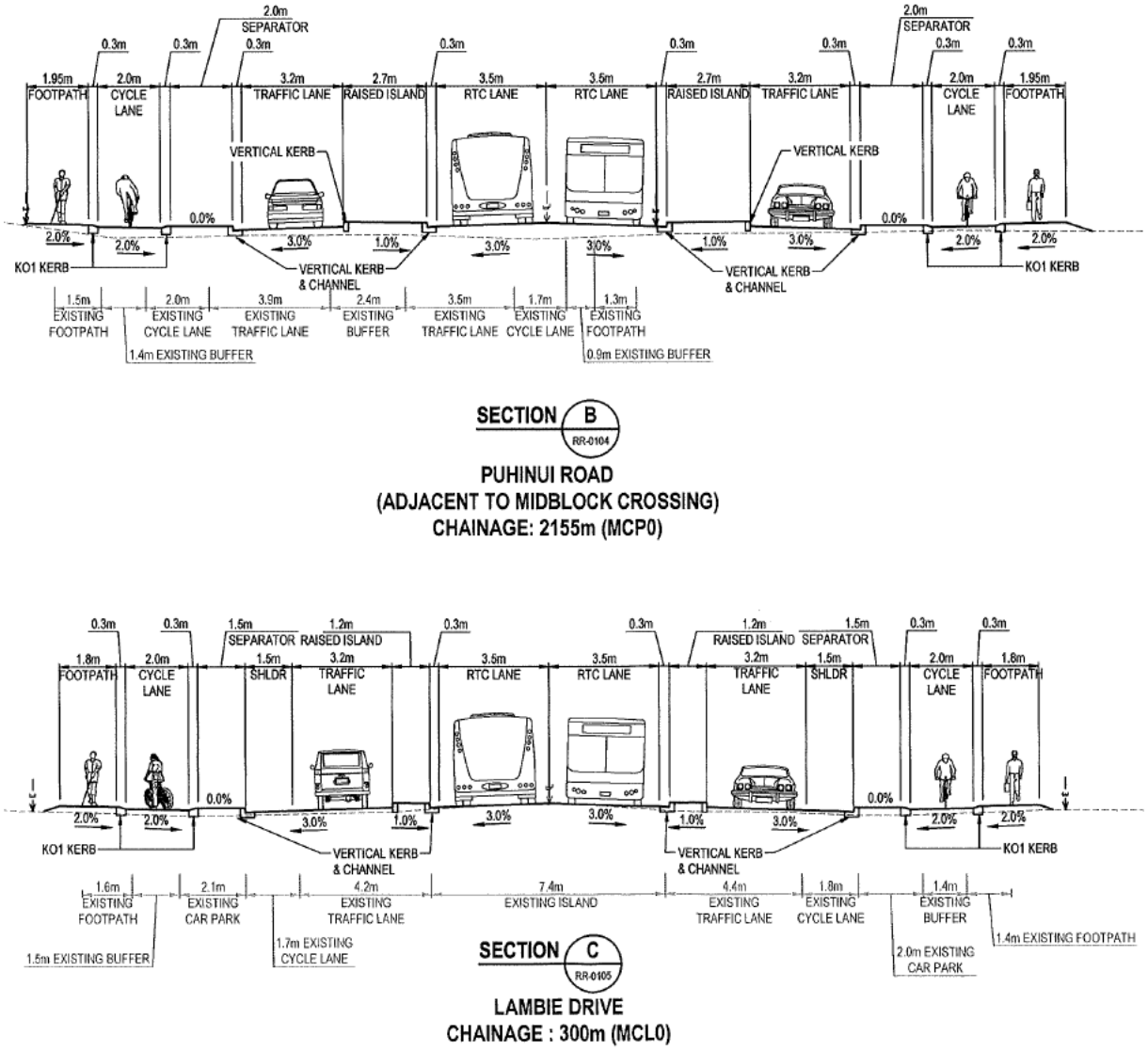


Figure 2: Typical cross-sections along the RTC

Although there are areas where on-street parking would be undesirable, there may be other areas where limited on-street parking could avoid drivers parking in inappropriate or dangerous places, such as obstructing sight lines to pedestrians.

Some parking along the RTC could assist with breaking up the linearity of the RTC and creating a slower speed environment.

Recommendation(s)

1. Reallocate the widths of the raised island and cycle path separator to provide indented parking wherever possible, especially along residential streets such as Puhinui Road.

Frequency Crashes are likely to be infrequent	Severity Death or serious injury is unlikely	Rating The safety concern is minor
Designer response	1. Based on the proposed cross section provided in item 2.1.3 the planting strip can be utilised as parking bays as required. These should be kept to a minimum.	
Safety Engineer comment	Agree with designer and SAT.	

Client decision	Agree with designer response and Safety Engineer – revised concept design to show parking where appropriate – particularly where existing parking is currently proposed to be removed.
Action taken	It is recommended that parking locations be considered in greater detail following more detailed engagement with the local community. As outlined above this will not have an impact on the footprint and / or cost which are the focus of the business case phase.

2.2 Signalised intersections

For the purposes of the business case, a generic fully protected signalised intersection has been applied to every major intersection along the route at this stage. No detailed analysis of the intersections has been undertaken, for example with regard to spatial requirements for pedestrians and cyclists. The SAT acknowledges that applying the generic intersection to each intersection is an appropriate approach at this stage as the proposed cross-section of the RTC is consistent along the entire route.

Figure 3: Typical fully protected signalised crossing as applied to the RTC

Nevertheless, there are safety concerns that will need to be noted and addressed early before proceeding further, as these may influence the choice of route and cross-section of the RTC significantly.

For the following three concerns, and many others concerning severance, it is recommended that the route of the RTC avoid as many intersections where there are high pedestrian and cyclist demands as possible, especially in the Manukau city centre and along Great South Road where the proposed RTC passes through eight signalised intersections.

Three major signalised intersections could be avoided if the RTC ran from Lambie Drive left into Ronwood Avenue, left into Sharkey Street and right into Cavendish Drive to Great South Road. There seems to be enough width in Ronwood Avenue to provide the RTC without removing any trees as shown in Figure 4 and Figure 5.

An RTC bus station could be provided next to the multi-storey carpark on the corner of Ronwood Avenue and Davies Avenue shown in Figure 5.

A covered walkway along Davies Avenue could provide the desired pedestrian connection to the train and local bus stations at Putney Way.

Figure 4: Ronwood Avenue west of Davies Avenue (Google Street View, 2018)

Figure 5: Ronwood Avenue east of Davies Avenue with car park buiding (Google Street View, 2018)

2.2.1 Length of toucan crossings affecting capacity

Moderate

The toucan crossings across some of the roads are about 30 m long, requiring about 25 s full protection each cycle e.g. the intersections along Lambie Drive and Manukau Station Road. Although 25 s full protection can be achieved and is similar to the existing crossing distance across Ellerslie-Panmure Highway at Forge Road near the Panmure Station, long protected phases will lead to reduced capacity and possible knock-on safety issues due to driver frustration. Typical adverse behaviour might be red light running of the fully protected phase when drivers think that all pedestrians have completed the crossing, not noticing the late-comer cyclist.

Split phases are proposed at other intersections, such as all those along Te Irirangi Drive, where pedestrians and cyclists would have to stand and wait in the median. Splitting the phases where there are bus stops in the median makes sense, but for those just crossing the road, waiting for a long time in the median leads to jaywalking.

The ranking of this safety concern is based on the possibility that a driver running a red traffic signal may hit a pedestrian or cyclists.

Recommendation(s)

1. Endeavour to tighten up the intersections as much as possible, even if it requires the larger vehicles to track occasionally and momentarily into adjacent lanes during protected signal phases.
2. Reduce the number of affected intersections, especially along Great South Road, by rerouting the RTC to avoid as many intersections as possible.

Frequency Crashes are likely to be occasional	Severity Death or serious injury is likely	Rating The safety concern is moderate
Designer response	1. Agree - Current controlled intersections are designed based on 'TDM - Engineering Design Code - Urban and Rural Roadway design'. The size of intersections at this concept design stage follows the requirements as determined by swept path of design vehicles as defined in 'Table 2: Design Vehicles for Street Types' and 'Table 3: Tracking Type' of above-mentioned standard. At this stage of the design it is important to understand the implications of the proposed solution on the surrounding environment. An opportunity to reduce the size of the intersections further can be investigated during the next design stage. 2. Disagree - The selection of Rapid Transit Network (RTN) route is based on a long list, through short list, to a preferred proposal, using a multi criteria analysis (MCA) process. This has been conducted in coordination with Auckland Transport (AT) and a range of stakeholders and specialists. The route of the preferred option has been confirmed by AT. Whilst the proposal means that the route passes through two more intersections than the recommendation provided by the safety audit team, both of these are proposed as fully signalised protected intersections. In addition to this the northern arm of the Davies Ave / Manukau Station Road intersection will be closed to general traffic, reducing conflicts further.	
Safety Engineer comment	1. Agree that the intersections should be tightened up as much as possible. In regard to the SAT's suggestion that heavy vehicles should be permitted to track into opposing lanes, the TDM states where this is permitted. There may be some situations where the design believes a departure from the TDM would provide a safer layout and these would need to be the subject to a departure process including a risk assessment on a case by case basis. 2. Accept designer's response.	
Client decision	1. Agree with SAT, designer and Safety Engineer – where possible intersections should be tightened to shorten crossing times for pedestrians and cyclists, particularly in high pedestrian areas (e.g. Manukau Centre). T	

	Also note comment from Irene Tse, AT Safety Team, re: raising intersections – need to follow up on where this may be required. Consideration of this design refinement can be undertaken as part of the next design stage. 2. Agree with designer and Safety Engineer – preferred alignment has been agreed with internal and external stakeholders and allows RTC to serve an important interchange function with the Manukau Centre and bus/rail interchange.
Action taken	1. We take note of the recommendations made by the SAT, SE and Client comments. The concept design make provision for all modes of transport to use an intersection and primarily assure that enough land is acquired to construct the necessary infrastructure. These recommendations will be transferred and looked into more depth in the next design phase. 2. No action required.

2.2.2 Clearance times affecting capacity

Moderate

The wider intersections require longer clearance times, which reduces capacity and could lead to driver frustration as described in Section 2.2.1. It is acknowledged that the Te Irirangi Drive intersections would remain the same size as the existing intersections, as the existing median was designed for conversion to some form of rapid transit. This comment applies mainly to the intersections in the Manukau city centre, where a greater number of pedestrians crossing the road each cycle can be expected. It also applies to the two intersections under the RTC bridge at Kenderdine Road and Cambridge Terrace described in Section 2.3.4.

The ranking of this safety concern is based on the possibility that a driver running a red traffic signal may hit a pedestrian or cyclists.

Recommendation(s)

1. Reduce the size of the intersections as much as possible, even if it requires larger vehicles to track occasionally and momentarily into unopposed (e.g. protected by a signal phase) or adjacent lanes.
2. Reduce the number of affected intersections, especially along Great South Road and Manukau Station Road, by rerouting the RTC to avoid as many intersections as possible.

Frequency Crashes are likely to be occasional	Severity Death or serious injury is likely	Rating The safety concern is moderate
Designer response	As per response to 2.2.1: 1. Agree - Current controlled intersections are designed based on 'TDM - Engineering Design Code - Urban and Rural Roadway design'. The size of intersections at this concept design stage follows the requirements as determined by swept path of design vehicles as defined in 'Table 2: Design Vehicles for Street Types' and 'Table 3: Tracking Type' of above-mentioned standard. At this stage of the design it is important to understand the implications of the proposed solution on the surrounding environment. An opportunity to reduce the size of the intersections further can be investigated during the next design stage. 2. Disagree - The selection of Rapid Transit Network (RTN) route is based on a long list, through short list, to a preferred proposal, using a multi criteria analysis (MCA) process. This has been conducted in coordination with Auckland Transport (AT) and a range of stakeholders and specialists. The route of the preferred option has been confirmed by AT. Whilst the proposal means that the route passes through two more intersections than the recommendation provided by the safety audit team, both of these are proposed as fully signalised protected intersections. In	

	addition to this the northern arm of the Davies Ave / Manukau Station Road intersection will be closed to general traffic, reducing conflicts further.
Safety Engineer comment	1. Agree with SAT and designer 2. Accept designer's response
Client decision	As per response to 2.2.1
Action taken	As per response to 2.2.1

2.2.3 Reduced turning capacity at existing intersections

Moderate

To fit the RTC in the median, the number of turning lanes will be limited or reduced to one left-turn combined with a straight-ahead lane and one right-turn lane at all intersections. In combination with the additional and dedicated phasing required to accommodate the RTC, these changes will significantly reduce the existing capacity of intersections, particularly along Te Irirangi Drive and Great South Road. While this may promote the use of the rapid transit facilities in peak times, the effect on the background all-day commercial traffic and driver frustration along these roads should not be underestimated.

As observed above, frustration brought about by congestion can lead to red light running and possibly speeding.

The ranking of this safety concern is based on the possibility that a driver running a red traffic signal may hit a pedestrian or cyclists.

Recommendation(s)

1. Assess the impact of reducing the number of turning lanes on capacity, especially along roads such as Great South Road and along Te Irirangi Drive at major intersections such as Ormiston Road.
2. Reduce the number of affected intersections, especially along Great South Road, by rerouting the RTC to avoid as many intersections as possible.

Frequency Crashes are likely to be occasional	Severity Death or serious injury is likely	Rating The safety concern is moderate
Designer response	1. This project promotes the inclusion of an RTN and improved / safer walking and cycling facilities. To encourage this modal shift and create a safer environment for all users. Some right turn lanes have been removed at major intersections to reduce the footprint of the intersection in an attempt to reduce pedestrian / cycle crossing lengths to and from the RTN stations. This has been promoted within this safety audit report by the auditors (see item 2.2). It is accepted that the capacity for general vehicles will be reduced. This will be managed through the lifecycle of this project. 2. Disagree - The selection of Rapid Transit Network (RTN) route is based on a long list, through short list, to a preferred proposal, using a multi criteria analysis (MCA) process. This has been conducted in coordination with Auckland Transport (AT) and a range of stakeholders and specialists. The route of the preferred option has been confirmed by AT. Whilst the proposal means that the route passes through two more intersections than the recommendation provided by the safety audit team, both of these are proposed as fully signalised protected intersections. In addition to this the northern arm of the Davies Ave / Manukau Station Road intersection will be closed to general traffic, reducing conflicts further.	
Safety Engineer comment	Accept designer's response in principle, but caution will be needed to identify the best solution on an intersection by intersection bases.	

	More lanes will result in a wider intersection and longer clearance times. As the SAT has already pointed out this is itself a potential safety issue. Full protection is typically provided for toucan crossings where vehicles turn left across the crossing, whereas pedestrian only crossings typically only have partial protection. Where shared through and left lanes are provided then the designer will need to consider what the impact of the type of protection is and whether this shared lane type is appropriate.
Client decision	Agree with designer's and Safety Engineer's response in principle. Note that this current stage of design will test impacts of the RTC on general traffic using an AIMSUN microsimulation model and there will be amendments to the design if necessary, acknowledging that there is likely to be some negative impact on general traffic travel times as a result of the RTC. Future stages of design beyond this concept design phase should, as recommended by the Safety Engineer, further consider the best solution on an intersection by intersection basis.
Action taken	Agree in principal with SE and Client Response. Each intersection is being evaluated and the layout will be reconfirmed in conjunction with the AIMSUM model.

2.2.4 U-turns at intersections

Moderate

The conversion of minor intersecting streets to left-in and left-out operation will require all signalised intersections to cater for safe unopposed U-turns. This will have a marked effect on capacity. For instance, opposing left turns would not be able to run while two opposing right-turn movements run with diamond phasing.

As described above, the reduction in capacity could lead to driver frustration and result in possibly unsafe behaviour or manoeuvres.

On other projects where similar concerns have been noted with regard to providing adequate and safe U-turn facilities, the response has been to direct drivers around the block. While this could work in some instances where there is a clear grid layout of public roads, the nature of the adjacent car parks and businesses in Manukau city centre could lead to drivers rat running through car parks and service stations. This could increase the volume and speed of traffic in such areas and increase the risk of collisions with vulnerable road users walking or riding in car parks and along back streets. In many cases such rat run routes could be classified as trespassing across private property.

The ranking of this safety concern is based on the possibility that a driver running a red traffic signal may hit a pedestrian or cyclists.

Recommendation(s)

1. Reroute the RTC to reduce the number of intersections converted to left-in and left-out and requiring U-turns to be allowed at major intersections.
2. Reroute the RTC to reduce the number of intersections where safe protected U-turns have to be accommodated.

Frequency Crashes are likely to be occasional	Severity Death or serious injury is likely	Rating The safety concern is moderate
Designer response	1&2. The selection of the Rapid Transit Network (RTN) route is based on a long list, through short list, to a preferred proposal, using a multi criteria analysis (MCA) process. This has been conducted in coordination with Auckland Transport (AT) and a range of specialists. The route of the preferred option has been confirmed by AT. Note: Most of the land uses are residential, with access via those side streets. If they cannot turn right (which they already can't do), and cannot U-turn at signals, they can easily use the residential streets to get to signals from a	

	crossroad with the RTC corridor. All major land uses are signalised, so those demand generators can directly go in any direction.
Safety Engineer comment	Agree with SAT in principle. The designer should undertake a street by street assessment of the side roads and the practicability of them becoming left-in / left-out only rather than signalised. If they have already done this as part of the MCA then this should be supplied.
Client decision	Agree with Safety Engineer re: street-by-street assessment of side roads access and the practicability of them becoming left-in / left-out only rather than signalised. In addition, where relevant use the AIMSUN model to assess impacts with AT Traffic Ops teams. Agree with designer responses re: retaining preferred alignment.
Action taken	It is recommended that this assessment be undertaken in the next design stage. There may be opportunities to convert signalised intersection to left in / left out from a technical perspective however this will also require engagement with the local community. This design change would likely reduce the construction cost and the current approach is considered conservative.

2.2.5 Drivers turning into busway

Minor

There is a risk of drivers turning right into the busway from the intersecting roads when visibility is reduced such as on a rainy night. It will be difficult to communicate to drivers that they must not keep left of the more visible busway median island, but in fact the next median island which might be less visible and would be further away from them.

Turning into the busway would not in itself be a major safety concern, as drivers are likely to keep left, but there would be no release signal phases for them to re-enter the general traffic lanes safely as there is no need for such phases for buses.

Recommendation(s)

1. Provide a clear colour and texture difference for the busway as it passes through each intersection, ensuring that it is clearly visible on a rainy night.

Frequency Crashes are likely to be occasional	Severity Death or serious injury is very unlikely	Rating The safety concern is minor
Designer response	1. Agree – It is believed that this issue can be solved by differentiating the RTN from general traffic lanes at the entrance point via LED's / marking / surfacing / signage. This will be investigated at the next stage of design as it has no impact at this SSBC stage.	
Safety Engineer comment	Agree with SAT and designer.	
Client decision	Agree with all above. Commentary to be included within the Preliminary Design Philosophy Statement.	
Action taken	PDPS Report will be updated.	

2.3 Puhinui Road

2.3.1 Undulating vertical alignment

Moderate

The existing vertical alignment along Puhinui Road is undulating with sharp crest vertical curves. Some of the crest curves are so sharp that there is inadequate stopping sight distance to the zebra crossings, and vehicles ahead are obscured in the subsequent sag curve.

Figure 6: Inadequate sight distance to zebra crossing

Although the new road would not include zebra crossings, the proposed longitudinal sections would still provide inadequate sight distance to the road surface in some locations, as low as 45 m, notably to the signalised intersections at Wyllie Road, Noel Burnside Road, and Plunket Avenue.

Recommendation(s)

1. Regrade Puhinui Road to improve the sight distance to road markings, especially on the approaches to signalised intersections and mid-block pedestrian crossings.

Frequency Crashes are likely to be occasional	Severity Death or serious injury is likely	Rating The safety concern is moderate
Designer response	1. Disagree – Stopping Sight Distance to markings is met at all crossing points, except at Wylie Road and Plunkett Ave. At the time of construction both of these are at existing signalised crossings (Wylie is on site today, Plunkett is being upgraded as part of the early deliverable works). Visibility to the traffic signals is good from both sites, advanced signage is provided and will have high friction surfacing applied. Therefore, it is not deemed that Puhinui Road will need major regrading.	
Safety Engineer comment	In their response the designer identified two locations where the normal visibility requirements for markings have not been met. I acknowledge that visibility of the signal aspects goes a long way to reducing the resulting risk, however it does not reduce it to the same level than if the markings were visible. More investigation / justification is required to demonstrate that it not practical to regrade the road as recommended by the SAT. If the visibility does not meet Austroads guidelines then it is a departure and should receive the same level of scrutiny as normally applied to departures.	

Client decision	High level investigation into regrading Puhinui Road to meet Austroads guidelines to be carried out, including rough cost estimate. Note that if a departure is required may need to justify this to the Chief Engineer and/or design review panel.
Action taken	This will be investigated at a high level.

2.3.2 Sight distance from driveways to cyclists and pedestrians

Moderate

The natural crossfall of the terrain either side of Puhinui Road suggests that cut and fill retaining walls will be required either side of the road, even if the cross-section is stepped in the medians. That means that sight distance along the footpaths and separated cycle paths from the driveways along the northern side of the road and the new driveways on the southern side of the road, is likely to be restricted by the walls themselves or the fences on top of the walls.

Recommendation(s)

1. Align the road within the new road reserve (or the new road boundaries) in such a way that there is adequate safe sight distance to cyclists and pedestrians from driveways, noting that many driveways will require drivers to reverse out.

Frequency Crashes are likely to be common	Severity Death or serious injury is unlikely	Rating The safety concern is moderate
Designer response	1. The introduction of access streets (as per item 2.1.3) would assist visibility along Puhinui Road.	
Safety Engineer comment	Agree with SAT and designer.	
Client decision	Access streets proposed along Puhinui Road is a new proposal that has not been confirmed by A2B PM team. What is the safety implication of bi-directional cycle lanes here instead? If access streets provide a better outcome for visibility and for cyclist safety on Puhinui Road, note the need for an additional safety audit.	
Action taken	For the SSBC, all cycle lanes along Puhinui Road will be wide enough to accommodate either Access streets or bi-directional cycle lanes. Both will assist in better visibility. This will be noted in the PDPS to be analysed further in the next design phase.	

2.3.3 Desire lines

Significant

The drawings show very few formal opportunities to cross Puhinui Road, particularly were there are residential areas on either side of the road. The auditors observed twice while on site the difficulty that pedestrians have with crossing the existing road and also that they did not use the zebra crossings, preferring to jaywalk instead. The two pedestrians in Figure 7 progressed halfway across Puhinui Road, then retreated to the kerb for a second attempt. The arrow points to a zebra crossing that they could have used. From their vantage point, they might not have noticed that it was there due to the sharp crest vertical curve.

Figure 7: Pedestrians trying to cross the road

Jaywalking is likely to increase along the whole corridor as the two median strips between the carriageways and the busway provide convenient refuges and raised vantage points.

Fencing the median is not a preferred solution as the fences can always be circumvented at some point and can restrict sight distance for motorists. However, the designers could consider making the medians unattractive for walking or standing on, such as by providing a narrow low concrete barrier coupled with numerous signalised midblock crossing points.

Recommendation(s)

1. Provide more opportunities for pedestrians to cross Puhinui Road safely, especially at desire lines and between residential areas that span the road.
2. Design the medians to dissuade pedestrians from jaywalking.

Frequency Crashes are likely to be common	Severity Death or serious injury is likely	Rating The safety concern is significant
Designer response	1. Agree we need to ensure key desire lines are provided for through frequent and well-designed safe crossings. A safe crossing will be incorporated at Ranfurly Road or between Ranfurly and Plunket Road on Puhinui Rd to reinstate the zebra that currently exits to access these shops. 2. *Disagree - medians should not be designed to dissuade pedestrians from using these. If able bodied pedestrians want to use these medians to cross the street, these will provide places of refuge and the ability to break the crossing into smaller pieces. Eliminating opportunities to cross in such a manner is a poor outcome for pedestrians. *Note – we are not comfortable with the term 'jaywalking' used in an RSA. *'The invention of the concept of 'jaywalking' seemed to be intricately connected to a shifting of the blame for vehicle/pedestrian accidents away from drivers and towards pedestrians.'*	
Safety Engineer comment	1. Agree with SAT and designer. Providing frequent, well located, and well-designed formal crossing points will maximise the number of pedestrians using them. 2. Regardless of the quality and quantity of pedestrian facilities and regardless of the design of the median, there will be some pedestrians who cross away from the formal crossings. The designer needs to adopt a safe system approach where normal human error by drivers or pedestrians does not result in a death or serious injury. Measures need to be included by the	

	designer to ensure collisions involving vulnerable road users cannot happen at speeds in excess of those considered survivable (30 km/h).
Client decision	1. Agree with SAT and designer. Also request further analysis of spacing between safe pedestrian crossings is to be undertaken for the whole corridor, with additional crossings to be added to the concept design if necessary. 2. Potential for safe system assessment to be undertaken for the corridor to be further followed up by the AT client team as per suggestion by Irene Tse, AT Safety Team. Agree with designer response re: provision of pedestrian refuges in the median.
Action taken	1. The pedestrian crossings are positioned along the route where current demands were identified. The land use may change between now and construction and it is therefore recommended to only reanalyse this closer to the time of construction. The cost estimate does allow for contingency for additional pedestrian crossings should they be required in the future. 2. Save systems can be investigated in more detail during the next design phase of this project.

2.3.4 Kenderdine Road and Cambridge Terrace intersections

Moderate

The intersections of Kenderdine Road and Cambridge Terrace with Puhinui Road under the RTC overbridge are unconventional. The SAT appreciates that the very small scale drawings of the intersections are conceptual only and has therefore grouped the safety concerns under one heading to be addressed together as the design proceeds.

- There would be quite a lot to be aware of for an unfamiliar driver. Both intersection layouts are unconventional and would be coupled with high pedestrian and cyclist activity, being so close to the Puhinui train station. Both intersections would also incorporate frequent U-turns as described in Section 2.2.4.
- At Kenderdine Road, the remaining two-way stub of Puhinui Road would align directly opposite the new eastbound carriageway. The intersection layout would need to prevent drivers from traveling the wrong way down the eastbound carriageway of Puhinui Road.

Figure 8: Intersection of Kenderdine Road and Puhinui Road (Google Street View, 2017)

- At Kenderdine Road, the stop line in Kenderdine Road (northern approach) for the pedestrian crossing across Puhinui Road would be set back about 40 m from the actual crossing, which would also be across a right-turn movement.

- At Cambridge Terrace, the stop line in Cambridge Terrace (northern approach) for the pedestrian crossing across Puhinui Road would be set back about 30 m from the actual crossing, which would be hidden around a left-hand curve as shown by the orange arrow in Figure 9.

Figure 9: Intersection of Cambridge Terrace and Puhinui Road (Google Street View, 2018)

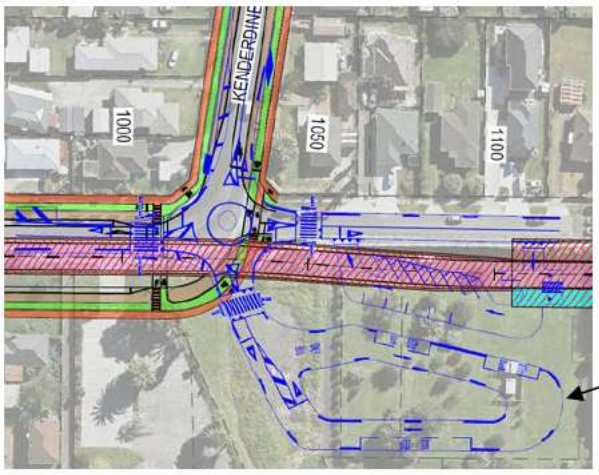
- At Cambridge Terrace, the vehicle tracking from the westbound carriageway of Puhinui Road would require a right-hand turn, then a left-hand turn and then a right-hand turn into Cambridge Terrace. Drivers would be likely to straight-line the manoeuvre and cut across the opposing lane.
- The bridge columns could obstruct visibility between drivers and pedestrians.
- The bridge columns would be hazards that would need to be protected.

With respect to vehicle-to-vehicle collisions, the ranking of this safety concern could be based on common frequency with unlikely death or serious injury consequences or with respect to vehicle collisions with pedestrians, the frequency could be occasional but with likely death or serious injury outcomes. Both approaches result in a moderate ranking. However, if the frequency of pedestrian crashes were common, then the ranking would be significant. The SAT therefore suggests that a significant improvement to these two intersections not be passed over as being too hard to achieve.

Recommendation(s)

1. Refer to the points above.

Frequency Crashes are likely to be occasional	Severity Death or serious injury is likely	Rating The safety concern is moderate
Designer response	A. Agree - Pedestrian and cycle access across some of these side roads around this section of the route could be improved. As part of the detailed station access assessment completed for the Puhinui Station, several treatments have been proposed that would remove some vehicle movements and therefore reduce the conflicts at many of these side road intersections. B&C. Agree – The proposed Puhinui / Kenderdine Road intersection is currently being upgraded as part of the 'Puhinui Interchange' early deliverable. The outcome of this will need to be considered in the final design of the Puhinui / Kenderdine Road intersection.	



Puhinui Interchange- Early Deliverable Preliminary Design

D&E. Agree – The Cambridge Terrace / Puhinui Road intersection is currently being re-designed as part of the Puhinui Road / Lambie Drive Early Deliverable. The intersection layout will be re-arranged to provide better pedestrian and vehicle movements, considering the early deliverable works.

F. Agree – The final position of bridge columns will be determined during the finalisation of the Puhinui Road / Kenderdine Road intersection. Provision will be made for the location of the columns ensuring that visibility requirements can be met.

G. Agree - Road Safety Barrier systems along bridge columns will be designed as per the required standard at the next design stage.

Safety Engineer comment	Agree with SAT and designer on all points. It is acknowledged that this is an early stage of the design with limited detail supplied, however these intersections are unusual and complex and careful consideration is needed before progressing into later stages of the design. The points raised by the SAT are all valid.
Client decision	Agree with designer's response and Safety Engineer above. Given proximity to Puhinui Station and in light of recent fatality, safe system approach should be taken. Design to consider the potential need for speed calming measures on this stretch.
Action taken	These two intersections will be updated for final submission.

2.3.5 Bridge Street pedestrian and cyclist crossings

Moderate

Drawing RR-0202 shows a footpath and one-way cycle on either side of Kenderdine Road, Bridge Street and Cambridge Terrace.

There are no pedestrian or cyclist crossings across Bridge Street for pedestrians or cyclists originating from north of Bridge Street who may wish to proceed southbound along Kenderdine Road to Puhinui Road.

Similarly, there is no crossing across Bridge street for northbound pedestrians and cyclists along Cambridge Terrace. There is also no crossing across Kenderdine Street to get from Bridge Street westbound to Milan Road.

Recommendation(s)

1. Provide full pedestrian and cyclist crossing facilities at the intersections of Kenderdine Road and Cambridge Terrace with Bridge Street.

Frequency Crashes are likely to be infrequent	Severity Death or serious injury is likely	Rating The safety concern is moderate
Designer response	Refer to response 2.3.4 above.	
Safety Engineer comment	Accept designer response.	
Client decision	Accept designer response.	
Action taken	Pedestrian crossings will be added across Kenderdine at the intersection with Puhihui Road as well as at Cambridge Terrace and Puhinui Road intersections. Pedestrian crossing directly across Bridge Street can be investigated under the Bridge Street Bridge widening upgrade project.	

2.4 Manukau City Centre

The common theme for the safety concerns in the Manukau city centre is that a 26 m wide (excluding width of footpaths) mixed use arterial running along Davies Avenue and Ronwood Avenue would bisect what is currently a low-speed, generally pedestrian- and cyclist-friendly environment.

2.4.1 Bisection of low-speed environment city centre amenity

Significant

The removal of most if not all the trees along Lambie Drive and Ronwood Avenue will create a higher speed and less self-explaining environment where speeds need to be kept low.

The cross-section of the RTC through the Manukau city centre needs to be altered substantially to a low-speed shared use facility, somewhat like a light rail facility running through a cobbled piazza that would be for buses and those accessing parking buildings only. There does not seem to be any reason why the pedestrian and cyclist facilities need to be tagged so closely onto and parallel to the route of the RTC. The pedestrian and cyclist facilities should instead follow the true desire lines within the city centre, which are likely to be basically every which way. For example, it is highly unlikely that cyclists exiting Putney Way would prefer to cycle around Hayman Park via Manukau Station Road to Lambie Drive through two arterial intersections, rather than using the much shorter, more direct and more pleasant pathway through Hayman Park.

Figure 10: Basketball player chasing ball across Davies Avenue

This section should be read in conjunction with Section 2.1.1, where the SAT discusses integrating the RTC with a wider master planning approach for all land use developments and all forms of transport, not just the RTC at the expense of all else, and in conjunction with Section 2.4.2.

Recommendation(s)

1. Preserve the mature trees along Ronwood Avenue and Lambie Drive and thread the RTC through them.
2. Remove general traffic from passing through the city centre. The only reason for general traffic being there should be to access a car park at car park speeds.
3. Consider pedestrian and cyclist needs separate to the RTC alignment, as alluded to generally in Section 2.1.1.

Frequency Crashes are likely to be common	Severity Death or serious injury is likely	Rating The safety concern is significant
Designer response	1. Whilst removing the trees along Ronwood Avenue in isolation may create a higher speed environment, this seems to ignore the full redesign of the corridor that is being proposed here, which would encourage low speeds (e.g. reduced lane widths, a recommended posted speed limit of 30km/h). Further design stages would include a landscaping mitigation plan to ensure trees / vegetation are replaced. 2. Agree – This would be a good outcome for active modes and the RTN. This would need to be understood alongside the impact on general traffic movements. 3. Agree - This has been completed. Ronwood Avenue was found to be an important route for people on bikes/micromobity to use within Manukau central area, certainly not the only route but a useful one (reference 'Walking and Cycling Area Plan' report dated 2017).	
Safety Engineer comment	1. Ideally mature trees should be retained if at all practicable as they are likely to contribute more to a low speed environment than less mature specimens. I encourage the designer to work with their landscape architect to ensure that this possibility is given careful consideration, but acknowledge that it may not be possible and that a new high quality landscaping layout can contribute to a safe road environment. 2. Agree with SAT and designer. 3. Agree with SAT and designer.	
Client decision	Overall a shared space is proposed at Manukau Station, which is in line with the approach proposed by the auditor. The busway in the city centre is intended to form part of a high quality urban environment, including trees, paving and other details, promoting a low speed and safe environment, suitable for pedestrians to cross. Further consideration at the next design phase should be given to the route of cycle facilities. 1. Agree in part with Safety Engineer – where practicable mature trees should be retained or replaced with similarly mature specimens for speed calming and amenity where possible. The Corridor Strategy as part of the business case should reflect this, as well as the future Urban Design Landscape Framework and mitigation plans prepared during the pre-implementation phase. 2. Agree - However note that removing all traffic from Manukau centre is outside of the scope of this project. Note prelim design philosophy statement proposes 30km/h speed limit for Davies & Ronwood, and that closure of southern end of Davies Ave to general traffic which will contribute to low-speed carpark-like environment. 3. Ronwood/Davies cycling facilities contribute to a network of cycling improvements in Manukau proposed through Connected Communities, Safe and Healthy Streets South Auckland, Panuku's "Transform Manukau" project and A2B station access improvements. Note: General theme that more attention to detail is needed in Manukau Centre, and that general cross-sections / intersection arrangements may not be appropriate	

	here. Suggest closer look at design, intersection treatments, and interface with surrounding land use and urban design in this section and detail on look and feel (e.g. Davies Ave pedestrian environment) to be provided in PDPS.
Action taken	1. The vegetation and landscaping will be evaluated further in the next design phase. 2. No current actions to be taken. 3. Refinement of the walking and cycling facilities through Manukau will be dealt with under the next design phase and in conjunctions with other Manukau projects in progress.

2.4.2 Severance of desire lines

Significant

There are pedestrian desire lines to Hayman Park and playground and to the train station across Davies Avenue, across Ronwood Avenue to retail areas, and across Great South Road to a lesser extent that would be severed by the RTC.

Three midblock crossings are proposed that correspond more or less with existing crossings and desire lines, one across Davies Avenue, and two across Ronwood Avenue as shown in Figure 11 and Figure 12. However, the spacing and waiting times to cross the RTC would not be conducive for pedestrians moving about a central business district. Currently the crossings are all zebra crossings with good amenity, but the proposed replacement crossings would be signalised and may be two-phase crossings. Given the separators and median strips that would provide informal refuge along the RTC, jaywalking between the crossings can be expected.

Figure 11: Zebra crossing across Davies Avenue at Amersham Way (Google Street View, 2018)

Figure 12: Zebra crossing across Ronwood Avenue near Leyton Way (Google Street View, 2018)

An RTC facility that looked and operated more like Putney Way would offer more crossing opportunities and would indicate that drivers should be on the lookout for pedestrians. The proposed cross-section indicates to drivers in no uncertain manner that buses and general traffic have priority over pedestrians, and that there is no need to be on the lookout for jaywalkers.

Figure 13: Putney Way (Google Street View, 2018)

This section should be read in conjunction with Section 2.1.1, where the SAT discusses integrating the RTC with a wider master planning approach for all land use developments and all forms of transport, not just the RTC at the expense of all else, and in conjunction with Section 2.4.1.

Recommendation(s)

1. Alter the cross-section of the RTC through Manukau city centre to convey to bus and general traffic drivers that they are passing through the Manukau city precinct where they do not have absolute right of way over all other road users.

Frequency Crashes are likely to be common	Severity Death or serious injury is likely	Rating The safety concern is significant
Designer response	1. Agree – The current cross section provides space for all modes as required. It is agreed this would be a good outcome for active modes and the RTN. The cross-sectional width would not change so for the SSBC it is proposed to retain the current cross section and at a further design stage this can be developed further. This would also need to be understood alongside the impact on general traffic movements.	

Safety Engineer comment	Agree with SAT and designer. General traffic should not be given undue priority, through traffic should be discouraged and traffic visiting adjacent properties need only travel at low speed.
Client decision	Agree that Davies Ave in particular should operate like a shared space, with both general traffic and buses on the lookout for pedestrians. If design is not updated to this effect at SSBC phase, further commentary should at least be added to the PDPS regarding the type of environment proposed for the Manukau City Centre (potentially with reference to Manukau workshop, renders etc.) Refer to response at 2.4.1. Overall a shared space is proposed at Manukau Station, which is in line with the approach proposed by the auditor. The busway in the city centre is intended to form part of a high quality urban environment, including trees, paving and other details, promoting a low speed and safe environment, suitable for pedestrians to cross.
Action taken	Commentary will be added to the PDPS to develop this concept further in the next design phase.

2.5 Te Irirangi Drive

2.5.1 Removal of existing pedestrian bridges

Significant

The proposed widening or upgrading of the existing footpaths paths along Te Irirangi Drive to create separated cycle paths requires the demolition of the two existing pedestrian bridges at Whetstone Road / Belinda Road and at East Tamaki Road / Banville Road. The bridges are not intended to be replaced due to perceived low patronage.

There does not seem to be any reason why the existing footpaths in the vicinity of the two bridges could not be widened for cyclists without having to demolish the bridges. The SAT did observe usage in the very short time spent at the bridges.

Figure 14: Footbridge at Whetstone Road / Belinda Road

Figure 15: Footbridge at East Tamaki Road / Banville Road

Recommendation(s)

1. Adjust the cross-section of the separated cycle paths to fit past the columns of the two existing pedestrian bridges so that the bridges do not have to be demolished.

Frequency Crashes are likely to be occasional	Severity Death or serious injury is very likely	Rating The safety concern is moderate
Designer response	1. The existing pedestrian bridges provide a poor level of access and connection here for pedestrians and people on bikes / micromobility. E.g. distance to cross the road becomes -250m vs 42m for an at grade crossing (208m extra) across Te Irirangi Dr at Whetstone Rd (if not going to/from the playing fields and you are unable to use the stairs). Signalised midblock crossings will be added in approximately the same locations as the existing structures.	
Safety Engineer comment	Agree with designer with the proviso that if at grade crossings are used to replace the bridges operating speed need to be reduce to a safe system level where if a crash involving a pedestrian does happen it can only happen at a survivable speed (30 km/h for pedestrians). The bridges are too indirect, and the long stairs and ramps can cause difficulties for some user types. It is likely that at least some, perhaps many, pedestrians choose to cross at grade rather than use the bridges and these pedestrians do not receive the safety benefit they are intended to provide. There are also CPTED issues as stated in the following item, which even if treated in the way recommended by the SAT would only reduce but not eliminate the problem.	
Client decision	Proceed with including at-grade crossings to replace footbridges as described by the designer, noting vision zero proviso by the Safety Engineer above. Designer to confirm whether this can be implemented.	
Action taken	Safe systems will be investigated to reduce the operating speeds round these at-grade crossings in the following design phase. Costs for new bridges have been allowed for within the risk assessment in case this decision is changed.	

2.5.2 Comment – CPTED at the East Tamaki Road footbridge

Manuka has grown up and is shielding the footpath, which does not create a safe or pleasant walking environment.

Figure 16: East Tamaki Road footbridge

There is evidence of rough sleepers using the alternative disabled access under bridge, which has been very poorly maintained as shown in Figure 17.

The manuka should be cleared and replaced with a lower species of planting that will not shield the footpath or obscure users from passing traffic.

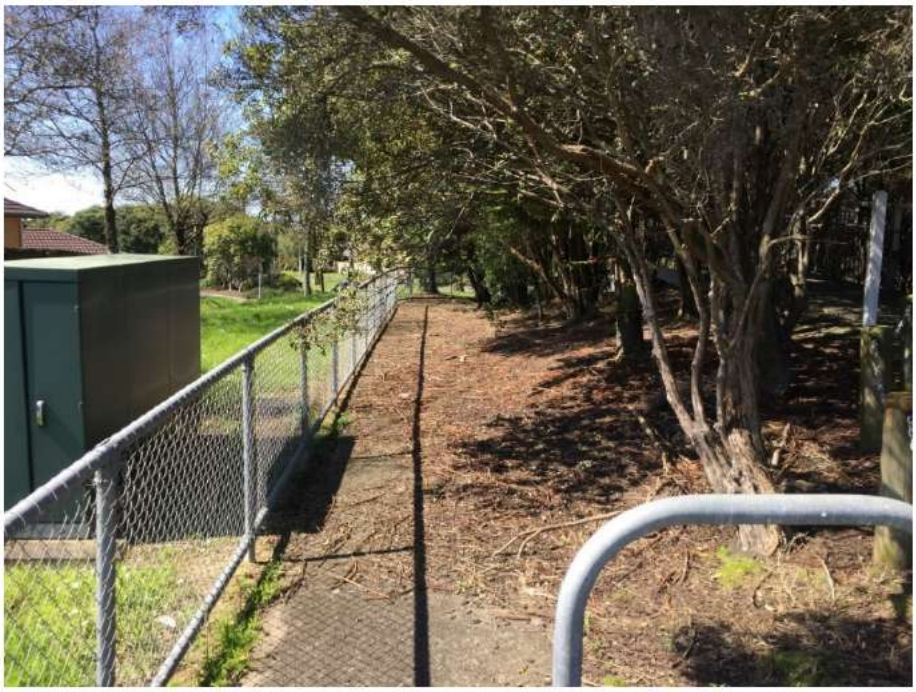


Figure 17: Poorly maintained disability access at East Tamaki Road footbridge

Designer response	See response to item 2.5.1. – The removal of the pedestrian bridge will negate the need for this link with an alternative route provide for all users.
Safety Engineer comment	See response to item 2.5.1.
Client decision	Refer to Section 2.5.1 above. Proceed with at-grade crossings to replace footbridges, noting vision zero proviso above.
Action taken	General Arrangement drawings has been updated.

2.5.3 Bicycle streets and one-way separated cycle paths

Minor

The existing service and frontage roads along Te Irirangi Drive are proposed to be converted into bicycle streets. Refer to Section 2.1.2 for comments on the concept of bicycle streets. Although the service roads that have a single entrance from and exit back onto Te Irirangi Drive are necessarily one-way, frontage roads that are connected to other streets such as Wayne Francis Drive are necessarily two-way.

With a mixture of one-way and two-way service and frontage roads, it is assumed that all the bicycle streets would operate as two-way streets. However, the separated cycle paths leading into and out of the bicycle streets would be one way.

Refer to Section 2.1.3 for comments on the circuitous routes that cyclists would have to ride to avoid riding the wrong way along the cycle paths. One of the recommendations in Section 2.1.3 was to provide more crossings points, however, this would not be practical across Te Irirangi Drive. The dangers of a two-way cycle path i.e. drivers exiting driveways and not looking both ways, would not apply to Te Irirangi Drive as no properties front directly onto Te Irirangi Drive. Therefore, the sections of cycle path at either end of the service roads could safely be made two-way.

Recommendation(s)

1. Consider providing two-way cycle paths leading into and out of the service road and frontage roads. Allow two-way traffic to operate on all service and frontage roads to avoid confusion.

Frequency Crashes are likely to be occasional	Severity Death or serious injury is unlikely	Rating The safety concern is minor
Designer response	1. Agree – Bidirectional cycle paths are proposed to be incorporated into the design between all the bicycle streets along Te Irirangi Drive so a continuous bidirectional facility is provided along its length. It is also proposed for a bidirectional facility to be included along Puhinui Road, where this can be incorporated. Some sections of the vegetated berm between the road and the cycle path may need to be reduced to fit this in.	
Safety Engineer comment	Agree with SAT and designer.	
Client decision	Agree with all above. Bidirectional facilities to be provided on Te Irirangi and Puhinui if possible.	
Action taken	Design has been updated	

2.5.4 Closing of two-way frontage road entry points

Minor

The proposals indicate that the entrances into almost all the two-way frontage roads off Te Irirangi Drive that are served by an alternative access, via for instance Wayne Francis Road, would be closed to allow cyclists to enter the frontage road (or bicycle street) without clashing with drivers entering from Te Irirangi Drive.

This seems to be an obvious safety improvement to make. However, within the short time spent on site the SAT noted two motorists who were either driving or clearly wished to drive the wrong way along the one-way streets to avoid having to go out of their way around the block. Closing the entrances to the two-way frontage roads may lead to even more of this behaviour, for instance causing motorists to enter via the exit roadway, especially those whose properties are close to the exit. The child care centre at the southern end of Shingleton Lane would be a good example. Although the actual extra travel distances to go around the block are typically only 500 m to 800 m, drivers' perceptions of the extra distances involved are usually greater, and there is the delay and effort to negotiate extra intersections to consider.

As suggested in Section 2.1.2, a raised table at the entrance threshold to each service or frontage road would demarcate the change in environment and accompanying change in behaviour that drivers would

need to adopt when entering the area. It would also indicate to cyclists that they too need to be on the lookout for other road users, such as children playing or chasing after a ball. As indicated in Section 2.1.2, chicanes, build-outs, indented parking etc. would enhance the shared nature.

Recommendation(s)

1. Leave the entries to the service roads open as they are but add raised table paired crossings a suitable distance clear of the through traffic in Te Irirangi Drive.
2. Convert the existing service roads to be even safer for vulnerable road users than they currently are by means of kerb build-outs, indented parking bays, rain gardens, etc.

Frequency Crashes are likely to be occasional	Severity Death or serious injury is unlikely	Rating The safety concern is minor
Designer response	1. Disagree – Closing the entrances will provide a safer more pleasant environment for vulnerable users and the adjacent properties. These are where the speeds of vehicles are highest are when they enter these streets. Raised tables will help but not completely remove the conflict and risk. While a few may choose to drive in through the exit, this will be awkward, and the majority should follow the road rules. We should not be compromising the design of streets to allow for a few people who might break the rules, particularly when this results in a worse outcome for vulnerable users. The other benefits we will see from removing access from these roads is the increase in priority and attractiveness of walking, cycling / micromobity will have. More people will feel more comfortable and see the benefits in walking or biking somewhere as often these trips may be more direct or faster on a bike. 2. Agree – this will be incorporated into the design of these streets.	
Safety Engineer comment	1. Accept designer's response. On balance it appears safer if smaller number of drivers illegally use these as two-way streets rather than a higher number are permitted and thereby encouraged to do so legally. A driver who knows they are making a prohibited turn movement is less likely to try and assert right of way over a pedestrian or cyclist. 2. Agree with SAT and designer.	
Client decision	Agree with designer responses and safety engineer comment.	
Action taken	No further actions will be taken at this stage. Further investigation into the detail of making these access streets safe will be done in the next design stage.	

2.5.5 Existing one-way service roads

Converting the existing one-way service roads to two-way operation, with the exception of the entry and exit points, would avoid confusion between those that are one way and those that aren't, as they all look the same. This could further enhance the shared nature of the streets.

Designer response	Agree – With our proposal to close majority of the entrances 7 out of 10 as well as install threshold treatments and speed reducing interventions along these roads, two-way operation should work fine. Consistency across the route and around the area will improve the expectations and behaviour of uses.
Safety Engineer comment	Agree with designer and SAT.
Client decision	Agree with all above.
Action taken	Refer to Section 2.5.4 above.

2.5.6 Exits from service roads

Moderate

The angle of intersection between the service road exits and Te Irirangi Drive is very acute. In almost all cases the driver has to look out of the rear passenger window to see oncoming vehicles in Te Irirangi Drive. The original designers may have tried to create a type of merge situation, given the 80 km/h speed limit on Te Irirangi Drive, but the exits are neither high speed nor comfortable for elderly drivers to use.

In addition, in most cases the vegetation in the buffer strip has grown up and obscures sight lines.

The SAT concedes that it would be impractical to convert each exit to a high entry angle intersection, but there may be opportunities to narrow the service road or swap the parking to the other side and introduce a chicane so that the exit can be shifted laterally about 3 m away from Te Irirangi Drive locally to improve the angle somewhat.

Recommendation(s)

1. Clear vegetation that is obscuring the sight lines.
2. Where possible, try to improve the angle of intersection at the exits from the service roads onto Te Irirangi Drive.

Frequency Crashes are likely to be occasional	Severity Death or serious injury is unlikely	Rating The safety concern is moderate
Designer response	1. Agree 2. Agree – The General Arrangement drawing's show indicative exits from service roads. The layout of the exits will be detailed further at the next design stage.	
Safety Engineer comment	Agree with designer and SAT.	
Client decision	Agree with all above. However, it is noted that the existing vegetation provides screening and contributes to a lower speed environment for a range of users, such as children playing. In addition, it provides amenity for adjacent properties. Its removal may require consideration of potential adverse urban design and landscape effects. This should be addressed in the Corridor Strategy. The potential for the need to provide mitigation as part of the future pre-implementation phase should be noted (Urban Design Landscape Framework, planting plans etc). Need for detailed analysis at later stages should be recorded in PDPS (along with general approach to access streets).	
Action taken	PDPS will be updated to point out the need for additional analysis of the service road exists.	

2.5.7 Comment – need to rebuild Te Irirangi Drive questioned

Providing the RTC also in combination with upgraded cycling facilities along Te Irirangi Drive seems to have sparked the need to reconstruct Te Irirangi Drive by narrowing the median and the lanes to provide the separated walking and cycling facilities as shown by the comparison between the existing and proposed cross-sections in Figure 18 and Figure 19.

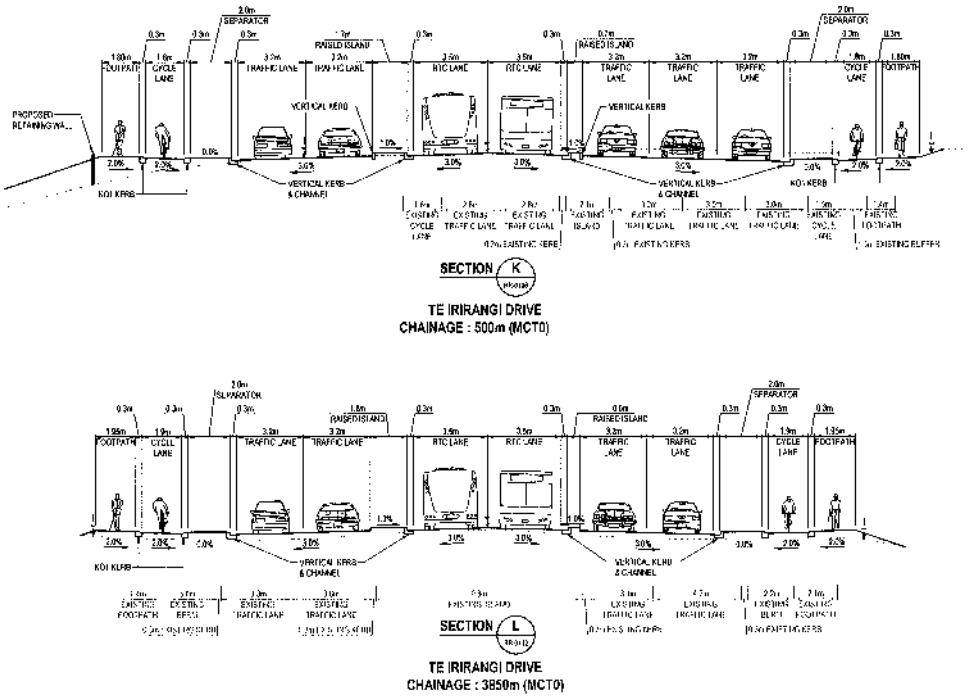


Figure 18: Proposed cross-sections along Te Irirangi Drive

The existing side friction along Te Irirangi Drive is good with its vegetation that almost overhangs the kerbs. Removing the mature vegetation will increase speeds when the desire is to reduce speeds.

There seems to be sufficient space along Te Irirangi Drive to upgrade the existing footpaths to accommodate cyclists on a shared use facility, without having to remove mature screening vegetation, reconstruct the pavement, and shift all kerbs, drainage catch pits and street lighting laterally by a relatively trivial amount to comply with the universal cross-section adopted for the RTC.

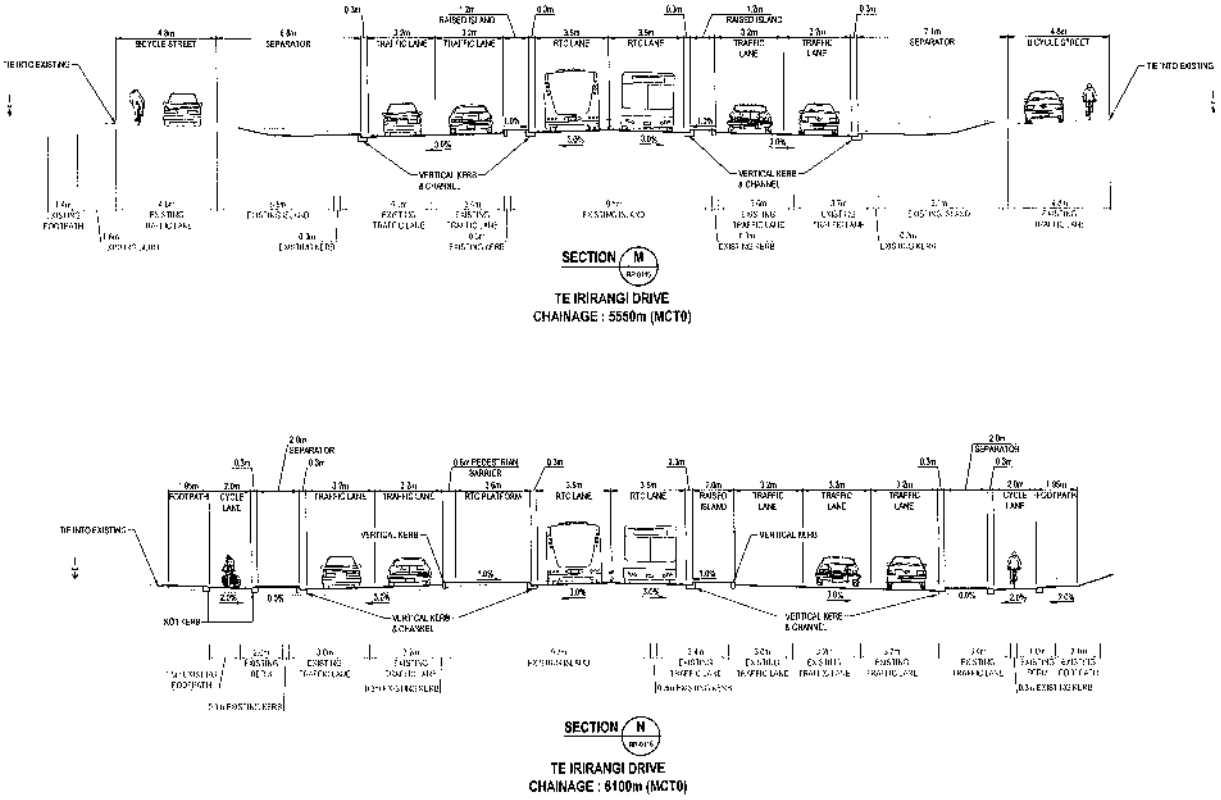
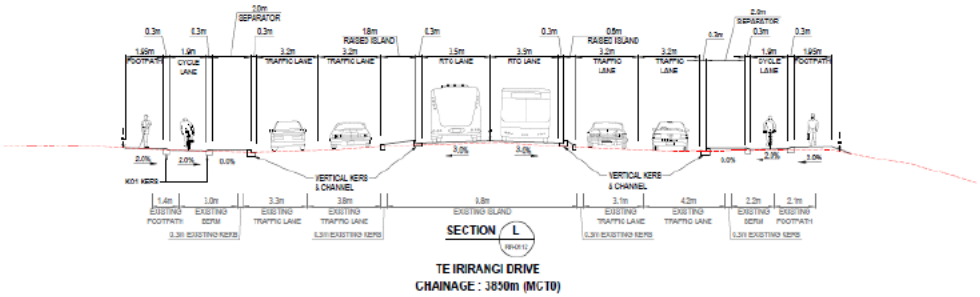


Figure 19: Proposed cross-sections along Te Irirangi Drive

If a dedicated highspeed separated cycle path is required, then Chapel Road has more width, has midblock crossings that can be converted to toucans, is more conducive to cycling as it is has lower speed environment, has only two lanes (one in each direction), serves the catchment area better (four schools Sancta Maria College, Baverstock Oaks School, Willowbank School and Botany Downs Secondary College), and extends naturally to Whitford Road. It would also keep cyclists out of the melee at the intersection of Ti Rakau Drive and Te Irirangi Drive. It would potentially also serve Ormiston better.

The SAT therefore suggests upgrading the existing footpaths along Te Irirangi Drive for combined cyclist and pedestrian use and adding separated cycle paths along Chapel Road from Ti Rakau Drive to Ormiston Road, and along Ormiston Road to join the proposed facilities on Te Irirangi Drive at Botany Junction.

Designer response	*Ti Irirangi Drive Design Philosophy:* Along Ti Irirangi Drive, between the Project Extent at Botany through to Dawson Road, no major property purchase is required. The existing wide median is utilised to accommodate the RTN, with the existing outside carriageway kerb line being relocated into the existing carriageway to provide space for walking and cycling facilities as required. This results in only a pavement overlay being required along most of Ti Irirangi Drive. Existing access streets are utilised where possible for walking and cycling links.  SECTION L TE IRIRANGI DRIVE CHAINAGE : 3850m (MCTO) *Upgrade of Existing Footpath to a SUP along Ti Irirangi Drive / Use of Chapel Road:* Disagree - Providing a safe and comfortable walking & micromobility environment (which need to be separated from each other to be safe and comfortable) was an important aspect of this project. The infrastructure proposed was aimed to provide access to the stations along the corridor, improve access within these neighbourhoods as well as to provide an alternative transport choice in addition to public transport or the private vehicle. The speed environment of both Chapel Road and Te Irirangi Drive will be the same under the proposed reduction in speed limit along Te Irirangi Drive to 50km/hr. Shared paths are not a suitable facility and compromise pedestrian safety and comfort. We agree that Chapel Rd would also be a good cycle route and would certainly improve bicycle / micromobity access around this area in combination with Te Irirangi Drive. This would start to develop a safe network for bikes/ micromobity. In the past there was the thought that we only need to provide a single route for bicycles through an area, but we now know a network is required for bicycles to become feasible forms of alternative transport.
Safety Engineer comment	Accept designer's response. I note this was raised as a comment rather than a safety concern.
Client decision	Agree with designer. Note Airport to Botany Rapid Transit will bring about a major change in the Te Irirangi environment (lower speed, dedicated facilities for pedestrians and cyclists) and hopefully change surrounding land use as well. Cycling facilities on Te Irirangi do not preclude facilities on Chapel Road delivered by another project/programme – both would be desirable to create a network for safe walking and cycling in the area.
Action taken	No actions will be taken.

3 Audit Statement

We declare that we remain independent of the design team and have not been influenced in any way by any party during this road safety audit.

We certify that we have used the available plans, and have examined the specified roads and their environment, to identify features of the project we have been asked to look at that could be changed, removed or modified in order to improve safety.

We have noted the safety concerns that have been evident in this audit and have made recommendations that may be used to assist in improving safety.

[redacted]

Date 22 October 2019

[redacted] BSc(Eng), BEng(Hons), MSc(Eng), CMEngNZ, CPEng
Principal Transportation Engineer, Stantec, Auckland

Signed [redacted]

Date 22 October 2019

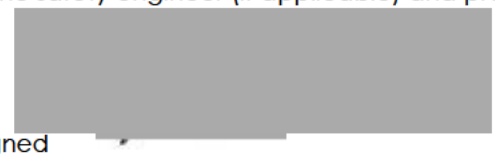
[redacted] ector Leader, Transportation Delivery, Stantec, Auckland

4 Response and Decision Statements

System designers and the people who use the roads must all share responsibility for creating a road system where crash forces do not result in death or serious injury.

4.1 Designer's Responses

I have studied and considered the auditors' safety concerns and recommendations for safety improvements set out in this road safety audit report and I have responded accordingly to each safety concern with the most appropriate and practical solutions and actions, which are to be considered further by the safety engineer (if applicable) and project manager.



Signed _____ Date 14 November 2019

[redacted] Associate, Aurecon IEng(UK) FHE]

4.2 Safety Engineer's Comments (if applicable)

I have studied and considered the auditors' safety concerns and recommendations for safety improvements set out in this road safety audit report together with the designer's responses. Where appropriate, I have added comments to be taken into consideration by the project manager when deciding on the action to be taken.

Date 12 December 2019

[redacted] Safety Engineer (Consultant to AT Road Safety Engineering Team), BE (Civil)]

4.3 Project Manager's Decisions

I have studied and considered the auditors' safety concerns and recommendations for safety improvements set out in this road safety audit report, together with the designer's responses and the comments of the safety engineer (if applicable), and having been guided by the auditor's ranking of concerns have decided the most appropriate and practical action to be taken to address each of the safety concerns.

Date 22 February 2021

[Project Manager's name, qualification, position, company]

4.4 Designer's Statement

I certify that the project manager's decisions and directions for action to be taken to improve safety for each of the safety concerns have been carried out.

Signed _____ Date 2nd March 2021

[redacted] Associate, Aurecon IEng(UK) FHE]

4.5 Safety Audit Close Out

The project manager is to distribute the audit report incorporating the decisions to the designer, safety audit team leader, safety engineer, and project file.

Date: 03 March 2021

5 References

(n.d.).

Google Street View. (2017, October).

Google Street View. (2018, October).

Google Street View. (2018, September).

Stantec. (2018, October 19). SH20B Short-term Improvements. *Addendum to Preliminary Design Road Safety Audit*.

Stantec. (2018, June 25). SH20B Short-term Improvements. *Preliminary Design Road Safety Audit*.

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Stantec. (2019, March 21). SH20B Short-term Improvements. *Detail Design Road Safety Audit*.

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Departures

Appendix I
Departures

SUBMISSION FOR DEPARTURE FROM STANDARDS

PROJECT NAME	Airport to Botany Rapid Transit Corridor Project
APPLICANT ORGANISATION	Aurecon
CONTACT DETAILS:	[redacted]
APPLICANT REF	D.0001
HIGHWAY AUTHORITY REF	
DATE SUBMITTED	22/11/2019

1) PROJECT DETAILS

A	Description	**Airport to Botany RTC: Departure D.0001** **Reduction in shoulder width within the RTC for the entire A2B route** The Airport to Botany (A2B) Rapid Transit Corridor (RTC) Project is to provide a dedicated corridor which runs down the entirety of Te Irirangi Drive, traverses through Manukau, passing Manukau Bus and Train stations connecting to Puhinui Interchange along Puhinui Road before heading west towards Auckland Airport via State Highway (SH) 20B. The Project is an initiative by Auckland Transport (AT) to provide a viable alternative to private vehicles for east and south Auckland, where one third of airport trips originate.		
B	Location	Puhinui Interchange with SH20 to south of Botany on Te Irirangi Drive		
C	Road category and type	**Road Name**	**Road Classification**	
			ONRC	**Roads and Streets Framework**
		Puhinui Road	Arterial	Single Use (Out of Centre) Arterial
		Lambie Drive (North of Cavendish Dr)	Arterial	Mixed Use Arterial
		Lambie Drive (South of Cavendish Dr)	Regional	Mixed Use Arterial
		Manukau Station Road	Regional	Mixed Use Arterial
		Davies Avenue	Primary Collector	Mixed Use Arterial
		Ronwood Avenue	Arterial	Mixed Use Arterial
		Great South Road	Arterial	Mixed Use Arterial
		Te Irirangi Drive	Regional	Single Use (Out of Centre) Arterial
D	Design speed and speed limit	**Road Name**	**Proposed Operating Speed**	**Proposed Design Speed**
		Puhinui Road	50 km/h	50 km/h
		Lambie Drive	50 km/h	50 km/h
		Manukau Station Road	50 km/h	50 km/h
		Davies Avenue	30 km/h	30 km/h
		Ronwood Avenue	30 km/h	30 km/h
		Great South Road	50 km/h	50 km/h

		Te Irirangi Drive (South of Whetstone Road)	50 km/h	50 km/h
		Te Irirangi Drive (North of Whetstone Road)	50 km/hr	60 km/hr
E	Traffic and NMU flows	**Road Name**	**AADT (ONRC)**	**NMU Flows**
		Puhinui Road	13,707	-
		Lambie Drive (North of Cavendish Dr)	15,000	-
		Lambie Drive (South of Cavendish Dr)	15,000	-
		Manukau Station Road	14,441	-
		Davies Avenue	6,129	-
		Ronwood Avenue	15,000	-
		Great South Road	24,791	-
		Te Irirangi Drive	16,635	-

2) DEPARTURE DETAILS

A	Discipline	Roads and Highways
	Type	Rapid Transit Corridor
B	Relevant Standard(s)	Busway Planning and Design Manual (BPDM)
	Clause	Section 5.2.2 (c) & Drawing B-1-3 An asphalt maintenance strip or shoulder of a minimum width of 1.0 m shall be provided adjacent to the kerbs for partial off-road parking for maintenance vehicles and disabled buses. Reductions in the width of the maintenance strip may be made with the prior approval of Transit NZ.
C	Difference between Standard(s) and Proposed Design	It is proposed that no maintenance strip/shoulder (0m) is to be provided.

D	Reason for Departure (overview)	The proposed cross section for the Project has been designed to accommodate a range of users including pedestrians, cyclists, general traffic and rapid transit within an urban environment. In retrofitting an RTN into an existing urban environment, constraints relating to the designated boundaries along the project extent are present. This can be mitigated by providing a narrower cross section to achieve cost savings for the project. The project is proposing a 3.5m wide lane in each direction for the RTN. This is bounded by a kerb and channel (150mm high kerb and a 0.3m wide channel). There is a raised median between the RTC and the general vehicle lanes (varied width between 0.6m and 5m throughout the corridor). The BPDM states that an asphalt maintenance strip or shoulder of a minimum width of 1.0 m shall be provided adjacent to the kerbs for partial off-road parking for maintenance vehicles and disabled buses. It also states that a reduction in this width may be made with the prior approval of the Road Controlling Authority. It is proposed that the 1.0m shoulder in each direction is omitted, which will save 2.0m off the cross section along the length of the corridor (approx. 18km). This can be omitted whilst still adequately providing for disabled buses and maintenance vehicles. According to the Concept of Operations, maintenance will occur in the three-hour non-service period of the RTN, therefore the shoulders are not necessary for maintenance access, as it is anticipated that all maintenance will be undertaken offline. Furthermore, emergency maintenance vehicles can be parked on the general traffic lanes. To further mitigate this risk, the RTN may be closed temporarily to facilitate emergency maintenance if required. With regards to the occurrence of disabled buses on the RTN, the remaining width of 7.6m is an adequate width for a disabled bus (2.8m wide) to pull over and allow another bus to pass. This is also considered to be an extremely infrequent occurrence. As such, it is considered that the omittance of the shoulders will not adversely impact the safety of the proposed RTN, as vehicles should still be able to safely pass the disabled / maintenance vehicle on the RTN. Furthermore, the RTN corridor will have a proposed low speed environment between 50 to 60 km/h. According to Section 7.9 of the Auckland TDM: Urban and Rural Roadway Design, road shoulders are not required in urban areas for design speeds below 70km/h, therefore the provision of shoulders are not required under this clause. The table below outlines the effects of this proposal across the sections of the RTN.

Road	Reasons/ Effects
Puhinui Road	A proposed widening of 2m of the Puhinui Interchange.
Lambie Drive (North of Cavendish Dr) Davies Avenue	The revised cross section of the corridor between Lambie Drive (North of Cavendish Drive) and Manukau Station Road will be mostly within the property boundary, thereby removing the need for further land acquisition, resulting in cost savings and reduction in risks and delays associated with the acquisition process.

		Manukau Station Road: There are difficulties and risks associated with the currently proposed RTN corridor in the vicinity of Manukau Train Station Road, given that the Manukau Train Station is situated towards the north, and the land towards the south is being developed for the Manukau Institute of Technology (MIT) campus. With the removal of the shoulders, the corridor will now be situated mostly within the existing designated project boundary, minimizing the need for large land acquisition in this area. Lambie Drive (South of Cavendish Dr) Ronwood Avenue: The removal of the shoulders will remove the need for land acquisition in this section of the RTN corridor. Great South Road: Removal of the shoulders will result in the reduction of required land acquisition in this section of the corridor. Te Irirangi Drive: Removal of the shoulders at this location will result in the corridor being mostly within the property boundary, reducing the need for land acquisition or additional widening of the structures in this section. In summary, the removal of the shoulders will result in the reduction of capital construction costs associated with the reduced in land acquisition with a narrower construction footprint, along with reduced ongoing maintenance costs. It is considered that the benefits of this proposal outweigh the associated disadvantages, and that the key concerns surrounding disabled vehicles and maintenance vehicle access have been sufficiently addressed by both the Concept of Operations and proposed design of the RTC corridor.
E	Associated Project Departures	N/A
F	Other options considered	-
3) JUSTIFICATION (POTENTIAL POSITIVE AND NEGATIVE IMPACTS)		
A	Safety	The risk of a collision between general traffic and the RTN vehicles will be reduced by the raised separator island proposed. In the event of a collision, the low speed environment (50km/h) will also serve to reduce the severity of the crash. The low speed environment will also enable a safer overtaking manoeuvre for vehicles passing the disabled / maintenance vehicle. The removal of the shoulders will also reduce the driver's perceived width of the lane, thereby creating a traffic calming effect, encouraging drivers to be more cautious and travel at a slower and safer speed. It furthermore reduces the overall cross-sectional width, which reduce the crossing length of pedestrians and cyclists.
B	Congestion/ delay	In the occurrence of breakdowns, the opposing RTN lane may be utilised by buses to pass the disabled vehicle, which may result in a slight delay. This may only become an issue during peak hours where the frequency of the busses is higher.
C	Environmental/ Sustainability	The removal of the shoulders will result in a narrower cross section, which will reduce the effects on roadside features such as trees and vegetation, hence reducing the ecological impact of the project. It also reduces the stormwater runoff from the road surface.

D	Capital and Whole Life Cost/Value	Reduction in capital costs due to a reduction in land acquisition, and a reduction in construction costs due to the reduction in cross-sectional width. This will further result in lower maintenance costs. This cost saving will be particularly significant on the major bridge structures on Puhinui Road and Te Irirangi Drive.		
E	Accessibility	No impact on accessibility		
F	Integration	No impact on Integration		
G	Structural	No impact on structures, apart from the reduction in capital costs to widen existing structures.		
H	Network Resilience & Maintenance	Minor impact on space available to carryout maintenance.		
4) COMPENSATORY MEASURES				
A	Included Measures			
B	Rejected Options			
5) ATTACHMENTS & OTHER INFORMATION				
A	List of Attachments			
B	Consultations			
C	Other information			
6) DESIGN ORGANISATION'S CONCLUDING REMARKS				
It is recommended that this departure for the removal of the shoulders along the RTN corridor be accepted on the following basis: - Reduction of private land acquisition. - Reduced impact on the surrounding ecosystem. - Reduction in capital and lifecycle costs, due to a reduced corridor cross-sectional width. - The RTN will be operating in a low speed environment (50km/h), which should result in lower occurrences and severity of collisions. - The operational effects relating to disabled vehicles and maintenance vehicle access will be sufficiently addressed / mitigated by the Concept of Operations and RTN design.				
7) DECISION				
Reviewer		Signature		Date
Approver		Signature		Date
Decision	☐ Approved	☐ Approved with comments	☐ Rejected with reasons	
*COMMENTS or *REASONS FOR REJECTION (*delete as applicable)				

Notes for Completion

1. This form must be provided with a signed cover sheet giving full details of the applicant's staff and checking process in accordance with the Quality Assurance procedures in place. The Departures submission should be considered as a "report".
2. If a particular box is not relevant, do not leave it blank, instead state "not applicable" or similar.
3. Names and signatures associated with the Decision (see Section 6) should be inserted in accordance with agreed responsibility and competency matrix set out by the highway authority policy.
4. When completing section 2A, please refer to list of choices provided by highway authority which will normally be broadly based on DMRB/volume or SHW/series categorisation.

SUBMISSION FOR DEPARTURE FROM STANDARDS				
PROJECT NAME		Airport to Botany Rapid Transit Corridor Project		
APPLICANT ORGANISATION		Aurecon		
CONTACT DETAILS:		[redacted]		
APPLICANT REF		D.0002		
HIGHWAY AUTHORITY REF				
DATE SUBMITTED		22/11/2019		
1) PROJECT DETAILS				
A	Description	**Airport to Botany RTC: Departure D.0002** **Grade length more than preferred maximum grade length for footpath from Ch.2251.99 to Ch.2496.78 at Te Irirangi Drive** The Airport to Botany (A2B) Rapid Transit Corridor (RTC) Project is to provide a dedicated corridor which runs down the entirety of Te Irirangi Drive, traverses through Manukau, passing Manukau Bus and Train stations connecting to Puhinui Interchange along Puhinui Road before heading west towards Auckland Airport via State Highway (SH) 20B. The Project is an initiative by Auckland Transport (AT) to provide a viable alternative to private vehicles for east and south Auckland, where one third of airport trips originate.		
B	Location	Te Irirangi Drive		
C	Road category and type	**Road Name**	**Road Classification**	
			ONRC	**Roads and Streets Framework**
		Te Irirangi Drive	Regional	Single Use (Out of Centre) Arterial
D	Design speed and speed limit	**Road Name**	**Proposed Operating Speed**	**Proposed Design Speed**
		Te Irirangi Drive (South of Whetstone Road)	50 km/h	60 km/h
E	Traffic and NMU flows	**Road Name**	**AADT (ONRC)**	**NMU Flows**
		Te Irirangi Drive	16,635	-
2) DEPARTURE DETAILS				
A	Discipline	Roads and Highways		
	Type	Footpath		
B	Relevant Standard(s)	Transport Design Manual (TDM): Footpaths and Public Realm		
	Clause	Different footpath gradients should only be utilised for a specified maximum length according to Table 3 in Section 3.4 of the Transport Design Manual (TDM): Footpaths and Public Realm. The maximum continuous footpath length to have a gradient of 3%-5% should be 120m.		
C	Difference between Standard(s) and Proposed Design	A longitudinal grade of -3.38% for a continuous length of 244.8m is proposed along the corridor between chainages 2251.99m and 2496.78m, therefore it is not compliant with the 120m requirement according to the TDM Manual.		

		Chainage	**Longitudinal Grade**	**Grade Length**
		Ch. 2251.99 - Ch. 2496.78	-3.38%	244.8m
D	Reason for Departure (overview)	The footpath section is located along Te Irirangi drive, where the gradient is restricted by its topography. The impact is considered to be minimal given that the design grade of 3.38% is slightly above the 3% threshold. The alternative option is to lower Te Irirangi Drive at this location by 0.5m to comply with the 120m footpath length requirement, however this will introduce considerable costs and complications to the project, whereas the currently proposed design retains existing topography, which effectively provides an option with lower cost and less disruption to road users. It is considered that the alternative option will be excessive given that the 124.8m non-compliant length is not a significant length.		
E	Associated Project Departures	-		
F	Other options considered	-		
3) JUSTIFICATION (POTENTIAL POSITIVE AND NEGATIVE IMPACTS)				
A	Safety	Departure does not result in any safety issues.		
B	Congestion/ delay	Due to the steeper grade, a slight delay may be invoked on pedestrians at this location, particularly mobility impaired pedestrians.		
C	Environmental/ Sustainability	Retaining the existing topography will reduce the ecological impact of the project.		
D	Capital and Whole Life Cost/Value	The departure will result in reduced capital cost as it retains existing topography over the 244.8m section.		
E	Accessibility	Minor impact on comfort for pedestrians navigating the footpath along this section.		
F	Integration	No impact on Integration.		
G	Structural	No structural impact.		
H	Network Resilience & Maintenance	-		
4) COMPENSATORY MEASURES				
A	Included Measures			
B	Rejected Options			
5) ATTACHMENTS & OTHER INFORMATION				
A	List of Attachments			
B	Consultations			
C	Other information			
6) DESIGN ORGANISATION'S CONCLUDING REMARKS				

It is recommended that the departure to adopt a longitudinal grade of -3.38% across the 244.8m section be accepted on the following basis:

- Negligible change to the existing grade of the road at this location

- The proposed grade of -3.38% is similar to the 3% threshold, and the TDM states that there is no limit on preferred maximum length for longitudinal grades below 3%.

- Cost efficiency as altering the topography will introduce significant capital costs to the project.

7) DECISION

Reviewer		Signature		Date
Approver		Signature		Date
Decision	☐ Approved	☐ Approved with comments	☐ Rejected with reasons	
*COMMENTS or *REASONS FOR REJECTION (*delete as applicable)				

Notes for Completion
1. This form must be provided with a signed cover sheet giving full details of the applicant's staff and checking process in accordance with the Quality Assurance procedures in place. The Departures submission should be considered as a "report".
2. If a particular box is not relevant, do not leave it blank, instead state "not applicable" or similar.
3. Names and signatures associated with the Decision (see Section 6) should be inserted in accordance with agreed responsibility and competency matrix set out by the highway authority policy.
4. When completing section 2A, please refer to list of choices provided by highway authority which will normally be broadly based on DMRB/volume or SHW/series categorisation.

SUBMISSION FOR DEPARTURE FROM STANDARDS

PROJECT NAME	Airport to Botany Rapid Transit Corridor Project
APPLICANT ORGANISATION	Aurecon
CONTACT DETAILS:	[redacted]
APPLICANT REF	D.0003
HIGHWAY AUTHORITY REF	
DATE SUBMITTED	22/11/2019

1) PROJECT DETAILS

A	Description	**Airport to Botany RTC: Departure D.0003** **Reduction in general traffic lane width for the entire A2B route** The Airport to Botany (A2B) Rapid Transit Corridor (RTC) Project is to provide a dedicated corridor which runs down the entirety of Te Irirangi Drive, traverses through Manukau, passing Manukau Bus and Train stations connecting to Puhinui Interchange along Puhinui Road before heading west towards Auckland Airport via State Highway (SH) 20B. The Project is an initiative by Auckland Transport (AT) to provide a viable alternative to private vehicles for east and south Auckland, where one third of airport trips originate.
B	Location	Puhinui Interchange with SH20 to south of Botany on Te Irirangi Drive

C – Road category and type

Road Name	Existing Classification	
	ONRC	Roads and Streets Framework
Puhinui Road	Arterial	Single Use (Out of Centre) Arterial
Lambie Drive (North of Cavendish Dr)	Arterial	Mixed Use Arterial
Lambie Drive (South of Cavendish Dr)	Regional	Mixed Use Arterial
Ronwood Avenue	Arterial	Mixed Use Arterial
Great South Road	Arterial	Mixed Use Arterial
Te Irirangi Drive	Regional	Single Use (Out of Centre) Arterial

D – Design speed and speed limit

Road Name	Proposed Operating Speed	Proposed Design Speed
Puhinui Road	50 km/h	50 km/h
Lambie Drive	50 km/h	50 km/h
Ronwood Avenue	30 km/h	30 km/h
Great South Road	50 km/h	50 km/h
Te Irirangi Drive (South of Whetstone Road)	50 km/h	50 km/h
Te Irirangi Drive (North of Whetstone Road)	50 km/hr	60 km/hr

E	Traffic and NMU flows	**Road Name**	**AADT (ONRC)**	**NMU Flows**
		Puhinui Road	13,707	-
		Lambie Drive (North of Cavendish Dr)	15,000	-
		Lambie Drive (South of Cavendish Dr)	15,000	-
		Ronwood Avenue	15,000	-
		Great South Road	24,791	-
		Te Irirangi Drive	16,635	-

2) DEPARTURE DETAILS

A	Discipline	Roads and Highways
	Type	General Traffic Lane
B	Relevant Standard(s)	Transport Design Manual (TDM): Urban and Rural Roadway design – Section 7.3
	Clause	Section 7.3 of the Transport Design Manual (TDM): Urban and Rural Roadway Design specifies the preferred lane width as 3.5m for roads with speed environments > 50km/, with the minimum being 3.0m. However, the minimum width cannot be adopted on a bus or heavy freight route. For speed environments < 50km/h, the preferred lane width is 3.2m, with a minimum width of 3.0m. The preferred width is increased to 3.5m on RTN bus or designated freight routes, and the minimum cannot be used on these routes.
C	Difference between Standard(s) and Proposed Design	The current design proposes to adopt a 3.2m lane width for general traffic lanes across the project extent, with the exception of sections of Davies Avenue and sections of Ronwood Avenue, where there will be 3.5m general traffic lanes in either or both directions.
D	Reason for Departure (overview)	The key aim of the project is to encourage a modal shift via the inclusion of an RTN, along with improved and safer walking and cycling facilities. The width of the general traffic lanes is proposed at 3.2m, to sufficiently accommodate all the required facilities within the cross-sectional restraints. It is considered that a carriageway width of 3.2m is appropriate in facilitating the movements of most vehicles at the proposed posted speed limit. Sections along the project extent are classified as freight routes and / or FTN routes, which require 3.5m lane widths according to TDM requirements. Appendix A contains the FTN and freight route maps. The table below outlines the road sections which are freight routes and / or FTN routes, along with the reasons / motivations for this departure.

Road	FTN/Freight Route	Explanation
Puhinui Road	FTN 380 Route Puhinui Interchange with SH20 to Wyllie Road Junction	• Approximately 250m of Puhinui Road within the project extent is classified as a FTN route. • A 1.2km length within this section is classified as a freight route. • Puhinui Road is classified as a Level 3 road, which defines these roads as roads with no freight priority but requires active management. • The cross section will be reduced by 0.6m across the corridor, which will result in reduced capital and maintenance costs, motivating the proposed reduced width at this section. • The proposed cross section would result in the reduction of 0.6m of the corridor width.
	Level 3 Freight Network From Puhinui Interchange with SH20 to Bridge street	
Lambie Drive (North of Cavendish Dr)	FTN 380 Route From Puhinui Junction to North of Cavendish Dr Junction (complete length)	• 600m of this section is part of the FTN route. • The proposed 1.5m shoulders adjacent to the traffic lanes in each direction may be used by buses (if required). • The proposed cross section would be within AT's designated boundary, whereas having 3.5m lanes would result in the corridor extending beyond the boundary, resulting in the need for further land acquisition, consequently increasing capital costs.
	No Freight Route	
Lambie Drive (South of Cavendish Dr)	FTN 380 Route From South of Cavendish Dr Junction to Ronwood Junction	• 210m of this section of Lambie Drive is classified as a FTN route. • The proposed cross section would be within AT's designated boundary, whereas having 3.5m lanes would result in the corridor extending beyond the boundary, resulting in the need for further land

					acquisition, consequently increasing capital costs. • The proposed cross section would result in the reduction of 1.2m of the corridor width.
			Ronwood Avenue	FTN 33 Route (complete length)	500m of Ronwood Avenue is classified as a FTN route. • A reduction in the lane widths, in combination with a posted speed limit of 30km/h would serve to create a safer environment to better accommodate the FTN route. • The proposed 1.5m shoulders adjacent to the traffic lanes will provide a buffer for the buses should it be required. The proposed cross section would be within AT's designated boundary, whereas having 3.5m lanes would result in the corridor extending beyond the boundary, resulting in the need for further land acquisition, consequently increasing capital costs. • The proposed cross section would result in a reduction of 0.6m of the corridor width.
				No Freight Route	
			Great South Road (2 lanes in each direction)	FTN 33 Route Used full project road	• Overdimension280m of Great South Road at this location is classified both as a FTN and an overdimension route. • The section is classified as Level 1B – Arterial roads serving strategic inter-and intra-regional movements. • The proposed cross section would be within AT's designated boundary, whereas having 3.5m lanes would result in the corridor extending beyond the boundary, resulting in the need for further land acquisition, consequently increasing capital costs. • The proposed cross section would result in the reduction of 1.2m of the corridor width.
				Level – 1B Network Overdimension	

Te-Irirangi Drive	No FTN Route	• 225m of the road section between the Great South Road junction to the SH1 offramp is classified as a Level 2 road, which is defined as a road which provides for the manoeuvre of freights, serving industrial parks. • 6.5km of the road section between the SH1 offramp and Botany is classified as a Level 1B road, which is defined as an arterial road serving the manoeuvre of freigths, serving strategic inter- and intra-regional movements. Providing 3.5m lanes would result in the corridor between Botany and Dawson Road extending beyond the boundary, resulting in the need for further land acquisition at this location, consequently increasing capital costs. • The proposed cross section will result in the reduction of 1.2m of the corridor width.
	Level 2 Network From Great South Rd Junction to SH1 Off Ramp Level 1B Network From SH1 Off Ramp to Botany (Project Extent)	

Further to the reasons provided in the table above, corridor sections which are classified as freight and / or FTN routes will be designed to accommodate overdimension vehicles as outlined in the design philosophy statement, which states that all overdimension routes will accommodate the following clearance envelope specifications:

- A 10m wide load with an allowance for a possible off-centre load.
- In accordance with AGRD Part 3 "Table 8.1: Typical minimum vertical clearances over roadways and pedestrian / cycle paths", a minimum 6.1m vertical clearance over a carriageway width of at least 10m is to be provided between road surface to underside of structure for all overhead bridges and structures on overdimension vehicle routes, which shall be increased to 6.3m for all overhead pedestrian structures.

The effects of super elevation and vehicle tracking on curves will also be accounted for in the preparation of overdimension vehicle clearance envelopes. Identified intersections within the project extent will also be designed to safely accommodate overdimension vehicle manouevres. Kerbs and islands on overdimension routes will also be mountable where required.

The proposed width reduction of the general traffic lanes will also serve the purpose of a traffic calming measure, reducing the general travel speeds within the project extent, therefore improving safety for all road users.

The raised islands and separators proposed across the project will also improve road user safety through the separation of active modes from the motorised vehicles, therefore the narrower traffic lane should not have any adverse effects on pedestrians or cyclists. Overall, the proposal was developed strategically to simultaneously provide a safe corridor for all road users, whilst achieving considerable capital and maintenance cost savings.

E	Associated Project Departures	-		
F	Other options considered	-		
3) JUSTIFICATION (POTENTIAL POSITIVE AND NEGATIVE IMPACTS)				
A	Safety	The proposed lane width reductions will serve as a traffic calming measure, reducing overall travel speeds in the affected sections of the project. The raised islands and separators will also significantly reduce the risk of collision between motorised vehicles and active mode users, therefore the impact on pedestrians and cyclists as a result of this proposal is considered to be negligible.		
B	Congestion/ delay	The reduction in width of 0.3m per traffic lane is unlikely to introduce significant congestion / delays to the affected sections of the project.		
C	Environmental/ Sustainability	As the overall cross section will be reduced, this will also decrease the ecological impact within the project extent as a whole.		
D	Capital and Whole Life Cost/Value	A reduced cross-sectional width will result in a reduction of land acquisition required for the project, thereby reducing the capital cost. Construction and maintenance costs will also be reduced because of reduced corridor width.		
E	Accessibility	No impact on accessibility		
F	Integration	No impact on Integration		
G	Structural	No impact on structures, apart from the reduction in capital costs to widen existing structures.		
H	Network Resilience & Maintenance	No significant risks are associated with the reduce lane widths with regards to maintenance.		
4) COMPENSATORY MEASURES				
A	Included Measures			
B	Rejected Options			
5) ATTACHMENTS & OTHER INFORMATION				
A	List of Attachments			
B	Consultations			
C	Other information			

6) DESIGN ORGANISATION'S CONCLUDING REMARKS

It is recommended to reduce the width of the general traffic lanes from 3.5m to 3.2m and is accepted on the following basis:

- Project is designed for a low speed environment. Narrower traffic lanes will promote and physically enforce a lower travel speed and driver awareness.

- Reduces pedestrian and cyclist crossing lengths, promoting safety.

- Less land acquisition required, resulting in large project cost savings.

- Reduced capital and whole-life costs to construct and maintain the narrower corridor.

- The 1.5m shoulders adjacent to the traffic lanes on Ronwood Avenue and Lambie Drive (North of Cavendish Drive) will provide additional space for overdimension vehicles (if required), resulting in essentially the same effect as a 3.5m traffic lane.
- The 0.3m channel adjacent to the outer traffic lanes on Lambie Drive (South of Cavendish Drive), Great South Road, and Te-Irirangi Drive will provide additional space for overdimension vehicles (if required) on the outer lanes, resulting in a similar effect to a 3.5m traffic lane.

7) DECISION

Reviewer		Signature		Date
Approver		Signature		Date
Decision	☐ Approved	☐ Approved with comments	☐ Rejected with reasons	
*COMMENTS or *REASONS FOR REJECTION (*delete as applicable)				

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4. When completing section 2A, please refer to list of choices provided by highway authority which will normally be broadly based on DMRB/volume or SHW/series categorisation.

Appendix
Rapid Transit Network and Freight Route

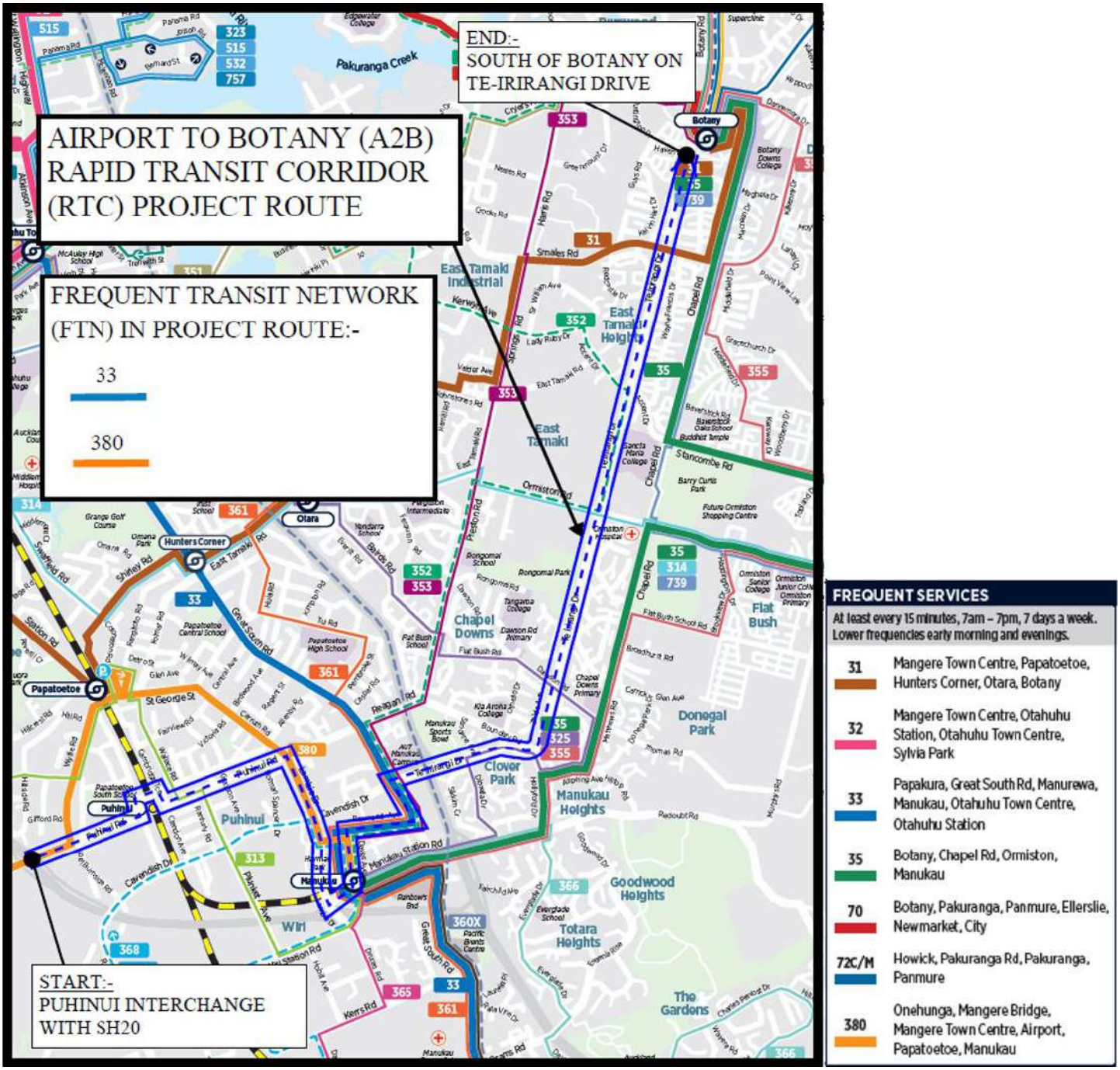

Figure A.1: Rapid Transit Network Route along A2B project corridor

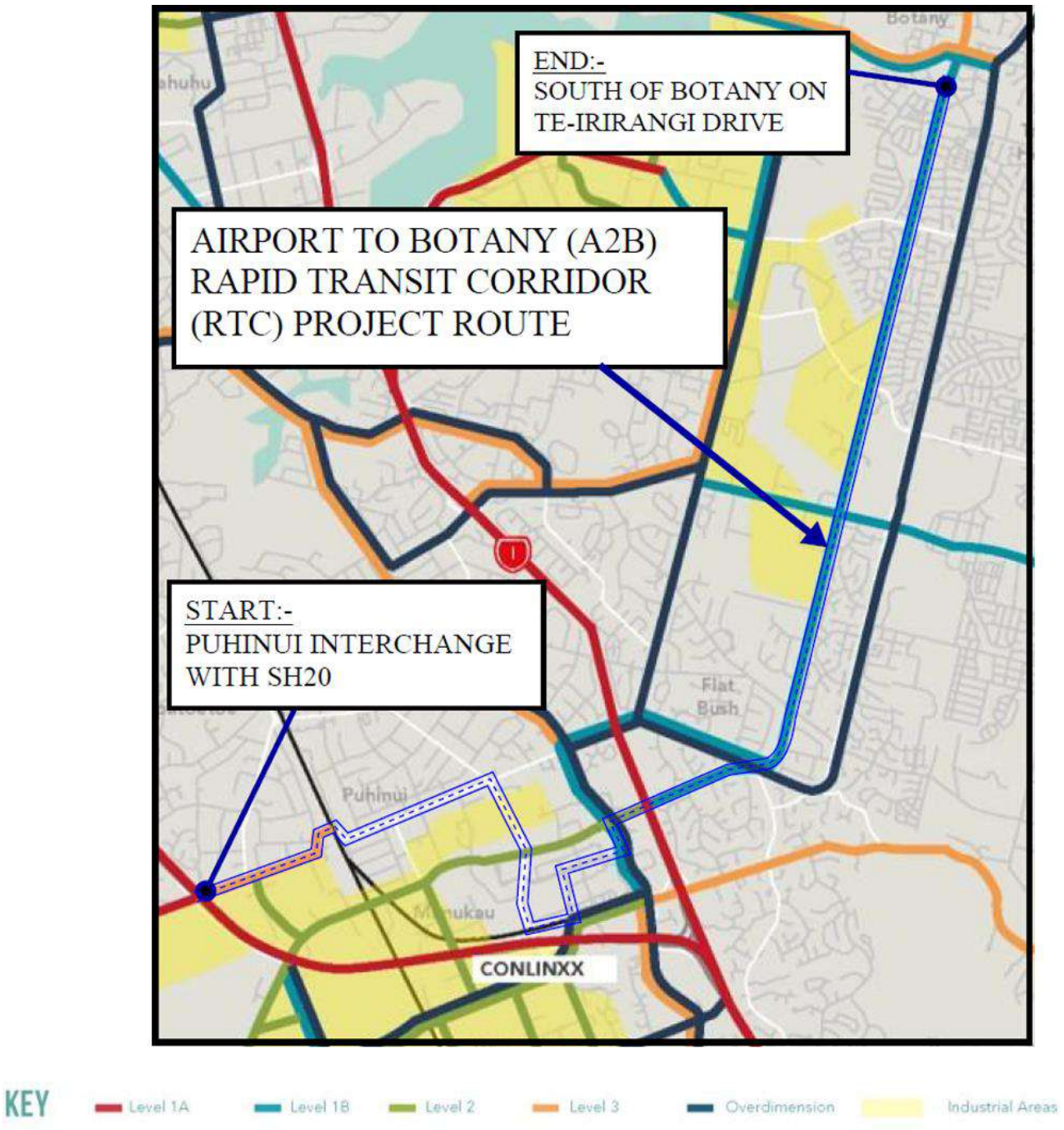

Figure A.2: Strategic Freight Network, inland container and industrial areas along A2B project corridor

Figure A.2 shows the strategic network in the study area (based on the Auckland Regional Land Transport Plan (RLTP) 2015-2025), with routes depicted as follows:

- Level 1A – Motorways serving strategic inter-and intra-regional movements
- Level 1B – Arterial roads serving strategic inter-and intra-regional movements
- Level 2 – Roads serving industrial parks
- Level 3 – Roads with no freight priority but requires active management

J

Safety in Design Register

Appendix J
Safety in Design Register

Document control record

A person using Aurecon documents or data accepts the risk of:
a) Using the documents or data in electronic form without requesting and checking them for accuracy against the original hard copy version.
b) Using the documents or data for any purpose not agreed to in writing by Aurecon.

Document control						aurecon
Report title	Airport to Botany - Safety in Design (SiD)					
Document ID	501094-7000-REG-JJ-0002		**Project number**		502334	
File path	pw:\\designshare.au.aurecon.info:PW_AUDC1_01\Documents\Projects\502xxx\502334 - Airport to Botany RTC SSBC\5 Deliver Design\501 Engineering\7000 - LONG-TERM AIRPORT ACCESS IMPROVEMENTS (PART 2)\REG-0002 Safety in Design (SiD) Register\					
Client	Auckland Transport					
Client contact			**Client reference**			
Rev	**Date**	**Rev details/status**	**Author**	**Reviewer**	**Verifier**	**Approver**
0	7/11/2019	**Issue for Information**				
1	5/12/2019	**Issue for Client Comment**				
Current revision						1

Approval			
Author signature		**Approver signature**	
Name		**Name**	
Title		**Title**	

Notes:

1. This risk register has been prepared to document hazards and control measures associated with project elements designed by Aurecon, including subconsultants where applicable.
2. The full life cycle of the project has been considered including design, construction (and commissioning), operation, maintenance, modification and demolition phases.
3. The risk register is focussed on hazards resulting from atypical /unique features specific to the design. It is expected that risks associated with generic hazards (working at heights, excavations, etc) will be addressed by other stakeholders using appropriate risk management techniques during subsequent phases of the project.
4. Risks which were not eliminated by Aurecon during the design phase have been identified as either acceptable, tolerable or intolerable. These risks require ongoing management by other stakeholders during subsequent phases of the project (e.g. construction, operations, maintenance, modification or demolition).
5. This risk register does not replace the need for other stakeholders to complete their own hazard identification and risk assessment for the project (including the development of safe work procedures for specific activities) in due course.

Safe Design Risk Register – Airport to Botany

IDENTIFY SAFE DESIGN RISK							ASSESSMENT SAFE DESIGN RISK - CURRENT EXPOSURE						IMPLEMENT SAFE DESIGN RISK TREATMENT	
ID	Risk Title	Event / Cause / Consequence	Persons Affected	Applicable Phases	Applicable Disciplines	Inherent Consequence	(Risk Treatment) Current Control Measures	Consequence	Likelihood	Risk Level	Risk Owner	Evaluation	(Risk Treatment) Action Summary	Comments
1	Pedestrian crossings during construction	Pedestrians may jaywalk and get struck by a construction vehicle due to: - Access to PT stations are no longer easy - Insufficient number of crossings during construction - Pedestrians don't have a safe and accessible means of crossing - Access to public services (parks, MIT, court building etc) disrupted or restricted Which could result in: - Pedestrian fatality	Local Communities Workers	Construction	Roads & Highways	B - Major				'				
2	Reduced parking	A person may get struck by a vehicle because of driver frustration due to lack of parking and/or dangerous parking due to: - Reduction in parking is no longer sufficient to service surrounding businesses and services Which could result in: - Injury to pedestrian	Local Communities Workers	Construction	Roads & Highways	D - Minor								
3	Network disruption during construction	Driver/pedestrian confusion/panic/frustration during construction may lead to an accident due to: - PT routes no longer viable because of construction - Traffic around the Lambie Dr/Manukau Station Road intersection is not managed effectively - Construction causes traffic to overflow and congest other streets via detours - The public transport network around the RTC changes to accommodate construction requirements - No dedicated routes for construction traffic - Multiple overlapping construction projects exacerbate traffic impacts - Airport bus link to kiss and ride at Puhinui interchange is disrupted Which could result in: - A fatality	Operators Workers Local Communities	Construction	Roads & Highways	B - Major				'				
4	Dust and noise exposure	Constructors and the public may be exposed to exceeded safe levels of dust and noise due to: - Works within construction sites Which could result in: - People developing hearing/breathing problems - Liability under the Occ H&S regulations	Workers	Construction	Roads & Highways	C - Moderate				'				
5	CPTED issues	CPTED issues may occur due to: - Insufficient lighting/visibility underneath the new bridge at Puhinui interchange - Design of bridge strucuture Which could result in: - Damage to infrastructure - Promote dangerous activities and other crime involving injury to residents	Local Communities	Design Maintenance	Bridge Structures	D - Minor				'				
6	Difficult maintenance duties	Dangerous maintenance works due to: - Hard to access tall structures or objects (e.g. lights, CCTV) - Traffic service cabinets are diffcult to access (in a confined space, close to the road etc) Which could result in: - Maintenance worker injury	Maintainers	Design Maintenance	Roads & Highways Bridge Structures	C - Moderate				'				
7	Unattended maintenance vehicle	A vehicle collision may occur with an unattended maintenance vehicle due to: - No dedicated service bays for maintenance vehicles to park to carry out their duties, resulting in dangerous parking Which could result in: - Injury to driver	Maintainers Local Communities	Maintenance	Roads & Highways	C - Moderate				'				
8	Pedestrian crossings during operation	Pedestrians may jaywalk and get struck by a moving vehicle due to - Insufficient number of crossings - Pedestrians jump over barriers at stations to catch PT rather than at designated crossings - No crossings at desirelines (e.g. near schools/daycares) Which could result in: - Pedestrian fatality	Local Communities	Operations	Roads & Highways	B - Major				'				
9	Altered traffic conditions	Vehicle collision within the RTC may occur during the operation phase due to: - Local bus drivers being confused and uncertain with the changed local network and might drive into the RTC - General vehicles may turn into the RTC and panic as they feel stuck Which could result in: - A fatality	Operators Local Communities	Operations	Roads & Highways	B - Major				'				

Safe Design Risk Register – Airport to Botany

IDENTIFY SAFE DESIGN RISK							ASSESSMENT SAFE DESIGN RISK - CURRENT EXPOSURE						IMPLEMENT SAFE DESIGN RISK TREATMENT	
ID	Risk Title	Event / Cause / Consequence	Persons Affected	Applicable Phases	Applicable Disciplines	Inherent Consequence	(Risk Treatment) Current Control Measures	Consequence	Likelihood	Risk Level	Risk Owner	Evaluation	(Risk Treatment) Action Summary	Comments
10	Shared space outside Manukau Train and Bus Stations	A vehicle collision with pedestrians or cyclists may occur due to: - The free movement of cyclists and pedestrians across the RTC and road at any point where drivers may not be aware of it Which could result in: - Pedestrian/cyclist fatality	Local Communities	Operations	Roads & Highways	B - Major				-				
11	Vandalism of shelters	A maintenance worker or pedestrian may cut themselves due to: - Vandalism of station structures resulting in protruding objects or broken glass Which could result in: - Minor to moderate injuries	Local Communities	Operations	Roads & Highways	D - Minor				-				
12	Sight distance	Vehicles could strike object on the road because of insufficient sight distance due to: - High vegetation at RTC intersection stations - High barriers at RTC intersection stations - Bridge structure at Puhinui Interchange for users turning from Kenderdine rd/Cambridge Tce - Insufficient bike/e-scooter parking at stations, leading to people to dump them and potentially fall onto the road Which could result in: - Injury to driver	Local Communities	Operations	Landscaping	C - Moderate				-				
13	Insufficient platform widths	High volume of pedestrians waiting for PT may spill onto busy adjacen roads and get struck by a vehicle due to: - Platform widths for peds being of an insufficient width, particularly around schools Which could result in: - Pedestrian fatality	Local Communities	Operations	Roads & Highways	B - Major				-				
14	Illegal traffic movements	Forced left-in, left-out movements may cause a vehicle collision to occur due to: - Frustrated drivers may drive the wrong way down a road as a shortcut - Frustrated drivers may cut across the RTC to turn right. Which could result in: - A fatality	Local Communities	Operations	Roads & Highways	B - Major	The risk has been controlled to the current level by: - Provided vertical kerbs and separators between general traffic lanes and the RTC lanes, to restrict people from cutting across the RTC			-				
15	Bi-directional use of uni-directional cycle paths	Cyclists may head the wrong way down the uni-directional cycle paths leading to a head on cyclist collision due to: - Lack of right turn options for cyclists - insufficient number of cycle crossings Which could result in: - Major injuries to cyclists	Local Communities	Operations	Roads & Highways	B - Major				-				
16	Driveway interaction with walking and cycling facilities	Collision with vehicle coming out of a driveway may occur due to: - Inadequate visibility splay for vehicles to see crossing pedestrians and cyclists - A cyclist heading the wrong way down a cycle path will not be anticipated from a vehicle coming out of a driveway Which could result in: - A fatality	Local Communities	Operations	Roads & Highways	B - Major				-				
17	On-road cyclists	Cyclist and vehicle collision may occur due to - Cyclists using the road as the cycle path is not meeting requirements to entice cyclits to use it - Drivers do not anticipate cyclists to use the road because a cycle path is provided. - Cyclists crossing the road due to insufficient number of crossings Which could result in: - A fatality	Local Communities	Operations	Roads & Highways	B - Major				-				
18	Emergency at Puhinui bridge	Emergency vehicles unable to reach emergency (e g. fire/accident on bridge) due to: - Difficult access to Puhinui interchange bridge for emergency vehicles Which could result in: - Fatality - Extensive fire damage	Operators	Operations	Roads & Highways	B - Major								

Safe Design Risk Register – Airport to Botany

IDENTIFY SAFE DESIGN RISK							ASSESSMENT SAFE DESIGN RISK - CURRENT EXPOSURE						IMPLEMENT SAFE DESIGN RISK TREATMENT	
ID	Risk Title	Event / Cause / Consequence	Persons Affected	Applicable Phases	Applicable Disciplines	Inherent Consequence	(Risk Treatment) Current Control Measures	Consequence	Likelihood	Risk Level	Risk Owner	Evaluation	(Risk Treatment) Action Summary	Comments
19	Noise disruption	Surrounding residents may be exposed to higher than average noise levels due to: - Elevated RTC traffic over the rail line at Puhinui Interchange distributing noise easier to the surrounding areas - Construction works Which could result in: - Health issues for adjacent residents	Neighbours	Operations Construction	Architectural Bridge Structures	D - Minor				'				

K

Supporting Information for Stormwater Ponds

Appendix K
Supporting Information for Stormwater Ponds

APPENDIX – Support Information for Existing Ponds

1.0 Otara Creek/Flat Bush Catchment

1.1 Rongomai Upper and Lower Dams

No Resource Consent was found for these ponds. However, a report was prepared by consultants Tonkin & Taylor (T&T) dated November 2010 (file reference 26731) regarding the Dams' routing analysis, this was reviewed, and the relevant information is below:

- The existing Rongomai Upper Dam (Figure 1) has a dead storage volume of 6,900 m^3 and a live storage volume of 154,300 m^3. This pond attenuates peak stormwater flows from the 50year ARI storm event from 23.7 m^3/s to 6.0 m^3/s with the peak reservoir level during this event reaching 17.4m RL, (0.25m above the 20m crest depression and 0.1m below the average crest elevation of 17.5m RL).

Figure 1 : Rongomai Park Upper Dam extension when water level is at the dam crest (Source: Tonkin&Taylor Rongomai Upper and Lower Dams Routing Analysis Report (2010))

- The existing Lower Dam (Figure 2) provides has a dead storage volume of 750 m^3 and a live storage volume of 37,450 m^3. This pond attenuates peak flows from the 50year ARI storm event from 6.4 m^3/s to 5.4 m^3/s with a maximum reservoir level of 12.5m RL (that is, 0.3m below the broad crest depression and 0.5m below the average crest level).

Figure 2 : Rongomai Park Lower Dam extension when water level is at the dam crest (Source: Tonkin&Taylor Rongomai Upper and Lower Dams Routing Analysis Report (2010))

This peak flow of 5.4 m^3/s is in excess of the 1.0 m^3/s peak flow that is required by [the now legacy] Manukau City Council to meet the conditions of the Rongomai Dam Water Permit.

To achieve a flow reduction to 7.3 m^3/s at the discharge point to Otara Stream, the two dams need to attenuate peak flows to 1.0 m^3/s (as there are additional contributing catchments below the dams).

Within their report T&T advised that the Probable Maximum Flood (PMF) storm event was not attenuated through either the Upper or Lower Dam as flows discharged over the wide dam crests at time of peak flows. The maximum discharge depths over the dam crests were 0.4 m and 0.5 m for the Upper and Lower Dams respectively and presented a significant potential risk of dam failure. That potential failure could affect some residential properties in the area. To solve this matter, T&T proposed an auxiliary spillway option to bypass PMF floods for the geometry of the existing dams.

The risk associated with these two dams, and any proposed Auckland Council intervention should be confirmed before considering either of these dams as a potential mitigation option for increased stormwater flows from the A2B project.

1.2 Accent Drive Pond (Sancta Maria Pond – North)

No Resource Consent was found for this pond. A file named as "*Spencer Block Stage 8 - Pond Maintenance Schedule – Stormwater Management Pond*", reference SP8337, was reviewed and the relevant information is shown below:

The pond is an off-line wet pond to provide both water quality treatment and attenuation in accordance with the legacy Auckland Regional Council (ARC) Technical Publication 10 (TP10) design guideline. The pond has a permanent pond water depth of 1.50 m and fluctuates up to 3.7 m over 24 hours to an RL of 17.7 m providing an attenuation of 80% of the pre-development flows for the sub-catchment. The pond volume is 8,300 m3.

Furthermore, a review of the Stormwater Pond design, carried out by legacy Manukau City Council (file reference 24330R3), dated June 2004, summarised the consideration and assumption of the pond design development, as shown below:

- The pond design meets the minimum requirements of ARC TP10.
- The pond is designed for stormwater quality treatment, extended detention and to control flows up to a 10% AEP rainfall event. Flows higher than 10% AEP event (up to 1% AEP event) are diverted at Accent Drive and Cyril French Drive into the adjacent watercourses where they are attenuated behind the Accent Drive embankment and controlled to 80% of the flow from the developed areas.
- Total catchment area considered for design is 44.14 ha.
- Catchment Imperviousness of 65% has been adopted.
- Initial abstraction (Ia) has been allowed for impervious areas as well. The design consultant (Wood and Partners) consider that some storage occurs in channels, catchpits and manholes although the quantum of this storage is debatable. ARC TP108 considers no *Ia* for impervious areas. The design water quality volume for the pond (50% of the total of 7,053m^3 WQV calculated considering nil *Ia* for impervious areas) = 3,847m^3.
- Sediment Forebay volume required = 15% of 7,053 m^3 = 1,058 m^3. Volume provided in the forebay = 1,100m^3.
- The proportional L: B Ratio for the whole pond is approx. 3:1, equivalent to a minimum recommended in TP10.

Peak flows and volumes – the design calculations show the following:

- The 50% AEP overall post development flow is limited to 64% of the pre-development flow.
- The overall 10% AEP post development flow is to 85% of the predevelopment scenario.
- And the 1% AEP overall post development flow is calculated on the following assumption:
- Allowable 1% AEP post development outflow = 100% of the outflow from catchment that will be not be developed plus 80% of outflow from catchment that will be developed.

1.3 Whaka Maumahara (Guys Reserve)

The Resource consent application for land use activity, applied for legacy Manukau City Council (MCC), under MCC Proposal No. 9673 and BRS Reference P6906, contains the following information:

The area of catchment contributing to the flow to be piped is 86 hectares and the 1% AEP flood flow has been calculated as 15.4m^3/s using MCC rainfall intensity curves. The upstream 1% AEP flood level is 21.4 mRL assuming the road level at the start of the overland flow is 21 mRL.

Soils are silty clays and clays of the Waitemata Group sediments.

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