Wellington City Council

Hutt Road Sustainable Transport Study

Final Report

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Prepared By

Sam Thornton
Senior Transportation Engineer

Reviewed By

Eliza Sutton
Transportation Work Group Manager

Approved for Release By

Eliza Sutton
Transportation Work Group Manager

Opus International Consultants Ltd
Wellington Civil
L10, Majestic Centre, 100 Willis St
PO Box 12 003, Wellington 6144
New Zealand

Telephone: +64 4 471 7000
Facsimile: +64 4 471 1397

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Executive Summary

Opus International Consultants was commissioned by Wellington City Council to investigate options to upgrade sustainable transport infrastructure on the Hutt Road corridor. The purpose of the project was to provide a multi-modal solution (with a focus on sustainable modes) for the corridor, building on the previous work undertaken. This investigation was undertaken in conjunction with a review of similar upgrade options on the adjoining Thorndon Quay, and where relevant the performance of that part of the network is commented on within this review.

The Recommendation

The solution (Option B) which best meets the objectives of the project is described below with an expected cost of $5.6M and result in a shortfall of around 50 car parks along the corridor (including 100m along side streets), the majority of which are currently used by long stay / commuter parkers. Other major improvements include:

- Intersection improvements at Jarden Mile to reduce bus and vehicle delays and provide safe crossing opportunities for pedestrians and cyclists; and
- Peak hour directional T2 lanes on Hutt Road with clearway parking in the southbound kerbside lane and a 5-6m wide two-way segregated path to provide priority for sustainable modes and multiple occupant vehicles.

Work Undertaken

In arriving at the solution described above, a comprehensive review of the existing and future safety and performance was undertaken for all modes. This included:

- Crash History;
- Parking;
- Pedestrians;
- Cyclists;
- Buses; and
- General Vehicles

Alternatives Considered

The other option (A) considered in detail was almost identical to the proposed solution with a significant reduction in parking provision (above and beyond that realised within the preferred option) along the entire corridor in order to eliminate the visibility concerns with vehicles entering and existing accesses.

1 Introduction

This report summarises the work undertaken by Opus International Consultants on behalf of Wellington City Council on the Hutt Road Sustainable Transport Upgrades project (RS 816).

1.1 Background to Project

The Hutt Road/Thorndon Quay corridor is presently the busiest cycle route and bus route (excluding the Golden Mile) within Wellington City. The corridor connects Wellington CBD with the northern and some of the western suburbs and the Hutt Valley. The corridor as a whole was considered concurrently as both Hutt Road and Thorndon Quay are inter-linked. This review focuses on the Hutt Road portion of the overall corridor, with consideration to Thorndon Quay identified more fully in the detail of that report.

There have been a number of recent studies that have looked at this corridor from different perspectives, including:

- Bus Priority Plan (Duffill Watts and Tse, 2006);
- Future Bus Network (GWRC, 2014-15);
- Cycle Feasibility Study (Opus, 2013); and
- Wellington to Hutt Valley Cycle Route (AECOM, 2014).

The safety of the corridor is also an issue despite various improvements over the years including speed changes, clearways, and additional pedestrian crossings.

1.2 Project Purpose

The purpose of the project is to provide a multi-modal solution (with a focus on sustainable modes) for the corridor, building on the previous work undertaken.

The objectives of the project (as defined in the RFT are):

- Maintain or improve the level of service and safety of pedestrians;
- Improve the level of service and safety for people on bikes along identified study area;
- Improve the level of service for people using buses along identified routes;
- Maintain an acceptable level of service for general traffic movements;
- Minimise impacts on parking and increase parking supply if feasible; and
- Ensure implementation costs represent good value for money.

1.3 Report Content

The report is split into three parts (which are described further below):

- Part A: Safety Assessments
- Part B: Transportation Demands
- Part C: Design Philosophy and Corridor Options

1.3.1 Part A: Safety Assessments

Part A summarises the crash analysis along the corridor.

1.3.2 Part B: Transportation Demands

Part B presents the current and forecast transportation demands on the Hutt Road corridor as defined in the RFT.

The following sections in Part B cover:

- Pedestrians
- Cyclists
- Motor vehicles
- Buses

The sections are intended to be read alongside the data summaries included in the relevant appendices. A forecast year of 2031 has been assumed for future demand assessments. This forecast year is consistent with other assessment for major roading developments throughout the wider region.

1.3.3 Part C: Design Philosophy and Corridor Options

Part C looks at the physical constraints along the corridor. It also identifies and assesses two options for improvements:

- High sustainable transport utility (Option A); and
- High sustainable transport utility with a reduced parking impact (Option B).

Part A: Safety Assessments

2 Crash History

Appendix A contains a report identifying and assessing the crash history along the entire Hutt Road / Thorndon Quay corridor, and then summarising the particular identifiable trends along the Hutt Road portion.

2.1 Conclusions

The following conclusions can be drawn from the report:

- The proportion of cyclist crashes along the corridor is significantly higher than local, regional and national averages which highlights a safety issue. It should be noted that the cyclist volumes are also significantly higher than the national average.

2.1.1 Hutt Road

- The overall crash rates for vehicles and cyclists has reduced following the adoption of the reduced speed limit.
- There is a higher proportion of northbound (than southbound) cycle crashes (69%) on the Hutt Road both on the shared path and on the road.

2.2 Implications for Options

The following implications exist for the options being considered.

2.2.1 Shared Path on Hutt Road

- Visibility to cyclists in both directions on the shared path from vehicles leaving properties and turning left or right onto Hutt Road is important as this is the cause of 67% of cyclist crashes on the shared path.
- Visibility to cyclists in both directions on the shared path from vehicles entering the premises from Hutt Road will become more important if kerbside parking is provided (vehicles turning in make up 20% of the crashes on the shared path).
- The intersection improvements at the Jarden Mile intersection may provide an opportunity to address the crash risk for all users at the intersection.

Part B: Transportation Demands

3 Parking

Appendix B contains a note on the Parking Review. The findings of which are summarised below.

3.1 Demand Review

Hutt Road

- There is a high proportion of long stay / commuter parking demand on Hutt Road along its entire length. This demand is significantly reduced on the weekend with the exception of an increase in short stay parking at the southern end of Hutt Road.
- Hutt Road north of Kaiwharawhara Road has a consistent weekday demand from 7.00 to 16.00 with the section south of Kaiwharawhara Road having a pronounced peak in the afternoon.
- On Hutt Road, weekend demand is never more than 50% of capacity.

Side Streets

- The side streets generally have a higher turnover on the weekday when compared to the weekend.
- Kaiwharawhara Road and School Road are the least utilised side streets with Westminster Street reaching capacity at various times throughout the day (weekday).
- Kaiwharawhara Road is the least utilised side street with Westminster Street exceeding 50% of demand over capacity at various times throughout the weekend.

3.2 Opportunities

The analysis has identified that:

- There is the potential to reprioritise ~250 parks (out of ~320) from Hutt Road used for commuter / employee parking or parks that are underutilised.
- There is the potential to reprioritise ~40 parks from Hutt Road and reallocate them to unused parks on the side streets.

Based on this analysis, there is the opportunity to reallocate road space for active or passenger transport modes along the corridor by using commuter parking spaces and better utilising the current spaces. It has been assumed that short to medium term parking is required for local businesses and efforts will be made to retain these parks in the development of the options.

4 Pedestrians

4.1 Existing Demands

The existing demands are described below and shown in Appendix C. The demands were identified from surveys at the following intersections / crossings:

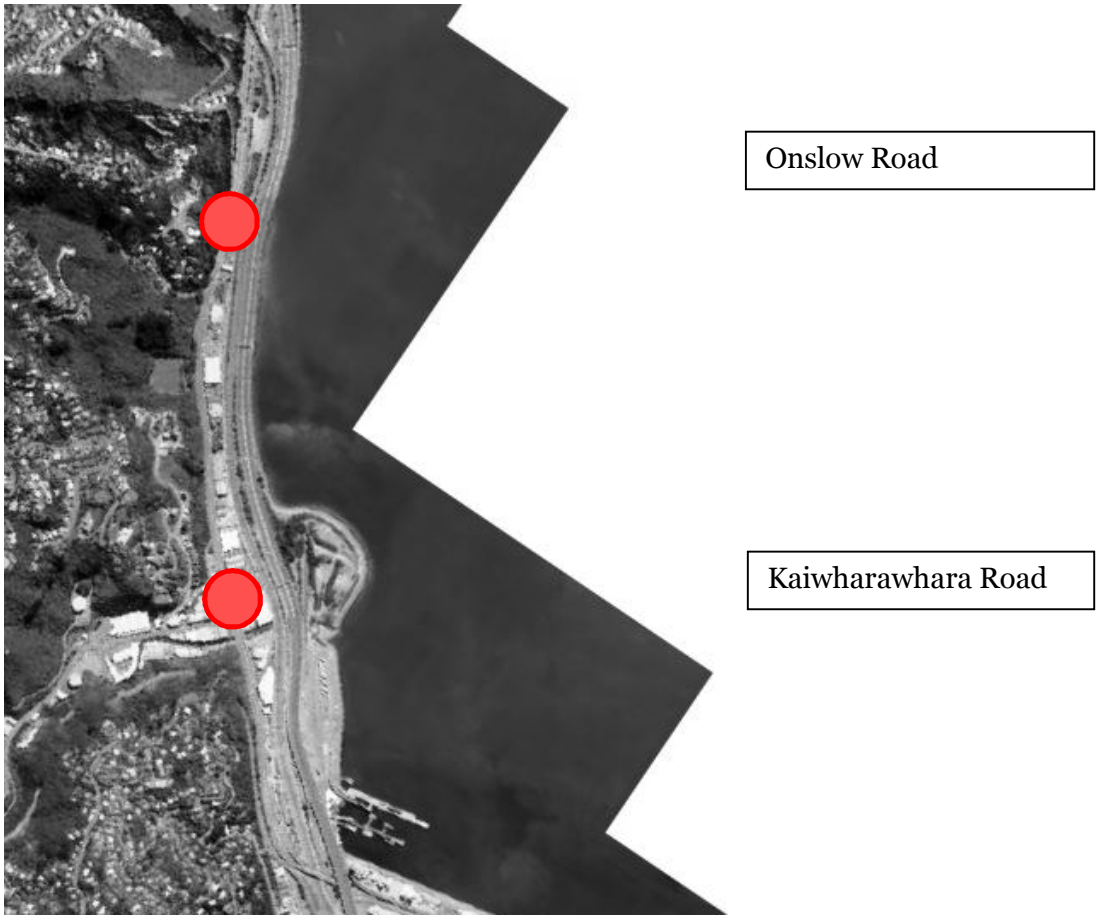


Figure 1: Active Mode Data Collection Locations

4.1.1 Link Demands

The two-way peak hour pedestrian link demands are shown in Figure 2 below.

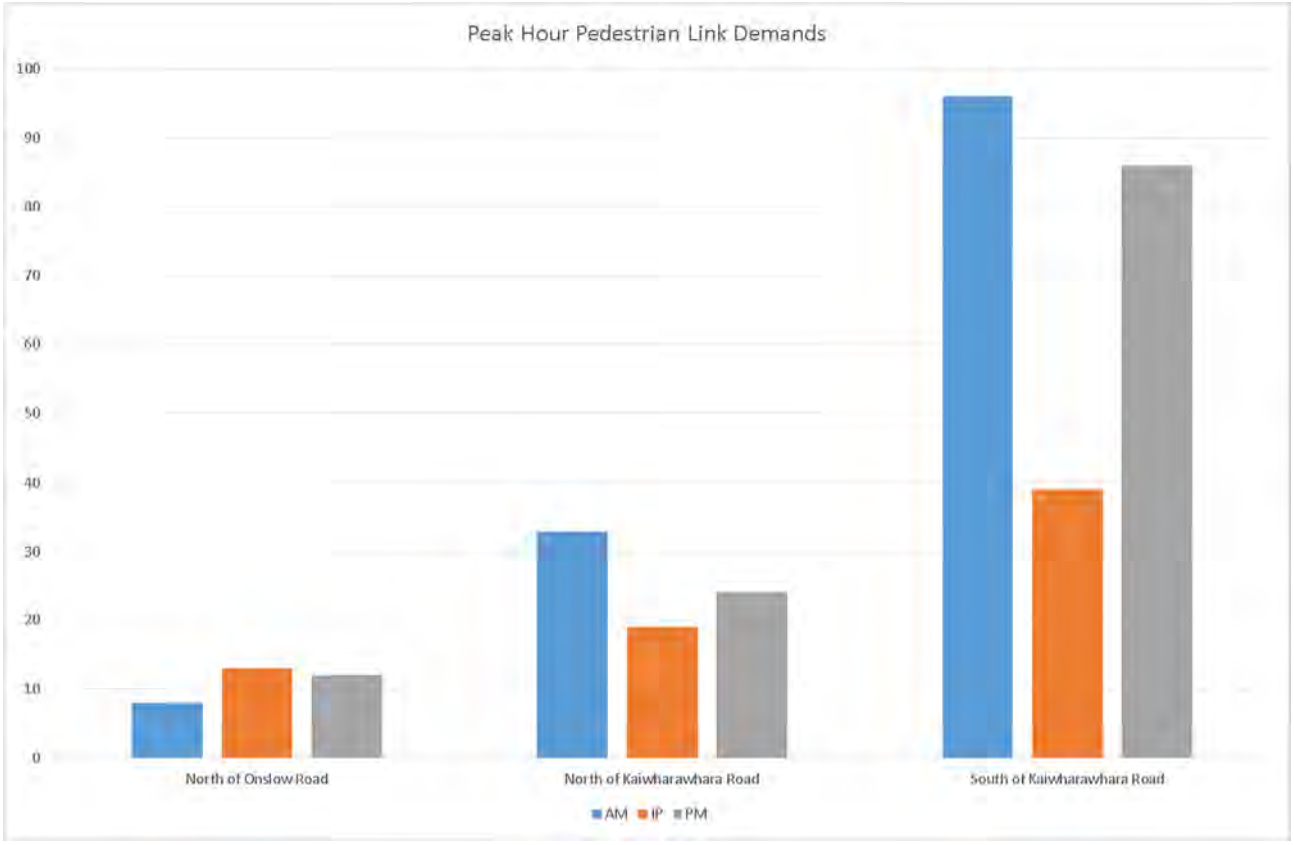


Figure 2: Pedestrian Link Demands (2015 count data)

There is a low demand on Hutt Road north of Kaiwharawhara Road, the demand increases by around 200% south of Kaiwharawhara Road.

4.1.2 Crossing Demands

The two-way peak hour pedestrian crossing demands are shown in Figure 3 below.

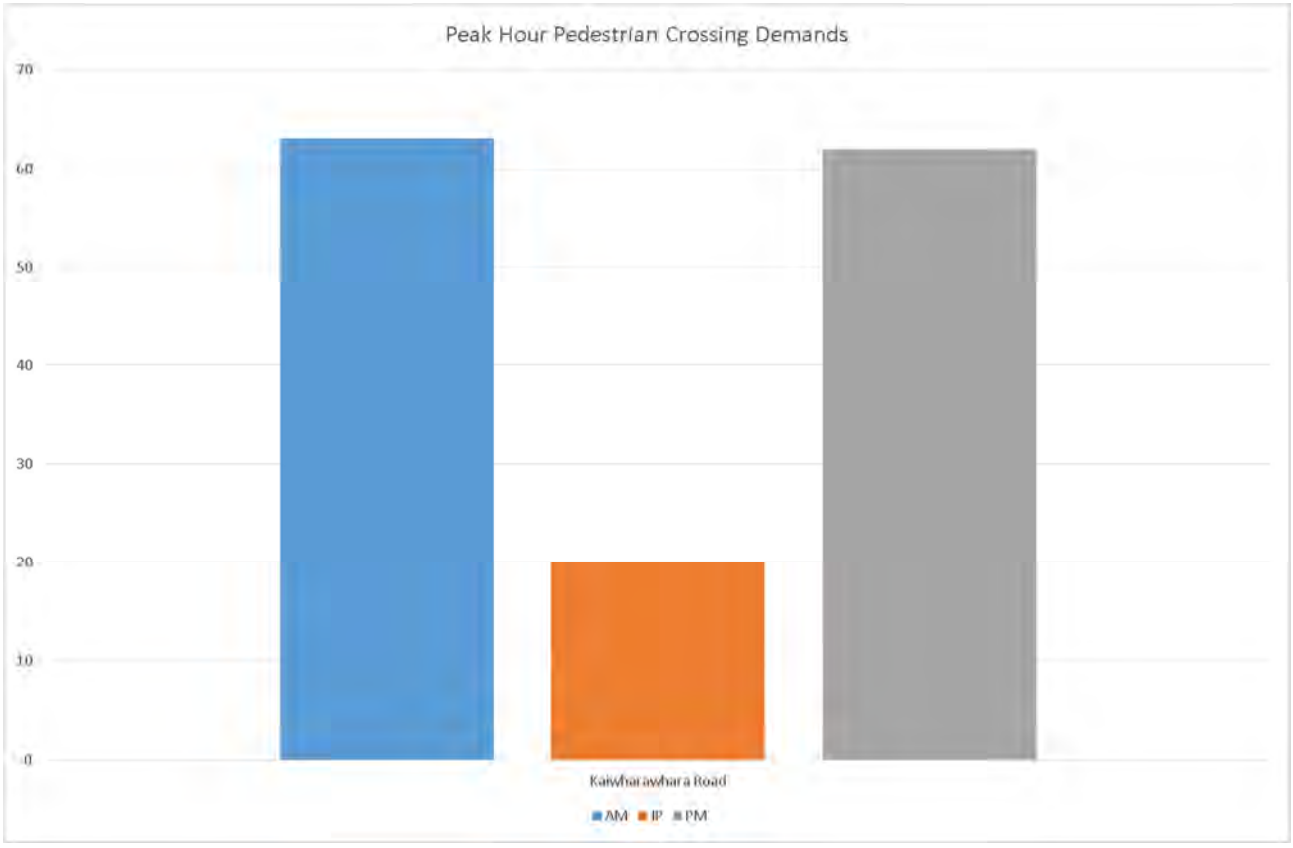


Figure 3: Peak Hour Pedestrian Crossing Demands (2015 count data)

The crossing of Hutt Road at Kaiwharawhara Road is a key link for the residential catchment west of Hutt Road in this area.

4.2 Forecast Demands

The growth in pedestrian demand north of Tinakori Road is likely to be relatively low over the next 15 years as there is little opportunity for residential intensification in this area.

Based on the above assumptions the following growth rates demand forecasts have been assumed.

Table 1: Two-way Forecast Year Demands (Pedestrian)

Location	Existing Peak Hour	Average Growth % P.A.	2031 Design Demand (rounded)
North of Kaiwharawhara Road	33	2%	45
Kaiwharawhara to Tinakori Road	96	2%	130
Kaiwharawhara Road Crossing	63	2%	85

5 Cycling

5.1 Existing Demands

The existing demands are described below and shown in Appendix D.

5.1.1 Link Demands

The two-way peak hour cycle link demands are shown in Figure 4 below.

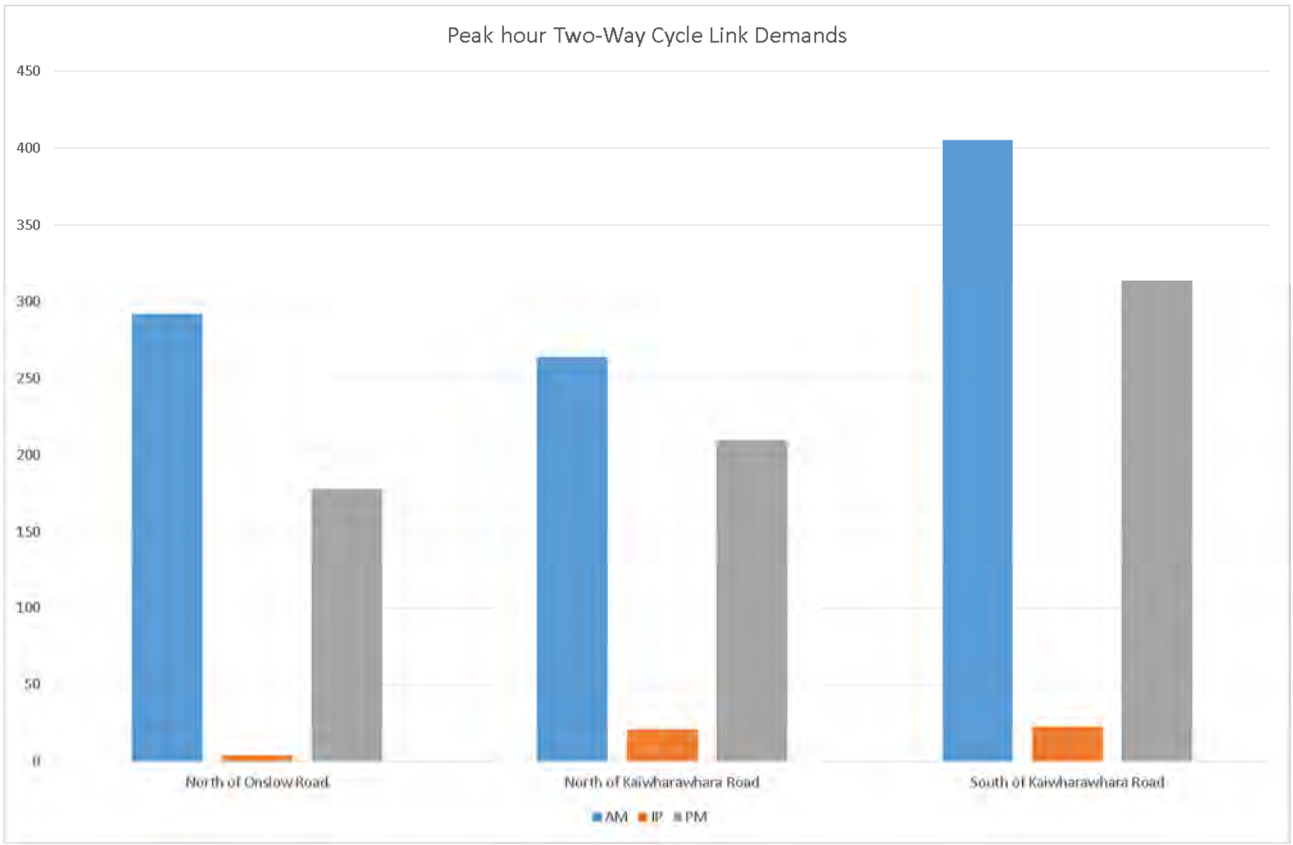


Figure 4: Cycle Link Demands (2015 count data)

The cycle link demand is consistently high in the commuter peaks and low at other times. As expected the demands increase from north to south as more catchments connect with the route, the most significant change is south of Kaiwharawhara Road which is reflected in the turning demands below.

The proportion of cyclists on the existing shared path is relatively consistent in the AM peak with 93-95% of southbound cyclists and 39-41% of northbound cyclists using the path. In the PM peak the numbers reverse adjacent to Kaiwharawhara Road with 54% of southbound and 66% of northbound cyclists using the path. North of Kaiwharawhara Road the proportions using the path increase (84% of southbound and 76% of northbound) most likely due to more capacity on the path and the higher traffic speeds.

5.1.2 Crossing Demands

The two-way peak hour cycle crossing demands are shown in Figure 5 below.

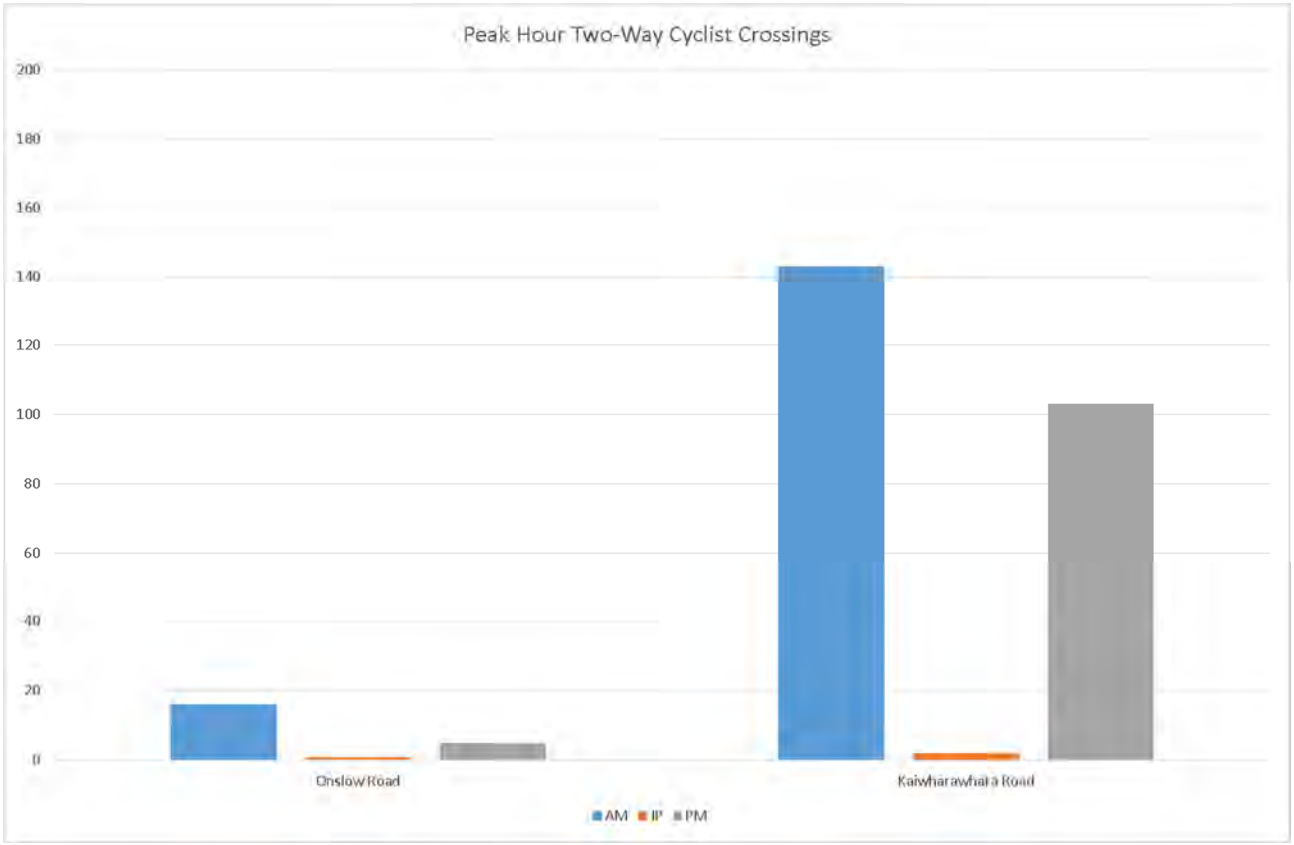


Figure 5: Peak Hour Cyclist Crossing Demands (2015 count data)

The numbers above also include cyclists turning into and out of Kaiwharawhara Road from Hutt Road from the road as well as crossing from the shared path.

The demand for crossings is very high at Kaiwharawhara Road, with the majority of southbound cyclists from Kaiwharawhara connecting onto the shared path at the ramp provided at the intersection (67-77%).

5.2 Forecast Demands

The background growth in commuter cyclists over the past 10 years is shown in Figure 6 below (counted at Ngauranga Gorge). The trend lines indicate that growth is increasing at an average per annum rate of 8.3%.

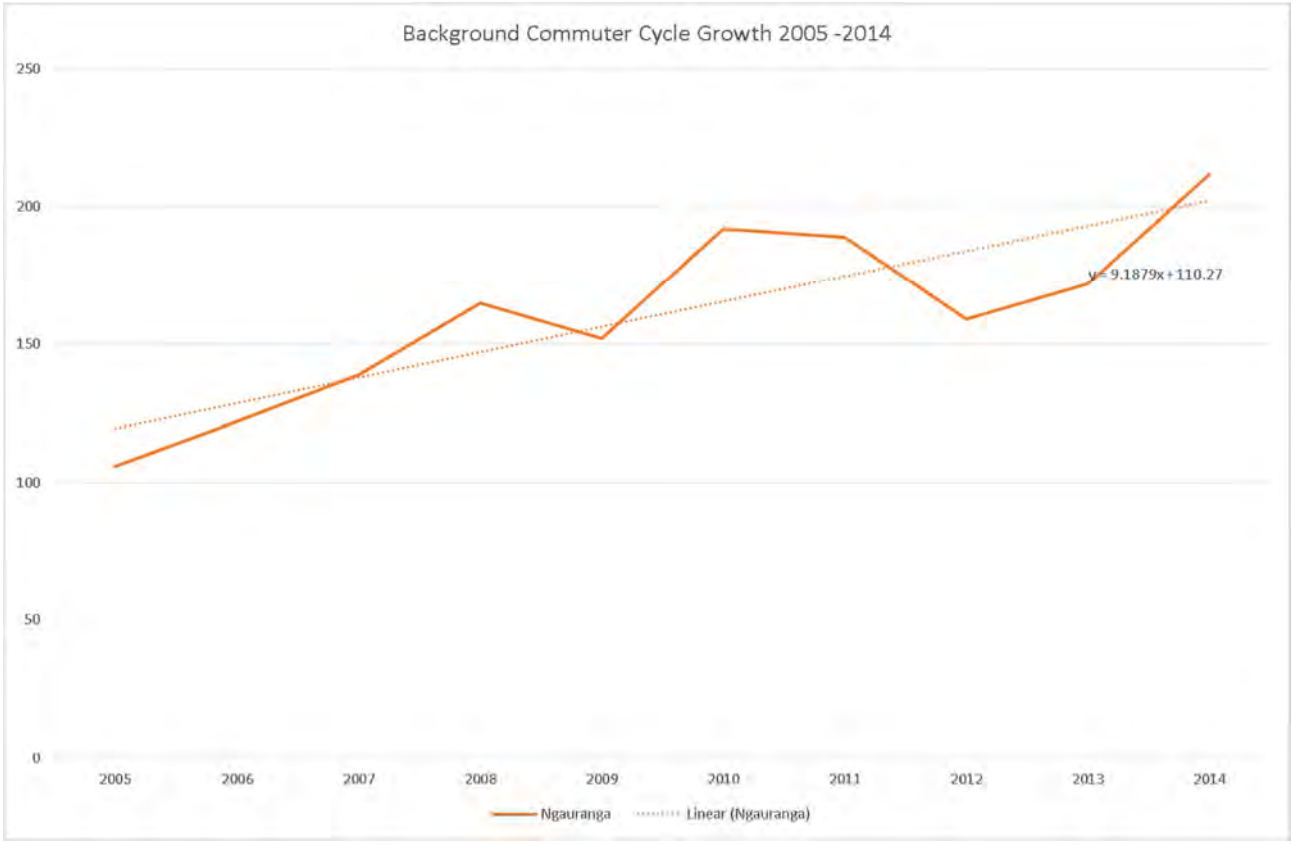


Figure 6: Background Peak Hour Commuter Cycle Growth 2005-2014 (sourced from TDG annual surveys)

The work undertaken by AECOM for the NZ Transport Agency predicts an additional 280 cyclists in year one (2020) with an average growth rate of 6.45% for the following years. For assessment purposes it has been assumed that this equates to 100 additional cyclists in year one in the peak hour.

Based on the analysis above the following growth rates demand forecasts have been assumed.

Table 2: Two-way Forecast Year Demands

Location	Existing Peak Hour	Average Growth % P.A.	2031 Design Demand (rounded)
Onslow Road Crossing	16	5%	30
North of Kaiwharawhara Road	290	100 in 2020 +8%	950
Kaiwharawhara Road Crossing	140	10%	440
Kaiwharawhara to Tinakori Road	400	100 in 2020 +10%	1470

6 Traffic

6.1 Existing Demands

The existing demands are described below and shown in Appendix E.

6.1.1 Link Flows

Vehicles

There are various sources for the existing link flows along the corridor, the following figures compares the Wellington Traffic Model (WTM) base year (2011) peak hour demand flows against the latest available count information.

Figure 7 and Figure 8 show the following:

- Reasonable correlation between the WTM and actual counts in the off peak direction;
- An over-prediction of southbound AM peak demand and an under-prediction of northbound PM peak demand by the WTM compared with actual counts; and
- Demand over the threshold for a dual lane link (1600-1800vph) for southbound traffic and between Aotea Quay and Onslow Road for northbound traffic.

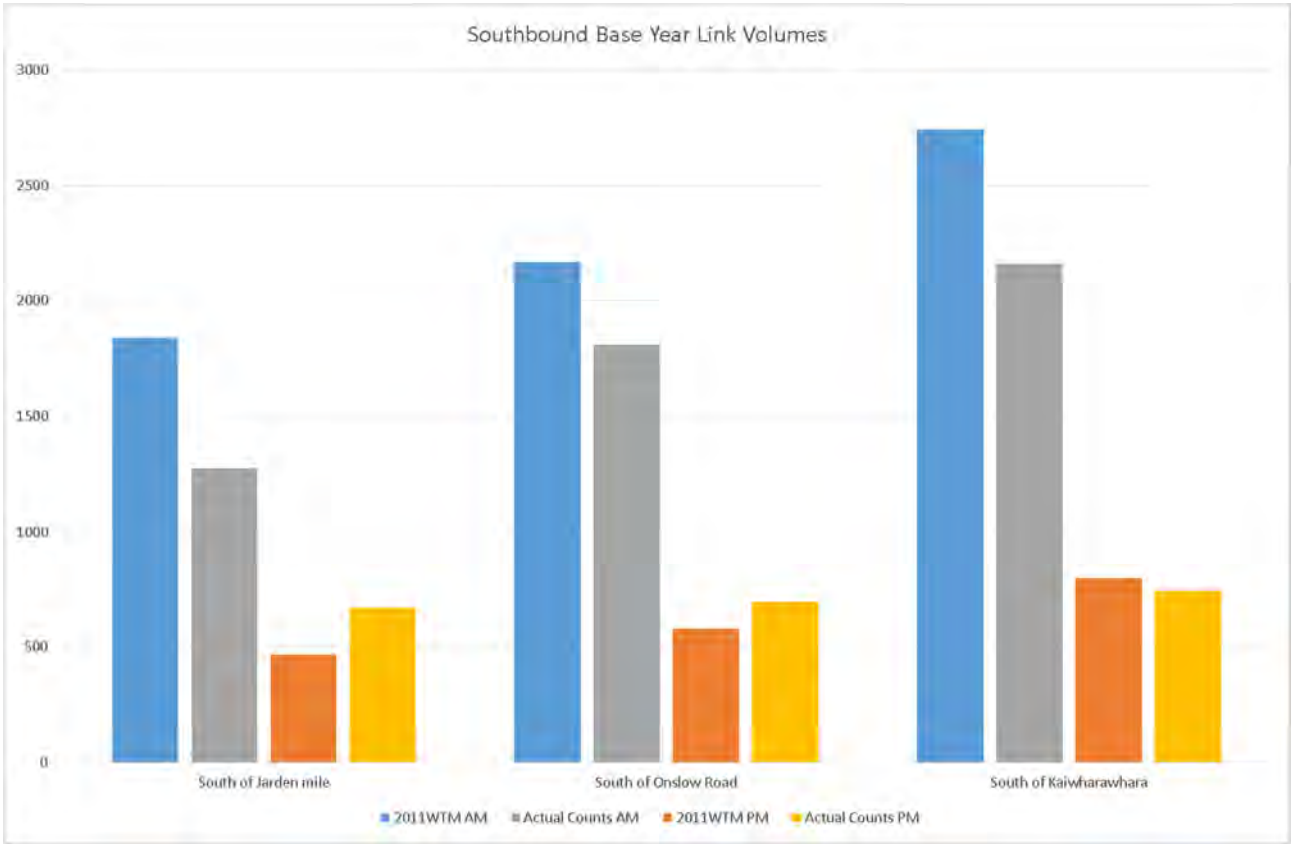


Figure 7: Southbound Base Year Link Volumes Comparison

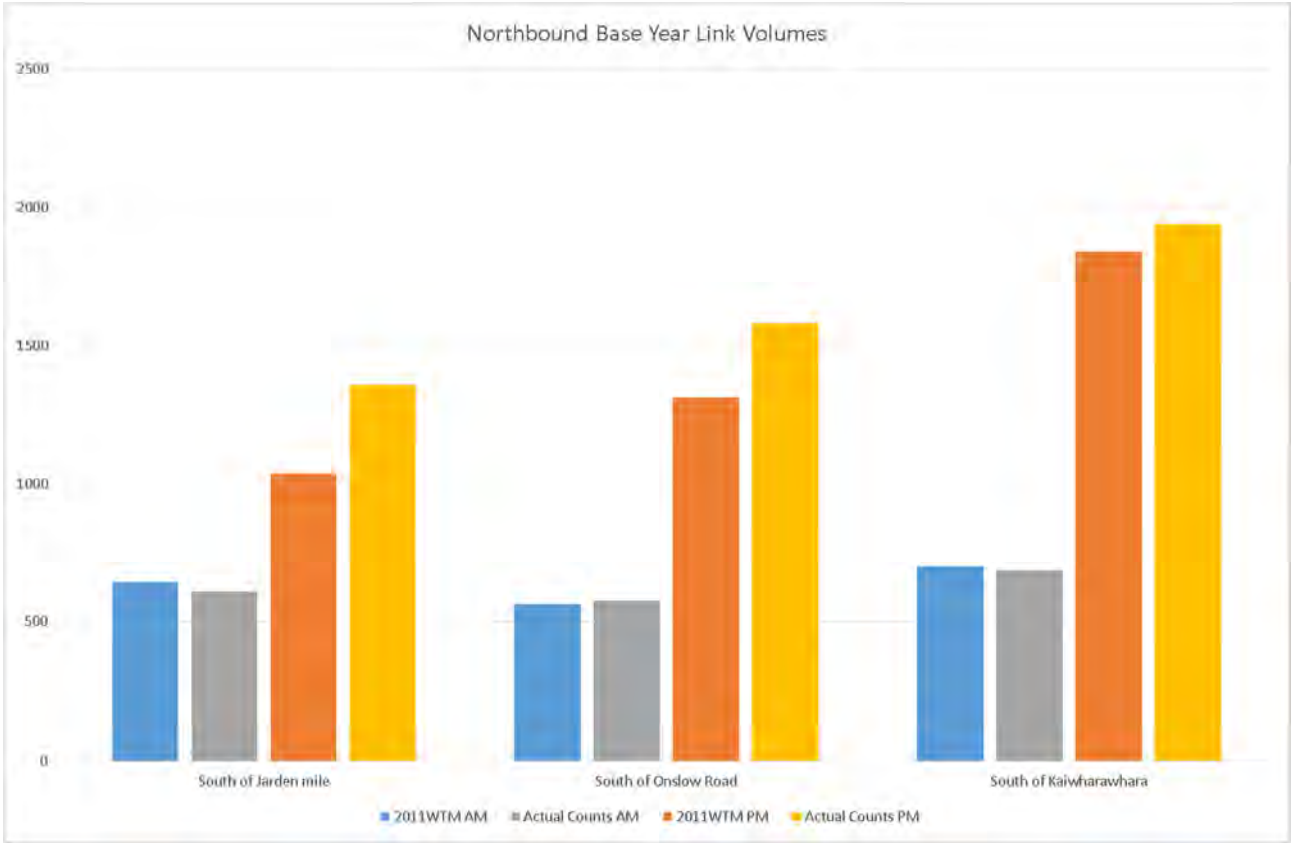


Figure 8: Northbound Base Year Link Volumes Comparison

Vehicle Occupancy

The March 2013 counts undertaken for Wellington City Council by TDG identifies the following vehicle occupancy statistics for the inbound AM peak:

- Thorndon Quay (south of Tinakori Road) the average vehicle occupancy is 1.5. The split of occupancy was 58% single occupancy, 36% dual occupancy and 6% with three or more people per vehicle. A similar pattern has been assumed for the Hutt Road portion of the corridor.
- Aotea Quay (south of the SH1 off-ramp) the average vehicle occupancy is 1.4. The split of occupancy was 69% single occupancy, 27% dual occupancy and 4% with three or more people per vehicle.

6.1.2 Turning Flows

The turning flows at the key intersections (from a variety of sources) are shown in Appendix E.

The following commentary can be made with regard to those intersections.

Jarden Mile

- In the AM peak the highest flows (~1600vph) are on the Centennial Highway approach and are evenly split between Hutt Road and SH2. Similarly the flows (~1000vph) on the SH2 off-ramp are evenly split between Centennial Highway and Hutt Road. The flow on Hutt Road (~400vph) is also evenly split between SH2 and Centennial Highway; and

- In the PM peak the flows on each approach are not as evenly split with the Centennial Highway approach having a strong bias for SH2 (~830vph). Both the SH2 off ramp (~950vph) and the Hutt Road (~740vph) flows are predominantly heading to Centennial Highway.

Onslow Road

- There are high demand flows (~750vph) out of Onslow Road in the AM peak, predominantly southbound; and
- The inbound flows (~420vph) to Onslow Road in the PM peak are significantly less than the AM peak and are biased toward northbound vehicles.

Kaiwharawhara Road

- There are very high flows turning right (~1030vph) out of Kaiwharawhara Road in the AM peak competing for signal phase time with the southbound through flows (~1660vph); and
- In the PM peak the flows on the southern approach (~2200vph) make up almost two thirds of the total flows through the intersection in the peak hour.

6.1.3 Intersection Performance

The existing intersection performance is presented below. The following definitions apply to the tables:

- Delay: Average Delay per vehicle (seconds)
- LoS: (Level of Service)
- Queues: 95% Back of Queue (Vehicles)

Jarden Mile

The following results are based from an uncalibrated SIDRA6 model using turn flows from the North Wellington Saturn Model 2011 Base.

Table 3: Jarden Mile Existing Intersection Performance

Approach	AM Peak			PM Peak		
	Delay	LoS	Queue	Delay	LoS	Queue
SH2 Left Turn	12.9	B	8.9	7.2	A	3.1
SH2 Through	39.4	D	11.4	137.3	F	48.3
SH2 Right Turn	45.1	D	11.4	143.0	F	48.3
Centennial Hwy Left Turn	7.0	A	0	7.0	A	0
Centennial Hwy Through	28.5	C	15.8	99.9	F	9.5
Centennial Hwy Right Turn	25.8	C	0.2	57.8	E	0.7
Jarden Mile Left Turn	44.7	D	1.0	59.0	E	1.2
Jarden Mile Through	43.3	D	1.0	57.6	E	1.2
Jarden Mile Right Turn	45.0	D	1.2	59.7	E	1.7
Hutt Road Left Turn	36.7	D	4.0	90.1	F	34.5
Hutt Road Through	34.5	C	4.1	84.5	F	34.5
Hutt Road Right Turn	47.2	D	8.3	120.2	F	32.9
Overall	**25.0**	**D**	**15.8**	**79.1**	**E**	**48.3**

The intersection performs at an acceptable level in the AM peak. In the PM peak the intersection performs poorly for all of the right turn movements and the SH2 off-ramp through movement. This reflects site observations, where queues from SH2 (southbound) to Ngauranga Gorge are observed to extend (and often exceed) the length of the available storage space.

Onslow Road

The following results are from a calibrated SIDRA6 model using March 2015 counts. To achieve closer calibration, the amber time has been reduced to three seconds and user defined cycle times have been used. However, the SIDRA model is over predicting queues on all approaches in the PM peak (particularly the northbound through movement – 10 additional vehicles). Further adjustment of the model to improve calibration was not possible.

Table 4: Onslow Road Existing Intersection Performance

Approach	AM Peak			PM Peak		
	Delay	LoS	Queue	Delay	LoS	Queue
Hutt North Through	-	-	-	-	-	-
Hutt North Right Turn	51.1	D	2.9	41.8	D	8.9
Onslow Left Turn	32.1	C	32.9	47.2	D	8.6
Onslow Right Turn	30.1	C	32.9	45.2	D	8.6
Hutt South Through	3.2	A	0.7	5.9	A	3.8
Hutt South Left Turn	31.1	C	8.6	18.9	B	24.8
Overall	**15.8**	**B**	**32.9**	**17.8**	**B**	**24.8**

The intersection performs at an acceptable level in both peaks. The right turn movements have the worst performance.

Kaiwharawhara Road

The following results are from a calibrated SIDRA6 model using March 2015 counts. To achieve closer calibration the amber time has been reduced to three seconds, user defined cycle times have been used and the bus-lane on Kaiwharawhara Road has been removed. However, the SIDRA model is over predicting (typically between 50 and 100%) queues on all approaches in the PM peak

Table 5: Kaiwharawhara Road Existing Intersection Performance

Approach	AM Peak			PM Peak		
	Delay	LoS	Queue	Delay	LoS	Queue
Hutt North Through	64.7	E	63.2	4.1	A	3.5
Hutt North Right Turn	44.0	D	6.8	62.7	E	11.4
Kaiwharawhara Left Turn	47.5	D	33.3	55.1	E	13.4
Kaiwharawhara Right Turn	47.6	D	33.3	55.1	E	13.4
Hutt South Through	6.9	A	1.9	8.1	A	7.3
Hutt South Left Turn	29.3	C	8.7	40.0	D	47.1
Overall	**50.4**	**D**	**63.2**	**31.1**	**C**	**47.1**

The Hutt Road through movements perform well in the PM peak and the northbound in the AM peak. The southbound AM peak movement performs poorly. All turns out and right turns into Kaiwharawhara Road are at capacity with average to poor performance.

6.1.4 Travel Times

Two southbound travel times were recorded using GPS on Tuesday 2 June 2015 from south of Jarden Mile intersection to south of Mulgrave Street. Figure 9 below plots speed against distance travelled. The figure shows speed disruption occurring at the following locations:

- Kaiwharawhara Road intersection;
- a vehicle parked in the clearway south of Aotea Quay; and
- the pedestrian crossings at Bordeaux Bakery and Moore Street (on Thorndon Quay section of entire corridor).

The later trip (8.12 am start) shows that the disruption at Kaiwharawhara Road intersection and the Moore Street pedestrian crossing is significant with disruption beginning approximately 800m and 400m respectively north of the limit lines.

The overall travel times for the two journeys are 12 minutes, 43 seconds and 15 minutes, 15 seconds respectively. This equates to average travel speeds over the 4.9km section of 24 and 19 km/h respectively.

It should be noted that the sample size here is not enough to be representative, however, it correlates well with typical conditions expected along the corridor and the bus travel times presented in section 7.1.3 below.

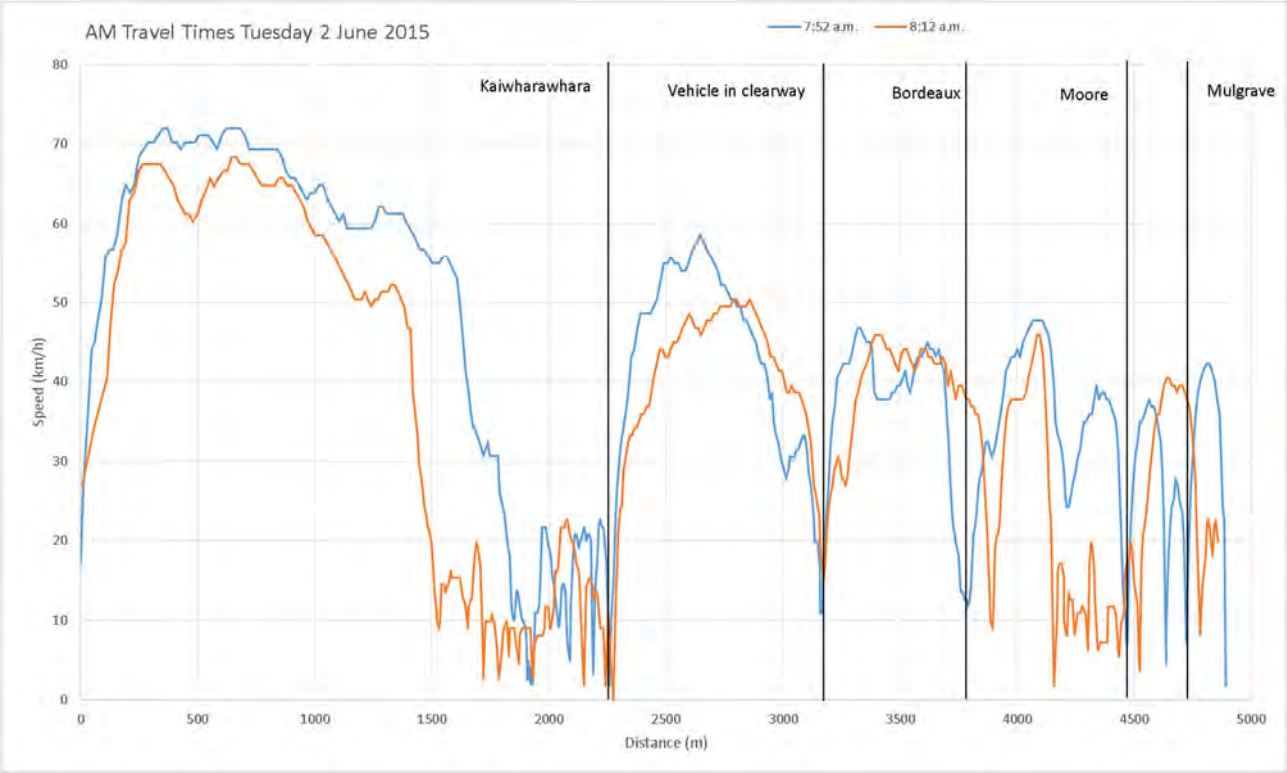


Figure 9: Southbound AM Travel Times

6.2 Forecast Demands

The forecast demands are described below.

6.2.1 Link Flows

The following figures compares the WTM base year (2011) peak hour demand flows against the demand flows from the 2031 option model for the Ngauranga to Aotea Quay Transport Agency project and the actual count flows. The 2031 modelling is based on a seven laning (four northbound and three southbound) scenario (under construction at the time of this report was prepared).

Figure 10 and Figure 11 show the following:

- In the southbound direction in the AM peak the 2031 scenario results in reduced flows along the entire corridor when compared with the 2011 base model. Between Jarden Mile and Aotea Quay the 2031 scenario shows good correlation with the existing actual counts.
- In the northbound direction in the PM peak the 2031 scenario correlates well with both the actual counts and 2011 base model flows between Onslow Road and Aotea Quay. North of Onslow Road both modelled flows are significantly lower than the actual counts.
- Demand greater than the threshold for a single lane link (1600-1800vph) north of Aotea Quay for southbound traffic and between Aotea Quay and Onslow Road for northbound traffic.

In summary, the 2031 scenario will result in little change in traffic flows when compared with the actual counts.

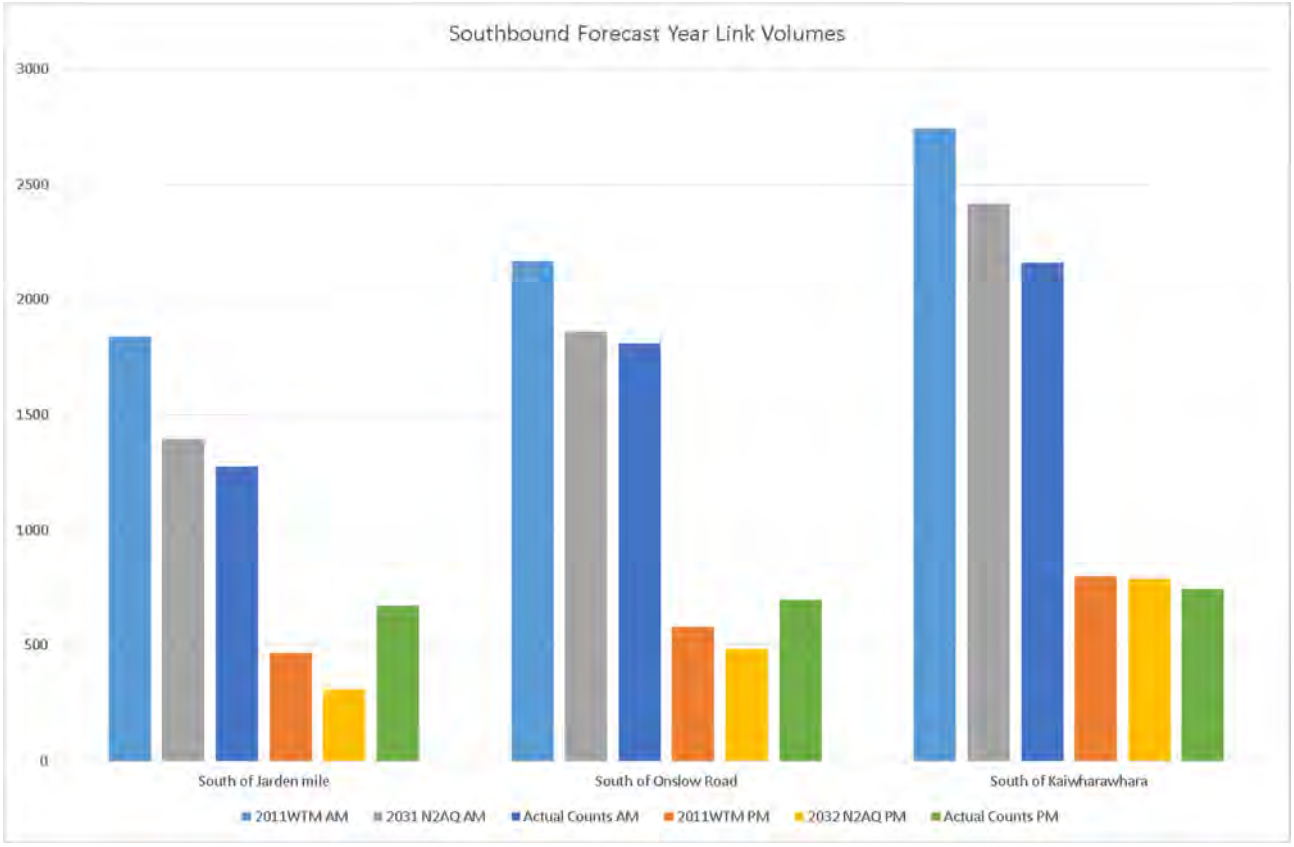


Figure 10: Southbound Forecast Year Link Volumes Comparison

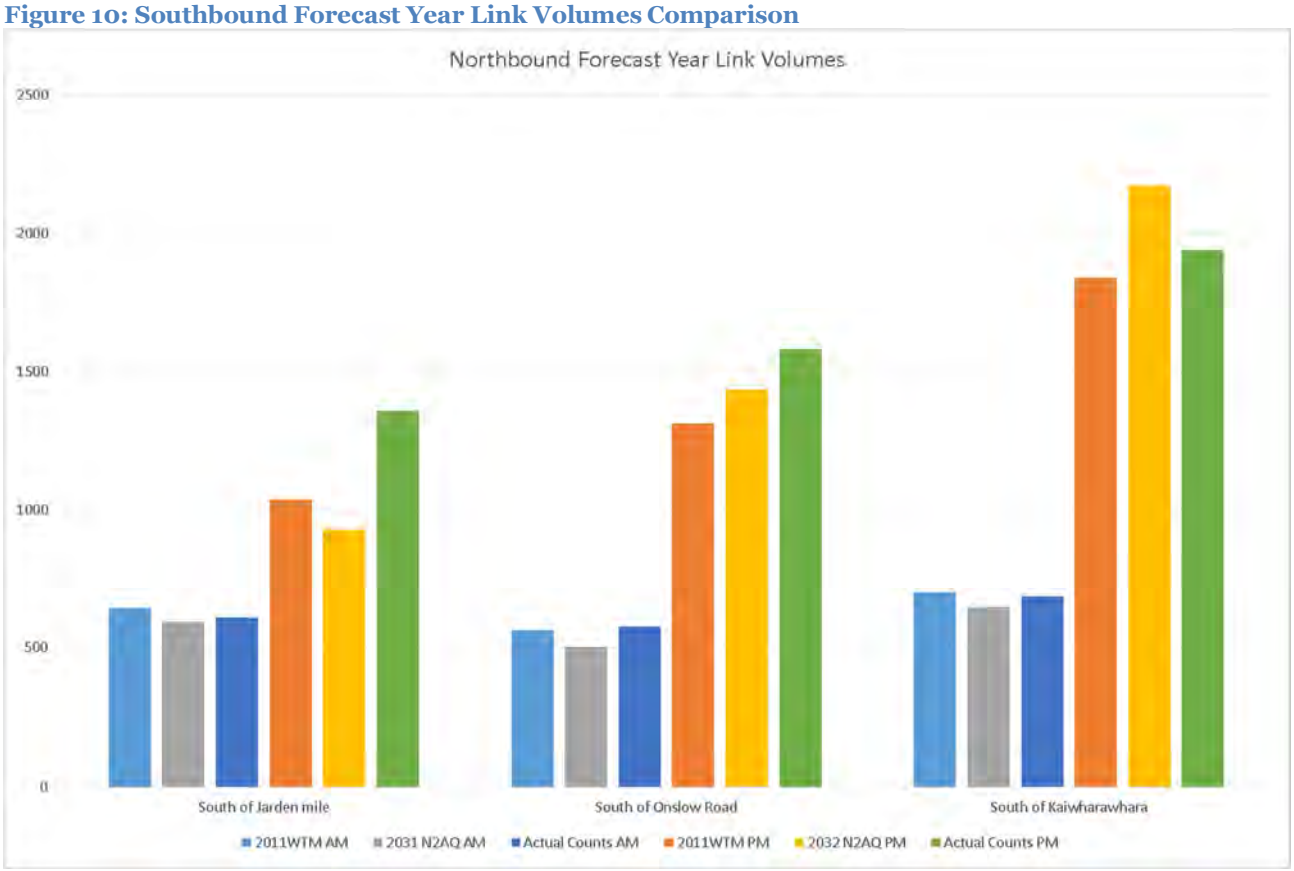


Figure 11: Northbound Forecast Year Link Volumes Comparison

6.2.2 Turning Flows

As identified above the change in traffic flows in the 2031 design year compared with existing data is negligible, therefore forecast turning flows are assumed to be as existing.

6.2.3 Intersection Performance

As identified above the forecast turning flows are assumed to be as existing and therefore the existing intersection performance is representative of the future intersection performance.

7 Public Transport

7.1 Existing Situation

7.1.1 Existing Infrastructure

The existing bus infrastructure is described below and bus data is shown in Appendix F.

Bus Routes

The project corridor is served by the bus routes shown below.

Figure 12: Bus Routes using the Corridor

The buses on the corridor predominantly serve the northern suburbs (Johnsonville, Churton Park, Grenada) and the suburbs that border the western side of the route (Ngaio and Khandallah). There are also buses that serve Porirua and Eastbourne that use this route. All of the buses travel through the CBD via the bus terminal except for some of the peak hour routes which travel via Featherston Street and terminate at Brandon Street.

Bus Stops

There are a significant number of bus stops along this corridor, the characteristics of these stops are described in the table below.

Table 6: Bus Stop Characteristics

Location	Northbound	Southbound
Ngauranga Gorge	3263 – Indented bus bay with shelter for SH2 northbound services only *2 buses in PM Peak hour*	3256 – Channelised bus bay and shelter south of Jarden Mile intersection *33 buses in AM Peak hour*
	3262 – Wide shoulder and shelter south of Jarden Mile *21 buses in PM Peak hour*	
Rangiora Avenue (Placemakers)	3260 - Wide shoulder and shelter north of Rangiora Avenue *27 buses in PM Peak hour*	3258 –In-lane stop with shelter outside Placemakers *38 buses in AM Peak hour*
Kaiwharawhara	5028 - In-lane stop no shelter opposite Westminster Street	5486 - In-lane stop with shelter north of Westminster Street

	27 buses in PM Peak hour	*38 buses in AM Peak hour*
Aotea Quay	5026 - Wide shoulder and shelter north of Aotea Overbridge *33 buses in PM Peak hour*	5488 - In-lane stop with shelter north of Aotea Overbridge *46 buses in AM Peak hour*
Kaiwharawhara Road	5401 - Wide shoulder with shelter west of Hutt Road *6 buses in AM Peak hour*	4401 - In-lane stop with shelter opposite immediately west of Hutt Road *8 buses in AM Peak hour*
Onslow Road	4433 - In-lane stop no shelter *4 buses in PM Peak hour*	5433 - Wide shoulder with shelter *5 buses in AM Peak hour*

The shading of the last two lines indicate that these are side road bus stops.

7.1.2 Existing Demands

Corridor Patronage

Figure 13 below shows that buses carry a comparable number of people as motor vehicles along the corridor even though the number of buses is a very small fraction of the number of motor vehicles. The Thorndon Quay / Hutt Road route is the region's busiest patronage corridor (excluding the Golden Mile).

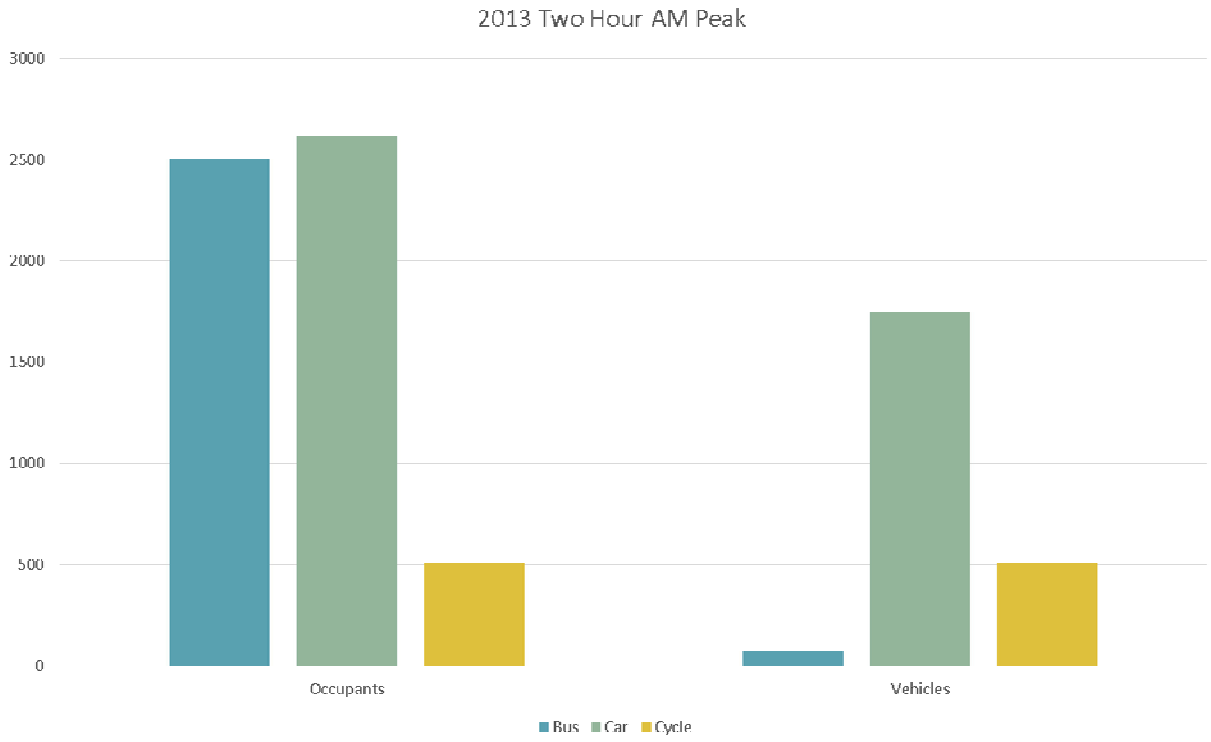


Figure 13: Volume / Patronage Analysis

Bus Numbers

The peak hour bus flows at the key intersections are shown in Appendix F and Figure 14 below.

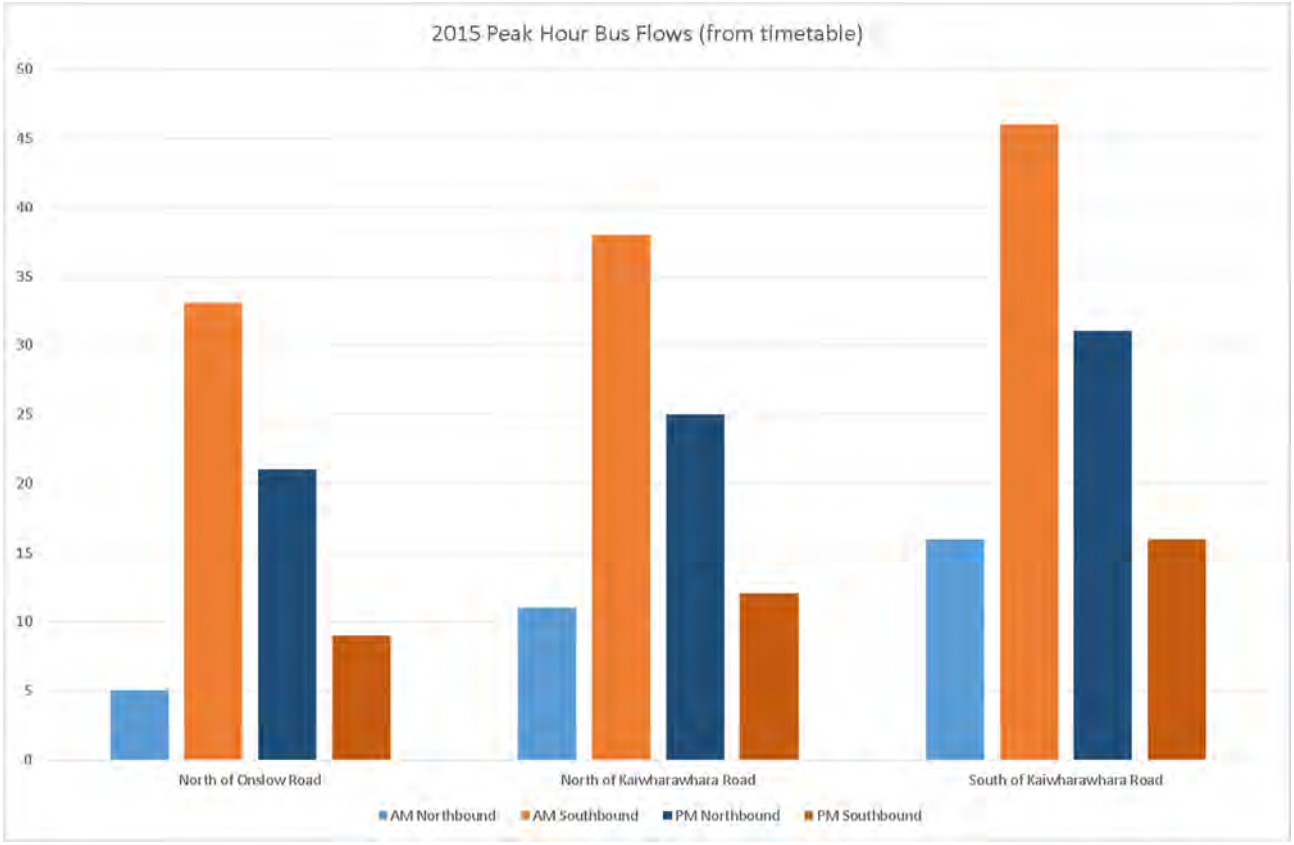


Figure 14: Peak Hour Bus Flows

In the AM peak hour there are 46 buses travelling southbound south of Kaiwharawhara Road and 16 buses travelling northbound. In the PM peak hour there are 16 buses travelling southbound south of Kaiwharawhara Road and 31 buses travelling northbound.

Bus Stop Demands

Figure 15 below shows the bus stop boarding data along the corridor. Only the boarding data is available, however, as a rough guide the alighting trends can be assumed to be the reverse.

The following trends can be observed:

- In the southbound direction, boarding demands are relatively consistent with a notable peak at Kaiwharawhara Road.
- The boarding demand on Kaiwharawhara Road is relatively low, with a strong demand southbound on Onslow Road.

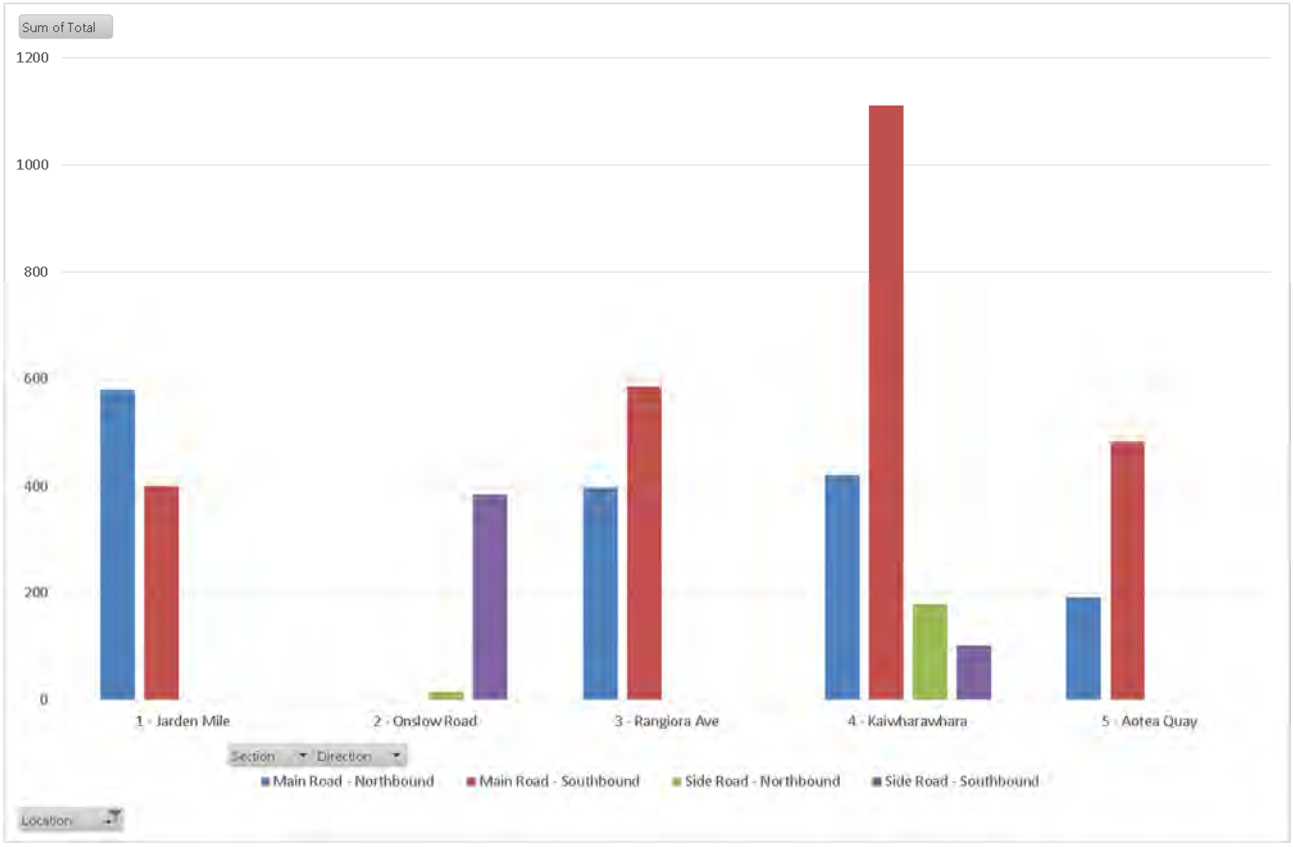


Figure 15: Bus Stop Boarding Data (weekdays in March 2013)

7.1.3 Existing Performance

The existing performance is based on the analysis of the weekday RTI data provided by GWRC.

The data provided includes the difference in time between all stops along the route. The times are assumed to be arrival times at the stop. The following journey times include intersection delay and dwell times in addition to link times (the data does not differentiate if a bus stops or not).

The information provided includes three months of data from March to May 2014. The data has been cleaned to remove extreme outliers and incomplete routes.

Average Speeds (Main Corridor)

The following two graphs show the average speeds over the Hutt Road / Thorndon Quay corridor based on the No. 54 route (Wellington to Churton Park).

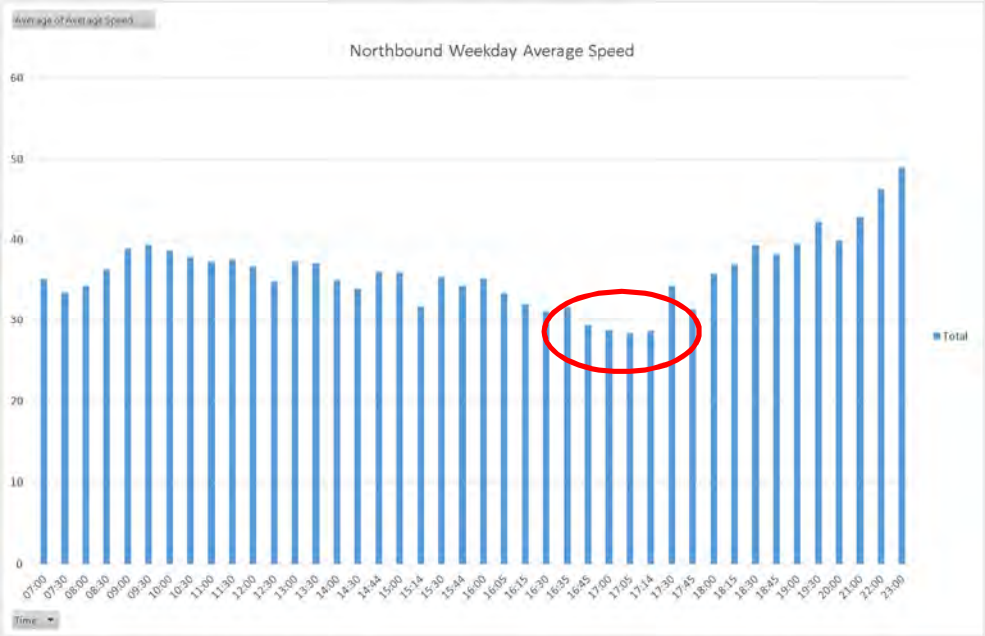


Figure 16: Northbound Weekday Average Bus Speed

In the northbound direction the slowest speeds occur in the PM peak (as expected).

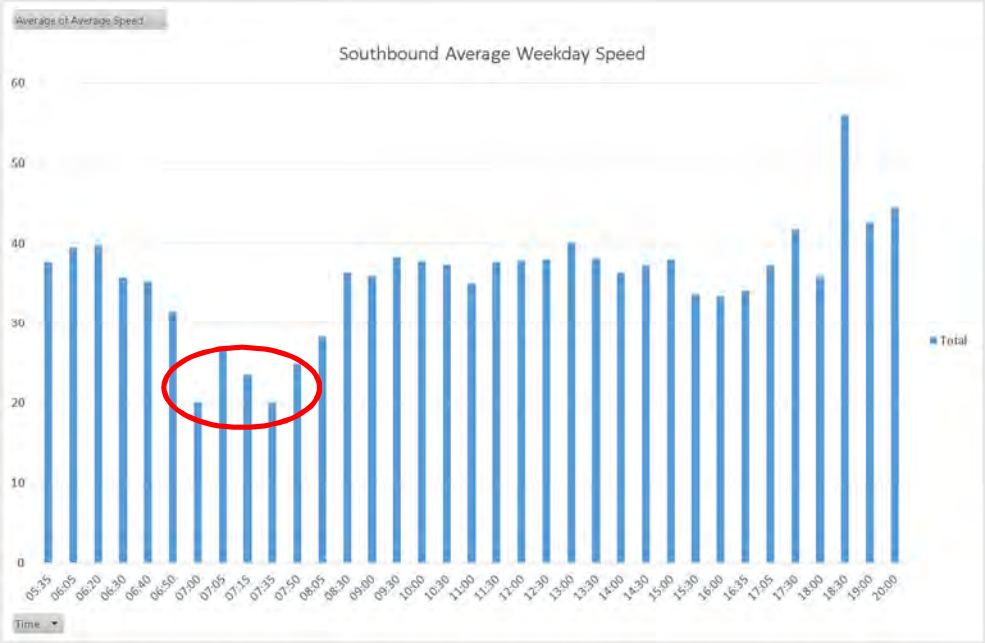


Figure 17: Southbound Weekday Average Bus Speed

In the southbound direction the slowest speeds occur in the AM peak (as expected).

The following two graphs show the average speeds over the different posted speed limit zones based on the No. 54 route.

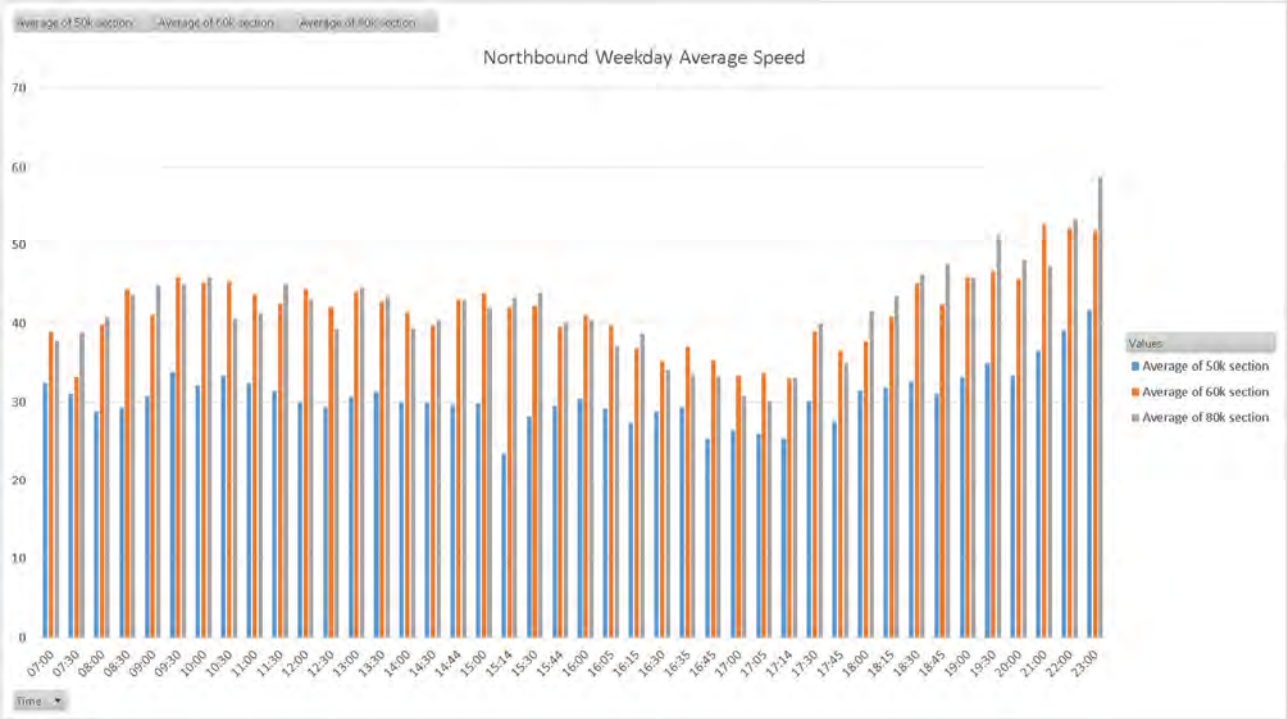


Figure 18: Northbound Weekday Average Bus Speed by Speed Zone

In the northbound direction the average speeds through the 50km/h zone are reasonably constant throughout the day. The variance in speeds in the 60/80km/h zones is more pronounced than in the 50km/h zone.

There is also little difference in the average speed between the 60 and 80km/h zones. The average speeds in the 60/80km/h zones is consistently around 10km/h higher than the 50km/h zone.

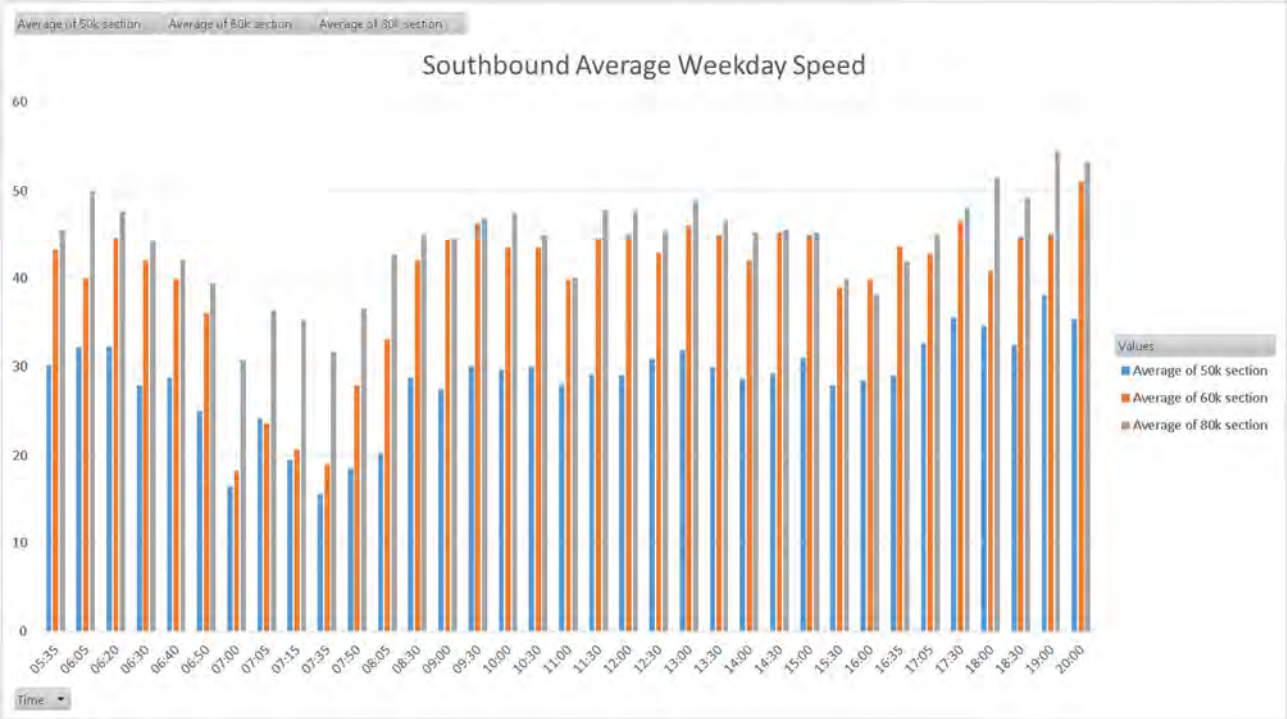


Figure 19: Southbound Weekday Average Bus Speed by Speed Zone

In the southbound direction the average speeds through the 50km/h zone are reasonably constant throughout the day with a noticeable drop in the AM peak. The variance in speeds in the 60/80km/h zones is more pronounced than in the 50km/h zone.

There is also little difference in the average speed between the 60 and 80km/h zones. The average speeds in the 60/80km/h zones is consistently around 10-15km/h higher than the 50km/h zone except in the AM peak where the 50 and 60km/h zones are very similar.

Peak Hour Journey Times (Main Corridor)

The following two graphs show the average journey times against distance for four peak hour period runs along with an evening run along the entire Hutt Road / Thorndon Quay corridor.

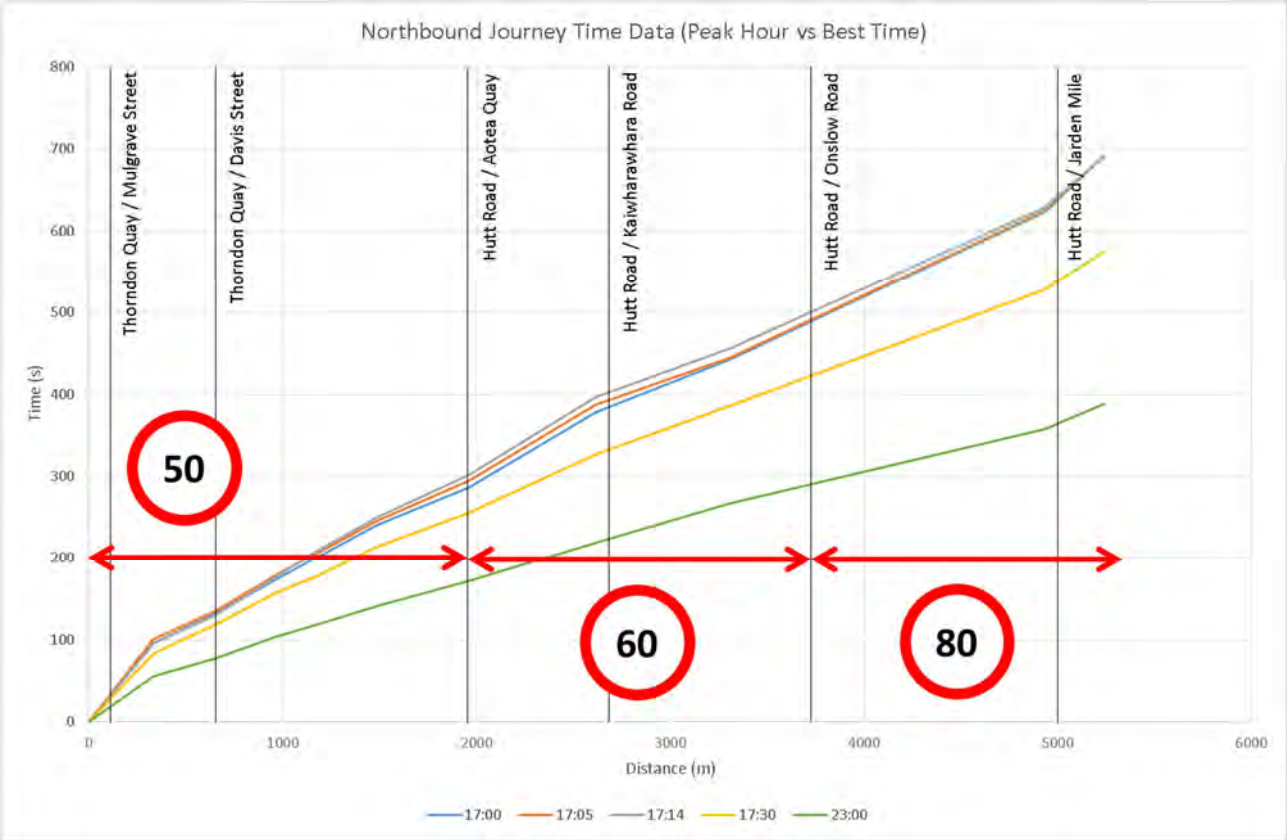


Figure 20: Northbound Bus Journey Time Data

In the northbound direction the slowest section of the journey is the first one which is leaving the bus-terminus and joining Thorndon Quay. This is expected to be due to high boarding numbers at the bus terminus, congestion associated with other buses and intersection delays at the Mulgrave Street intersection.

The remainder of the journey is at a relatively constant speed with noticeable slow points around the Kaiwharawhara Road intersection and the Jarden Mile Intersection.

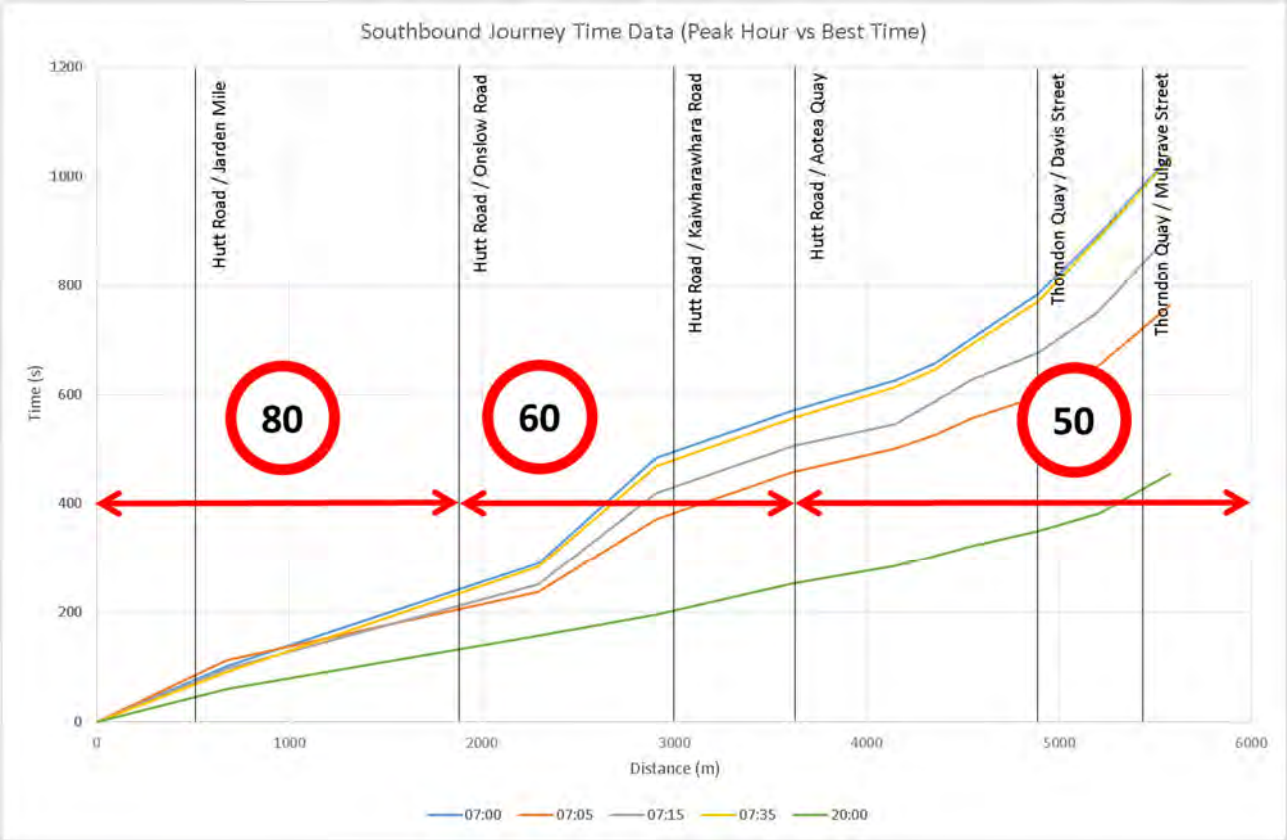


Figure 21: Southbound Bus Journey Time Data

In the southbound direction the slowest section of the journey is around the Kaiwharawhara Road intersection (approximately two and a half minutes additional delay when comparing the average worst peak trip against the average best trip). The Thorndon Quay section of the route is also noticeably slower than the remainder of the route.

Peak Hour Journey Speeds (Main Corridor)

Further to the graphs shown above the following table present the average speeds / travel times for the peak hour routes.

Table 7: Northbound Bus Peak Hour Journey Speeds

Northbound	Speeds (km/h)				Journey Times
	50	60	80	All	
Average Worst Peak Trip	26	34	30	**28**	11 minutes 31 seconds
Average Best Trip	42	52	59	**49**	6 minutes 28 seconds
Worst Trip	26	12	8	**12**	26 minutes 35 seconds
Best Trip	47	58	67	**56**	5 minutes 36 seconds

In the northbound direction the average worst peak trip speed and journey time is around double the average best trip. The worst trip recorded during the three month period was almost five times the best trip recorded. The worst trip occurred on Wednesday 12 March on the 5.00pm run. During the three month period there were 30 trips which took longer than 15minutes.

Table 8: Southbound Peak Hour Bus Journey Speeds

Southbound	Speeds (km/h)				Journey Times
	80	60	50	All	
Average Worst Peak Trip	31	18	16	**20**	17 minutes 16 seconds
Average Best Trip	53	48	38	**45**	7 minutes 24 seconds
Worst Trip	37	13	8	**13**	25 minutes 9 seconds
Best Trip	67	51	43	**53**	5 minutes 14 seconds

In the southbound direction the average worst peak trip is more than double the average best trip. The worst trip recorded during the three month period was almost five times the best trip recorded. The worst trip occurred on Wednesday 16 April on the 7.50am run. During the three month period there were 25 trips which took longer than 20 minutes.

Kaiwharawhara Road

Information for the delays into and out of the Kaiwharawhara Road intersection have been calculated from the No. 43 and No. 44 routes respectively. Information has been calculated for two stops prior and one stop after the closest stop to the intersection.

Table 9: Kaiwharawhara Inbound Road Bus Journey Speeds

Left Turn In	Speeds (km/h)	Journey Times
Average Worst Peak Trip	29	2 minutes 55 seconds
Average Best Trip	47	1 minute 44 seconds
Worst Trip	16	4 minutes 53 seconds
Best Trip	57	1 minute 25 seconds

The table shows that the average peak delay around the intersection in the worst peak trip is just over a minute (average worst trip – average best trip). The worst trip during the three month period incurred just over 3 minutes delay compared with average best trip (5.55pm run, Monday 3 March 2014).

Table 10: Kaiwharawhara Road Outbound Bus Journey Speeds

Right Turn Out	Speeds (km/h)	Journey Times
Average Worst Peak Trip	25	3 minutes 11 seconds
Average Best Trip	36	2 minutes 11 seconds
Worst Trip	16	4 minutes 54 seconds
Best Trip	53	1 minute 29 seconds

The table shows that the average peak delay around the intersection in the worst peak trip is one minute (average worst trip – average best trip). The worst trip during the three month period incurred two and a half minutes delay compared with average best trip (4.15pm run, Monday 3 March 2014).

Onslow Road

Information for the delays into and out of the Onslow Road intersection have been calculated from the No. 44 and No. 43 routes respectively. Information has been calculated for two stops prior and one stop after the closest stop to the intersection (only three stops for the left turn in).

Table 11: Onslow Road Inbound Bus Journey Speeds

Left Turn In	Speeds (km/h)	Journey Times
Average Worst Peak Trip	31	2 minutes 29 seconds
Average Best Trip	46	1 minute 40 seconds
Worst Trip	17	4 minutes 15 seconds
Best Trip	56	1 minute 19 seconds

The table shows that the average peak delay around the intersection in the worst peak trip is just less than a minute (average worst trip – average best trip). The worst trip during the three month period incurred two and a half minutes delay compared with average best trip (6.35am run, Wednesday 16 April 2014). This is the same day the worst southbound trip on the main route was recorded.

Table 12: Onslow Road Outbound Bus Journey Speeds

Right Turn Out	Speeds (km/h)	Journey Times
Average Worst Peak Trip	19	5 minutes 14 seconds
Average Best Trip	32	2 minute 33 seconds
Worst Trip	7	11 minutes 28 seconds
Best Trip	47	1 minute 44 seconds

The table shows that the average peak delay around the intersection in the worst peak trip is just under three minutes (average worst trip – average best trip). The worst trip during the three month period incurred nine minutes delay compared with average best trip (7.50am run, Thursday 13 March 2014).

Comparison to Intersection Performance

The intersection performance in the previous section identified the following average delays for bus movements.

Table 13: Existing Bus Intersection Performance

Location	Northbound delay PM Peak (sec/veh)	Southbound delay AM Peak (sec/veh)
Jarden Mile (Hutt Road)	41.3	29.2
Onslow Road (Hutt Road)	5.9	0
Kaiwharawhara Road (Hutt Road)	8.1	64.7
Onslow Road (Side road)	18.9	30.1
Kaiwharawhara Road (Side road)	40.0	47.6

The magnitude of delays identified in Table 13 above are consistent with the delays indicated in the average journey time graphs earlier.

Discussion

Based on the assessment of the available information the following conclusions can be drawn:

Northbound

- On the main route heading northbound there does not appear to be any significant pinch points. The average speed in the PM peak period is around 5km/h slower than average speeds throughout the rest of the day.
- In the AM peak delays of around one minute are experienced around the Kaiwharawhara Road intersection for routes travelling both through and left.
- In the PM peak delays of around one minute are incurred turning left into Onslow Road, this may be caused by turning traffic getting caught in the queued through traffic.

Southbound

- On the main route heading southbound significant delays are incurred around the Kaiwharawhara Road intersection (and along the southern portion of the corridor of Thorndon Quay). The average speed in the AM peak period is around 15km/h slower than average speeds throughout the rest of the day.
- In the AM peak delays of around one minute are incurred around the Kaiwharawhara Road intersection for routes turning right out of Kaiwharawhara Road and around two and a half minutes for through traffic.
- In the AM peak significant delays are incurred turning right out of Onslow Road.

7.2 Future Situation

7.2.1 Future Infrastructure

GWRC have identified a future bus network to be rolled out in 2017, as shown in Figure 22.

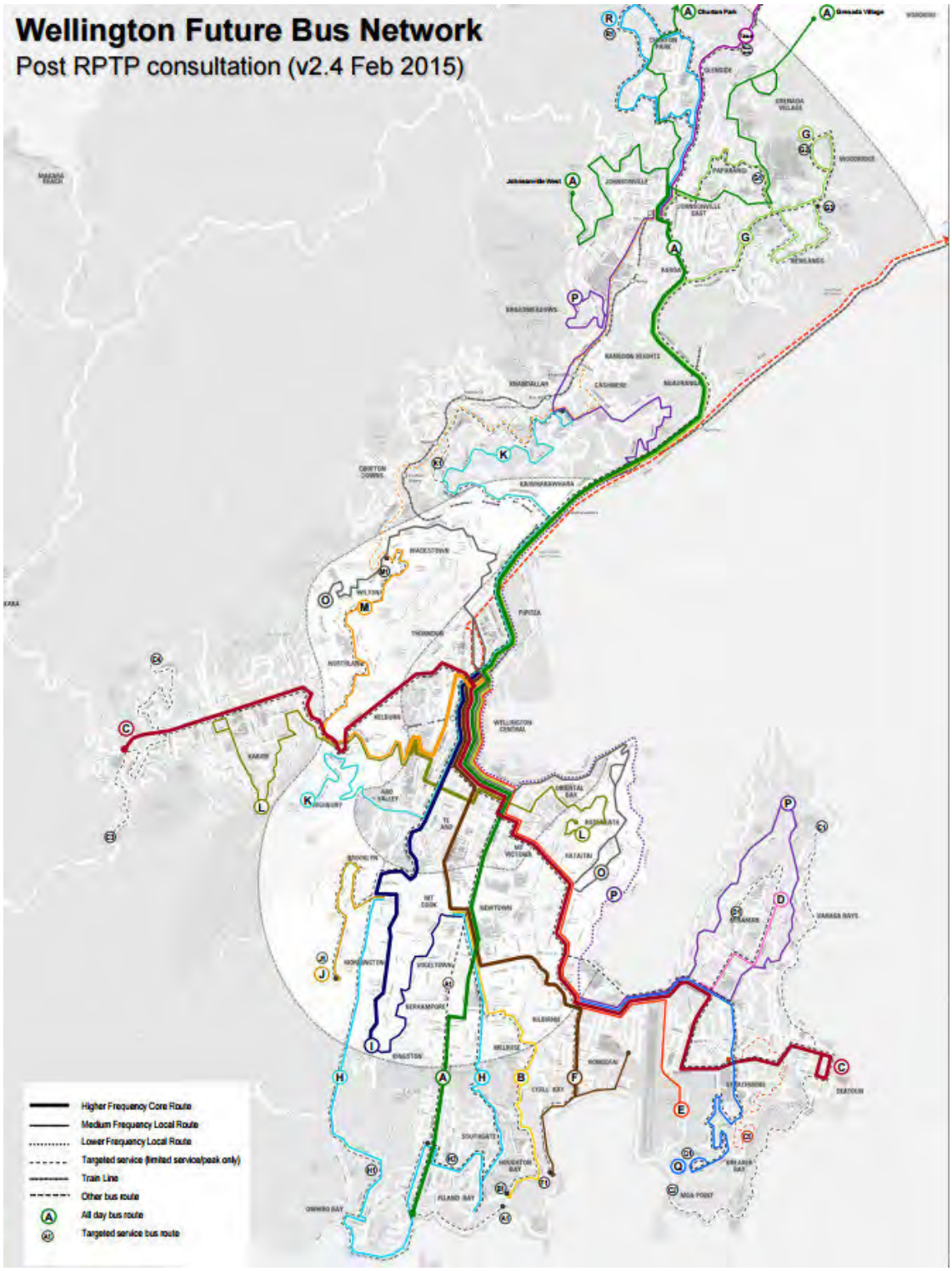


Figure 22: Future Bus Network

The future network changes will not result in any significant route changes for the buses currently using the corridor under review.

There are no known future infrastructure upgrades planned for the route.

However, it should be noted that NZ Bus are operating a new bus depot on Hutt Road immediately south of the Kaiwharawhara stream.

7.2.2 Future Demands

GWRC have provided the following draft timetable for implementation in 2017.

Table 14: Future Bus Network Indicative Timetable

Route Description	Peak Hour Buses (Southbound AM, Northbound PM)
A - Churton Park/ Grenada Village/ Johnsonville West – Johnsonville – Wellington – Newtown – Island Bay	8, 7
G - Johnsonville – Woodridge – Newlands - Wellington – Evans Bay – Maupuia (off peak only)	0, 0
G1 - Johnsonville - Newlands - Courtenay Place	4, 4
G2 - Woodridge - Newlands - Courtenay Place	4, 4
G3 - Baylands - Newlands - Courtenay Place	4, 4
K - Highbury - Wellington - Khandallah	5, 3
K1 - Ngaio - Brandon Street	3, 3
P - Johnsonville - Broadmeadows - Wellington – Maupuia / Kilbirne	5, 4
R1 - Johnsonville - Churton Park - Johnsonville - Wellington	3, 3
83 – Eastbourne (existing)	2, 2
Total	**38, 34**

The highest number of peak hour vehicles (38) is lower than the existing peak hour demand (46), however, higher capacity buses are likely to be used.

Also, the existing peak hour demand is based on the maximum vehicles in a 60 minute period and the forecast demands are based on an hour to hour count. Using an hour to hour count the existing peak hour demand is 42.

Future Passenger Numbers

GWRC forecasts predict annual growth of 1.7% between 2011 and 2031. Applying these factors the ~2500 passengers in the two hour 2013 AM peak can be expected to increase to ~3250 passengers (an increase of ~30%).

7.2.3 Future Performance

As identified in earlier sections and above the forecast turning flows and peak hour bus demands will be similar to existing and therefore the existing intersection performance is representative of the future intersection performance.

Part C: Design Philosophy and Corridor Options

8 Design Philosophy

The following sub-sections identify the desirable improvements and facilities for all of the different modes using the corridor.

8.1 Pedestrians

The following sub sections look at the desirable pedestrian facilities.

8.1.1 Link Path Widths

The guidance in the NZTA Pedestrian Planning Design Guide is shown in Table 15 below.

For the corridor that converts to 1.8m through route width (total 3.6m width).

The through route widths are generally already achieved in these locations so no potential improvements are necessary except for localised pinch points (refer to the shared path analysis in Section 8.2.3 for additional information).

Table 15: Extract from NZTA Pedestrian Planning Design Guide

Location	Maximum pedestrian flow	Zone				Total
		Kerb	Street furniture #	Through route	Frontage	
Arterial roads in pedestrian districts	80 p/min	0.15 m	1.2m	2.4 m +	0.75 m	4.5 m
CBD						
Alongside parks, schools and other major pedestrian generators						
Local roads in pedestrian districts	60 p/min	0.15 m	1.2 m	1.8 m	0.45 m	3.6 m
Commercial/ industrial areas outside the CBD						
Collector roads	60 p/min	0.15 m	0.9 m	1.8 m	0.15 m	3.0 m
Local roads in residential areas	50 p/min	0.15 m	0.9 m	1.5 m	0.15 m	2.7 m
Absolute minimum*		0.15 m	0.0 m	1.5 m	0.0 m	1.65 m

Consider increasing this distance where vehicle speeds are higher than 55 km/h.

* Only acceptable in existing constrained conditions and where it is not possible to reallocate road space.

8.2 Cycling

The following sub sections look at the desirable cycle facilities.

8.2.1 Cycle Options Considered

Table 16 identifies the cycling options considered for Hutt Road with an assessment of the positives and negatives outcomes for each option.

The objective of the project to “Improve the level of service and safety for people on bikes” is intended to encourage a significant increase in cycling, especially from the “interested but concerned” demographic (Gelller, 2009).

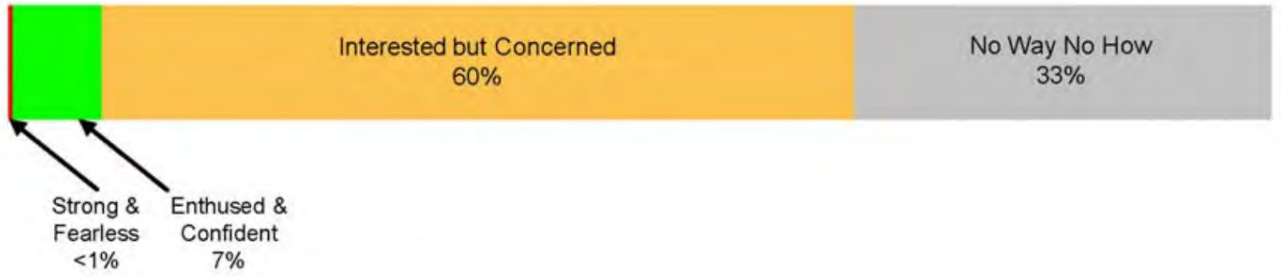


Figure 23: Types of Transportation Cyclists by proportion of Population (Geller, 2009)

Table 16: Cycling Options Considered on Hutt Road

Options	Positive	Negative
Off-road shared or separated path (west side)	• Consistent with facility proposed for SH2 from Petone to Ngauranga. • Cyclists separated from high speed traffic –perceived safety improved. • Improved connection for users from the western catchment (Ngaio, Khandallah).	• Conflicts with major intersections (Tinakori Road, Aotea Quay, Kaiwharawhara Road and Onslow Road). • Crossing facilities required to get to/from the shared path at either end of Hutt Road. • Space constraints under rail bridges that cross Hutt Road.
Off-road shared or separated path (east side)	• Consistent with facility proposed for SH2 from Petone to Ngauranga. • Cyclists separated from high speed traffic –perceived safety improved. • No crossing required to connect to major demands from the Hutt Valley. • Infrastructure already exists.	• Conflicts with accesses, including a number of high volume activities. • Crossing facilities required to get to/from the shared path at southern end of Hutt Road.
On-road protected cycle lanes	• Improved priority for on-road cyclists. • Cyclists separated from high speed traffic –perceived safety improved.	• Conflicts with major intersections (northbound). • Conflicts with accesses and Aotea Quay (southbound). • Crossing facilities required path at northern end of Hutt Road. • Space constraints under rail bridges that cross Hutt Road.
On-road unprotected cycle lanes	• Improved priority for on-road cyclists.	• Conflicts with major intersections (northbound). • Conflicts with accesses and Aotea Quay (southbound). • High speed environment 60-80 km/h and the perceived safety issues.

		• Safety perceptions are a key barrier to encouraging a wider section of the community to cycle.
Shared Cycle / Bus Lanes	• Improved priority for on-road cyclists.	• Conflicts with major intersections (northbound). • Conflicts with accesses and Aotea Quay (southbound). • Vic Roads Cycle Note 19 recommends that where cycle volumes are greater than 100 per hour and bus services are more frequent than 15 minutes that cyclists should not share with buses. Both of these criteria are met on this corridor.

Figure 24 below shows some guidance on facility types for different traffic conditions (speed versus volumes) prepared by the Cycling Embassy of Denmark.

The traffic volumes on Hutt Road conditions are off the chart shown below which indicates that a fully separated cycle facility is required.

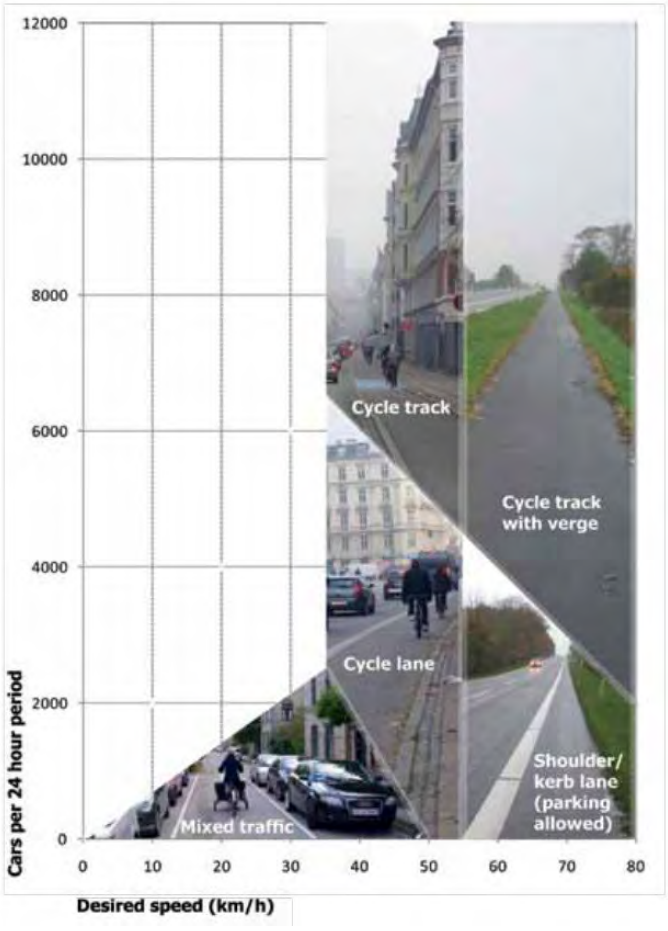


Figure 24: Cycle Facilities for Different Traffic Conditions (Collection of Cycle Concepts, 2012,)

8.2.2 Preferred Option

An off-road shared or separated path provided on the eastern side of Hutt Road (as existing) is the option that best provides for the "interested but concerned cyclists" whilst still maintaining a high level of service for more confident cyclists.

8.2.3 Link Path Widths

The guidance in the NZTA Pedestrian Planning Design Guide is shown in Table 17 below.

Table 17: Extract from NZTA Pedestrian Planning Design Guide

Table 14.13 – Widths of unsegregated shared-use paths

	Likely main use of path *		
	Local access only	Commuters	Recreational or mixed use
Desirable path width	2.5 m	3 m	3.5 m
Path width range	2 m to 2.5 m	2 m to 3.5 m	3 m to 4 m

* Where the use is uncertain, provide a width of 3 m [121].

Table 14.14 – Widths of segregated shared-use paths

	Area for cycles	Area for pedestrians	Total
Desirable path width	2.5 m	2 m	4.5 m
Path width range	2 m to 3 m	At least 1.5 m	At least 3.5 m

Based on the NZTA Guidance, the following path widths would be recommended:

- North of Kaiwharawhara Road: 3.5m unsegregated shared path
- South of Kaiwharawhara Road: 5m segregated shared path (3m +2m)

Vic Roads Cycle Note 21 also provides guidance on appropriate widths of shared / segregated paths.

There are different charts to use depending on the directional distribution of the users on the path. Based on the existing situation the distribution, vary depending on location and time of day.

The data used for the assessment is included in Table 18 below. The active mode users are two way flows and the Off Peak % is the proportion of users travelling in the opposite direction to the predominant flow.

Table 18: Assumptions for Vic Roads shared path assessment (2031 design year)

Location	AM Peak Hour			PM Peak Hour		
	Cyclists	Peds	Off Peak %	Cyclists	Peds	Off Peak %
North of Kaiwharawhara Road	950	45	10%	740	30	30%
Kaiwharawhara to Aotea Quay	1470	130	7%	1200	115	9%

Using the charts below, the recommended path configurations are as follows:

Table 19: Recommended cycle path widths

Location	AM Peak	PM Peak	Worst Case
North of Kaiwharawhara Road	3.0m shared path	3.0m bike path with 1.5m footpath	3.0m bike path with 1.5m footpath
Kaiwharawhara to Aotea Quay	4.0m bike path with 1.5m footpath	4.0m bike path with 1.5m footpath	4.0m bike path with 1.5m footpath

The following path configurations are proposed for design purposes (based on the analysis above and the information in section 8.1.1):

- North of Kaiwharawhara Road 3.0m bike path with 2.0m footpath
- Kaiwharawhara to Aotea Quay 4.0m bike path with 2.0m footpath

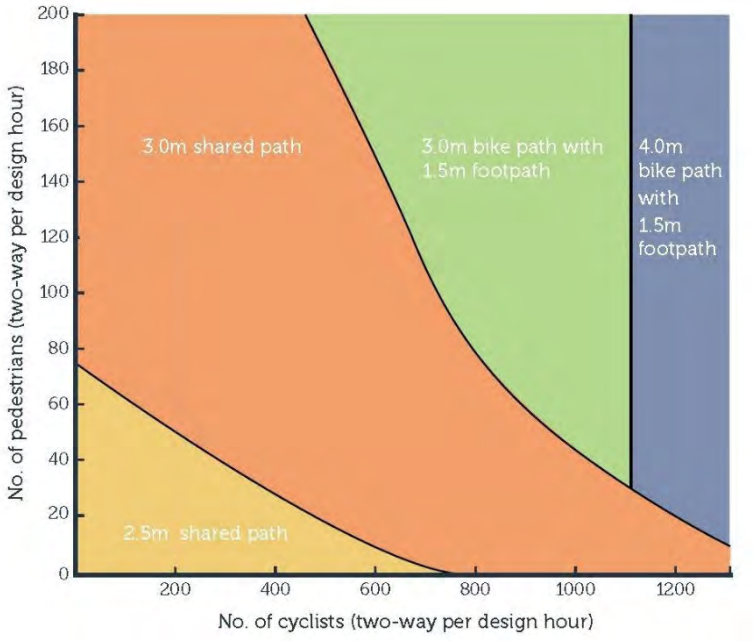


Figure 25: Vic Roads Chart for 90/10 Split

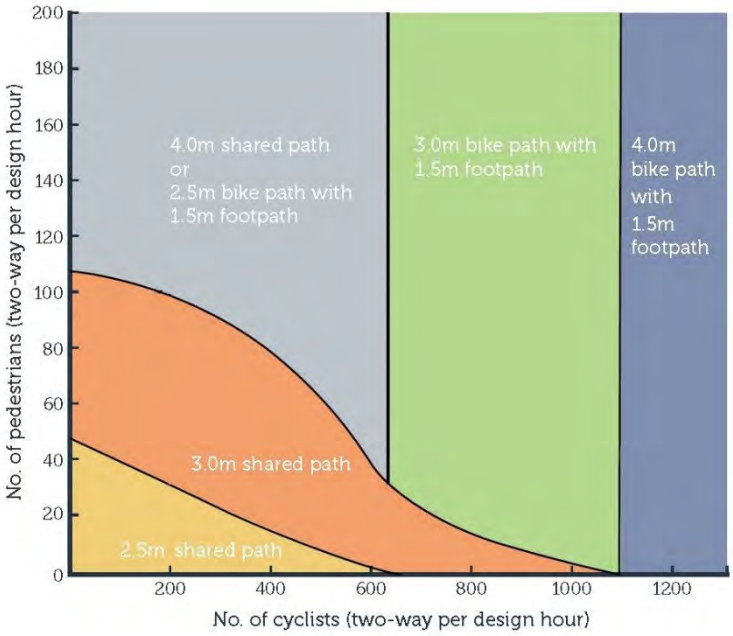


Figure 26: Vic Roads Chart for 50/50 Split

8.2.4 Crossing Facilities

Based on the demands in Table 20, consideration should be given to providing improved crossings at the Kaiwharawhara Road intersection.

8.3 Traffic

The following potential network enhancements have been identified.

8.3.1 Reallocation of Road Space

The following two lane sections have existing and forecast demand flows less than the threshold for a dual lane link (1600-1800vph) at times during the day. All of the locations below exclude intersection approaches.

Table 20: Potential for Road Space Reallocation

Location	Northbound	Southbound
Jarden Mile to Onslow Road	Potential lane removal	Potential off-peak clearway
Onslow Road to Kaiwharawhara Road	Potential off-peak clearway	Potential off-peak clearway
Kaiwharawhara Road to Aotea Quay	Potential off-peak clearway	Potential off-peak clearway

8.3.2 Intersection Improvements

Based on the above analysis, intersection improvements are desirable at the following intersections:

Kaiwharawhara Road

- Improvements for southbound through movement;
- Improvements for vehicles turning out of Kaiwharawhara Road.

Jarden Mile

- Overall intersection performance improvement in the PM peak.

8.4 Public Transport

8.4.1 Bus Lanes

USA Guidance

Table 21 below shows an extract from the Transit Capacity and Quality of Service Manual, 2nd Edition (Exhibit 4-37, General Planning Guidelines for Bus Preferential Treatments: Urban Streets, TRB).

Table 21: Bus Lane Warrants (TRB)

Treatment	Minimum One-Way Peak Hour Bus Volumes	Minimum One-Way Peak Hour Passenger Volumes	Related Land Use and Transportation Factors
Bus streets or malls	80-100	3,200-4,000	Commercially oriented frontage.
CBD curb bus lanes, main street	50-80	2,000-3,200	Commercially oriented frontage.
Curb bus lanes, normal flow	30-40	1,200-1,600	At least 2 lanes available for other traffic in same direction.
Median bus lanes	60-90	2,400-3,600	At least 2 lanes available for other traffic in same direction; ability to separate vehicular turn conflicts from buses.
Contraflow bus lanes, short segments	20-30	800-1,200	Allow buses to proceed on normal route, turnaround, or bypass congestion on bridge approach.
Contraflow bus lanes, extended	40-60	1,600-2,400	At least 2 lanes available for other traffic in opposite direction. Signal spacing greater than 500-ft (150-m) intervals.

Using the guidance in the table above, the Hutt Road section fits within the third treatment category; the peak hour bus and passenger volumes on the corridor would meet the warrants but the corridor would not be able to provide at least two traffic lanes in the same direction for general traffic.

Auckland Transport Guidance

Auckland Transport Guidance identifies a number of assessment criteria to determine whether bus lanes or high occupancy vehicle (HOV) lanes should be implemented:

- Alignment with Strategic Transport Plan;
- Consideration of Specific Characteristics of the Route;
- Analytical Assessment 1: Travel time or Level of Service (LOS);
- Analytical Assessment 2: Corridor Productivity or Efficiency;
- Analytical Assessment 3: Person Trips; and
- Road Safety.

The following identifies the specific assessments for each of the criteria listed above.

Alignment with Strategic Transport Plan

- The alignment with Auckland's Strategy is not relevant to this situation, however, the route has been identified as the key north-south bus corridor by GWRC which would warrant consideration of a bus lane.

Consideration of Specific Characteristics of the Route

- The guidance notes "In terms of the provision of bus lanes, it becomes increasingly justifiable as the number of buses increases to 20 or more buses per hour on a route during the peak, and most likely a necessity should there be 25 or more buses per hour."
- Other aspects to consider are the passenger catchments, and whether the route has a specific freight or vehicle emphasis.
- Based on the above criteria and the peak hour bus demand (>25) a bus lane should be considered.

Analytical Assessment 1: Travel time or Level of Service (LOS)

- The guidance notes that it is desirable to enable a LOS of B or C for buses on strategic routes.
- The guidance defines LOS C as "stable operating conditions but with manoeuvring becoming more restricted and motorists experience some driver discomfort and delays. Average travel speeds are at about 50% of the sign-posted speed limit".
- Table 7 and Table 8 above identify that the existing average worst speed northbound is approximately 50% of the posted speed and is less than 50% of the posted speed in the southbound direction. It should be noted that these speeds include bus dwell time, once this is removed from the travel times the actual average travel speeds would increase.
- Also based on the snapshot travel times in section 6.1.4 the travel times for the entire route are less than 50% of the posted speed.
- Based on the above criteria a bus lane should be considered.

Analytical Assessment 2: Corridor Productivity or Efficiency

- This section of the guidelines looks at the corridor productivity which is defined as the movement of people through a corridor by lane per hour.
- The guidance notes that "AUSTROADS have suggested a benchmark value of 38,000 person-km /hour per lane be used to reflect favourable corridor productivity or efficiency of a corridor.

In practise, a corridor productivity of 75% of this benchmark or higher, is desirable on arterials".

- Looking at the southbound section south of Kaiwharawhara Road; assuming an average speed of 25km/h, 2500 bus passengers per hour and 3240 car passengers per hour (1.5[1] people per car) the overall corridor productivity is ~164,000 (two lanes).
- Looking at the same section with one lane converted to bus lane and the speeds assumed to be 15km/h for vehicles and 45km/h for buses the efficiency for the bus lane would be ~113,000 and the vehicles ~61,000. The overall productivity would be slightly increased (~173,000).
- Looking at the same section with one lane converted to a T2 or T3 HOV (High Occupancy Vehicle) lane the overall productivity would likely increase.
- The above analysis suggests the corridor is already operating at almost double the suggested benchmark. However, the speed figures used are assumed only and will have a significant impact on the productivity.
- Based on the above criteria a bus lane or HOV lane should be considered.

Analytical Assessment 3: Person Trips

- The guidelines note "Effectively, where a transit lane accommodates approximately half of the total person trip movements on the corridor (assuming two lanes per direction), the equal share of person trips by lane suggests this is an appropriate split, irrespective of the proportion of vehicles on the respective lanes. Whilst this may not always be achievable, a share in excess of 30% (or more) of the total person trips on the bus / transit lane, is favourable and will begin to exhibit increased corridor productivity and efficiency"
- Based on the above criteria a bus lane should be considered.

Road Safety

- The guidance highlights potential safety issues for cyclists if bus speeds increase. This reinforces the analysis in section 8.2 above that cyclists and buses should not be sharing a lane.

The assessment criteria in the Auckland Transport Guidelines strongly indicate that a bus lane should be considered on this corridor.

Discussion

Bus lanes are certainly desirable southbound in the AM peak for most of the corridor. The demand for northbound PM peak bus lanes and other non-peak directional bus lanes is less clear as there is less information available for these periods.

Based on the analysis in section 8.3.1 there is limited potential to reallocate space on Hutt Road for peak hour bus lanes without major traffic LOS impacts. However, a T2 HOV lane might be possible with the following splits:

- T2 Lane: ~950 motor vehicles and ~45 buses (~4800 people); and
- Normal Lane: 1750 motor vehicles (~1750 people).

The impact of a T2 Lane on intersection performance is addressed later in this report.

[1] Based on 2013 vehicle occupancy data for the peak hour for Thorndon Quay / Aotea Quay

8.4.2 Intersection Performance

USA Guidance

Table 22 below shows an extract from the Transit Capacity and Quality of Service Manual, 2nd Edition (Exhibit 4-38, General Planning Guidelines for Bus Preferential Treatments: Intersections).

Table 22: Guidelines for Bus Intersection Treatments (TRB)

	Application Considerations		
Treatment	**Primary**	**Secondary**	**Related Land Use and Transportation Factors**
Bus-activated signal phases	Low-volume movement	High bus delay on approach	At access points to bus lanes, busways, or terminals; or where bus turning movements experience significant delays.
Bus signal priority	Intersections with high bus delay, coordinated signal system	Preferable at intersections with far-side stops	Traffic signal controller software may need to be upgraded.
Bus signal pre-emption	Intersections with high bus delay, uncoordinated signal system	Preferable at intersections without pedestrians	Pedestrian clearance or signal network constraints.
Special bus turn provisions	Route deviations to avoid turn prohibitions		Wherever vehicular turn prohibitions are located along routes.
Queue Jump	Intersections with large amounts of control delay (HCM LOS D or worse)	Right turn lane existence, bus routes with sub-15 minute headways	Merge on opposite side of intersection should consider bus operations.
Curb Extensions	Areas with high pedestrian traffic	Insufficient sidewalk space for shelter	Impacts to other road users and drainage issues.
Boarding Islands	Streets with four or more lanes	Locations where geometric conditions allow	Impacts to other road users, ped access to island may be a concern.
Parking Restrictions	Need for additional bus capacity	On-street parking exists	Local business and residence parking impacts.
Stop Consolidation (permanent or temporary)	Long routes with high ratio of dwell time to travel time	Pedestrian environment	May reduce access to transit routes if stops are too far apart.

Based on the guidance in Table 22, the following improvements may be warranted:

- Bus Signal Priority: could be implemented for bus movements at the Onslow Road intersection.
- Queue Jump: could be used at the Jarden Mile and Kaiwharawhara Road intersections.

Auckland Transport Guidance

The Auckland Transport guidance does not specifically address intersection performance.

Discussion

Based on observations and the information presented in the preceding sections the following intersections / crossings are a significant impediment to efficient and reliable bus trips:

- Jarden Mile Intersection
- Kaiwharawhara Intersection

The potential enhancements proposed at each location are discussed further below.

Jarden Mile Intersection

- Provide queue jump lanes for buses on the Hutt Road and Centennial Highway approaches to the intersection. The impact of this has been modelled in SIDRA, the results of which are provided in Table 23 and Table 24 below.
- The improvements can be expected to provide 7 seconds benefit for southbound AM peak buses and 55 seconds of benefit for northbound PM peak buses.

Table 23: Jarden Mile Current Year Intersection Performance (AM Peak Queue Jump)

Approach	Existing			With Queue Jump		
	Delay	LoS	Queue	Delay	LoS	Queue
Centennial Hwy Bus	28.5	C	15.8	21.7	C	0.5
Hutt Road Bus	34.5	C	4.1	20.7	C	0.3
Overall (all traffic)	**25.0**	**D**	**15.8**	**23.5**	**C**	**15.8**

Table 24: Jarden Mile Current Year Intersection Performance (PM Peak Queue Jump)

Approach	Existing			With Queue Jump		
	Delay	LoS	Queue	Delay	LoS	Queue
Centennial Hwy Bus	99.9	F	9.5	43.0	D	0.2
Hutt Road Bus	84.5	F	34.5	29.8	C	1.7
Overall (all traffic)	**79.1**	**E**	**48.3**	**61.8**	**E**	**42.1**

Kaiwharawhara Intersection

- Provide peak hour T2 lanes on peak direction approaches (Kaiwharawhara Road & Hutt Road North in the AM peak and Hutt Road South in the PM peak). The impact of this has been modelled in SIDRA, the results of which are provided in Table 25 and Table 26 below. The same phase times used in the base model have been used in the AM peak. Optimised phase times in the AM peak provide an overall improvement but significantly disbenefits the Kaiwharawhara Road approach. Optimised phase times have been used for both models in the PM peak.

- The T2 lanes provide significant benefit for buses and T2 lane vehicles (46 and 14 seconds savings for southbound vehicles from Hutt Road north and Kaiwharawhara Road respectively). There are also significant benefits for northbound T2 lane users in the PM peak (26 seconds savings).
- In the PM peak the overall impact on the performance of the intersection is negligible but in the AM peak the impact is significant. The non T2 lane users incur increased delays (127 and 30 seconds additional delay for southbound vehicles from Hutt Road north and Kaiwharawhara Road respectively).

Table 25: Kaiwharawhara Road Current Year Intersection Performance (AM Peak, T2 Lanes)

Approach	Existing			With T2 Lanes		
	Delay	LoS	Queue	Delay	LoS	Queue
Hutt Road North Bus	64.7	E	63.2	18.3	B	21.0
Kaiwharawhara Road Bus	47.6	D	33.3	33.5	C	22.2
Hutt Road South Bus	29.3	C	8.7	29.3	C	8.7
Overall	**50.4**	**D**	**63.2**	**80.6**	**F**	**107.9**

Table 26: Kaiwharawhara Road Current Year Intersection Performance (PM Peak, T2 Lanes)

Approach	Existing			With T2 Lane		
	Delay	LoS	Queue	Delay	LoS	Queue
Hutt Road North Bus	4.1	A	3.5	4.1	A	3.5
Kaiwharawhara Road Bus	55.1	E	13.4	57.5	E	13.8
Hutt Road South Bus	40.0	D	47.1	13.6	B	14.2
Overall	**31.1**	**C**	**47.1**	**28.1**	**C**	**50.0**

8.4.3 Bus Stops

Consolidation

Consolidation of the bus stops along the entire Hutt Road / Thorndon Quay corridor to a more suitable spacing is desirable to reduce stop and start delay and limit the obstructions to the existing footpaths / shared paths.

Figure 27 below shows the existing and proposed bus stop configurations with 400m radius extents around each bus stop. The purple stops are those on the main corridor and the green are on the side roads. Yellow are proposed new consolidated stops.

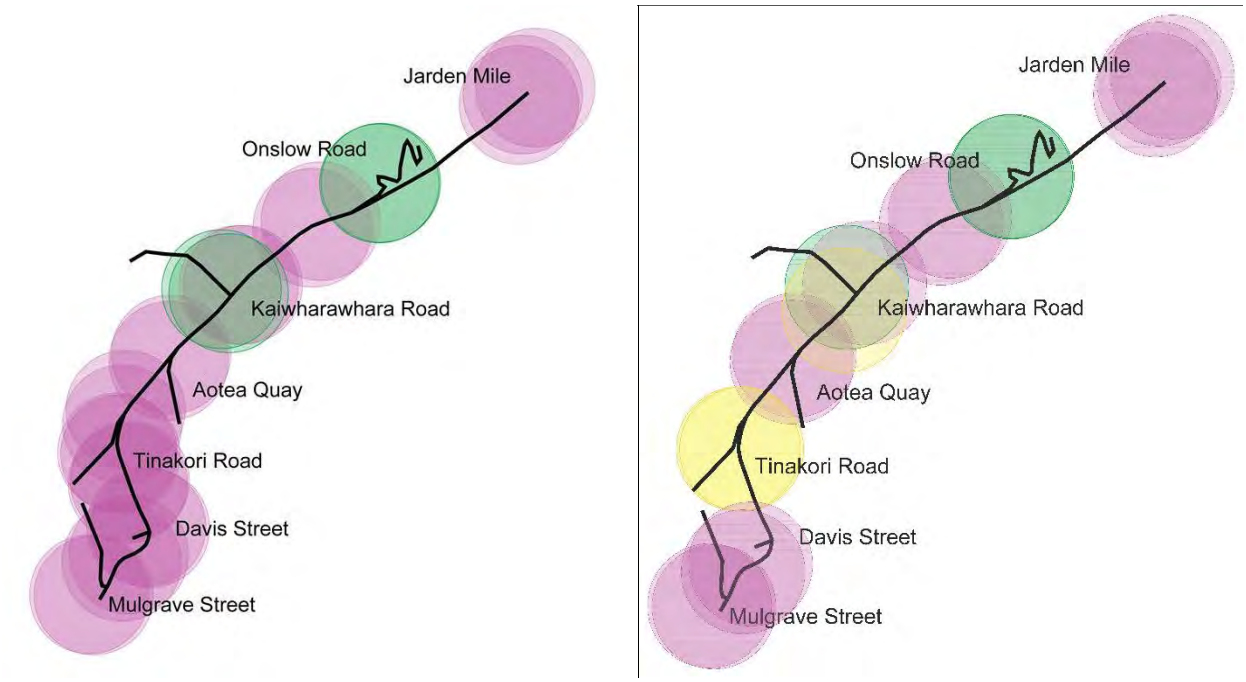


Figure 27: Proposed Bus Stop Consolidation

The changes proposed on Hutt Road are shown in **red** in the table below.

Table 27: Proposed Bus Stop Characteristics

Location	Northbound	Southbound
Ngauranga Gorge	3263 – Indented bus bay with shelter for SH2 northbound services only 3262 – Wide shoulder and shelter south of Jarden Mile	3256 – Channelised bus bay and shelter south of Jarden Mile intersection **Widen path at this location**
Rangiora Avenue (Placemakers)	3260 - Wide shoulder and shelter north of Rangiora Avenue	3258 – Recessed stop with offset shelter outside Placemakers
Kaiwharawhara	5028 - Recessed stop no shelter opposite Westminster Street	5486 - In-lane stop with shelter north of Westminster Street **Consolidated at new location south of Kaiwharawhara Road intersection**
Kaiwharawhara Road	5401 - Wide shoulder with shelter west of Hutt Road	4401 - In-lane stop with shelter opposite immediately west of Hutt Road **Consolidated at new location south of Kaiwharawhara Road intersection**

Onslow Road	4433 - In-lane stop no shelter	5433 - Wide shoulder with shelter

The sections below provide an assessment of the impact of the consolidation changes.

Kaiwharawhara Road

- The consolidation of southbound stops will improve performance of the Kaiwharawhara Road intersection through better lane utilisation and less disruption of traffic flow.
- The new stop will be approximately 210m south of the existing Hutt Road stop (however this is only an additional 60m walking distance away from the crossing across Hutt Road compared to the existing stop).
- The users of the current Kaiwharawhara Road southbound stop will have to cross Hutt Road to access a relocated bus stop but they will have a more frequent and wider range of bus services to choose from.
- Based on the data in Figure 15 above, the number boarding at the consolidated southbound stop is expected to be ~1200 with ~600 alighting. The northbound stop is assumed to be the reverse.

Bus Stop Bypasses

The Christchurch Cycle Design Guidelines recommend bus stop bypasses on high frequency bus routes (where buses run every 10 to 15 minutes during peak times). Based on this guidance, all of the stops which a path crosses should have bus stop bypasses except for the Onslow Road stops and the SH2 on-ramp (northbound).

8.5 Marked Parking and Sight Distances

The parking philosophy seeks to identify the safe separation distance for parking from accesses to minimise the risk of cycle / vehicle and vehicle / vehicle conflicts at the numerous accesses along parts of Hutt Road.

The most likely issue is: vehicles will give way to opposing vehicles and cyclists from the opposite direction but will fail to give-way to cyclists travelling from the same direction.

To minimise the potential risk to cyclists and vehicles the worst case sight lines (and parking offsets) would have to be catered for which would require parking to be restricted for ~100m either side of every access in conjunction with an education campaign to made drivers aware of cyclists travelling parallel with them and coming from both directions when exiting accesses along the route.

An active warning system could be implemented to provide warning to vehicles that a cyclist is travelling parallel to them. If an active warning system could be effectively implemented then the sight distance requirements could be relaxed.

The following table summarises the worst case parking offsets.

Table 28: Summarising Parking Offsets

Option	Parking offset to left (m)	Parking offset to right (m)
Vehicle Turning Out	~22m (ideal) ~15m (EDD)*	~45m (ideal) ~33m (EDD)*
Vehicle Turning In – No Active Warning System (moving vehicle)	~102m	~97m
Vehicle Turning In – No Active Warning System (stopped vehicle)	~33m	~33m

EDD = Extended Design Domain

The vehicle turning out values apply to both areas where cycle facilities are proposed and where they are not. Where cycle facilities are proposed, the vehicle turning out values are governed by the vehicle turning in values.

The current typical site distances turning out from accesses are shown in Table 29 below.

Table 29: Summarising Existing Typical Sight Lines

Location	Sightline to Vehicles (m)	Sightline to cycle on shared path (m)
Hutt Road (north of Aotea)	Unrestricted except by road geometry	Typically between 10m - 20m

Table 29 indicates that the sightlines to vehicles on the shared path from vehicles turning out are currently typically less than the recommended 35m. The sightlines for vehicles turning in across have not been shown and are typically unrestricted as there is no parking on the kerbside of the shared path.

8.6 Summary of Desirable Network Enhancements

8.6.1 Pedestrians

Dedicated footpath space and improved crossing facilities at the Jarden Mile intersection.

8.6.2 Cycling

The following path widths are recommended (based on Section 8.1.1 and 8.2.3):

- North of Kaiwharawhara Road: 3.0m bike path with 2.0m footpath (separated by markings only):
- Between Kaiwharawhara Road and Aotea Quay: 4.0m bike path with 2.0m footpath (separated by markings only); and

Consideration should be given to providing improved cycle crossings at the Kaiwharawhara Road and Jarden Mile intersections.

8.6.3 Traffic

All of the sections of the corridor with two lanes in the same direction are potentially suitable for off-peak clearways if required.

Kaiwharawhara Road

- Improvements for southbound through movement;
- Improvements for vehicles turning out of Kaiwharawhara Road.

Jarden Mile

- Overall intersection performance improvement in the PM peak.

8.6.4 Buses

The following improvements are desirable for improved bus efficiency and reliability.

Bus Priority Measures

- Peak hour directional T2 lanes;
- Bus lane queue jump at Jarden Mile intersection;
- T2 lanes at Kaiwharawhara Road intersection; and

Bus Stop Changes

- Consolidate Kaiwharawhara southbound stops to new location south of intersection;
- Widen shared path at Jarden Mile southbound stop; and
- Bus Stop bypasses should be implemented for all main corridor stops which are crossed by a cycle path.

9 Option Descriptions

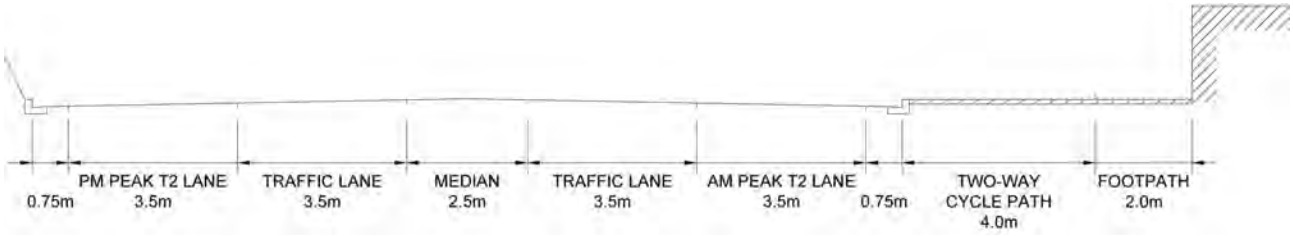
Two options have been identified:

- High sustainable transport utility (Option A); and
- High sustainable transport utility with a reduced parking impact (Option B).

The drawings for the two options can be found in Appendix G.

9.1 Option A

The overall philosophy for this option along Hutt Road is to remove the parking on the existing path and provide a consistent segregated (by markings) facility along the length of Hutt Road. T2 Lanes are recommended to be implemented in the AM peak southbound and the PM peak northbound with no on-road parking provided except where it does not restrict visibility



Location specific changes are described below.

Aotea Quay to School Road

- Remove all parking from the existing path and relocate all hazards to the rear of the path;
- 6.0m wide segregated shared path with 4.0m width for cyclists (segregation using markings only);
- Kerb widening north of Aotea Quay to achieve 6.0m path width;
- New combined southbound bus-stop with associated cycle bypass; and
- Southbound AM peak T2 lanes and northbound PM peak T2 lanes.

Adjacent to Kaiwharawhara Road

- Widened bridge over Kaiwharawhara Stream and path widening;
- Improved cycle crossing markings at intersection;
- Consolidation of existing southbound bus stop on Kaiwharawhara Road; and
- Southbound (and Kaiwharawhara Road) AM peak T2 lanes and northbound PM peak T2 lanes.

Westminster Street to Rangiora Avenue

- Kerb extensions to improve crossing of Westminster Street for pedestrians and cyclists;
- Consolidation of existing southbound bus stop on Hutt Road;
- Remove all parking (including existing encroachment licences) from the existing path and relocate all hazards to the rear of the path;
- 5.0m wide segregated shared path with 3.0m width for cyclists (segregation using markings only);

- Southbound AM peak T2 lanes and northbound PM peak T2 lanes; and
- New cycle bypass of reconfigured southbound bus stop opposite Rangiora Avenue.

Rangiora Avenue to Onslow Road

- Remove all parking (including existing encroachment licences) from the existing path and relocate all hazards to the rear of the path;
- 5.0m wide segregated shared path with 3.0m width for cyclists (segregation using markings only); and
- Southbound AM peak T2 lanes and northbound PM peak T2 lanes.

Onslow Road to south of Jarden Mile

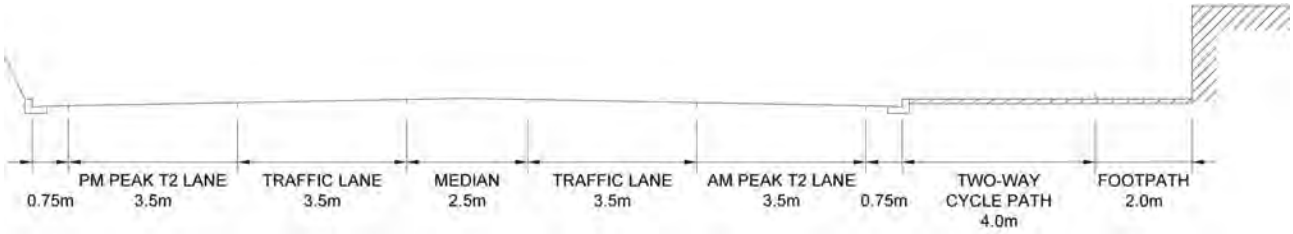
- Relocate all hazards to the rear of the path;
- Removal / trimming of vegetation and kerb changes to achieve 5.0m path;
- 5.0m wide segregated shared path with 3.0m width for cyclists (segregation using markings only);
- Property purchase from KiwiRail and adjustment of Onslow Road intersection kerbs and markings to fit 5.0m path; and
- Southbound AM peak T2 lanes and northbound PM peak T2 lanes.

Jarden Mile

- Remove all parking from the existing path and relocate all hazards to the rear of the path;
- Removal / trimming of vegetation and kerb changes to achieve 5.0m path;
- 5.0m wide segregated shared path with 3.0m width for cyclists (segregation using markings only);
- New cycle bypass of reconfigured southbound bus stop opposite; and
- Reconfigured Jarden Mile intersection providing, bus lanes for queue jump, improved pedestrian and cyclist facilities and reconfigured northbound bus stop.

9.2 Option B

The overall philosophy for this option along Hutt Road is to remove the parking on the existing path and provided a consistent segregated (by markings) facility along the length of Hutt Road. T2 Lanes are recommended to be implemented in the AM peak southbound and the PM peak northbound with off-peak clearway parking in the southbound lane.



Location specific changes are described below.

Aotea Quay to School Road

- Remove all parking from the existing path and relocate all hazards to the rear of the path;
- 6.0m wide segregated shared path with 4.0m width for cyclists (segregation using markings only);
- Kerb widening north of Aotea Quay to achieve 6.0m path width;
- Off-peak clear-way parking in lane;
- New combined southbound bus-stop with associated cycle bypass; and
- Southbound AM peak T2 clearway lanes and northbound PM peak T2 lanes.

Adjacent to Kaiwharawhara Road

- Widened bridge over Kaiwharawhara Stream and path widening;
- Improved cycle crossing markings at intersection;
- Consolidation of existing southbound bus stop on Kaiwharawhara Road; and
- Southbound (and Kaiwharawhara Road) AM peak T2 clearway lanes and northbound PM peak T2 lanes.

Westminster Street to Rangiora Avenue

- Kerb extensions to improve crossing of Westminster Street for pedestrians and cyclists;
- Consolidation of existing southbound bus stop on Hutt Road;
- Relocate all hazards to the rear of the path;
- 5.0m wide segregated shared path with 3.0m width for cyclists (segregation using markings only);
- Off-peak clear-way parking in lane (minimal offset distances from accesses and advanced warning system where appropriate);
- Southbound AM peak T2 clearway lanes and northbound PM peak T2 lanes; and
- New cycle bypass of reconfigured southbound bus stop opposite Rangiora Avenue.

Rangiora Avenue to Onslow Road

- Remove all parking (including existing encroachment licences) from the existing path and relocate all hazards to the rear of the path;
- 5.0m wide segregated shared path with 3.0m width for cyclists (segregation using markings only);
- Off-peak clear-way parking in lane (minimal offset distances from accesses and advanced warning system where appropriate); and
- Southbound AM peak T2 clearway lanes and northbound PM peak T2 lanes.

Onslow Road to south of Jarden Mile

- Relocate all hazards to the rear of the path;
- Removal / trimming of vegetation and kerb changes to achieve 5.0m path;
- 5.0m wide segregated shared path with 3.0m width for cyclists (segregation using markings only);
- Property purchase from KiwiRail and adjustment of Onslow Road intersection kerbs and markings to fit 5.0m path; and
- Southbound AM peak T2 lanes and northbound PM peak T2 lanes.

Jarden Mile

- Remove all parking from the existing path and relocate all hazards to the rear of the path;
- Removal / trimming of vegetation and kerb changes to achieve 5.0m path;
- 5.0m wide segregated shared path with 3.0m width for cyclists (segregation using markings only);
- New cycle bypass of reconfigured southbound bus stop opposite; and
- Reconfigured Jarden Mile intersection providing, bus lanes for queue jump, improved pedestrian and cyclist facilities and reconfigured northbound bus stop.

9.3 Option Staging

The upgrade of the two-way path along Hutt Road could be staged in a number of different ways as the form of the route would remain consistent both pre and post construction. Potential staging ideas are listed below:

- Relocate hazards/impediments to the path along path (light poles, signs etc.);
- Jarden Mile intersection upgrade;
- Improvements from Ngauranga to Onslow Road; and
- Improvements from Onslow Road to Aotea Quay.

10 Cost Estimates

Option estimates have been prepared using Wellington City Council maintenance rates and rates from other recent projects.

The estimates can be found in Appendix H.

The Hutt Road estimate is for the section of Hutt Road from Aotea Quay to Jarden Mile and is consistent across both options.

The base estimate for this area is $4.8M, with an expected estimate of $5.6M (including 15% contingency). The distribution of costs is shown in Table 30 below.

Table 30: Distribution of Costs (Hutt Road)

Values in ($000)	Pavement & Surfacing	Traffic Services	Pavement Markings	Extraordinary Works	Drainage & Services	Totals
Aotea Quay to Kaiwharawhara Road	246	66	48	304	215	879
Kaiwharawhara Road to Rangiora Avenue	213	32	62	10	113	430
Rangiora Avenue to Onslow Road	256	47	36	35	71	445
Onslow Road to Jarden Mile	793	180	56	51	190	1270
Traffic Management						250
Preliminary and General						491
Property						275
Professional Services						807
Totals	1508	324	202	400	589	4847

10.1 Cost and Benefit Assessment

The costs and benefits of the project have not been quantified but are expected to include:

- Crash cost savings for all modes but especially cyclist;
- Travel time and vehicle operating cost savings for bus travel and high occupancy vehicles;
- Potential for increased travel time and vehicle operating costs for single occupancy vehicles;
- Construction and maintenance costs;

- Walking and cycling health benefits; and
- Mode change benefits for changes to more sustainable transport modes.

11 Option Assessment

11.1 Road Safety Audit

A stage 1 road safety audit was undertaken by GHD in July, the report can be found in Appendix I.

The following changes have been made to the options as a result of the audit.

11.1.1 Hutt Road

- Proportion of time-restricted parking shown on drawings (Comment).
- Provide advance T2 lane warning signage around Kaiwharawhara Road intersection (Moderate Concern).
- Adjustments to kerbs and markings at Westminster Street intersection (Minor concern).
- Cycle refuge and drop kerb provided at Onslow Road intersection (Significant concern).
- Drop-kerb details shown on plans at Jarden Mile intersection (Minor concern).

11.1.2 All Options

- Removed zebra markings from bus stop bypasses / crossing bypasses (Moderate Concern).

11.2 Parking Assessment

The following sub sections identify the parking impact of each option and identify the provision for different parking types.

11.2.1 Overall Comparison of Options

Table 31 below compares the existing and proposed on-street parking provision for each of the options. The parking provision on the side-streets are unchanged as there is little opportunity for change (other than some potential for time restrictions).

Table 31: Comparison of parking provision

Location	Current Capacity	Option A	Option B
Hutt Road from Jarden Mile to Onslow Road	60	46	46
Hutt Road from Onslow Road to Rangiora Avenue	33	0	7
Hutt Road from Rangiora Avenue to Kaiwharawhara Road	73	0	51
Hutt Road from Kaiwharawhara Road to Aotea Quay	65	0	23
Westminster Street	32	32	32
Pickering Street	11	11	11
Kaiwharawhara Road	25	25	25
School Road	23	23	23
Total	**322**	**137**	**219**

11.2.2 Parking Demands

Table 32 below provides the existing short-medium term parking demands and the long-stay / commuter parking demands along the corridor. These demands are for the worst case for each type of parking and do not necessarily occur at the same time.

Table 32: Parking Demands

Location	Current Capacity	Short - Medium Term Parking Demand	Long-Stay / Commuter Parking Demand	Peak Demand at any one time
Hutt Road from Jarden Mile to Onslow Road	60	0	51	51
Hutt Road from Onslow Road to Rangiora Avenue	33	7	35	42
Hutt Road from Rangiora Avenue to Kaiwharawhara Road	73	6	49	55
Hutt Road from Kaiwharawhara Road to Aotea Quay	65	17	40	57
Westminster Street	32	23	18	33
Pickering Street	11	2	8	8
Kaiwharawhara Road	25	5	7	10
School Road	23	7	8	13
Total	**322**	**67**	**216**	**269**

11.2.3 Option A

Table 33 below details the number of parks provided by the option in each location.

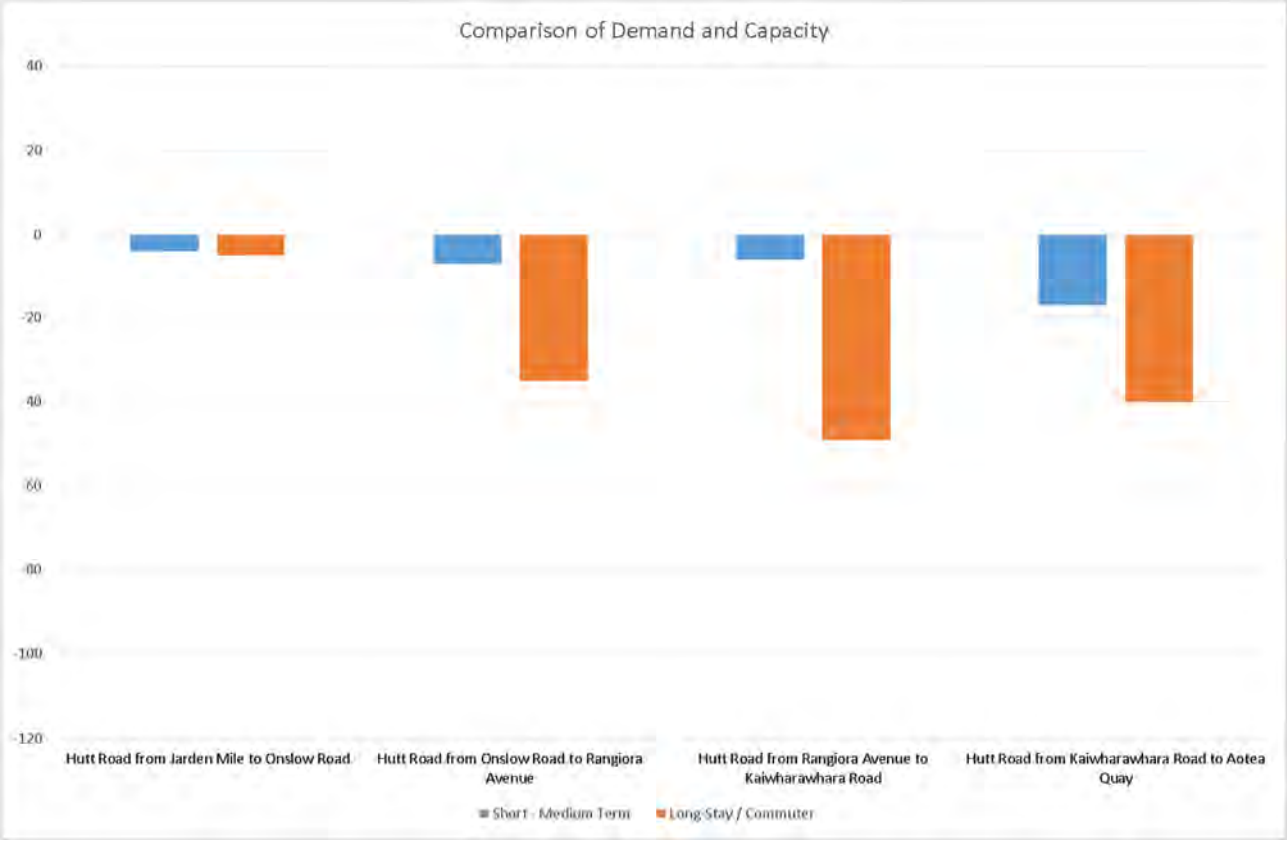


Figure 28: Comparison of Demand and Capacity for Option A

Figure 28 compares Table 32 above with Table 33 below (worst case demand for the different parking duration types against the capacity provided for that type). It shows a shortfall in long term / commuter parking capacity along the entire corridor with significant shortfalls (> 35 parks) on Hutt Road between Onslow Road and Aotea Quay.

Overall the total shortfall on is expected to be 132 parks assuming all underutilised parks on side streets are used.

Table 33: Parking Capacity Provided (Option A)

Location	Special / Short Term Parks	Medium Term Parks	Long Term / Unrestricted Parks	Total Parks
Hutt Road from Jarden Mile to Onslow Road	0	0	46	**46**
Hutt Road from Onslow Road to Rangiora Avenue	0	0	0	**0**
Hutt Road from Rangiora Avenue to Kaiwharawhara Road	0	0	0	**0**
Hutt Road from Kaiwharawhara Road to Aotea Quay	0	0	0	**0**
Westminster Street	0	16	16	**32**
Pickering Street	0	11	0	**11**
Kaiwharawhara Road	0	25	0	**25**
School Road	0	23	0	**23**
Total	**0**	**75**	**62**	**137**

11.2.4 Option B

Table 34 below details the number of parks provided by the option in each location.

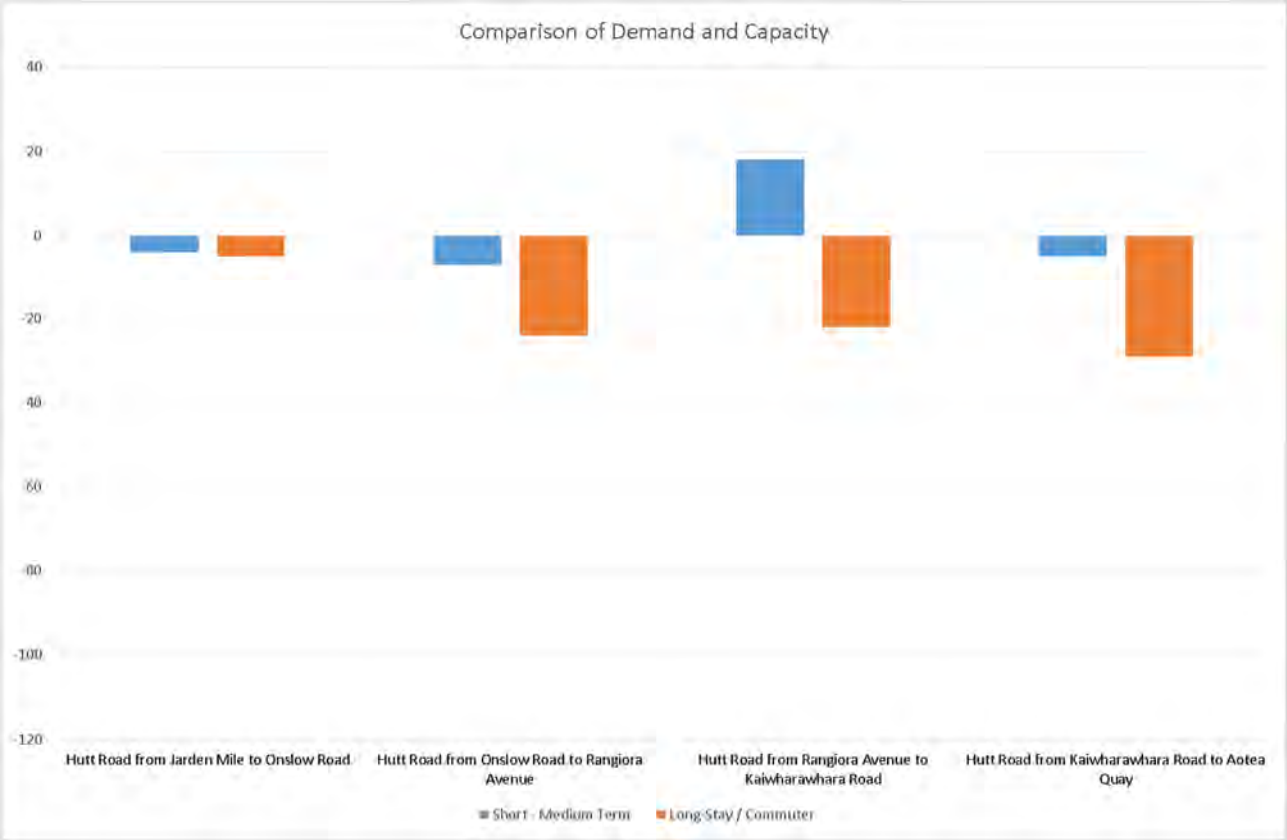


Figure 29: Comparison of Demand and Capacity for Option B

Figure 29 compares Table 32 above with Table 34 below (worst case demand for the different parking duration types against the capacity provided for that type). It shows:

- A shortfall in long term / commuter parking capacity along Hutt Road.
- A shortfall in short –medium term parking capacity along Hutt Road except for the section between Rangiora Avenue and Kaiwharawhara Road where there is an oversupply of 18 parks.

Overall the total shortfall on is expected to be 50 parks assuming all underutilised parks on side streets are used.

Table 34: Parking Capacity Provided (Option B)

Location	Special / Short Term Parks	Medium Term Parks	Long Term / Unrestricted Parks	Total Parks
Hutt Road from Jarden Mile to Onslow Road	0	0	46	**46**
Hutt Road from Onslow Road to Rangiora Avenue	0	0	11	**7**
Hutt Road from Rangiora Avenue to Kaiwharawhara Road	0	24	27	**51**
Hutt Road from Kaiwharawhara Road to Aotea Quay	0	12	11	**23**
Westminster Street	0	16	16	**32**
Pickering Street	0	11	0	**11**
Kaiwharawhara Road	0	25	0	**25**
School Road	0	23	0	**23**
Total	**0**	**111**	**111**	**219**

11.2.5 Mitigation Potential

Council as an acquiring authority may choose to mitigate some parking loss through acquiring nearby property.

11.3 Traffic Performance

The following sub sections identify the expected change in vehicle and bus performance along the corridor.

Table 35 below shows the expected change in performance.

Table 35: Expected change in traffic performance on Hutt Road

Location	Change	Effect
Jarden Mile intersection	Revised intersection layout to provide bus queue jump in both directions	**Buses** • 7 seconds benefit for southbound AM peak buses • 16 seconds benefit for northbound AM peak buses • 55 seconds benefit for northbound PM peak buses • 57 seconds benefit for southbound PM peak buses **General vehicles** • 3 seconds additional delay for southbound AM peak vehicles • 15 seconds benefit for northbound AM peak vehicles • 35 seconds benefit for northbound PM peak vehicles • 43 seconds benefit for southbound PM peak vehicles • Small reduction in delays for Jarden Mile and SH2 off-ramp approaches • Minor increase in delay for signalising (on demand) the left turn from SH2 onto Hutt Road for the cycle/pedestrian crossing.
Hutt Road	Peak hour directional clearways / T2 lanes	**Buses** • Reduced traffic in kerbside lane – more gaps to leave bus stops **General vehicles** • Reduced congestion for vehicles in the T2 lane. • Potential for increased congestion for single occupancy vehicles.
Onslow Road intersection	Peak hour directional clearways / T2 lanes	**Buses / T2 Vehicles** • No change for southbound buses • No change for northbound AM peak buses

		• 6 seconds benefit for northbound PM peak buses / T2 vehicles **General vehicles** • No change for southbound vehicles • No change for northbound AM peak vehicles • No change for Onslow Road AM peak vehicles • 6 seconds additional delay for northbound PM peak vehicles • 7 seconds of additional delay for Onslow Road PM peak vehicles
Kaiwharawhara Road intersection	Peak hour directional clearways / T2 lanes	**Buses / T2 Vehicles** • 46 seconds benefit for southbound AM peak buses / T2 vehicles • No change for northbound AM peak buses / T2 vehicles • 14 seconds benefit for Kaiwharawhara Road AM peak buses / T2 vehicles • 26 seconds benefit for northbound PM peak buses / T2 vehicles • No change for southbound PM peak buses / T2 vehicles • 2 seconds of additional delay for Kaiwharawhara Road PM peak buses **General vehicles** • 127 seconds of additional delay for southbound AM peak vehicles • No change for northbound AM peak vehicles • 29 seconds of additional delay for Kaiwharawhara Road AM peak vehicles • No change for northbound PM peak vehicles • No change for southbound PM peak vehicles • 2 seconds of additional delay for Kaiwharawhara Road PM peak vehicles

Overall the Hutt Road options are expected to result in:

- Additional delays for southbound single occupancy vehicles in the AM peak (at Kaiwharawhara Road intersection). Negligible change for other directions / periods, with additional delays at Kaiwharawhara and Onslow Road intersection balanced out by reduced delays at the Jarden Mile intersection.
- Significant benefits for buses and multiple occupant vehicles in the T2 lanes. The benefits mainly occur at the Kaiwharawhara Road and Jarden Mile intersections.
- There should be no change in pedestrian performance. However, the new facilities at the Jarden Mile intersection will provide priority which did not exist previously.

11.4 Assessment against objectives

The following sub sections identify how each of the options compares with the objectives:

- Maintain or improve the level of service and safety of pedestrians;
- Improve the level of service and safety for people on bikes along identified study area;
- Improve the level of service for people using buses along identified routes;
- Maintain an acceptable level of service for general traffic movements;
- Minimise impacts on parking and increase parking supply if feasible; and
- Ensure implementation costs represent good value for money.

The Hutt Road section positively meets most of the project objectives with the exception of:

- Significant additional delays for single occupancy vehicles at the Kaiwharawhara Road intersection
- Visibility concerns around parked cars (Option B) which could be mitigated through the use of electronic warning signs; and
- Significant parking impact (Option A).

Table 36: Assessment against project objectives

Objective	Positive	Negative
Maintain or improve the level of service and safety of pedestrians;	• New crossing facilities at Jarden Mile intersection • Dedicated pedestrian space	
Improve the level of service and safety for people on bikes along identified study area;	• High quality facility that will encourage new cyclists / is consistent with Petone to Ngauranga section; • Provides 24/7 facility; • Removes visibility concerns around parked cars (Option A)	• Visibility concerns around parked cars (Option B)
Improve the level of service for people using buses along identified routes;	• Significant benefits for buses in the T2 lanes / queue jump lanes.	
Maintain an acceptable level of service for general traffic movements;	• Negligible change for most directions / periods, with additional delays at Kaiwharawhara and Onslow Road intersection balanced out by reduced delays at the Jarden Mile intersection. • Significant benefits for multiple occupant vehicles in the T2 lanes.	• Additional delays for southbound single occupancy vehicles in the AM peak (at Kaiwharawhara Road intersection).

Minimise impacts on parking and increase parking supply if feasible;	• Limited parking impact (Option B)	• Significant parking impact (Option A)

12 Conclusions

The following conclusions can be drawn from the analysis presented in this report.

12.1 Part A: Safety Assessments

12.1.1 Crash History

The previous improvements on Hutt Road have improved the safety performance along the corridor. Northbound cyclists are at a higher risk than southbound cyclists and this will need to be considered in the design of the options.

12.2 Part B: Transportation Demands

12.2.1 Pedestrians

Pedestrian link and crossing south of Kaiwharawhara Road are relatively high.

12.2.2 Cycling

Cycle demands on the corridor have grown rapidly over the past five years and a step change can be expected with the construction of the proposed new facility between Petone and Ngauranga.

12.2.3 Traffic

Traffic demands on the corridor have been relatively constant in recent years and are not expected to change significantly in the future with the Roads of National Significance programme being implemented by the Transport Agency.

12.2.4 Public Transport

The future bus network proposed by GWRC is not expected to result in a significant increase in bus volumes along the corridor although higher capacity buses are expected. The existing bus services suffer from poor performance along the corridor in the peak periods.

12.2.5 Parking

There is the opportunity to reallocate road space for active or passenger transport modes along the corridor.

12.3 Part C: Design Philosophy and Corridor Options

12.3.1 Option Descriptions

Two route options have been identified, both options have the same improvements proposed along Hutt Road (intersection improvements at Jarden Mile, peak hour directional T2 lanes and a 5-6m wide two-way segregated path.

12.3.2 Cost Estimates

The expected cost estimate is $5.6M

12.3.3 Option Assessments

Option B best meets the objectives of the project.

Appendix A: Crash History Report

Hutt Road
Crash Summary

Hutt Road

Crash Summary

Prepared By

Evan Willcocks
Assistant Engineering Technician

Reviewed By

Jessica Fleet
Senior Safety Consultant

Opus International Consultants Ltd
Wellington Civil
L10, Majestic Centre, 100 Willis St
PO Box 12 003, Wellington 6144
New Zealand

Telephone: +64 4 471 7000
Facsimile: +64 4 471 1397

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Reference:
Status: Final

Contents

1 Introduction

1.1 Purpose

Opus International Consultants have been engaged by Wellington City Council to provide a summary report of the crashes that have occurred along Hutt Road. This report provides a crash summary of the study corridor as well as analysis of the crashes occurring both before and after the speed limit reduction along Hutt Road. The report also summarises the year and location in which crashes most commonly occurred, this helps to identify any reoccurring trends or potential problem areas.

1.2 Background

This report summarises the crash data for Hutt Road as identified in the location map below. The crash history information has been obtained from NZTA's Crash Analysis System (CAS).

For the corridor crash summary (see section 1.3) a 5 year crash history was used 2009 – 2013 inclusive and included Thorndon Quay.

For Hutt Road where changes were made to the speed limit, ten years of crash history was analysed (30 June 2004 – 29 June 2014).

Figure 1: Location map

1.3 Corridor Crash Summary

There were a total of 141 reported crashes along the corridor during 2009 – 2013 inclusive.

Of the 141 crashes there have been no reported fatal crashes, nine serious injury crashes, 53 minor injury crashes and 79 non-injury crashes. Non-injury crashes are typically under-reported, and as such trends observed from the data should be considered with caution.

Table 1: Corridor Summary Crash Types

Crash Movement Group	All Crashes	Injury Crashes
Overtaking Crashes	10%	10%
Straight Road- lost Control/ Head On	6%	8%
Bend – Lost Control/ Head on	4%	2%
Rear End/ Obstruction	43%	37%
Crossing/ Turning	33%	37%
Pedestrian Crashes	3%	6%
Miscellaneous Crashes	1%	0%

As it can be seen in Table 1 above the majority of crashes are related to crossing/ turning manoeuvres and rear end/ obstruction crashes.

When we consider all reported crashes:

- 47% of these crashes have resulted in injuries and 53% non-injury
- 87% of all crashes occur on a weekday and 13% on the weekend
- 29% of all crashes involve cyclists
- 6% of all crashes involve buses

There have been 62 crashes which has resulted in either serious or minor injury.

- 85% of all crashes occur on a weekday and 15% on the weekend
- 55% of all injury crashes involve cyclists
- 6% of all injury crashes involve pedestrians
- 8% of all injury crashes involve buses

1.3.1 Crash Rates

The crash rates have been calculated using both data from Thorndon Quay and Hutt Road corridor assuming a corridor length of 5.1 km.

The crash rate for all crashes as shown in Figure 2 below does not take into account traffic volumes along the route. There are only limited traffic counts along the corridor and the volumes vary significantly along the corridor. Analysis of the traffic counts at the Ngauranga Interchange shows there has been no growth in traffic volumes over the five year period so the crash rate shown is representative of the trends.

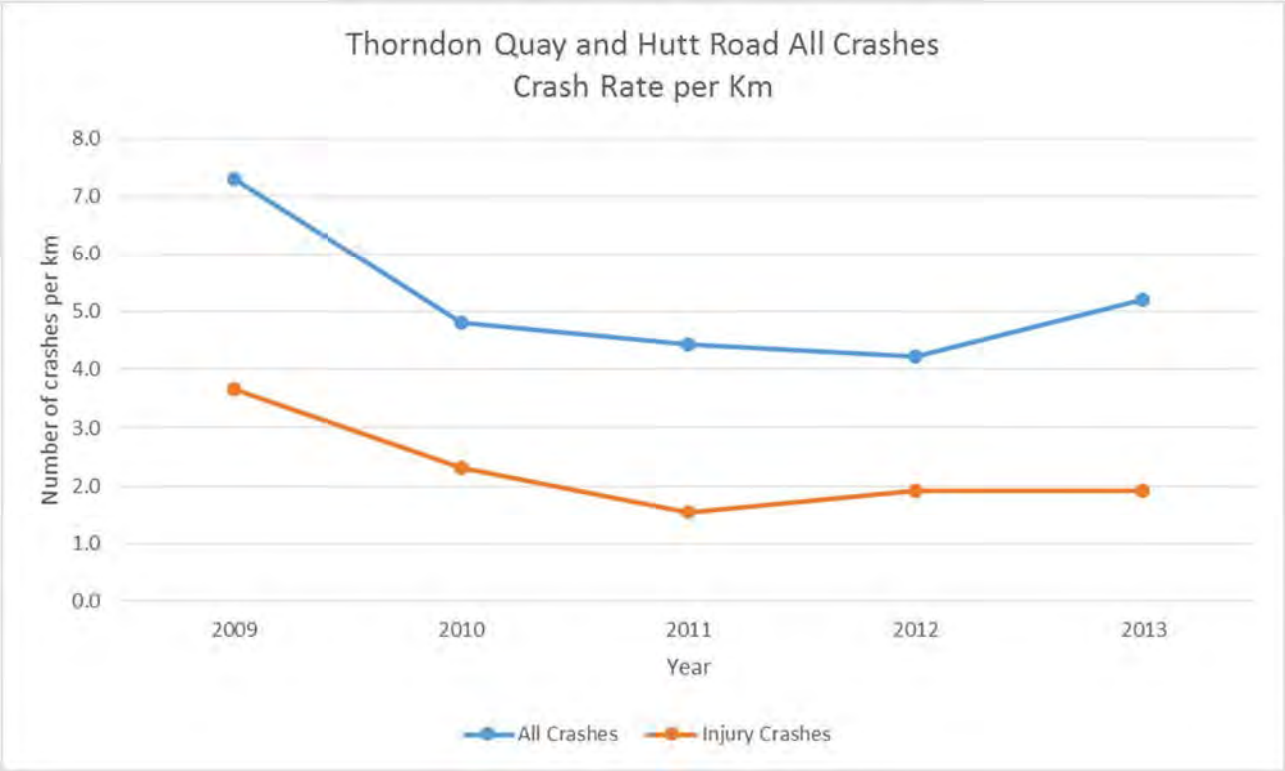


Figure 2: Corridor Summary: Crash Rate per km

Figure 2 above shows the overall crash rate for all reported crashes including non-injury crashes. The overall crash rate declined significantly between 2009 and 2010 after which the crash rate has stayed relatively static at between four and five crashes per km, before then experiencing a slight increase in 2013. There has been a steady decrease in the injury crash rate from 2009 to 2011, with a slight increase in the crash rate in 2012 but has stayed below two crashes per km. The overall crash trend is decreasing throughout the five year period.

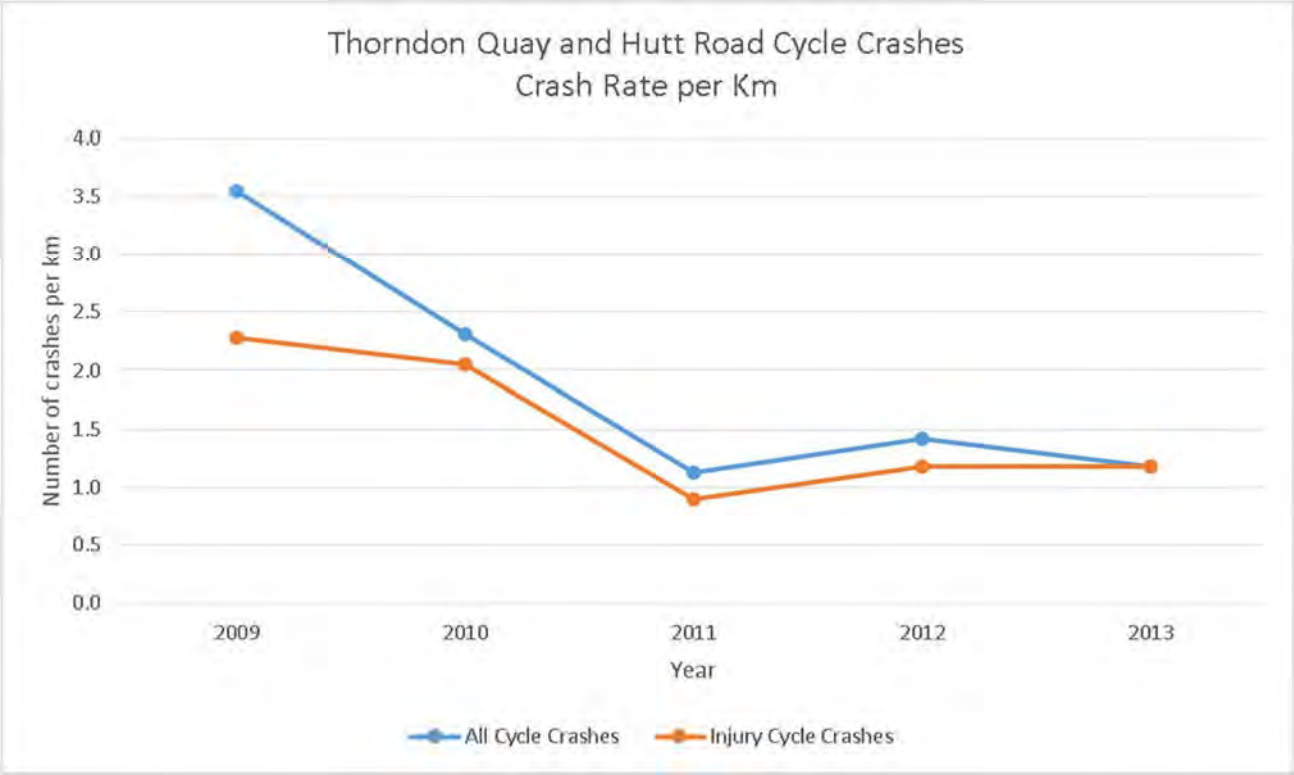


Figure 3: Corridor Summary: Cycle Crash Rate per km

Figure 3 above shows the crash rates for cycle crashes. The crash rates per km have been adjusted proportionally using the annual AM peak cycle surveys to account for the growth in cycle demands over the five year period. Indicative assessments of the corridor against the predicted crash frequency from the Economic Evaluation Model (EEM) show that the crash rate is significantly higher than would typically be expected.

There is little difference between all cycle crashes and injury crashes. This is reflective of the fact that cyclists are more likely to be injured in crashes when compared to motor vehicle users. However, non-injury cycle crashes are generally under-reported so these figures should be treated with caution.

The crash rate has decreased significantly from 2009 to 2011, after which time the rates have been slowly increasing. In 2013 all crashes involving cyclists resulted in injuries.

1.3.2 Cycle Crashes

There have been 42 reported crashes involving cyclists along Hutt Road and Thorndon Quay between 2009 and 2013, of these there have been five serious injury crashes, 29 minor injury and eight non-injury. There have been no reported fatal crashes involving cyclists within the reporting timeframe.

On the Hutt Road section there have been 26 reported crashes resulting in one serious injury crash, 17 minor injury crashes and eight non-injury crashes.

On the Thorndon Quay section there have been 16 reported crashes resulting in four serious injury and 12 minor injury crashes.

Of the reported 42 crashes, 23 of these crashes (55%) involved crossing/ turning movements either on-road or on the shared path.

- 78% (18) of the crossing/ turning crashes were associated with right turning movements
- 22% (5) of the crossing/ turning crashes were associated with left turning movements

There are two predominant crash types that are occurring. These involve vehicle conflicts with northbound cyclists on the shared path on Hutt Road and vehicle conflicts with drivers turning into or reversing out of angle parks on Thorndon Quay.

Figure 4 below shows that the proportion of fatal and serious crashes involving cyclists is increasing in the Wellington City, while the trend shows it to be decreasing on the Hutt Road and Thorndon Quay study corridor (although there is a small sample size which could be skewing the results).

1.3.2.1 Proportion of Total Cycle Crashes

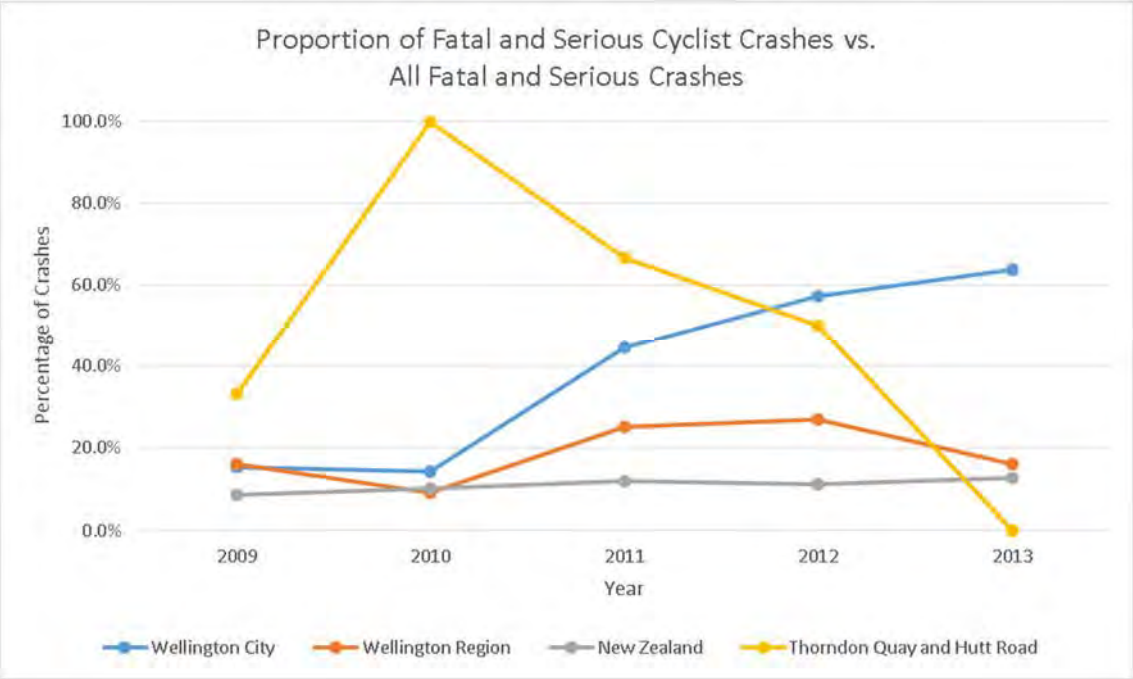


Figure 4: Corridor Summary: Comparison of All Fatal and Serious Cycle Crashes

The graph above shows that the proportion of fatal and serious crashes involving cyclists is increasing in the Wellington City, while the trend shows it to be decreasing on the study corridor.

1.3.2.2 Proportion of Urban Cycle Crashes

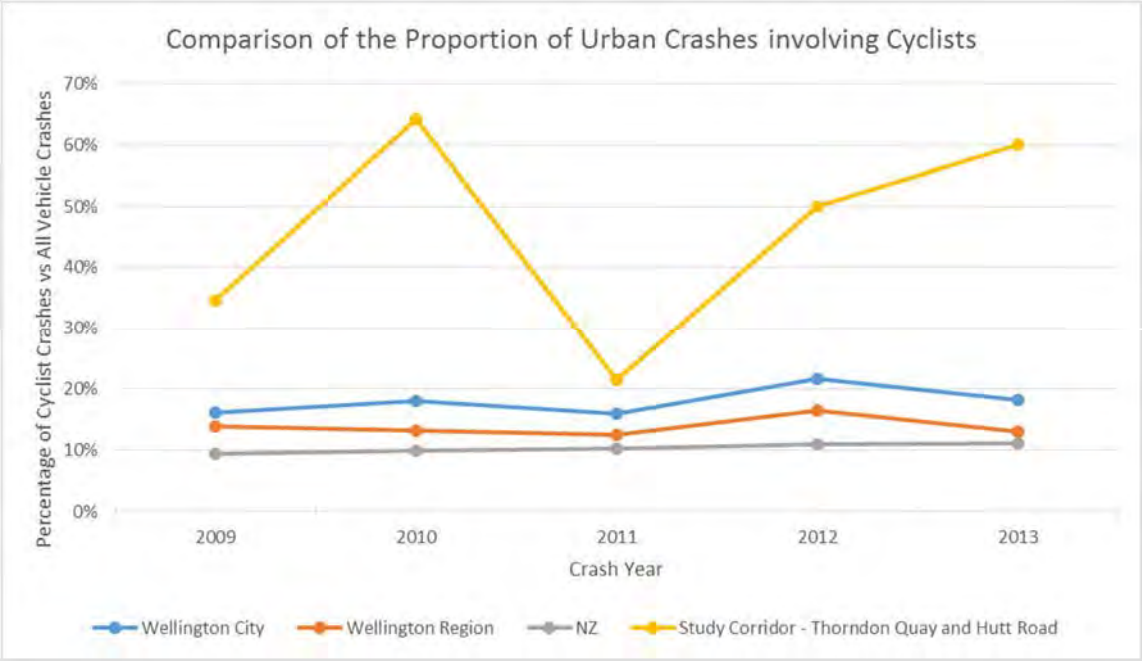


Figure 5: Corridor Summary: Comparison of Urban Fatal and Serious Cycle Crashes

Figure 5 shows that the study corridor length of Hutt Road and Thorndon Quay has a high proportion of crashes involving cyclists when compared to urban cycle crashes in Wellington City, Wellington Region and New Zealand.

1.3.2.3 Shared Path Cyclists

The existing shared path on the Hutt Road corridor is located adjacent to the southbound traffic lanes and is used by cyclists travelling in both directions.

From reviewing the Police crash reports, 58% (15) of the reported cycle crashes on Hutt Road (and 37% of the total reported crashes along the entire study corridor) occurred on the shared path. Of the reported cycle crashes on the shared path, 73% (11) of those crashes involved northbound cyclists.

The majority (67%, 10) of the crashes involved vehicles turning out of entranceways onto Hutt Road and failing to see the approaching cyclists.

- 70% of vehicles were attempting to turn left
- 30% of vehicles were attempting to turn right

Vehicles turning into entranceways accounted for 20% (3) of the crashes with the predominant movement being northbound vehicles turning right through southbound queued vehicles and colliding with cyclists on the path (as there is limited visibility to the cyclist).

There has been one reported crash involving two cyclists on the path colliding with each other while travelling in opposite directions.

There has also been one reported crash involving a vehicle reversing out of an angle park and colliding with a cyclist on the path.

The entranceways along the shared path, the unexpected direction of travel on the shared path and restricted sight visibility to and from cyclists causes conflicts. There can also be significant differences in speed between cyclists on the path and vehicles on Hutt Road especially during peak travel times, this can increase the potential injury severity for a cyclist in a crash.

1.3.2.4 On Road Cyclists

On the Hutt Road corridor, there are still a large number of cyclists that travel on road and do not use the shared path. Of the reported crashes 42% (11) of the crashes involve cyclists travelling on the road, 64% (7) of these crashes occurred in the northbound direction and 36% (4) in the southbound direction.

When considering all the reported cyclists crashes on Hutt Road, the predominant crash pattern involves cyclists travelling northbound either on the road or on the shared path.

All cyclists travel on the road along Thorndon Quay and the two most common crash types are cyclist conflicts with parked or parking vehicles (50%, 8) and vehicles turning left in/out of side roads and entranceways (25%, 4). The conflicts with parked or parking vehicles include drivers turning into or reversing out of angle parks or opening of car doors into the path of on-road cyclists.

1.3.2.5 Cycle Crash Sites

The locations of the cycle crashes are well distributed along the corridor of Hutt Road and Thorndon Quay. However there are three clusters of cycle crashes (30 metre radius).

The first site is on Hutt Road near the intersection with School Road (just south of Kaiwharawhara Road), there have been six reported crashes resulting in three minor injury and three non-injury crashes. Four of the crashes involved cyclists travelling on the shared path and being struck by vehicles either pulling in/out of an entranceway opposite School Road. One of the crashes involved a northbound on-road cyclist being struck by turning vehicle at School Road intersection. The sixth crash involved an on-road cyclist struck by a vehicle changing lanes who failed to see the cyclist in the traffic lane. Four of the crashes occurred in 2009, the other two crashes occurred during 2011 and 2012. There have been no reported crashes at this location since October 2012.

The second site is on Hutt Road near the intersection with Sar Street, where there have been three reported crashes resulting in two minor injuries and one non-injury injury crashes. Two of the crashes involved cyclists being struck by vehicles turning onto Hutt Road from a commercial entranceway (west side) and from Sar Street. The third crash involved a cyclist being struck by a driver turning into parking space.

The third site is on Thorndon Quay near the intersection with Moore Street, where there have been four reported crashes resulting in three minor injuries and one serious injury crash. Two of the crashes involved cyclists being struck by drivers turning into parking spaces. The serious injury crash involved a cyclists and pedestrian, when the cyclists failed to give way to a pedestrian on a Zebra Crossing. The fourth crash occurred when a cyclist lost their footing and fell onto a passing vehicle.

1.3.3 Pedestrian Crashes

There have been four reported pedestrian crashes along Hutt Road and Thorndon Quay between 2009 and 2013, one serious and two minor injury. Three of the crashes occurred at pedestrian zebra crossings facilities, however they have occurred at three different zebra crossings along the study length.

The first pedestrian crash occurred on the Hutt Road corridor at the zebra crossing north of the Rangiora Avenue intersection. Vehicles have stopped and were queued in lane 2 to give way to the pedestrian. A vehicle travelling in lane 1 at approximately 70 km/hr failed to observe the pedestrian and the queued vehicles. The driver struck the pedestrian in the middle of lane 1 on the crossing. The pedestrian sustained minor injuries. The crash occurred on Saturday February 27th 2010 at 1.10pm, weather and road conditions were dry and fine.

The second crash occurred at the zebra crossing south of Moore Street on Saturday 10th September 2011 at 9.24am. The pedestrian was attempting to cross Thorndon Quay using the zebra crossing from the south side, and a cyclist travelling south failed to stop for the pedestrian and has struck them on the zebra crossing. The pedestrian sustained serious injuries. Road and weather conditions were dry and fine, with overcast light conditions. It is noted that this accident was also discussed previously as a cyclist accident.

The third crash involved a pedestrian attempting to cross Thorndon Quay from the west side on Wednesday 2nd October 2013 at 5.10pm. A bus driver was starting to pull out of the adjacent bus stop, and obscured the visibility to the pedestrian for northbound approaching vehicles. The driver of a northbound vehicle failed to see the pedestrian and has struck them on the crossing. The pedestrian sustained minor injuries. The weather and road conditions were fine and dry.

The fourth crash involved a pedestrian attempting to cross Thorndon Quay 100m south of Tinakori Road from the west side on Tuesday 21st August 2012 at 8.00am. The pedestrian ran out between traffic to get to their parked vehicle on the opposite side of the road, when they failed to notice an approaching cyclist. The cyclist struck the pedestrian which caused the cyclist to flip over the handlebars. The cyclist suffered minor injuries and the pedestrian was not hurt.

1.3.4 Bus Crashes

There have been eight reported crashes involving buses along Hutt Road and Thorndon Quay between 2009 and 2013. Five of the reported crashes resulted in minor injuries and three were non-injuries. There have been no reported serious or fatal crashes involving buses.

Six of the crashes have occurred on Thorndon Quay between Mulgrave Street and just north of Moore Street.

Four of the crashes are crossing/turning related crashes involving vehicles turning in front of buses in the central southbound bus lane on Thorndon Quay. One crash involved a bus hitting a parked vehicle in the clearway just north of Moore Street which was active at the time. The sixth crash involved a bus turning into the bus terminus and struck a vehicle waiting at the left turn give way limit line for Thorndon Quay. Three crashes resulted in minor injuries and three were non-injury crashes.

On Hutt Road, there have been two reported rear end type bus crashes. One of the bus crashes involved a vehicle stopped in lane 1 in the northbound direction, north of Rangiora Avenue. The

other bus crash occurred when a vehicle attempting to turn into an entranceway had stopped to give way to a cyclist on the shared path, which was rear-ended by a following vehicle, which was struck by a following vehicle and then the bus. Both crashes resulted in minor injuries. There have been no reported bus crashes on Hutt Road since January 2011.

1.3.5 Motor Vehicle Crashes

There have been 88 reported crashes that have only involved motor vehicles (excluding pedestrians, cyclists and buses) along Hutt Road and Thorndon Quay between 2009 and 2013. Four of the reported crashes resulted in serious injuries and 19 in minor injuries. There have been 67 reported non-injury crashes.

Two of the serious injury crashes occurred at the intersection of Mulgrave Street and Thorndon Quay and were right turning / crossing crashes caused by failing to stop at a red signal. Another of the serious crashes was a head-on crash south of School Road in the early hours of the morning where alcohol was a factor. The final serious crash was a four car rear-end crash north of Westminster Street where five people were seriously injured.

The split between motor vehicle types is; 88% cars, 18% vans, 17% 4X4 / SUV, 10% motorcycles, 3% mopeds and 18% trucks.

55 of the crashes occurred on Hutt Road with 33 of those within 50m of an intersection. The intersections with the highest number of crashes were Jarden Mile (8), Kaiwharawhara Road (5), Onslow Road (5) and Rangiora Avenue (5). Similarly on Thorndon Quay, 20 of the 33 crashes occurred at or near to an intersection. The intersections with the highest number of crashes were Tinakori Road (10) and Mulgrave Street (6).

26 of the reported crashes were right turning / crossing crashes and all but five of those occurred at or close to intersections. 15 of the reported crashes were manoeuvring crashes, those on Hutt Road were typically u-turn crashes whereas those on Thorndon Quay were typically associated with driveways or parking. 21 of the reported crashes were rear-end crashes and were relatively evenly split between Thorndon Quay and Hutt Road. 18 of the reported crashes were lost control / overtaking crashes and most of these occurred on Hutt Road.

2 Hutt Road Crash Analysis

The following summarises the reported crashes which occurred along Hutt Road and is divided between the two following time periods:

- 18 September 2004 – 17 September 2008 (Pre speed limit reduction)
- 18 September 2008 – 17 September 2014 (Post speed limit reduction)

2.1 Pre/Post Speed Limit Reduction Injury Comparison

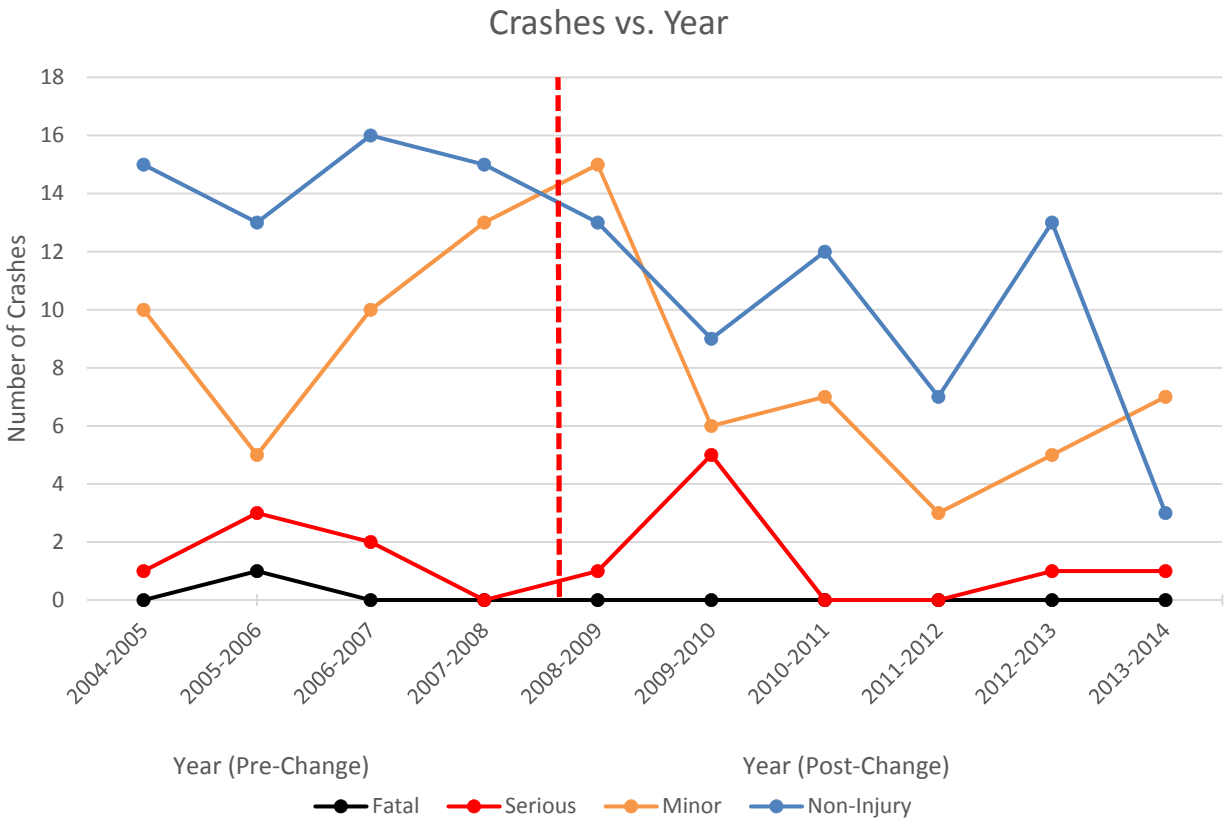


Figure 6: Hutt Road: Injury and Non-Injury crashes per year

Figure 6 shows all injury and non-injury causing crashes before and after the speed limit reduction, with the red dashed line denoting the period between the changes.

- The data shows an overall trend downwards for non-injury crashes following the change in speed limit.
- The minor injury crashes have halved from their peak of 15 in the first year after the speed limit was implemented and have remained relatively constant since then.
- Overall the data shows a reduction in the number of serious injuries after the speed limit was reduced with the exception of 2009-2010.
- There has been one reported fatal crash which occurred during the 2005-2006 period. The fatal crash occurred when by a car traveling south on Hutt Road swung wide and hit a truck travelling north head on.

2.2 Pre/Post Speed Limit Reduction Vehicle Type Comparison

Figure 7 shows a comparison between vehicle types and year. The number of crashes involving each of the three vehicle types (light vehicles, heavy vehicles and cyclists) peak around when the clearway was implemented and then have declined since then.

- The data shows an overall decline in all vehicle crashes following the reduction in speed limit on Hutt Road.
- The cyclist crashes accounted for 21% (21 of 104) of all crashes before the speed reduction, before increasing to 27% (28 of 108) after the speed limit reduction the increase in the proportion of cyclist crashes is due to the reduction in the number of light vehicle crashes.

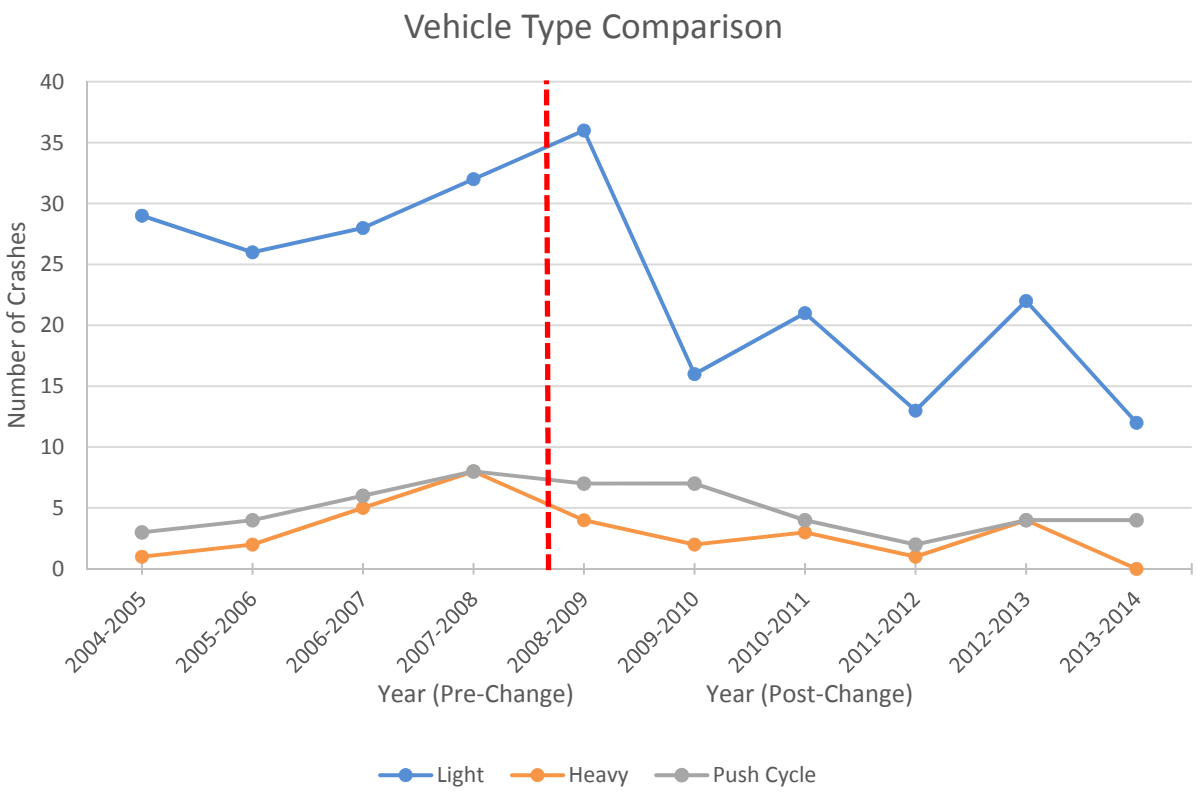


Figure 7: Hutt Road: Vehicle Type Comparison

2.4 Pre/Post Speed Limit Reduction Cyclist Crashes Injury Comparison

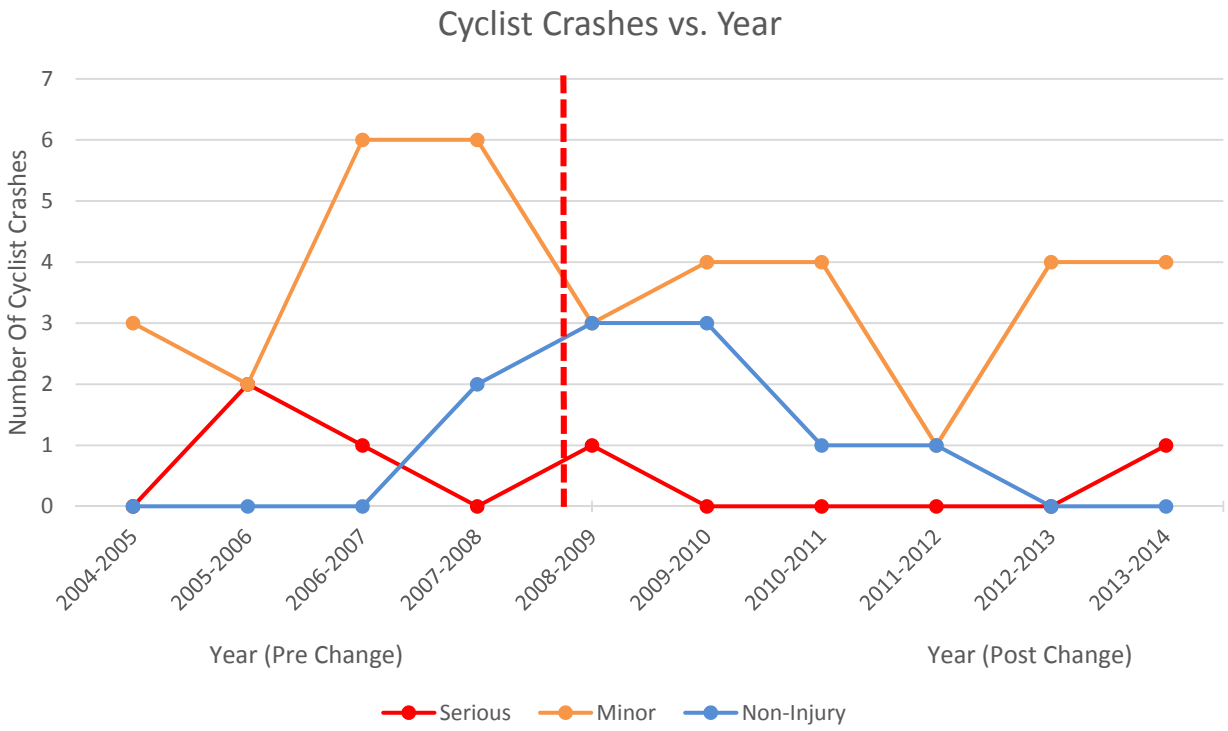


Figure 8: Hutt Road: Injury and Non-injury cyclist crashes per year

Figure 8 shows the number of injury and non-injury cyclist crashes both before and after the speed limit reduction.

- Non-injury cyclist crashes reached a high of three following the speed limit reduction but have declined since then (note that non-injury crashes are generally under reported).
- Minor injury cyclist crashes decreased following the speed limit reduction and have stayed relatively constant since then.
- Since the speed limit change there has been only two serious reported cyclist crashes which would suggest that the speed limit change has had a positive reduction on serious cycle injury crashes.

2.5 Pre/Post Speed Limit Reduction Cyclist Crashes Location Comparison

The majority of crashes involving cyclists occurred at an intersection rather than midblock. Before the speed limit reduction, the proportion of cycle crashes occurring at an intersection was 75%, of these, 80% of the crashes occurred where the intersection was uncontrolled.

Since the speed limit change the proportion of crashes occurring at intersections has stayed similar (77%) with the proportion of crashes occurring at uncontrolled junctions reducing to 54%. Crashes at stop or give way controlled junctions has increased to 25%, crashes at traffic signals only accounted for 5% of the crashes.

3 Summary

3.1 Conclusions

The following conclusions can be drawn from the analysis above:

- The proportion of cyclist crashes along the corridor is significantly higher than local, regional and national averages (but so are the cyclist volumes).

3.1.1 Hutt Road

- The overall crash rates for vehicles and cyclists has reduced following the adoption of the reduced speed limit.
- There is a higher proportion of northbound cycle crashes on the Hutt Road both on the shared path and on the road.

3.2 Implications for Options

The following implications exist for the options being considered.

3.2.1 Shared Path on Hutt Road

- Visibility to cyclists in both directions on the shared path from vehicles leaving properties and turning left or right onto Hutt Road is important, as is the unexpected direction of the cyclists, as this is the cause of 67% of cyclist crashes on the shared path.
- Visibility to cyclists in both directions on the shared path from vehicles entering the premises from Hutt Road will become more important if kerbside parking is provided (vehicles turning in make up 20% of the crashes on the shared path).
- The intersection improvements at the Jarden Mile intersection may provide an opportunity to address the crash risk at the intersection.

Appendix B: Parking Data

Hutt Road Parking Review

1 Introduction

As part of the Hutt Road Sustainable Transport Study a comprehensive parking report was required including analysis of:

- Variation in parking demand by time of day versus supply (including parking 100m up the adjacent side streets); and
- Parking turn-over and stay duration (and an estimate of the type of parking).

2 Data Collected

2.1 Parking Demand

Parking demand data was collected using a number plate beat survey undertaken over the time periods listed below. The survey covered the length of all of the key routes identified in the RFT and approximately 100m into each of the side streets along the route.

Hourly surveys were undertaken on the following hours / days:

- Tuesday 10 February (7am to 7pm); and
- Saturday 14 February (7am to 7pm).

Overnight surveys were undertaken on the following hours / days:

- Wednesday 11 February (at 12am and 4.30am); and
- Sunday 15 February (at 12am and 4.30am).

15 minute counts were undertaken on the following hours / days:

- Tuesday 17 February (11am – 1pm & 3pm – 5pm).

As noted above this initial review identifies trends from the one hour daytime surveys only.

2.2 Parking Capacity

Parking capacity data has been obtained from:

- Site visits
- Wellington City Council Aerials (2013)
- Wellington City Council CBD parking database.

3 Capacity Review

The following parking capacities have been identified for each section:

Location	Total	Unrestricted	Time restricted (free) <2 hours	Clearway
Hutt Road from Jarden Mile to Onslow Road	60	60		
Hutt Road from Onslow Road to Rangiora Avenue	33	33		
Hutt Road from Rangiora Avenue to Kaiwharawhara Road	73	73		
Hutt Road from Kaiwharawhara Road To Aotea Quay	65	65		
Westminster Street	32	16	16	
Pickering Street	11		11	
Kaiwharawhara Road	25		25	15
School Road	23		23	

Please note the following with regard to the parking categories:

- Unrestricted are parks with no restrictions and included non-marked parks and private parking that expands onto the road reserve.
- Time restricted (free) <2 hours are parks with restrictions less than two hours (including but not limited to P5, P10, P15, P30, P60 and P120).

Please note the following comments for specific locations:

- Hutt Road from Onslow Road to Rangiora Avenue – includes the parks that are half on Placemakers property and half on the road reserve. This section also included the highest number of unmarked parks especially around the Caltex petrol station.
- Westminster Street has a marked capacity of less than that stated above but there are several garage accesses that are no longer used which are regularly parked in front of.

4 Demand Review

The following terms used in this section are defined below:

- Short Stay (same number plate collected in one or two beats, indicating a stay less than two hours);
- Medium Stay (same number plate collected in three or four beats, indicating a stay longer than two hours but less than 4 hours); and
- Long Stay (same number plate collected in five or more beats, indicating a stay longer than four hours).

4.1 Unique Vehicles

The following table identifies the number of unique vehicles recorded during each 12 hour period:

Location	Capacity	Weekday			Weekend		
		Total	Medium Stay	Long Stay	Total	Medium Stay	Long Stay
Hutt Road from Jarden Mile to Onslow Road	60	59	1	54	13	1	6
Hutt Road from Onslow Road to Rangiora Avenue	33	61	1	39	6	0	4
Hutt Road from Rangiora Avenue to Kaiwharawhara Road	73	104	9	51	58	2	30
Hutt Road from Kaiwharawhara Road to Aotea Quay	65	86	9	43	26	4	7
Westminster Street	32	93	9	19	143	18	9
Pickering Street	11	13	0	9	15	1	11
Kaiwharawhara Road	25	21	4	8	19	2	5
School Road	23	13	0	8	26	4	7

The following conclusions can be drawn from the information above:

- There is a high proportion of long stay parking demand on Hutt Road along its entire length. This demand is significantly reduced on the weekend with the exception of an increase in short stay parking at the southern end of Hutt Road.
- The side streets generally have a higher turnover on the weekday when compared to the weekend.

4.2 Peak Demand

The following table identifies the maximum number vehicles recorded at any time during each 12 hour period:

Location	Capacity	Weekday			Weekend		
		Total	Medium Stay	Long Stay	Total	Medium Stay	Long Stay
Hutt Road from Jarden Mile to Onslow Road	60	51	1	51	10	1	6
Hutt Road from Onslow Road to Rangiora Avenue	33	42	1	35	5	0	4
Hutt Road from Rangiora Avenue to Kaiwharawhara Road	73	55	4	49	32	1	28
Hutt Road from Kaiwharawhara Road to Aotea Quay	65	57	5	40	15	3	7
Pickering Street	11	8	0	8	8	1	6
Kaiwharawhara Road	25	9	2	7	10	2	5
School Road	23	10	0	8	13	3	6

The following conclusions can be drawn from the information above:

- There is a high proportion of long stay parking demand (>200) on Hutt Road on weekdays along its entire length. This demand is likely to be made up of commuters and employees of the businesses along this section of the corridor.

4.3 Hourly Demand

The following table identifies the demand / capacity throughout the weekday:

Location	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
Jarden to Onslow	73%	85%	85%	85%	85%	85%	80%	80%	80%	32%	32%	0%
Onslow to Rangiora	70%	82%	109%	109%	106%	106%	127%	121%	118%	94%	55%	27%
Rangiora to Kaiwharawhara	66%	66%	71%	68%	74%	74%	75%	75%	70%	59%	44%	23%
Kaiwharawhara to Aotea	46%	54%	58%	58%	58%	55%	88%	80%	75%	74%	48%	26%
Westminster Street	38%	53%	59%	81%	97%	100%	103%	91%	91%	50%	50%	34%
Pickering Street	73%	73%	73%	73%	73%	64%	73%	73%	64%	55%	36%	36%
Kaiwharawhara Road	70%	70%	28%	28%	28%	28%	28%	28%	28%	36%	28%	28%
School Road	4%	17%	39%	39%	39%	43%	39%	43%	35%	4%	4%	0%

The red numbers indicate that clearways were operating in these periods and the as such the utilisation numbers are the demand / available capacity with the clearway operating.

The following conclusions can be drawn from the information above:

- Hutt Road north of Kaiwharawhara Road has a consistent demand from 7.00 to 16.00 with the section south of Kaiwharawhara having a pronounced peak in the afternoon.
- Kaiwharawhara Road and School Road are the least utilised side streets with Westminster reaching capacity at various times throughout the day.

The following table identifies the demand / capacity throughout the weekend:

Location	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
Jarden to Onslow	8%	13%	15%	17%	12%	12%	7%	7%	7%	3%	3%	3%
Onslow to Rangiora	6%	6%	9%	9%	9%	12%	12%	9%	9%	9%	15%	12%
Rangiora to Kaiwharawhara	10%	19%	21%	30%	27%	29%	44%	44%	44%	36%	26%	23%
Kaiwharawhara to Aotea	3%	6%	11%	9%	11%	8%	20%	18%	23%	9%	8%	6%
Westminster Street	6%	22%	53%	75%	97%	88%	100%	97%	94%	66%	34%	31%
Pickering Street	55%	64%	64%	73%	73%	64%	55%	55%	64%	64%	64%	64%
Kaiwharawhara Road	16%	16%	20%	32%	28%	24%	36%	40%	20%	16%	16%	12%
School Road	9%	17%	30%	26%	30%	22%	57%	52%	57%	26%	22%	17%

The following conclusions can be drawn from the information above:

- On Hutt Road demand is never more than 50% of capacity.
- Kaiwharawhara Road is the least utilised side streets with Westminster exceeding 50% of demand over capacity at various times throughout the day.

4.4 Overnight Demand

The following table identifies the overnight demand.

Location	Capacity	Weekday 0:00	Weekday 4:30	Weekend 0:00	Weekend 4:30
Jarden to Onslow	60	0	0	1	1
Onslow to Rangiora	33	2	3	2	2
Rangiora to Kaiwharawhara	73	10 (BMW)	10 (BMW)	13 (BMW)	13 (BMW)
Kaiwharawhara to Aotea	65	8	8	4	2
Westminster Street	32	4	4	5	5
Pickering Street	11	6	8	5	5
Kaiwharawhara Road	25	4	4	4	4
School Road	23	4	4	-	-

The following conclusions can be drawn from the information above:

- The overall demand for overnight parking is low.
- Areas where shift workers park while at work are relatively busy.

4.5 Peak 15 Minute Parking Analysis

The following tables identify the parking demand during 15 minute periods in the interpeak and late afternoon.

Interpeak Period: 11:00 – 13:00

Location	Capacity	Unique Vehicles	Average Stay (mins)	Max Vehicles (15 min)	Max Vehicles (daily)
Jarden to Onslow	60	42	117	42	51
Onslow to Rangiora	33	28	106	26	42
Rangiora to Kaiwharawhara	73	80	113	77	55
Kaiwharawhara to Aotea	65	49	109	47	57
Westminster Street	32	59	52	31	33
Pickering Street	11	10	87	8	8
Kaiwharawhara Road	25	8	77	6	9

School Road	23	8	109	8	10

Please note the following with regard to the table above and below:

- The average stay figures in the table above are not a true representation of average stay as they do not take into account vehicles that were parked before the count began or after the count finished.
- Max vehicles is the maximum number of vehicles at any one time, (15 min) from the 15 minute counts and (daily) from the hourly surveys.

Afternoon Period: 15:00 – 17:00

Location	Capacity	Unique Vehicles	Average Stay (mins)	Max Vehicles (15 min)	Max Vehicles (daily)
Jarden to Onslow	60	44	98	38	51
Onslow to Rangiora	33	28	81	28	42
Rangiora to Kaiwharawhara	73	78	63	54	55
Kaiwharawhara to Aotea	65	44	104	42	57
Westminster Street	32	36	55	19	33
Pickering Street	11	8	56	5	8
Kaiwharawhara Road	25	9	77	5	9
School Road	23	8	92	7	10

The following conclusions can be drawn from the information above:

- There is a very high turnover of vehicles during both periods analysed on Westminster Street.
- Similar trends to the hourly (all day counts) with regard to long stay vehicles.

5 Opportunities

Based on the above analysis the following opportunities exist to potentially reprioritise excess or long stay parking capacity to provide opportunities for active and passenger transport modes.

5.1 Long Stay Demand

The maximum number of long stay vehicles in each section were identified for reprioritisation and then these numbers were adjusted such that demand for short and medium parking would not exceed capacity in either the weekday or weekend (by converting long term or unrestricted parks to short term parks). These numbers are presented below.

Location	Long Term and Unrestricted Capacity	Maximum Long Stay Demand	Long Term and Unrestricted Capacity Reprioritised	Long Term and Unrestricted Capacity Converted to Short Term Parking
Hutt Road from Jarden Mile to Onslow Road	60	51	51	9
Hutt Road from Onslow Road to Rangiora Avenue	33	35	24	9
Hutt Road from Rangiora Avenue to Kaiwharawhara Road	73	49	49	24
Hutt Road from Kaiwharawhara Road to Aotea Quay	65	40	40	25
Westminster Street	16	18	6	10
Pickering Street	0	8	7	0
Kaiwharawhara Road	0	7	7	0
School Road	0	8	8	0

The following conclusions can be drawn from the information above:

- There are ~200 parks from Hutt Road used for commuter / employee parking.

5.2 Underutilised Capacity

In addition to potentially removing long stay parking there is also an opportunity to remove underutilised short term parking. Assuming that long stay parking and demand is removed the following utilisation is expected to occur.

Location	Maximum Utilisation	Underutilised Capacity	Underutilised Carparks
Hutt Road from Jarden Mile to Onslow Road	44%	46%	4
Hutt Road from Onslow Road to Rangiora Avenue	100%	0%	0
Hutt Road from Rangiora Avenue to Kaiwharawhara Road	42%	48%	11
Hutt Road from Kaiwharawhara Road to Aotea Quay	72%	18%	4
Westminster Street	92%	0%	0
Pickering Street	100%	0%	0
Kaiwharawhara Road	39%	51%	9
School Road	53%	37%	5

- Maximum utilisation is the maximum utilisation on either the weekday or weekend assuming that long stay parking and demand is removed.
- Underutilised carparks is the unused capacity (assuming an ideal maximum utilisation of 90%).
- Parks not required is the underutilised capacity converted to a number of vehicles.
- Total parks removed is the parks not required plus the long term and unrestricted capacity removed.

6 Summary

The table below summarise the analysis undertaken.

Location	Current Capacity	Short - Medium Term Parking Demand	Long-Stay / Commuter Parking Demand	Underutilised Parking	Total parks able to reprioritised
Hutt Road from Jarden Mile to Onslow Road	60	4	51	4	55
Hutt Road from Onslow Road to Rangiora Avenue	33	7	35	0	24
Hutt Road from Rangiora Avenue to Kaiwharawhara Road	73	6	49	11	60
Hutt Road from Kaiwharawhara Road to Aotea Quay	65	17	40	4	44
Westminster Street	32	23	18	0	6
Pickering Street	11	2	8	0	7
Kaiwharawhara Road	25	5	7	9	16
School Road	23	7	8	5	13

The analysis above has identified that:

- There is the potential to reprioritise ~250 parks (out of ~320) from Hutt Road used for commuter / employee parking or parks that are underutilised.
- There is the potential to reprioritise ~40 parks from Hutt Road and reallocate them to unused parks on the side streets.

Based on this analysis, there is the opportunity to reallocate road space for active or passenger transport modes along the corridor.

Appendix C: Pedestrian Data

PEDESTRIAN INTERSECTION COUNT SUMMARY

Onslow Road / Hutt Road

1 hour peak based on peak period for all movements

Movement	AM 1 hour	AM 2 hour	IP 1 hour	IP 2 hour	PM 1 hour	PM 2 hour
	7	14	4	10	1	2
	0	1	0	0	0	1
	1	3	9	14	11	18
	0	0	1	1	0	1
	0	0	0	0	0	0
	2	6	0	0	0	0
Total	**10**	**24**	**14**	**25**	**12**	**22**

Kaiwharawhara Road / Hutt Road

1 hour peak based on peak period for all movements
Yellow includes red movements, green excludes orange movements

Movement	AM 1 hour	AM 2 hour	IP 1 hour	IP 2 hour	PM 1 hour	PM 2 hour
	5	19	7	9	48	70
	58	84	13	18	14	24
	5	15	11	13	61	82
	33	50	15	19	11	18
	1	5	5	5	2	5
	4	14	5	8	3	11
Total	**106**	**187**	**56**	**72**	**139**	**210**

Appendix D: Cyclist Data

CYCLIST COUNT SUMMARY

Onslow Road / Hutt Road

1 hour peak based on peak period for all movements

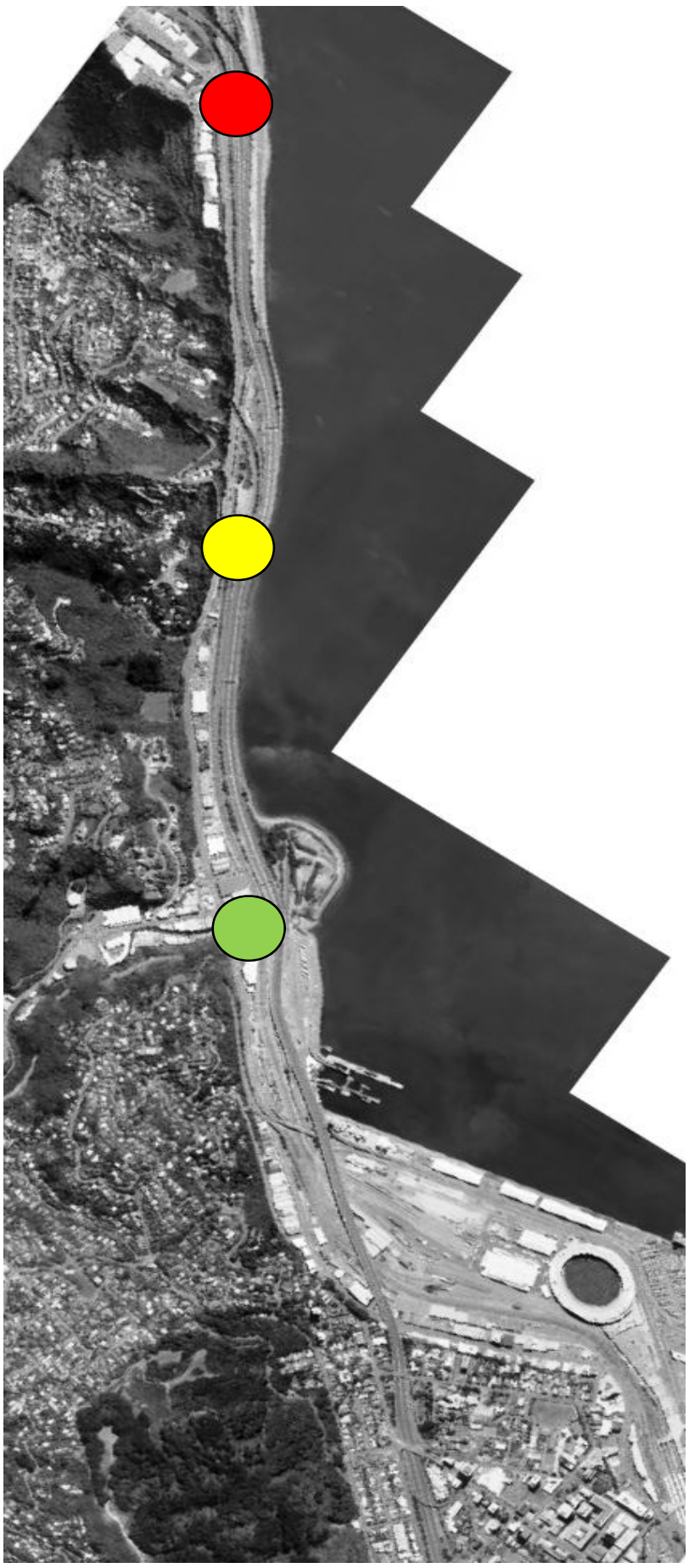
Movement	AM 1 hour	AM 2 hour	IP 1 hour	IP 2 hour	PM 1 hour	PM 2 hour
	263	423	2	2	40	48
	1	1	0	0	5	7
	28	46	2	4	133	175
	0	0	1	1	0	0
	0	0	0	0	0	0
	15	34	0	0	0	0
Total	**307**	**504**	**5**	**7**	**178**	**230**

Kaiwharawhara Road / Hutt Road

1 hour peak based on peak period for all movements

Movement	AM 1 hour	AM 2 hour	IP 1 hour	IP 2 hour	PM 1 hour	PM 2 hour
	240	409	7	12	20	42
	0	0	0	0	1	3
	23	34	14	15	188	336
	5	5	0	0	101	172
	1	3	0	0	1	2
	137	218	2	5	5	7
Total	**406**	**669**	**23**	**32**	**316**	**562**

CYCLE COUNT SUMMARY



Northbound

TDG values are peak hour weekly averages

Movement	Date	Source	AM Peak Hour	IP Peak Hour	PM Peak Hour
	Mar-14	TDG	21	-	-
	Feb-15	Opus	28	3	133
	Feb-15	Opus	28	14	289

Southbound

TDG values are peak hour weekly averages

Movement	Date	Source	AM Peak Hour	IP Peak Hour	PM Peak Hour
	Mar-14	TDG	185	-	-
	Feb-15	Opus	278	2	40
	Feb-15	Opus	377	9	25

PEAK HOUR DEMANDS ON SHARED PATH

AM Peak

Movement	NB Cyclists	SB Cyclists	NB Pedestrians	SB Pedestrians
	11	251	1	7
	11	257	1	9
	9	223	0	33
	11	329	5	91

Inter Peak

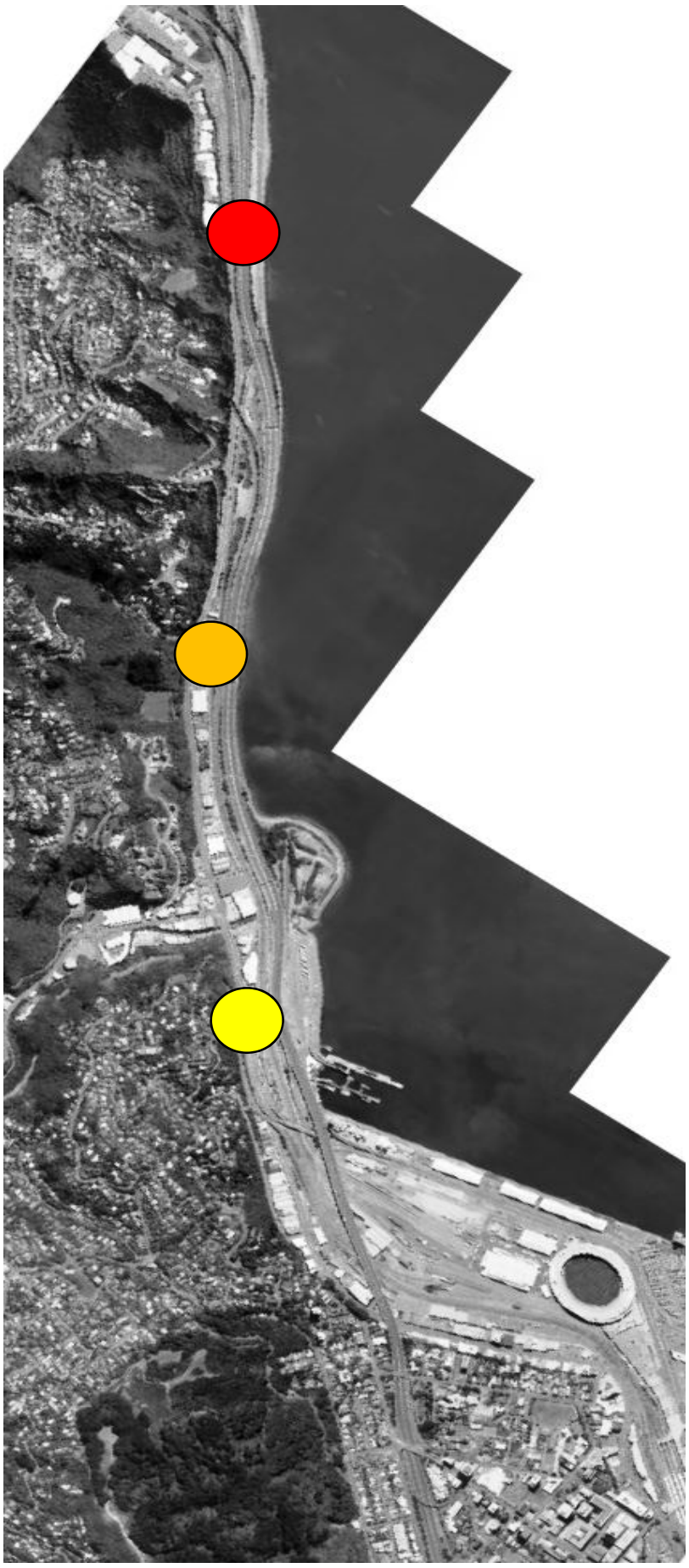
Movement	NB Cyclists	SB Cyclists	NB Pedestrians	SB Pedestrians
	2	2	9	4
	3	2	9	4
	14	7	7	15
	14	9	18	28

PM Peak

Movement	NB Cyclists	SB Cyclists	NB Pedestrians	SB Pedestrians
	101	38	11	1
	101	34	11	1
	125	11	13	11
	191	14	61	25

Appendix E: Motor Vehicle Data

VEHICLE LINK DEMANDS - N2AQ MODELLING



Northbound

Model includes: N2AQ 7 lanes, SH2 Ngauranga NB on ramp ramp metering, Hutt Rd/SH2 Ngauranga SB off-ramp improvement; Other Wellington urban RoNS schemes are included as per programmed

Movement	2011 Base		2031 Do Min		2031 N2AQ	
	AM	PM	AM	PM	AM	PM
	642	1039	773	1331	594	927
	562	1312	616	1238	502	1432
	701	1841	851	2547	645	2173

Southbound

Model includes: N2AQ 7 lanes, SH2 Ngauranga NB on ramp ramp metering, Hutt Rd/SH2 Ngauranga SB off-ramp improvement; Other Wellington urban RoNS schemes are included as per programmed

Movement	2011 Base		2031 Do Min		2031 N2AQ	
	AM	PM	AM	PM	AM	PM
	1836	464	1564	300	1394	306
	2168	576	2202	803	1858	484
	2743	795	3301	780	2417	787

2015 VEHICLE COUNTS

Onslow Road / Hutt Road

1 hour peak based on peak period for all movements

Movement	AM 1 hour	HCV%	IP 1 hour	HCV%	PM 1 hour	HCV%
	1218	9%	509	11%	538	4%
	58	9%	58	3%	131	0%
	432	8%	542	14%	1306	3%
	83	14%	128	3%	275	1%
	177	2%	55	5%	50	0%
	565	1%	127	4%	145	2%
Total	**2533**		**1419**		**2445**	

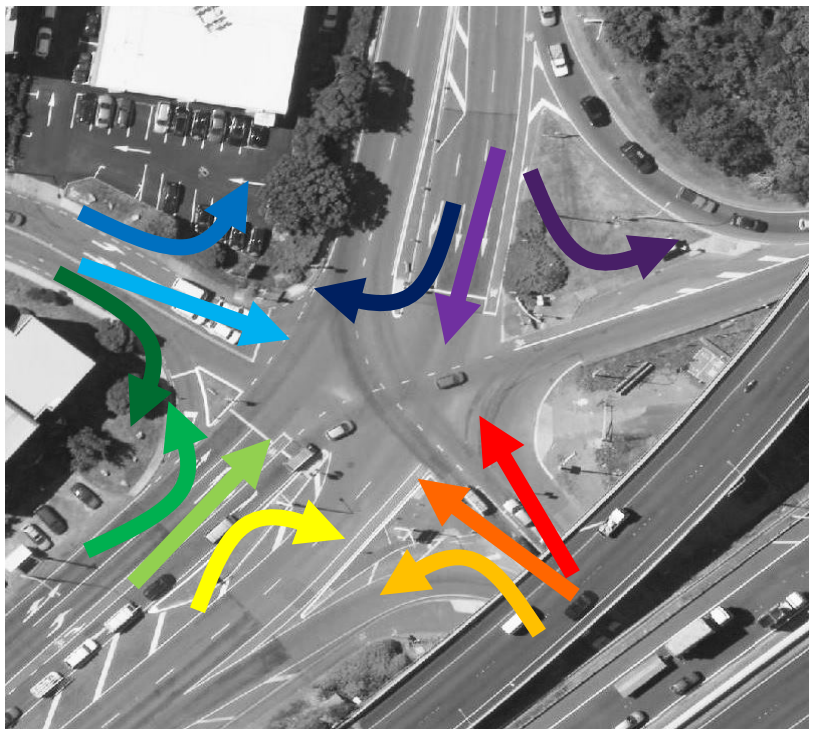
Kaiwharawhara Road / Hutt Road

1 hour peak based on peak period for all movements

Movement	AM 1 hour	HCV%	IP 1 hour	HCV%	PM 1 hour	HCV%
	1659	3%	511	4%	490	2%
	148	9%	92	1%	204	1%
	429	7%	566	4%	1405	1%
	237	3%	309	2%	776	0%
	145	1%	143	3%	174	1%
	1033	2%	299	2%	335	0%
Total	**3651**		**1920**		**3384**	

OTHER VEHICLE COUNTS

Jarden Mile / Hutt Road



Data sources: Turn Counts from 2011 Base NWSM Model, HCV % from loop counts on SH2 ramps, Jarden Mile and Hutt Road

Movement	AM 1 hour	HCV%	IP 1 hour	HCV%	PM 1 hour	HCV%
	507	7%	525	7%	954	7%
	3	7%	8	7%	8	7%
	458	7%	216	7%	346	7%
	181	5%	242	5%	369	5%
	192	5%	202	5%	741	5%
	21	5%	36	5%	27	5%
	29	4%	36	4%	31	4%
	14	4%	9	4%	11	4%
	10	4%	12	4%	10	4%
	7	6%	10	6%	13	6%
	812	6%	210	6%	238	6%
	821	6%	563	6%	826	6%
Total	**3055**		**2069**		**3574**	

Appendix F: Bus Data

BUS DEMANDS

Onslow Road / Hutt Road

Movement	AM 1 hour	AM 2 hour	IP 1 hour	IP 2 hour	PM 1 hour	PM 2 hour
	33	54	8	16	9	16
	5	10	6	12	23	40
	6	8	1	2	4	7
	5	8	1	2	3	5
NB	**11**	**18**	**7**	**14**	**27**	**47**
SB	**38**	**62**	**9**	**18**	**12**	**21**

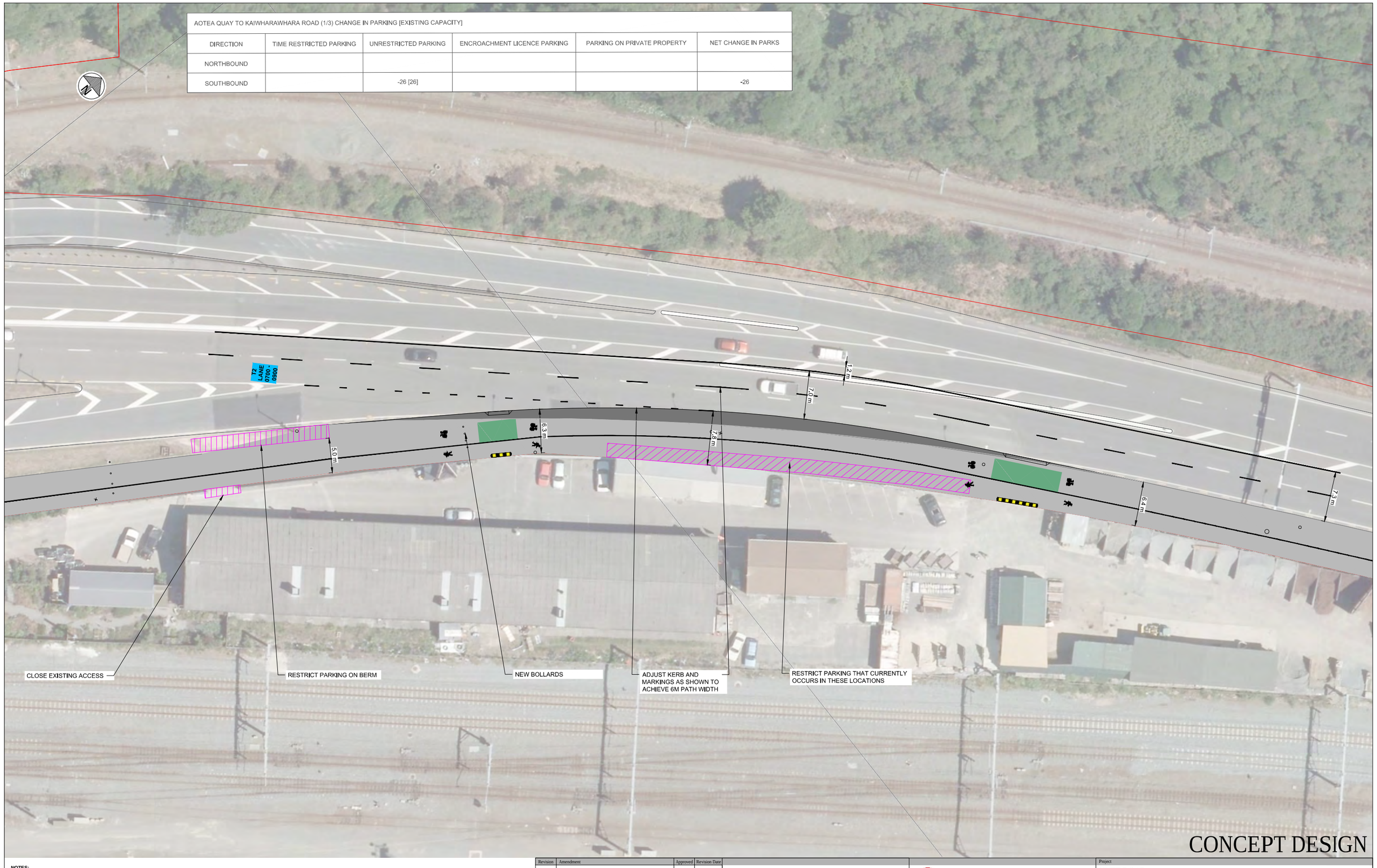
Kaiwharawhara Road / Hutt Road

Movement	AM 1 hour	AM 2 hour	IP 1 hour	IP 2 hour	PM 1 hour	PM 2 hour
	38	62	9	18	12	21
	11	18	7	14	27	45
	5	10	1	2	6	12
	8	15	1	2	4	8
NB	**16**	**28**	**8**	**16**	**33**	**57**
SB	**46**	**77**	**10**	**20**	**16**	**29**

Appendix G: Engineering Drawings

AOTEA QUAY TO KAIWHARAWHARA ROAD (1/3) CHANGE IN PARKING [EXISTING CAPACITY]

DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND		-26 [26]			-26



CONCEPT DESIGN

300 mm
200
100
50
10 mm
0

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
3) HUTT ROAD SHARED PATH TO BE RESEALED ALONG ENTIRE LENGTH

Revision	Amendment	Approved	Revision Date
A	CONCEPT DESIGN	-	27/01/2016

OPUS
Wellington Office
+64 4 471 7000
PO Box 12-003
Wellington 6144
New Zealand

Drawn	Designed	Approved	Revision Date
ST	ST	ES	27/01/2016

Project No.	Scale
5-C2953.00	1:250

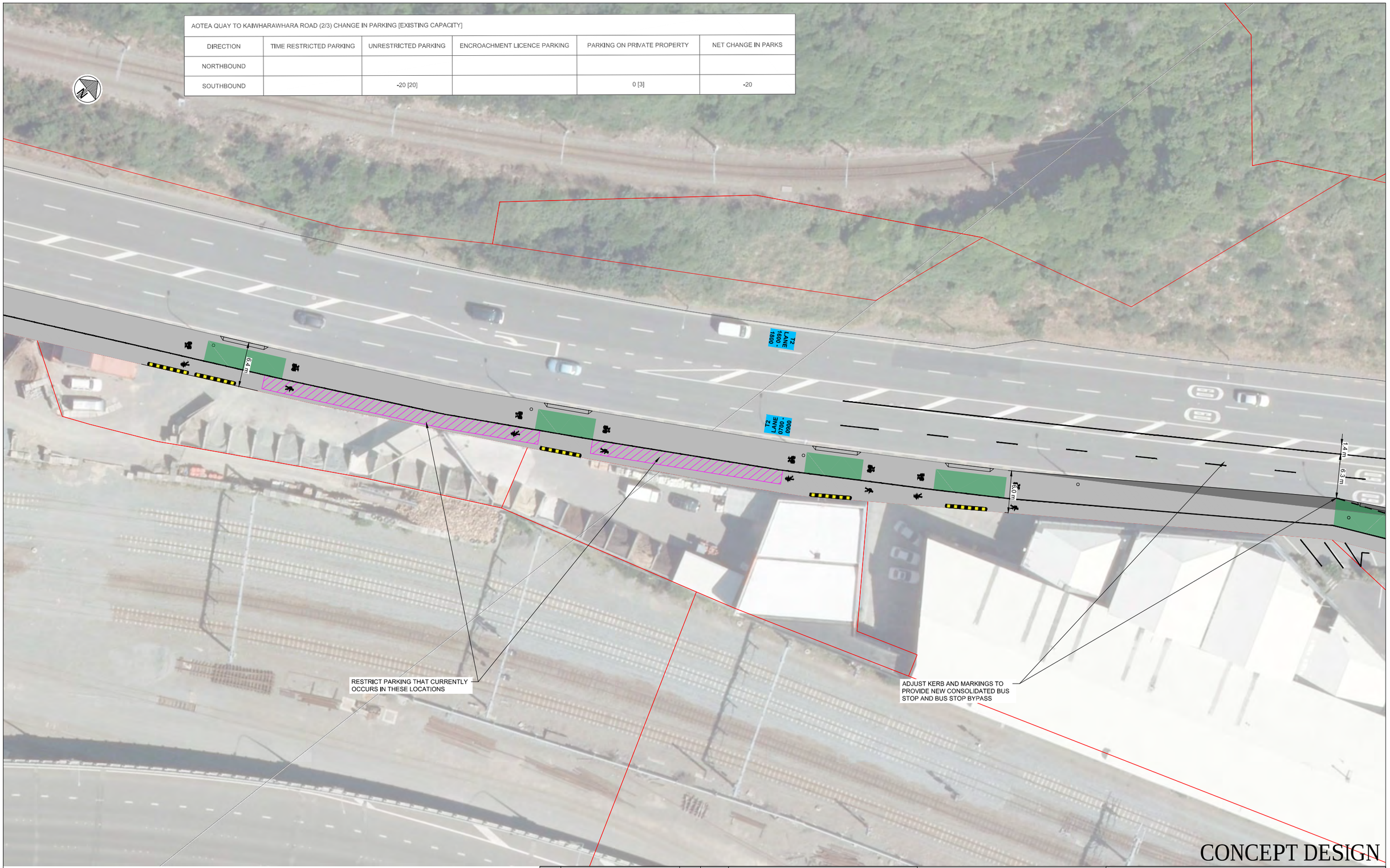
Project: HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet: OPTION A

Drawing No.	Sheet. No.	Revision
5-C2953.00_C120	01	A

Original Sheet Size A1 [841x594] Plot Date 27 Jan 2016 @ 4:00 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C120.dwg 01

AOTEA QUAY TO KAIWHARAWHARA ROAD (2/3) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND		-20 [20]		0 [3]	-20



300 mm
200
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50
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0

CONCEPT DESIGN

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
3) HUTT ROAD SHARED PATH TO BE RESEALED ALONG ENTIRE LENGTH

Revision	Amendment	Approved	Revision Date
A	CONCEPT DESIGN	-	27/01/2016

OPUS
Wellington Office
+64 4 471 7000
PO Box 12-003
Wellington 6144
New Zealand

Drawn	Designed	Approved	Revision Date
ST	ST	ES	27/01/2016

Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION A

Project No.	Scale	Drawing No.	Sheet. No.	Revision
5-C2953.00	1:250	5-C2953.00_C120	02	A

Original Sheet Size A1 [841x594] Plot Date 27 Jan 2016 @ 4:01 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C120.dwg 02

AOTEA QUAY TO KAIWHARAWHARA ROAD (3/3) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND			-17 [17]	-10 [17]	-27

ADVANCE WARNING SIGNAGE ADVISING OF T2 LANES

EXISTING BUS STOP AND SHELTER REMOVED

T2 LANE 0700 - 0900

8.8 m

3.0 m

6.8 m

5.2 m

6.0 m

0.6 m

5.0 m

2.1 m

6.7 m

6.0 m

9.3 m

ADJUST KERB AND MARKINGS TO PROVIDE NEW CONSOLIDATED BUS STOP AND BUS STOP BYPASS

ADJUST VEHICLE CROSSINGS AS SHOWN TO ACCOMMODATE NEW BUS STOP

NEW BUS STOP SHELTER

PROPERTY PURCHASE TO PROVIDE PATH WIDTH AS SHOWN

NEW / WIDENED BRIDGE AS SHOWN

PROPERTY SWAP / PURCHASE AND RECONFIGURATION OF PARKING LAYOUT AS SHOWN

RESCIND ENCROACHMENT LICENSES

300 mm
200
100
50
10 mm
0

CONCEPT DESIGN

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
3) HUTT ROAD SHARED PATH TO BE RESEALED ALONG ENTIRE LENGTH

Revision	Amendment	Approved	Revision Date
A	CONCEPT DESIGN	-	27/01/2016

OPUS
Wellington Office
+64 4 471 7000
PO Box 12-003
Wellington 6144
New Zealand

Drawn	Designed	Approved	Revision Date
ST	ST	ES	27/01/2016

Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION A

Project No.	Scale	Drawing No.	Sheet. No.	Revision
5-C2953.00	1:250	5-C2953.00_C120	03	A

Original Sheet Size A1 [841x594] Plot Date 27 Jan 2016 @ 4:01 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C120.dwg 03

KAIWHARAWHARA ROAD TO RANGIORA ROAD (1/4) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND		-14 [14]	-14 [14]		-28

HANDY CORNER

T2 LANE 1600 - 1800

6.8 m

T2 LANE 0700 - 0900

8.5 m

5.0 m

WIDEN KERB AND PROVIDE IMPROVED CROSSING OF WESTMINSTER STREET AS SHOWN

REMOVE EXISTING BUS STOP AND SHELTER

RESTRICT PARKING THAT CURRENTLY OCCURS IN THESE LOCATIONS

RESCIND ENCROACHMENT LICENSES

POSSIBLE SHOWROOM PARKING (RESTRICTIONS ON USE WOULD APPLY)

300 mm
200
100
50
10 mm
0

CONCEPT DESIGN

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
3) HUTT ROAD SHARED PATH TO BE RESEALED ALONG ENTIRE LENGTH

Revision	Amendment	Approved	Revision Date
A	CONCEPT DESIGN	-	27/01/2016

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New Zealand

Drawn	Designed	Approved	Revision Date
ST	ST	ES	27/01/2016

Project No.	Scale
5-C2953.00	1:250

Project: HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet: OPTION A

Drawing No.	Sheet. No.	Revision
5-C2953.00_C120	04	A

Original Sheet Size A1 [841x594] Plot Date 27 Jan 2016 @ 4:01 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C120.dwg 04

KAIWHARAWHARA ROAD TO RANGIORA ROAD (2/4) CHANGE IN PARKING [EXISTING CAPACITY]

DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND		-28 [28]			-28

300 mm
200
100
50
10 mm
0

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
3) HUTT ROAD SHARED PATH TO BE RESEALED ALONG ENTIRE LENGTH

Revision	Amendment	Approved	Revision Date
A	CONCEPT DESIGN	-	27/01/2016

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Drawn	Designed	Approved	Revision Date
ST	ST	ES	27/01/2016

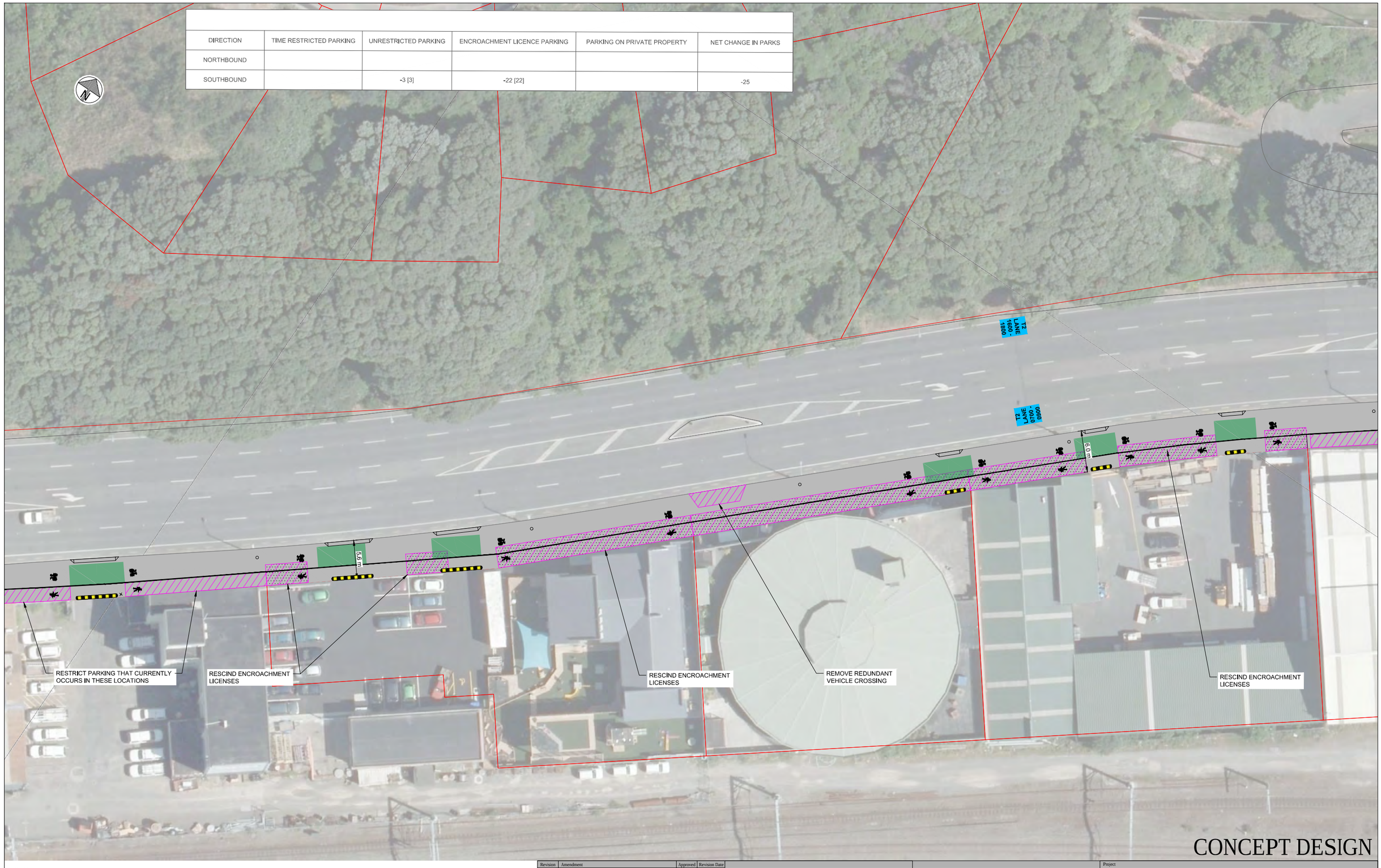
Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION A

Project No.	Scale	Drawing No.	Sheet. No.	Revision
5-C2953.00	1:250	5-C2953.00_C120	05	A

Original Sheet Size A1 [841x594] Plot Date 27 Jan 2016 @ 4:01 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C120.dwg 05

DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND		-3 [3]	-22 [22]		-25



CONCEPT DESIGN

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
3) HUTT ROAD SHARED PATH TO BE RESEALED ALONG ENTIRE LENGTH

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A	CONCEPT DESIGN	-	27/01/2016

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Drawn	Designed	Approved	Revision Date
ST	ST	ES	27/01/2016

Project No.	Scale
5-C2953.00	1:250

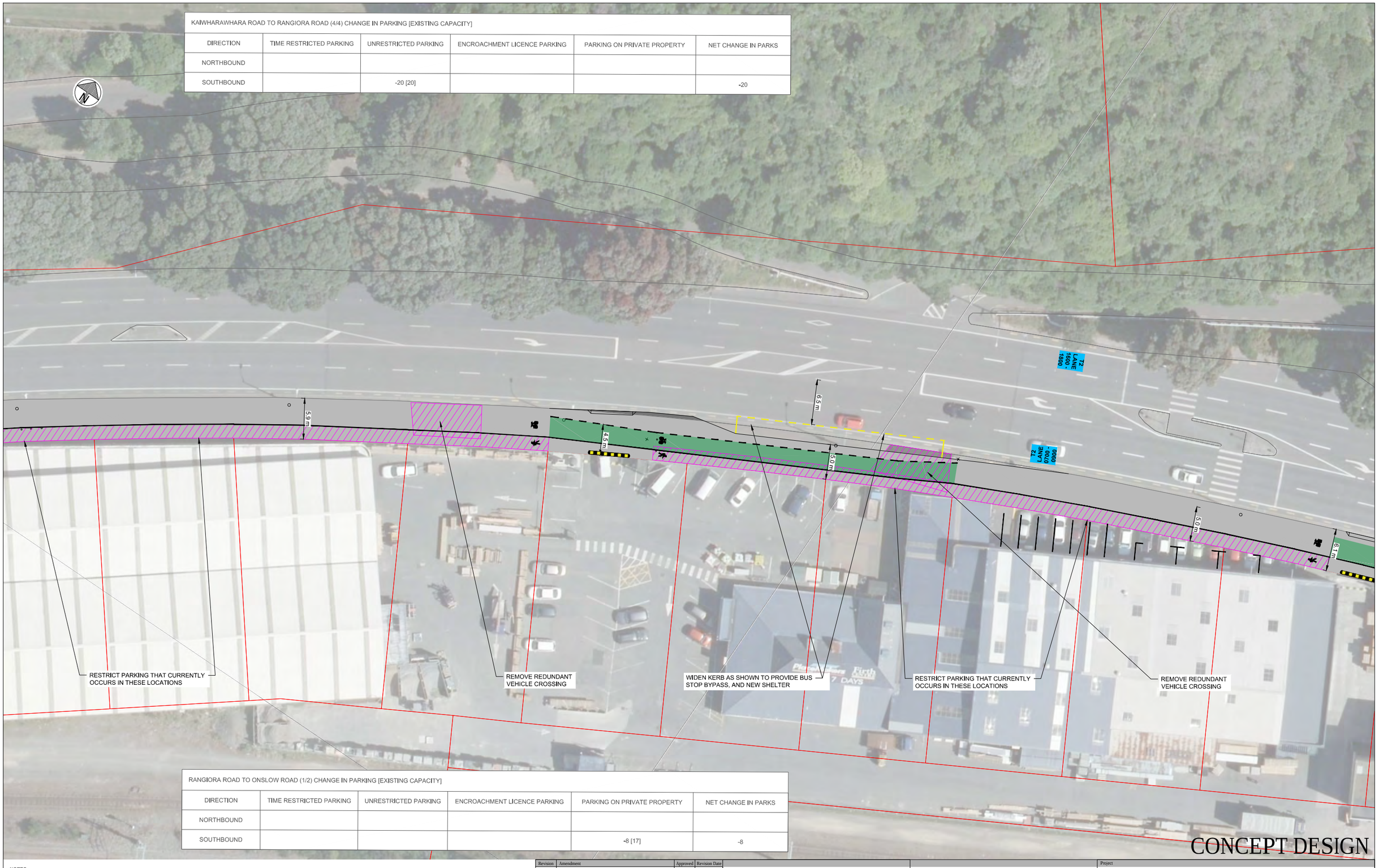
Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION A

Drawing No.	Sheet. No.	Revision
5-C2953.00_C120	06	A

Original Sheet Size A1 [841x594] Plot Date 27 Jan 2016 @ 4:02 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C120.dwg 06

KAIWHARAWHARA ROAD TO RANGIORA ROAD (4/4) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND		-20 [20]			-20



RANGIORA ROAD TO ONSLOW ROAD (1/2) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND				-8 [17]	-8

CONCEPT DESIGN

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
3) HUTT ROAD SHARED PATH TO BE RESEALED ALONG ENTIRE LENGTH

Revision	Amendment	Approved	Revision Date
A	CONCEPT DESIGN	-	27/01/2016

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ST	ST	ES	27/01/2016

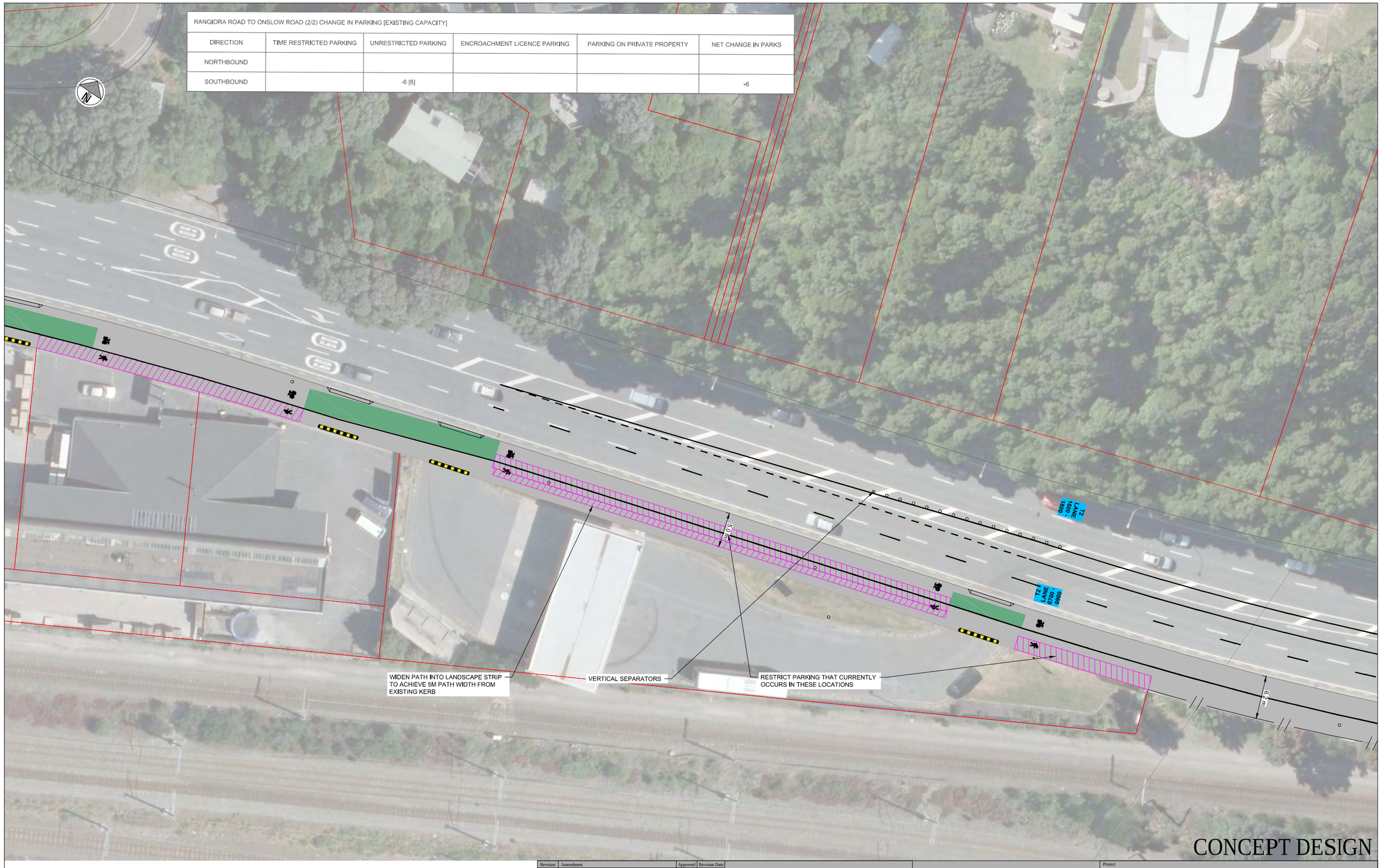
Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION A

Project No.	Scale	Drawing No.	Sheet. No.	Revision
5-C2953.00	1:250	5-C2953.00_C120	07	A

Original Sheet Size A1 [841x594] Plot Date 27 Jan 2016 @ 4:02 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C120.dwg 07

RANGIORA ROAD TO ONSLOW ROAD (2/2) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND		-6 [6]			-6



CONCEPT DESIGN

300 mm
200
100
50
10 mm
0

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
3) HUTT ROAD SHARED PATH TO BE RESEALED ALONG ENTIRE LENGTH

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A	CONCEPT DESIGN	-	27/01/2016

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ST	ST	ES	27/01/2016

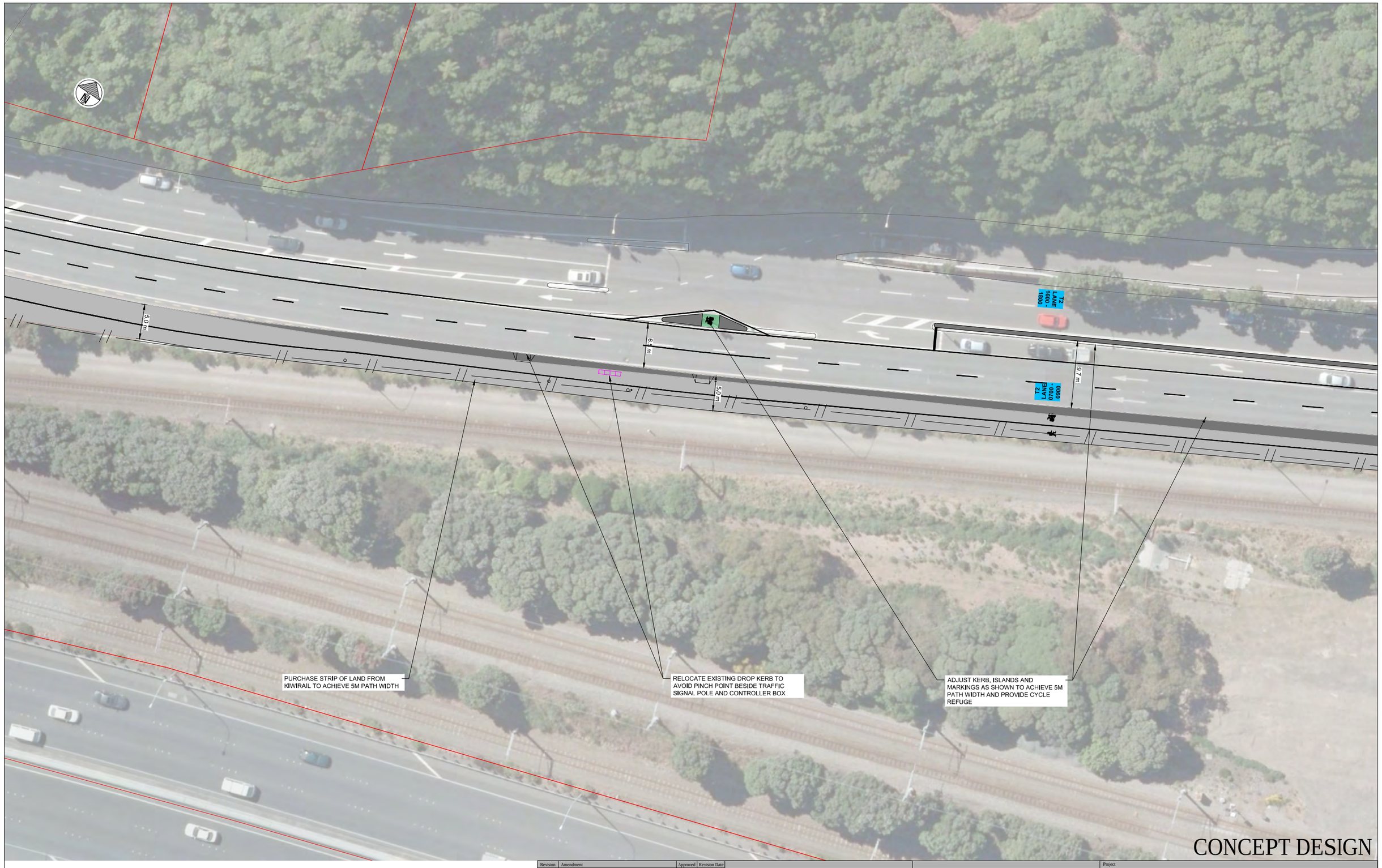
Project No.	Scale
5-C2953.00	1:250

Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION A

Drawing No.	Sheet. No.	Revision
5-C2953.00_C120	08	A

Original Sheet Size A1 [841x594] Plot Date 27 Jan 2016 @ 4:02 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C120.dwg 08



300 mm
200
100
50
10 mm
0

CONCEPT DESIGN

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
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A	CONCEPT DESIGN	-	27/01/2016

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ST	ST	ES	27/01/2016

Project No.	Scale
5-C2953.00	1:250

Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION A

Drawing No.	Sheet. No.	Revision
5-C2953.00_C120	09	A

Original Sheet Size A1 [841x594] Plot Date 27 Jan 2016 @ 4:02 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C120.dwg 09

300 mm
200
100
50
10 mm
0

NOTES:

1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
3) HUTT ROAD SHARED PATH TO BE RESEALED ALONG ENTIRE LENGTH

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A	CONCEPT DESIGN	-	27/01/2016

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ST	ST	ES	27/01/2016

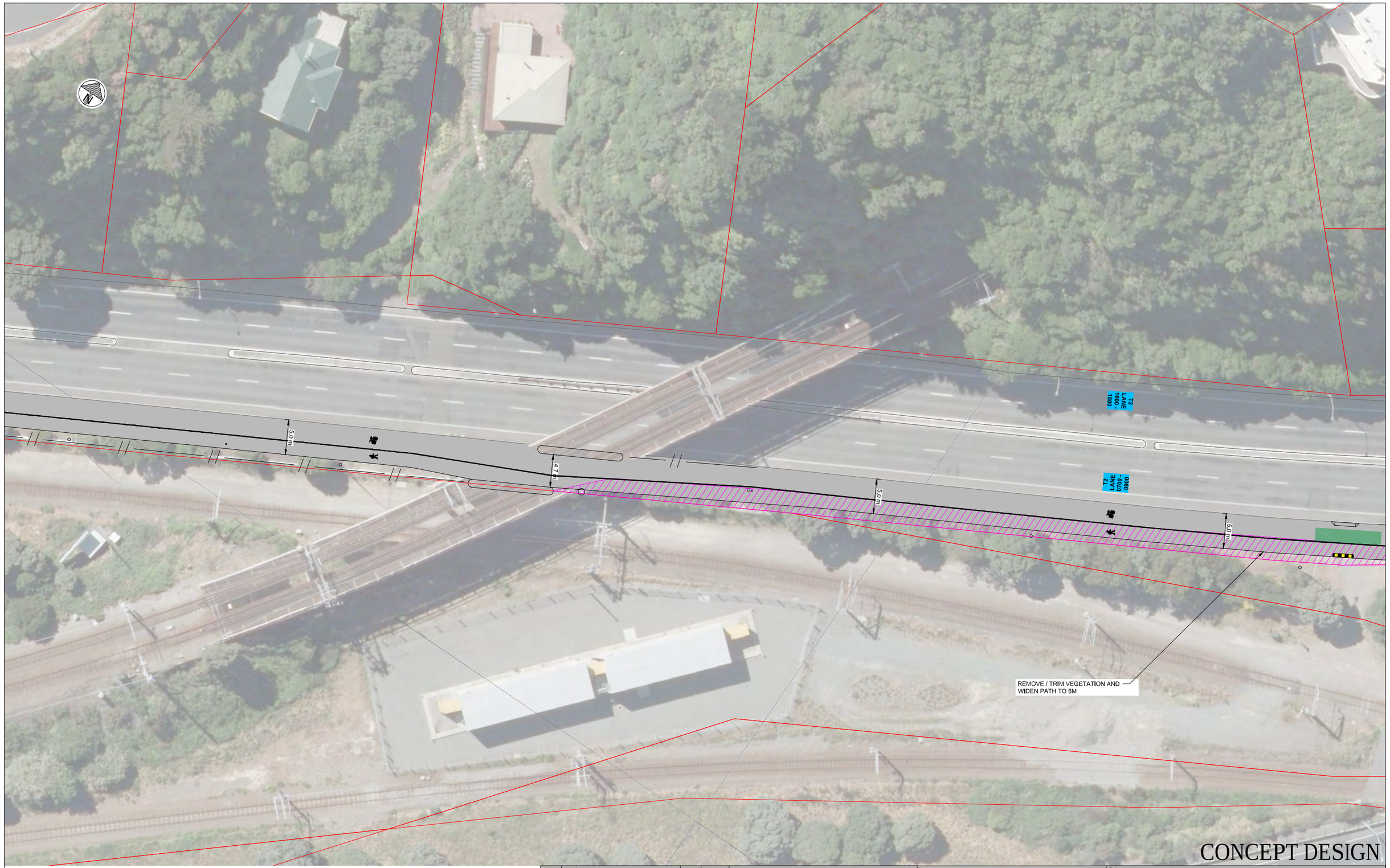
Project No.	Scale
5-C2953.00	1:250

Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION A

Drawing No.	Sheet. No.	Revision
5-C2953.00_C120	10	A

Original Sheet Size A1 [841x594] Plot Date 27 Jan 2016 @ 4:03 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C120.dwg 10



300 mm
200
100
50
10 mm
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NOTES:

1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
3) HUTT ROAD SHARED PATH TO BE RESEALED ALONG ENTIRE LENGTH

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A	CONCEPT DESIGN	-	27/01/2016

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Drawn	Designed	Approved	Revision Date
ST	ST	ES	27/01/2016

Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION A

Project No.	Scale	Drawing No.	Sheet. No.	Revision
5-C2953.00	1:250	5-C2953.00_C120	11	A

Original Sheet Size A1 [841x594] Plot Date 27 Jan 2016 @ 4:03 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C120.dwg 11

CONCEPT DESIGN

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
3) HUTT ROAD SHARED PATH TO BE RESEALED ALONG ENTIRE LENGTH

Revision	Amendment	Approved	Revision Date
A	CONCEPT DESIGN	-	27/01/2016

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Drawn	Designed	Approved	Revision Date
ST	ST	ES	27/01/2016

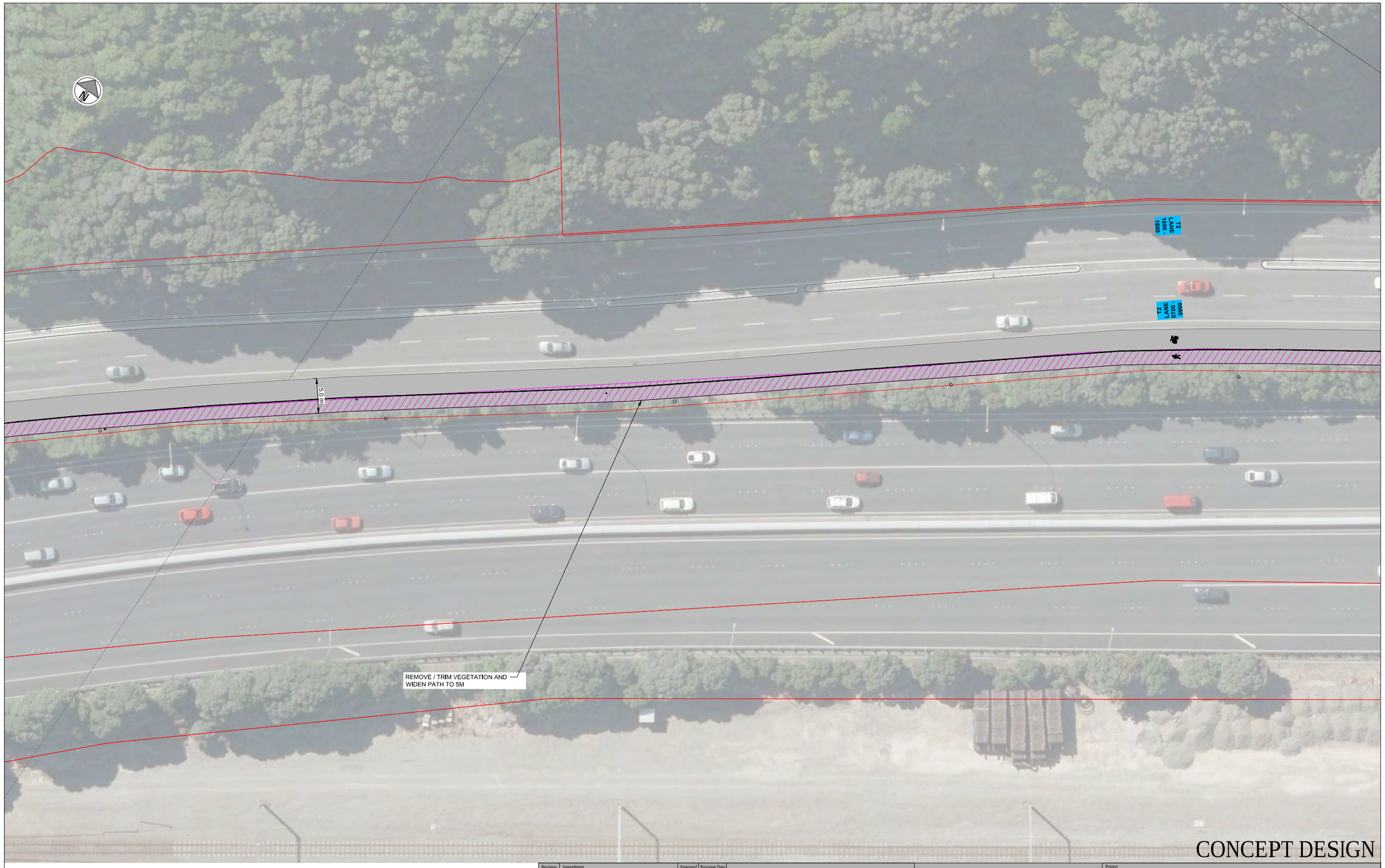
Project No.	Scale
5-C2953.00	1:250

Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION A

Drawing No.	Sheet. No.	Revision
5-C2953.00_C120	12	A

Original Sheet Size A1 [841x594] Plot Date 27 Jan 2016 @ 4:03 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C120.dwg 12



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10 mm
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CONCEPT DESIGN

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
3) HUTT ROAD SHARED PATH TO BE RESEALED ALONG ENTIRE LENGTH

Revision	Amendment	Approved	Revision Date
A	CONCEPT DESIGN	-	27/01/2016

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Drawn	Designed	Approved	Revision Date
ST	ST	ES	27/01/2016

Project No.	Scale
5-C2953.00	1:250

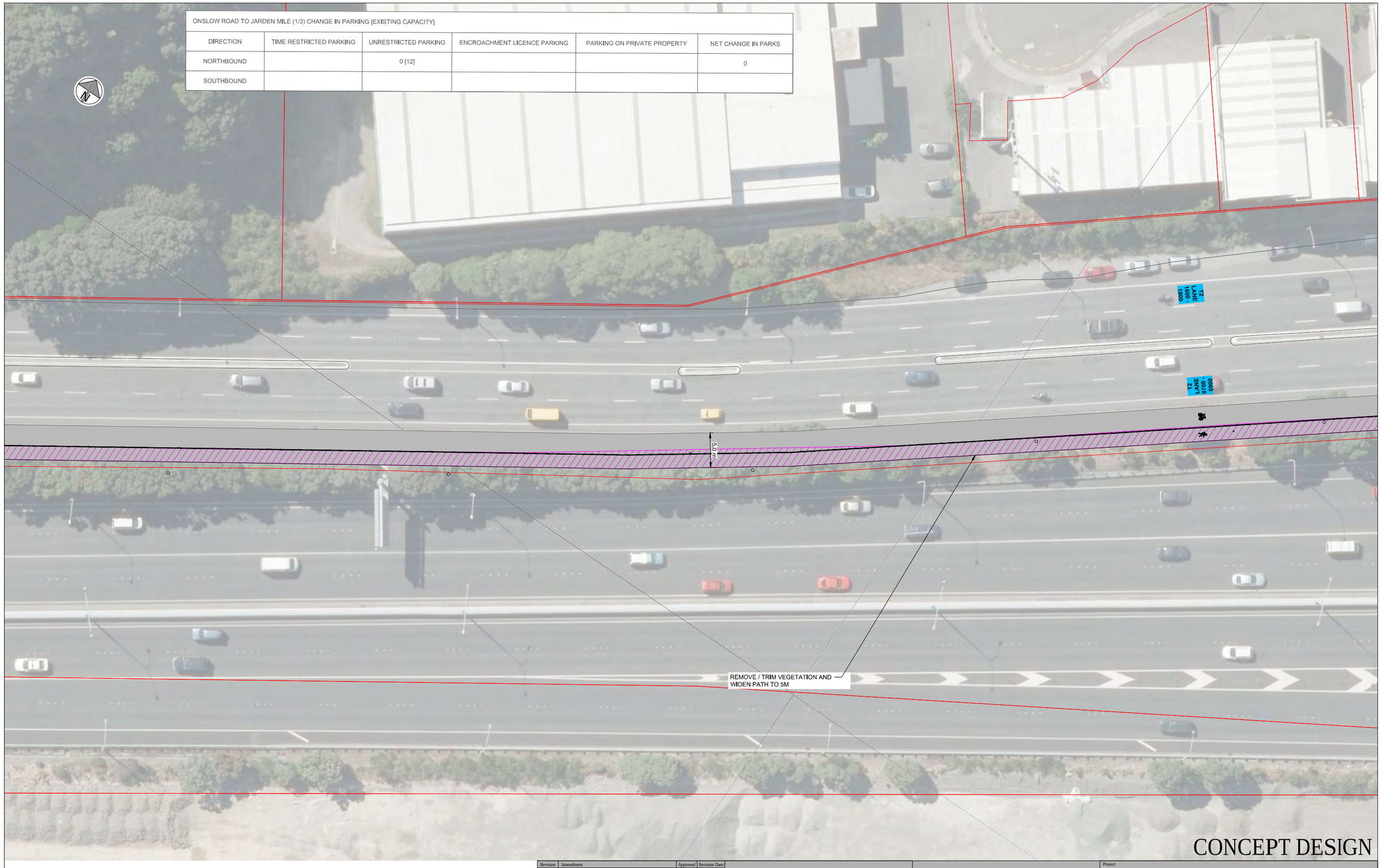
Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION A

Drawing No.	Sheet. No.	Revision
5-C2953.00_C120	13	A

Original Sheet Size A1 [841x594] Plot Date 27 Jan 2016 @ 4:03 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C120.dwg 13

ONSLOW ROAD TO JARDEN MILE (1/3) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND		0 [12]			0
SOUTHBOUND					



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10 mm
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CONCEPT DESIGN

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
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Revision	Amendment	Approved	Revision Date
A	CONCEPT DESIGN	-	27/01/2016

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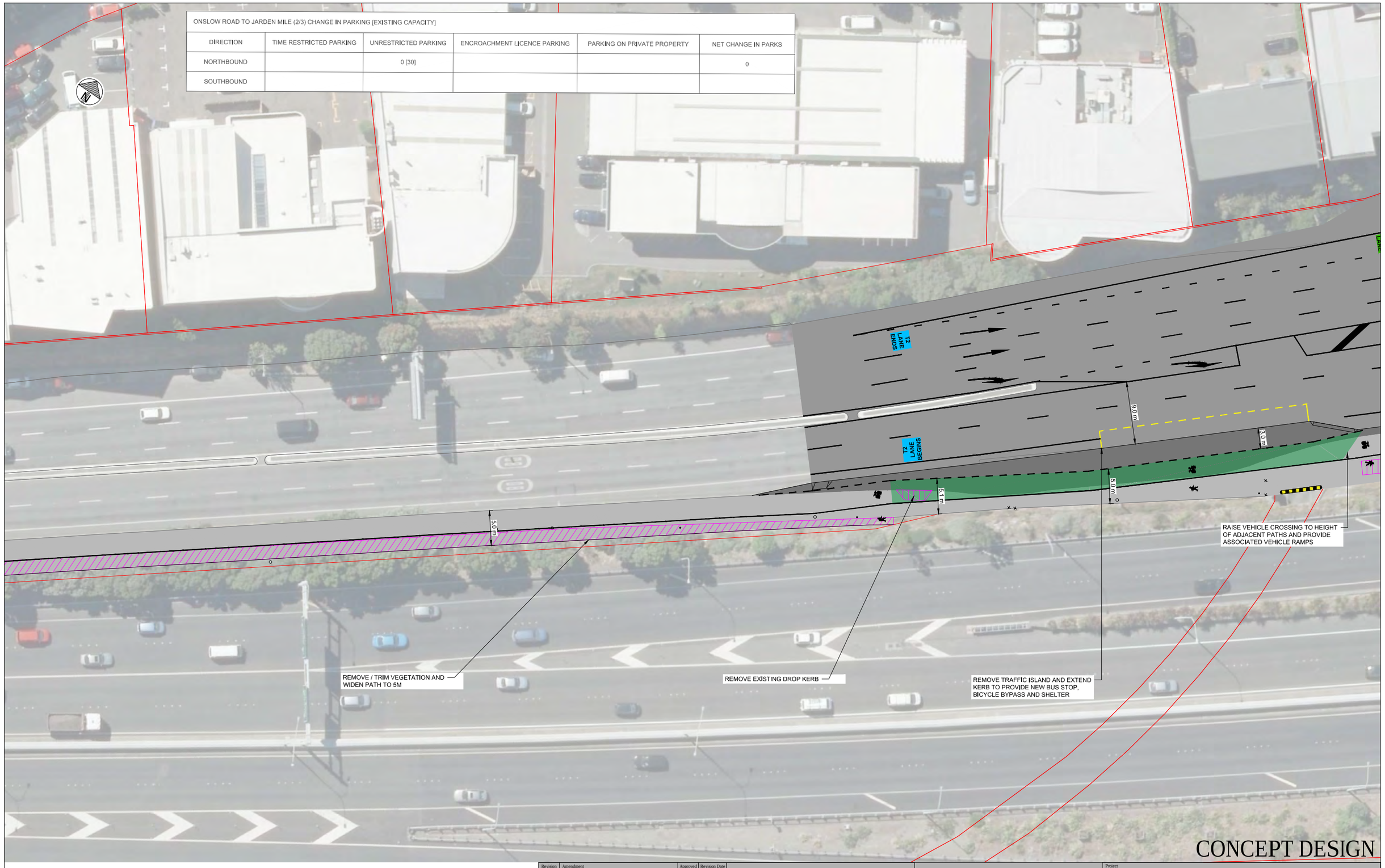
Drawn	Designed	Approved	Revision Date
ST	ST	ES	27/01/2016

Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION A

Project No.	Scale	Drawing No.	Sheet. No.	Revision
5-C2953.00	1:250	5-C2953.00_C120	14	A

ONSLOW ROAD TO JARDEN MILE (2/3) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND		0 [30]			0
SOUTHBOUND					



CONCEPT DESIGN

300 mm
200
100
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10 mm
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NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
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Revision	Amendment	Approved	Revision Date
A	CONCEPT DESIGN	-	27/01/2016

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Drawn	Designed	Approved	Revision Date
ST	ST	ES	27/01/2016

Project No.	Scale
5-C2953.00	1:250

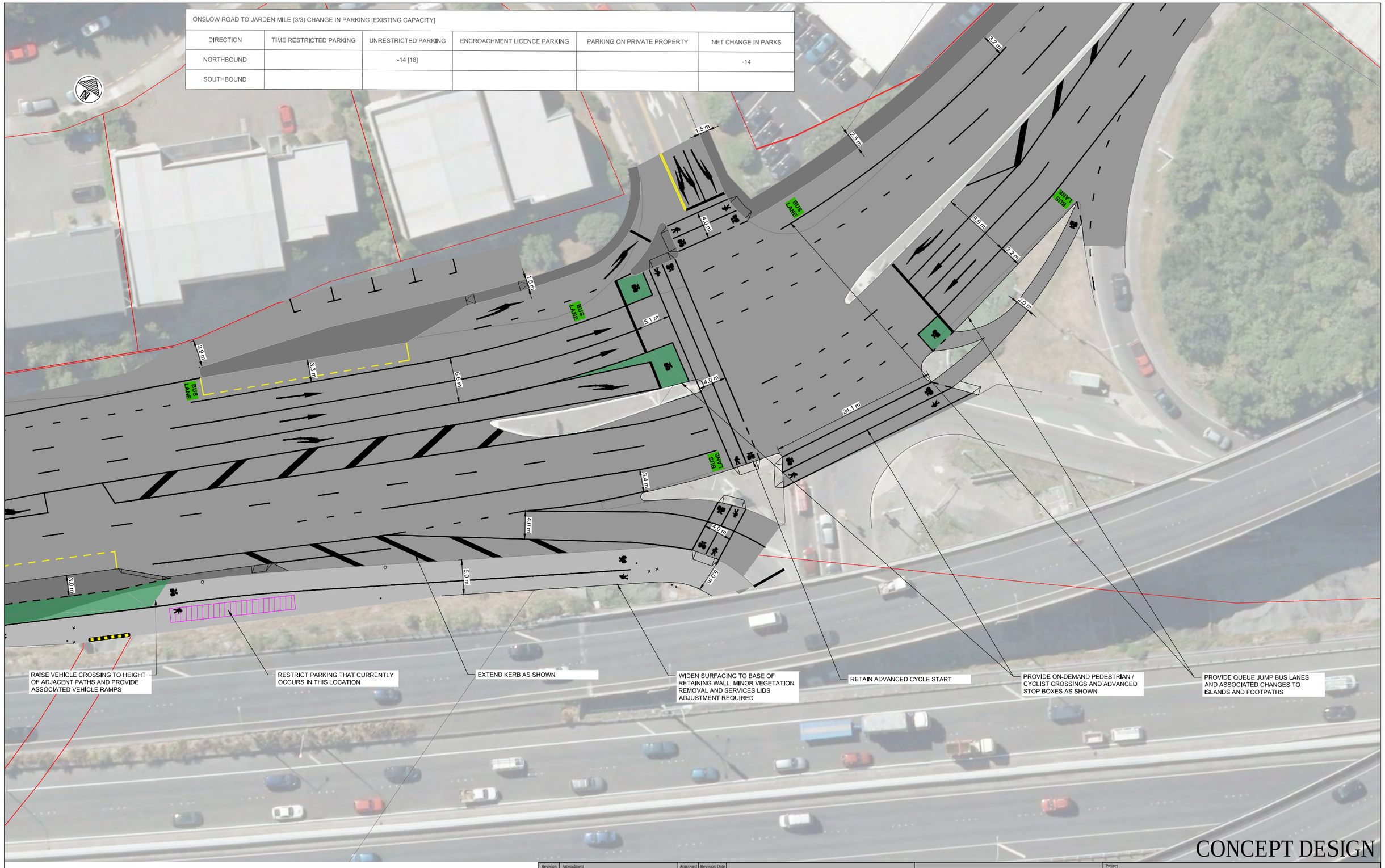
Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION A

Drawing No.	Sheet. No.	Revision
5-C2953.00_C120	15	A

Original Sheet Size A1 [841x594] Plot Date 27 Jan 2016 @ 4:04 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C120.dwg 15

ONSLOW ROAD TO JARDEN MILE (3/3) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND		-14 [18]			-14
SOUTHBOUND					



CONCEPT DESIGN

300 mm
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10 mm
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NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
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Revision	Amendment	Approved	Revision Date
A	CONCEPT DESIGN	-	27/01/2016

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Drawn	Designed	Approved	Revision Date
ST	ST	ES	27/01/2016

Project No.	Scale
5-C2953.00	1:250

Project: HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

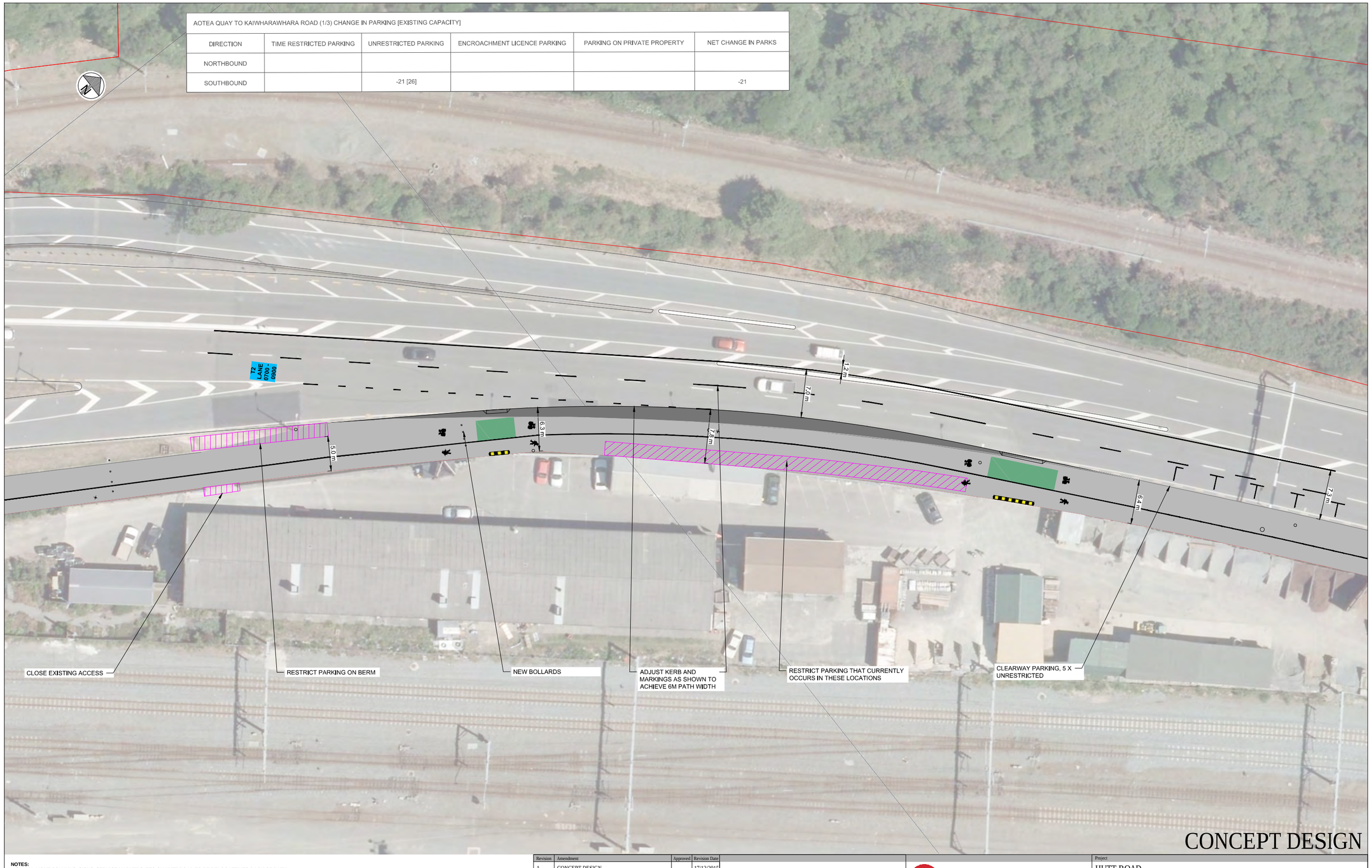
Sheet: OPTION A

Drawing No.	Sheet. No.	Revision
5-C2953.00_C120	16	A

Original Sheet Size A1 [841x594] Plot Date 27 Jan 2016 @ 4:04 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C120.dwg 16

AOTEA QUAY TO KAIWHARAWHARA ROAD (1/3) CHANGE IN PARKING [EXISTING CAPACITY]

DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND		-21 [26]			-21



CONCEPT DESIGN

300 mm
200
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NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
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Revision	Amendment	Approved	Revision Date
A	CONCEPT DESIGN	-	17/12/2015

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Drawn	Designed	Approved	Revision Date
ST	ST	ES	17/12/2015

Project No.	Scale
5-C2953.00	1:250

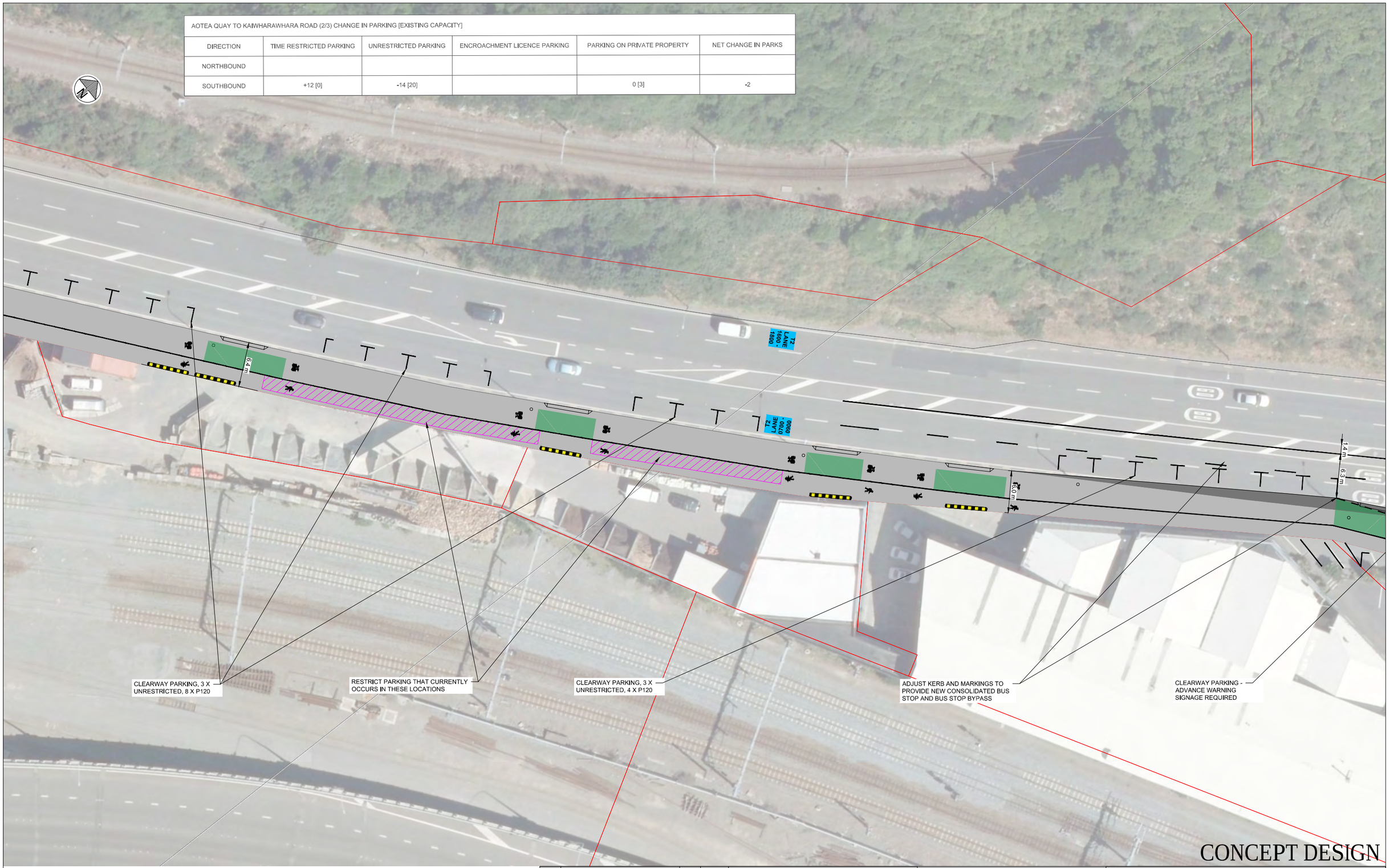
Project: HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet: OPTION B

Drawing No.	Sheet. No.	Revision
5-C2953.00_C220	01	A

Original Sheet Size A1 [841x594] Plot Date 17 Dec 2015 @ 6:50 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C220.dwg 01

AOTEA QUAY TO KAIWHARAWHARA ROAD (2/3) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND	+12 [0]	-14 [20]		0 [3]	-2



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CONCEPT DESIGN

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
3) HUTT ROAD SHARED PATH TO BE RESEALED ALONG ENTIRE LENGTH

Revision	Amendment	Approved	Revision Date
A	CONCEPT DESIGN	-	17/12/2015

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Wellington Office
+64 4 471 7000
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New Zealand

Drawn	Designed	Approved	Revision Date
ST	ST	ES	17/12/2015

Project No.	Scale
5-C2953.00	1:250

Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION B

Drawing No.	Sheet. No.	Revision
5-C2953.00_C220	02	A

Original Sheet Size A1 [841x594] Plot Date 17 Dec 2015 @ 6:50 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C220.dwg 02

AOTEA QUAY TO KAIWHARAWHARA ROAD (3/3) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND			-10 [17]	-10 [17]	-20

ADVANCE WARNING SIGNAGE ADVISING OF T2 LANES

EXISTING BUS STOP AND SHELTER REMOVED

T2 LANE 0700 - 0900

8.8 m

3.0 m

6.8 m

5.2 m

6.0 m

0.6 m

5.0 m

2.1 m

6.7 m

6.0 m

9.3 m

ADJUST KERB AND MARKINGS TO PROVIDE NEW CONSOLIDATED BUS STOP AND BUS STOP BYPASS

ADJUST VEHICLE CROSSINGS AS SHOWN TO ACCOMMODATE NEW BUS STOP

NEW BUS STOP SHELTER

PROPERTY PURCHASE TO PROVIDE PATH WIDTH AS SHOWN

NEW / WIDENED BRIDGE AS SHOWN

PROPERTY SWAP / PURCHASE AND RECONFIGURATION OF PARKING LAYOUT AS SHOWN

RESCIND ENCROACHMENT LICENSES

300 mm
200
100
50
10 mm
0

CONCEPT DESIGN

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
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3) HUTT ROAD SHARED PATH TO BE RESEALED ALONG ENTIRE LENGTH

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ST	ST	ES	17/12/2015

Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION B

Project No.	Scale	Drawing No.	Sheet. No.	Revision
5-C2953.00	1:250	5-C2953.00_C220	03	A

Original Sheet Size A1 [841x594] Plot Date 17 Dec 2015 @ 6:50 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C220.dwg 03

KAIWHARAWHARA ROAD TO RANGIORA ROAD (1/4) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND	+2 [0]	-10 [14]	-14 [14]		-22

HANDY CORNER

T2 LANE 1600 - 1800

6.8 m

T2 LANE 0700 - 0900

8.5 m

5.0 m

WIDEN KERB AND PROVIDE IMPROVED CROSSING OF WESTMINSTER STREET AS SHOWN

REMOVE EXISTING BUS STOP AND SHELTER

RESTRICT PARKING THAT CURRENTLY OCCURS IN THESE LOCATIONS

RESCIND ENCROACHMENT LICENSES

POSSIBLE SHOWROOM PARKING (RESTRICTIONS ON USE WOULD APPLY)

FULL TIME PARKING 2 X P120

300 mm
200
100
50
10 mm
0

CONCEPT DESIGN

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Project No.	Scale
5-C2953.00	1:250

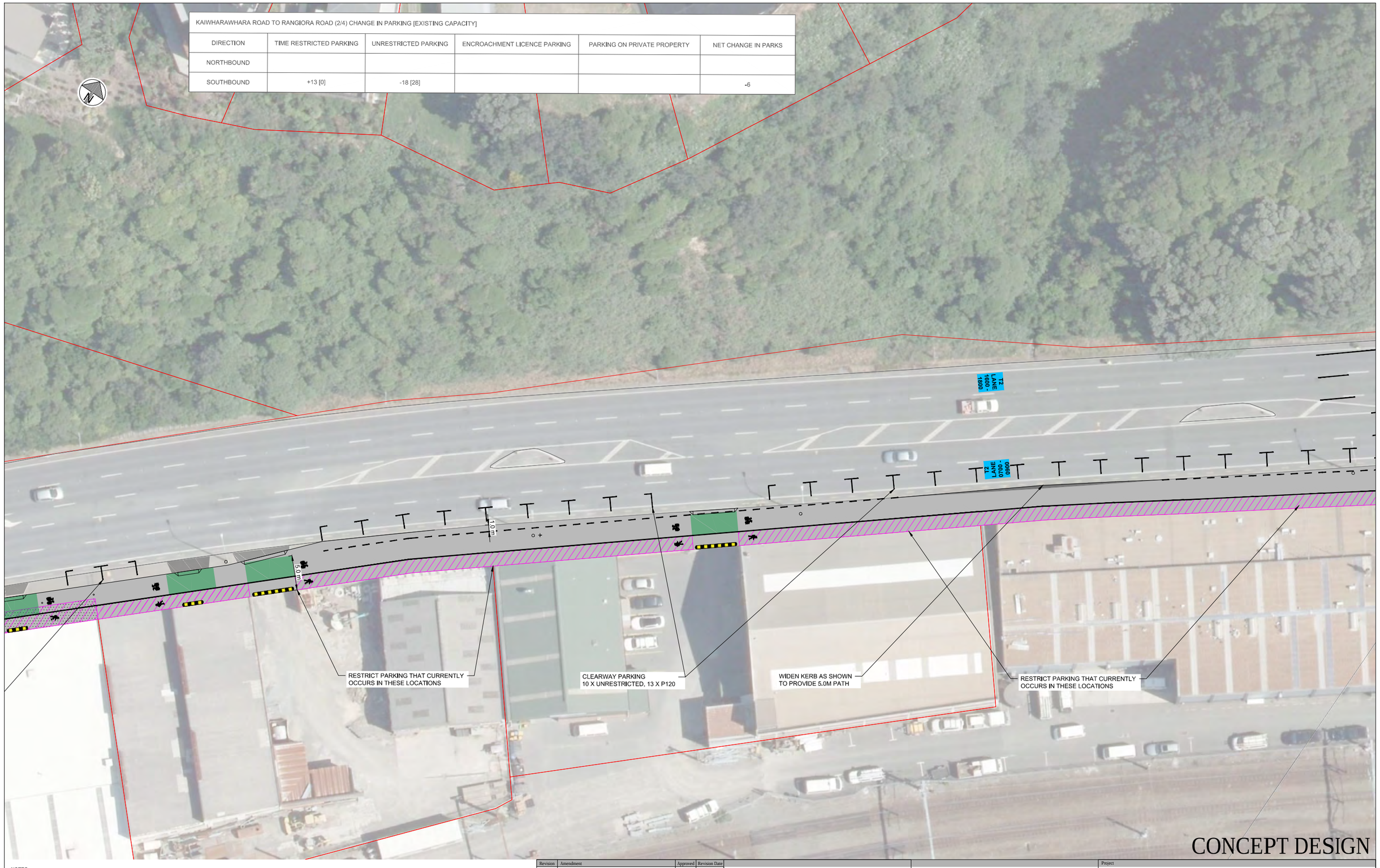
Project: HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet: OPTION B

Drawing No.	Sheet. No.	Revision
5-C2953.00_C220	04	A

Original Sheet Size A1 [841x594] Plot Date 17 Dec 2015 @ 6:50 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C220.dwg 04

KAIWHARAWHARA ROAD TO RANGIORA ROAD (2/4) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND	+13 [0]	-18 [28]			-6



CONCEPT DESIGN

300 mm
200
100
50
10 mm
0

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
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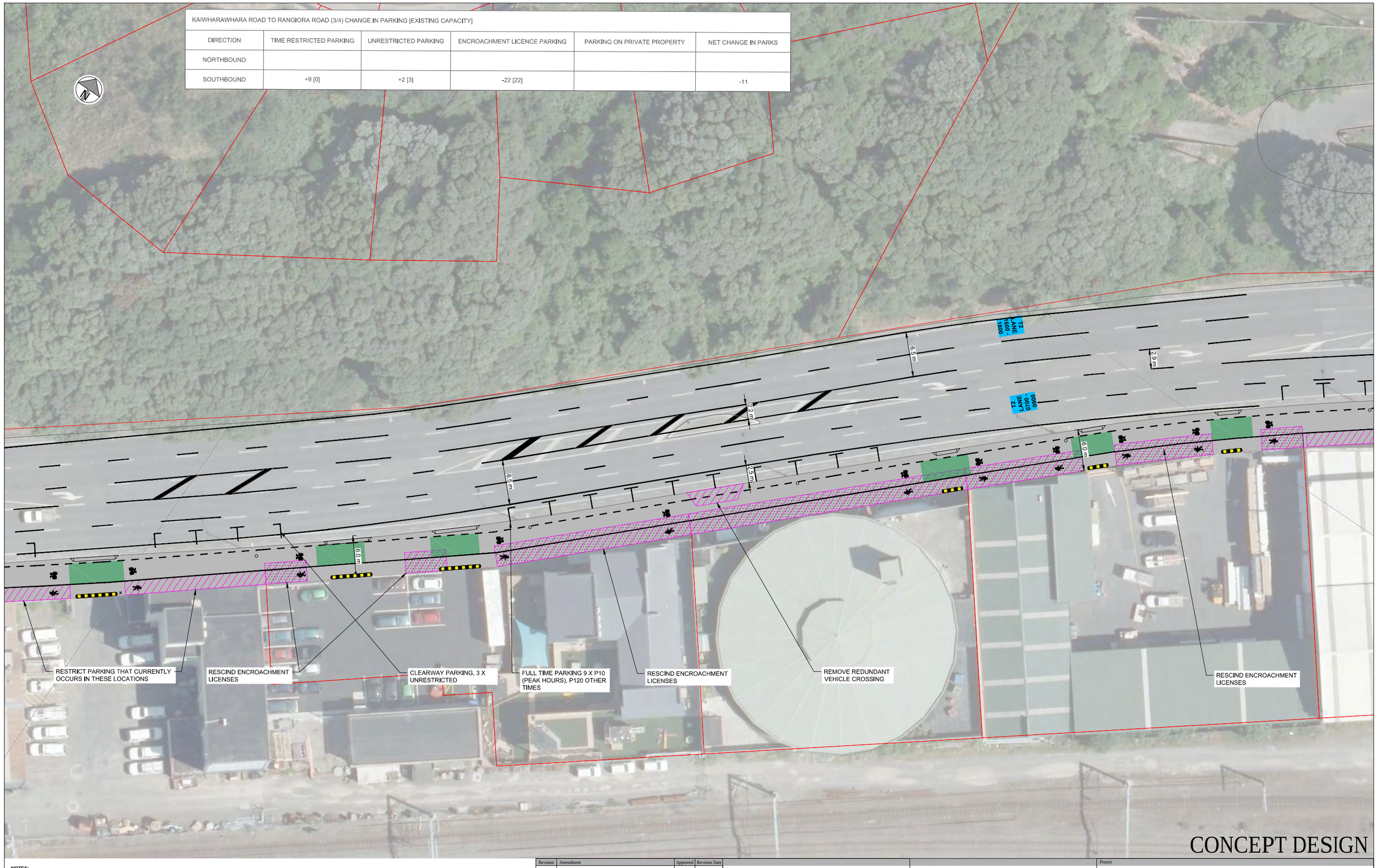
Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION B

Project No.	Scale	Drawing No.	Sheet. No.	Revision
5-C2953.00	1:250	5-C2953.00_C220	05	A

Original Sheet Size A1 [841x594] Plot Date 17 Dec 2015 @ 6:50 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C220.dwg 05

KAIWHARAWHARA ROAD TO RANGIORA ROAD (3/4) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND	+9 [0]	+2 [3]	-22 [22]		-11



CONCEPT DESIGN

300 mm
200
100
50
10 mm
0

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
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Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION B

Project No.	Scale	Drawing No.	Sheet. No.	Revision
5-C2953.00	1:250	5-C2953.00_C220	06	A

Original Sheet Size A1 [841x594] Plot Date 17 Dec 2015 @ 6:51 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C220.dwg 06

KAIWHARAWHARA ROAD TO RANGIORA ROAD (4/4) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND		-8 [20]			-8

RANGIORA ROAD TO ONSLOW ROAD (1/2) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND		+4 [0]		-8 [17]	-4

RESTRICT PARKING THAT CURRENTLY OCCURS IN THESE LOCATIONS

CLEARWAY PARKING, 14 X UNRESTRICTED

REMOVE REDUNDANT VEHICLE CROSSING

WIDEN KERB AS SHOWN TO PROVIDE BUS STOP BYPASS, AND NEW SHELTER

RESTRICT PARKING THAT CURRENTLY OCCURS IN THESE LOCATIONS

REMOVE REDUNDANT VEHICLE CROSSING

CLEARWAY PARKING, 7 X UNRESTRICTED

T2 LANE 1600 - 1800

T2 LANE 0700 - 0900

5.9 m

4.5 m

6.5 m

5.0 m

5.0 m

6.1 m

CONCEPT DESIGN

NOTES:
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Project No.	Scale
5-C2953.00	1:250

Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

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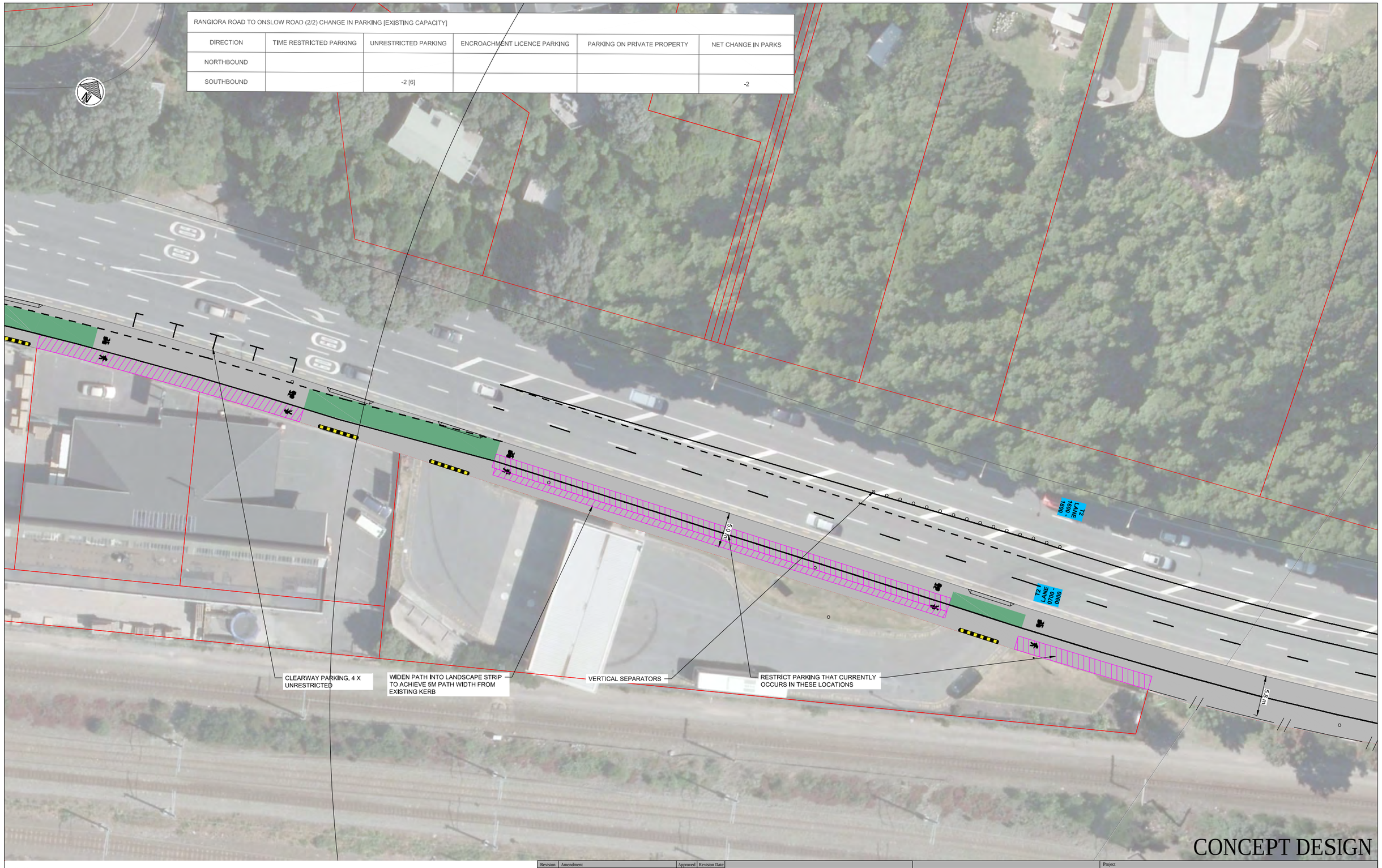
OPTION B

Drawing No.	Sheet. No.	Revision
5-C2953.00_C220	07	A

Original Sheet Size A1 [841x594] Plot Date 17 Dec 2015 @ 6:51 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C220.dwg 07

RANGIORA ROAD TO ONSLOW ROAD (2/2) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND					
SOUTHBOUND		-2 [6]			-2



CONCEPT DESIGN

300 mm
200
100
50
10 mm
0

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
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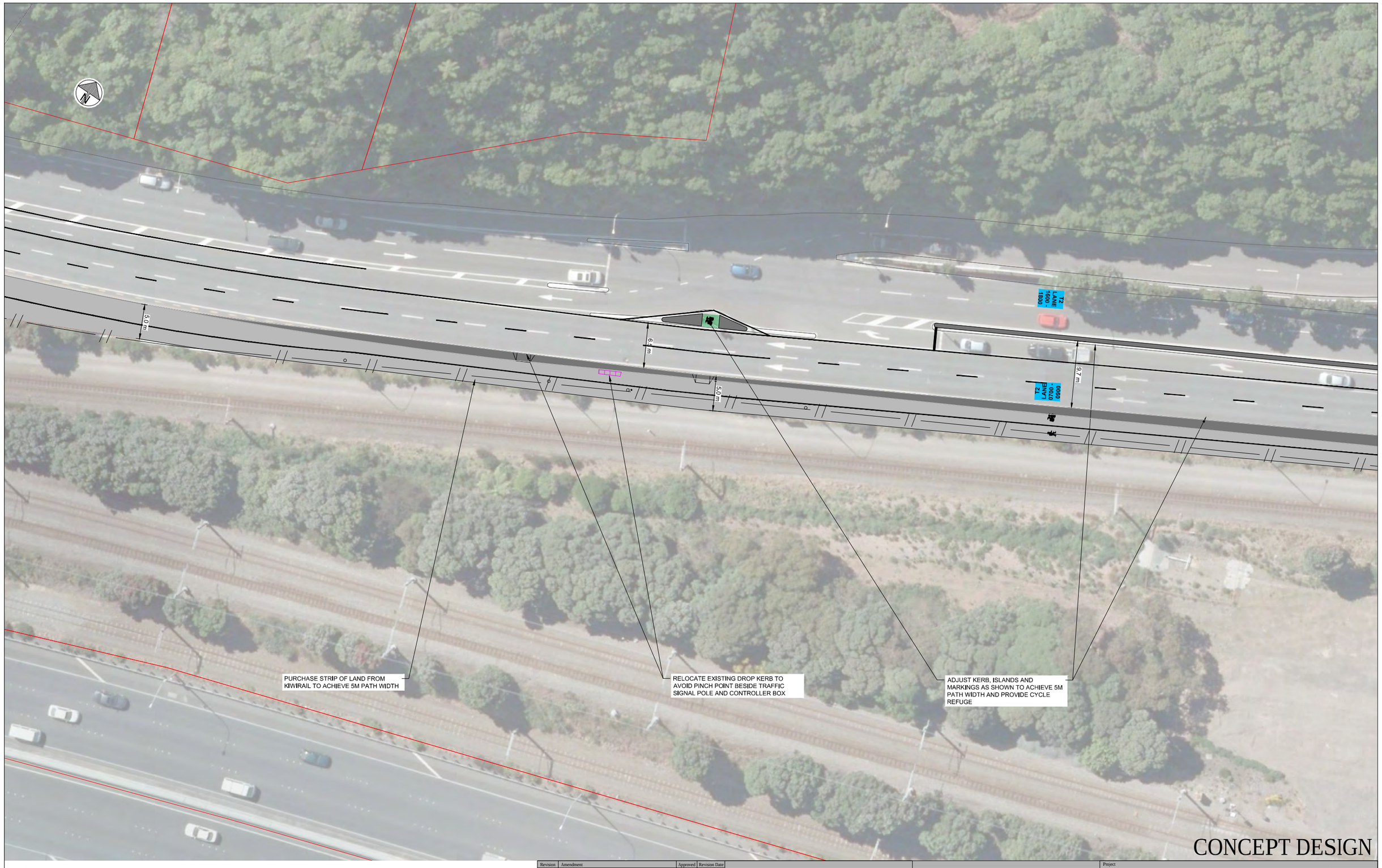
Project No.	Scale
5-C2953.00	1:250

Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION B

Drawing No.	Sheet. No.	Revision
5-C2953.00_C220	08	A

Original Sheet Size A1 [841x594] Plot Date 17 Dec 2015 @ 6:51 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C220.dwg 08



300 mm
200
100
50
10 mm
0

CONCEPT DESIGN

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
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Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION B

Project No.	Scale	Drawing No.	Sheet. No.	Revision
5-C2953.00	1:250	5-C2953.00_C220	09	A

Original Sheet Size A1 [841x594] Plot Date 17 Dec 2015 @ 6:51 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C220.dwg 09

300 mm
200
100
50
10 mm
0

CONCEPT DESIGN

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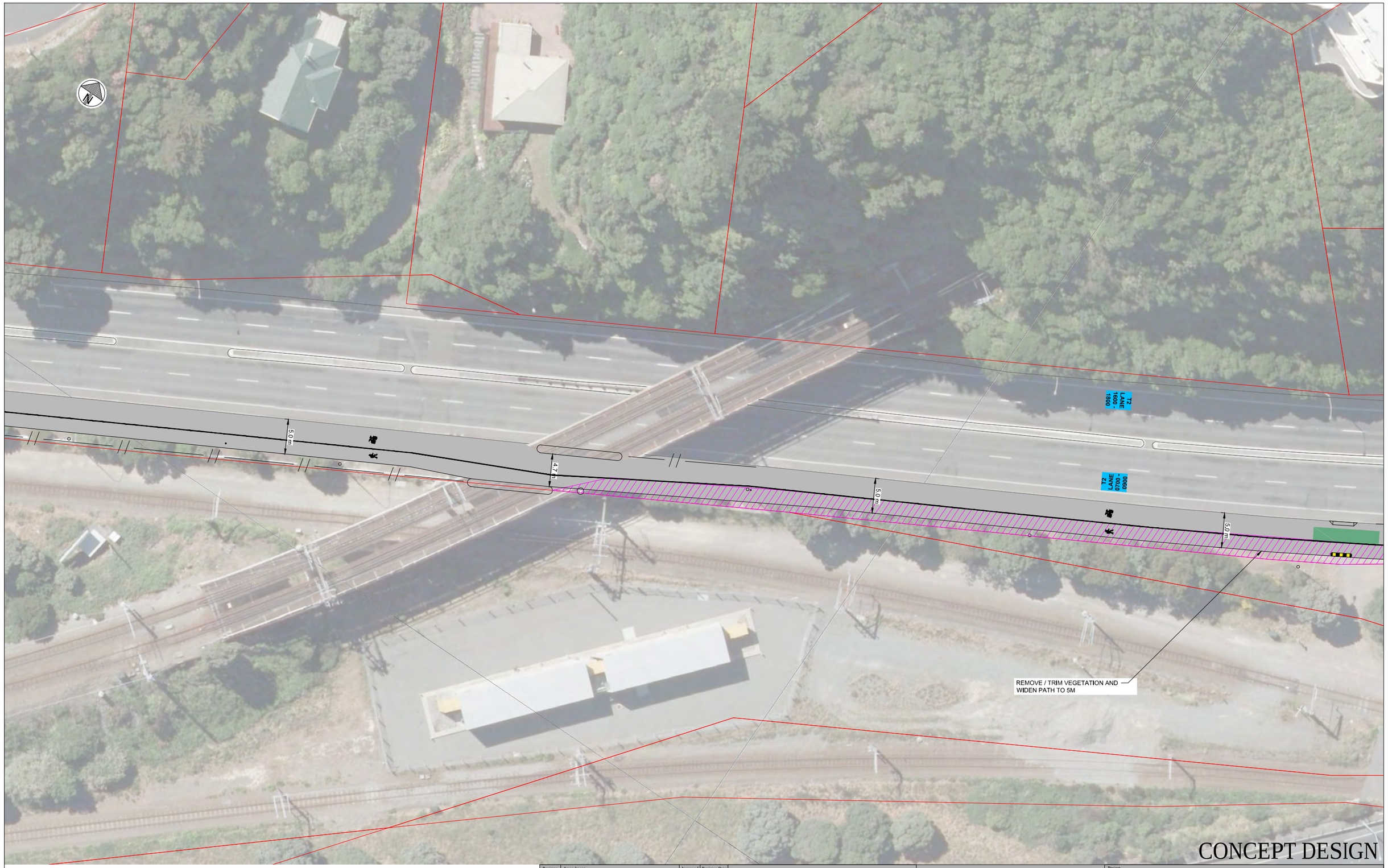
Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION B

Drawing No.	Sheet. No.	Revision
5-C2953.00_C220	10	A

Original Sheet Size A1 [841x594] Plot Date 17 Dec 2015 @ 6:52 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C220.dwg 10



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100
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10 mm
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CONCEPT DESIGN

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
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Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION B

Project No.	Scale	Drawing No.	Sheet. No.	Revision
5-C2953.00	1:250	5-C2953.00_C220	11	A

Original Sheet Size A1 [841x594] Plot Date 17 Dec 2015 @ 6:52 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C220.dwg 11

300 mm
200
100
50
10 mm
0

NOTES:
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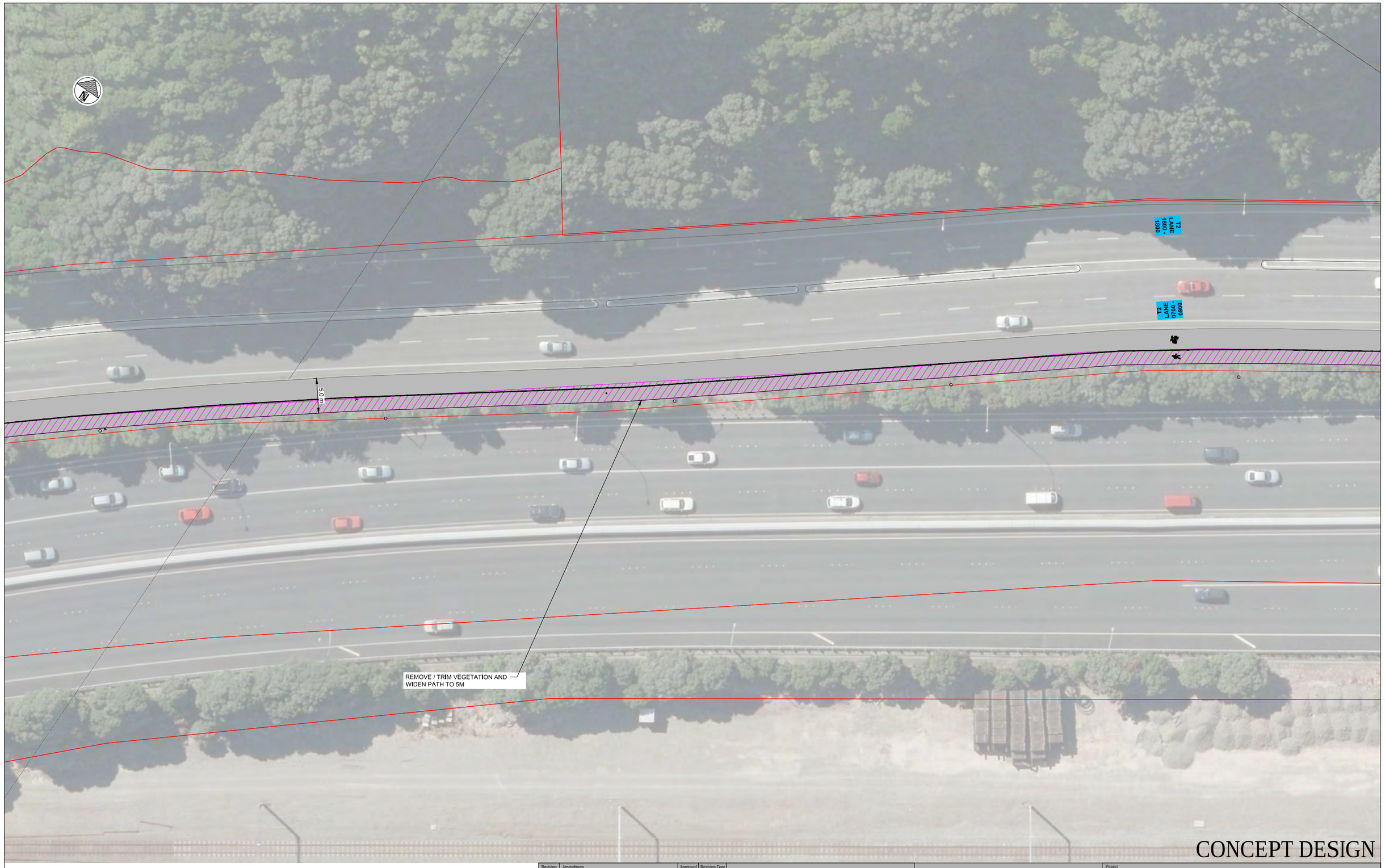
Project No.	Scale
5-C2953.00	1:250

Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION B

Drawing No.	Sheet. No.	Revision
5-C2953.00_C220	12	A

Original Sheet Size A1 [841x594] Plot Date 17 Dec 2015 @ 6:52 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C220.dwg 12



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CONCEPT DESIGN

NOTES:
ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC TO BE RELOCATED TO BACK OF PATH

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Project No.	Scale
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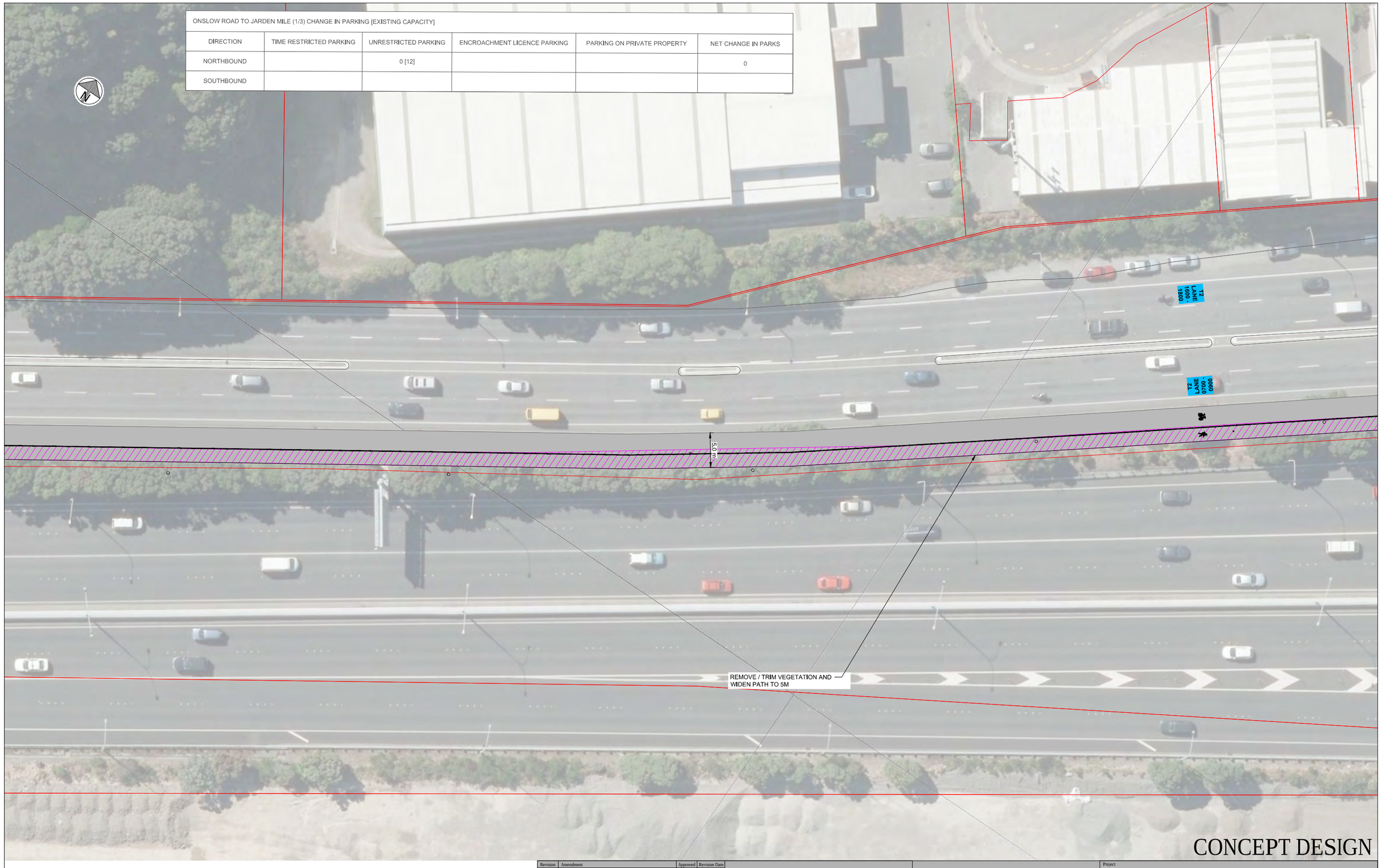
Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION B

Drawing No.	Sheet. No.	Revision
5-C2953.00_C220	13	A

Original Sheet Size A1 [841x594] Plot Date 17 Dec 2015 @ 6:52 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C220.dwg 13

ONSLOW ROAD TO JARDEN MILE (1/3) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND		0 [12]			0
SOUTHBOUND					



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CONCEPT DESIGN

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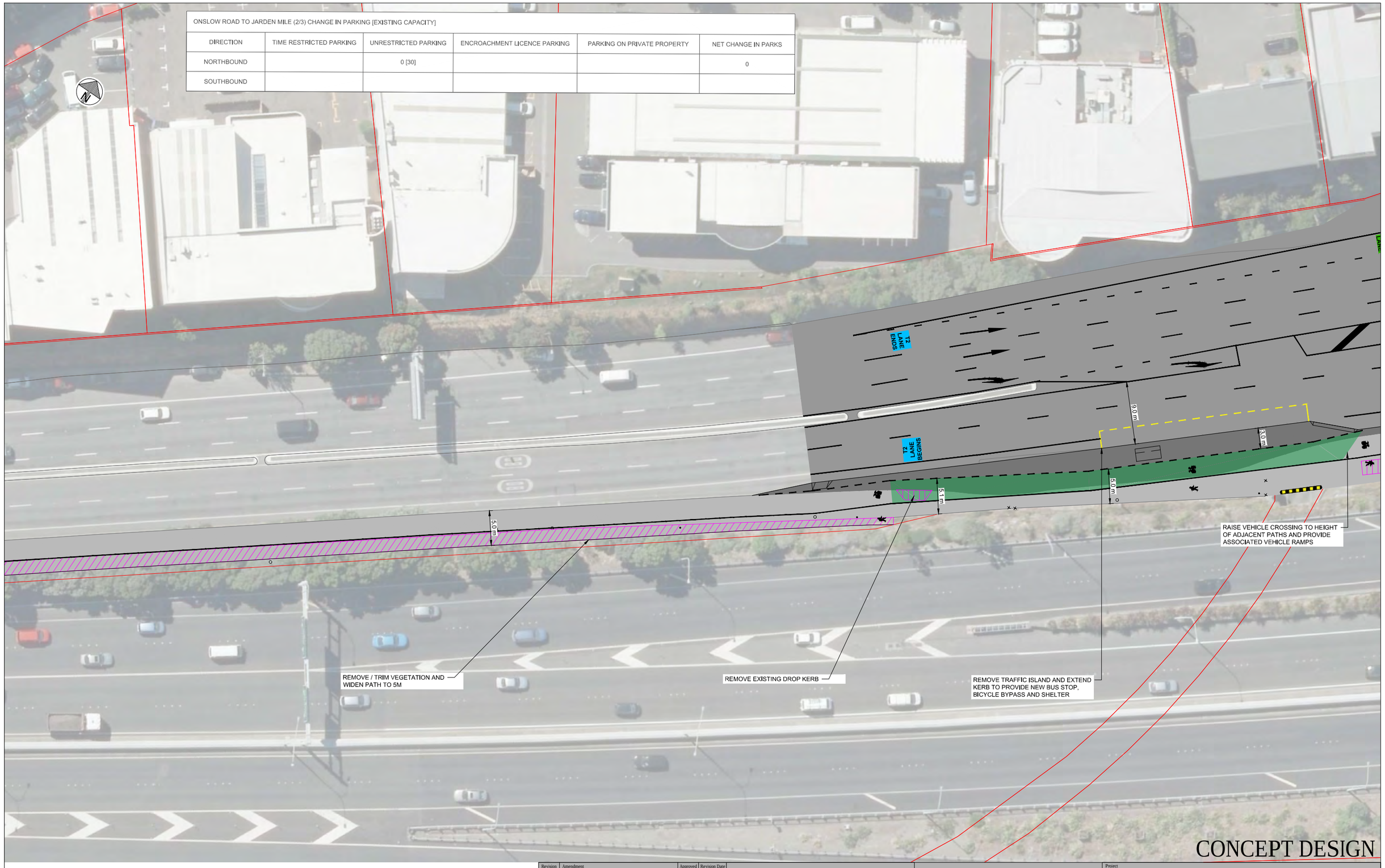
Project
HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet
OPTION B

Drawing No.	Sheet. No.	Revision
5-C2953.00_C220	14	A

Original Sheet Size A1 [841x594] Plot Date 17 Dec 2015 @ 6:53 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C220.dwg 14

ONSLOW ROAD TO JARDEN MILE (2/3) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND		0 [30]			0
SOUTHBOUND					



CONCEPT DESIGN

300 mm
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1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
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Project No.	Scale
5-C2953.00	1:250

Project
HUTT ROAD
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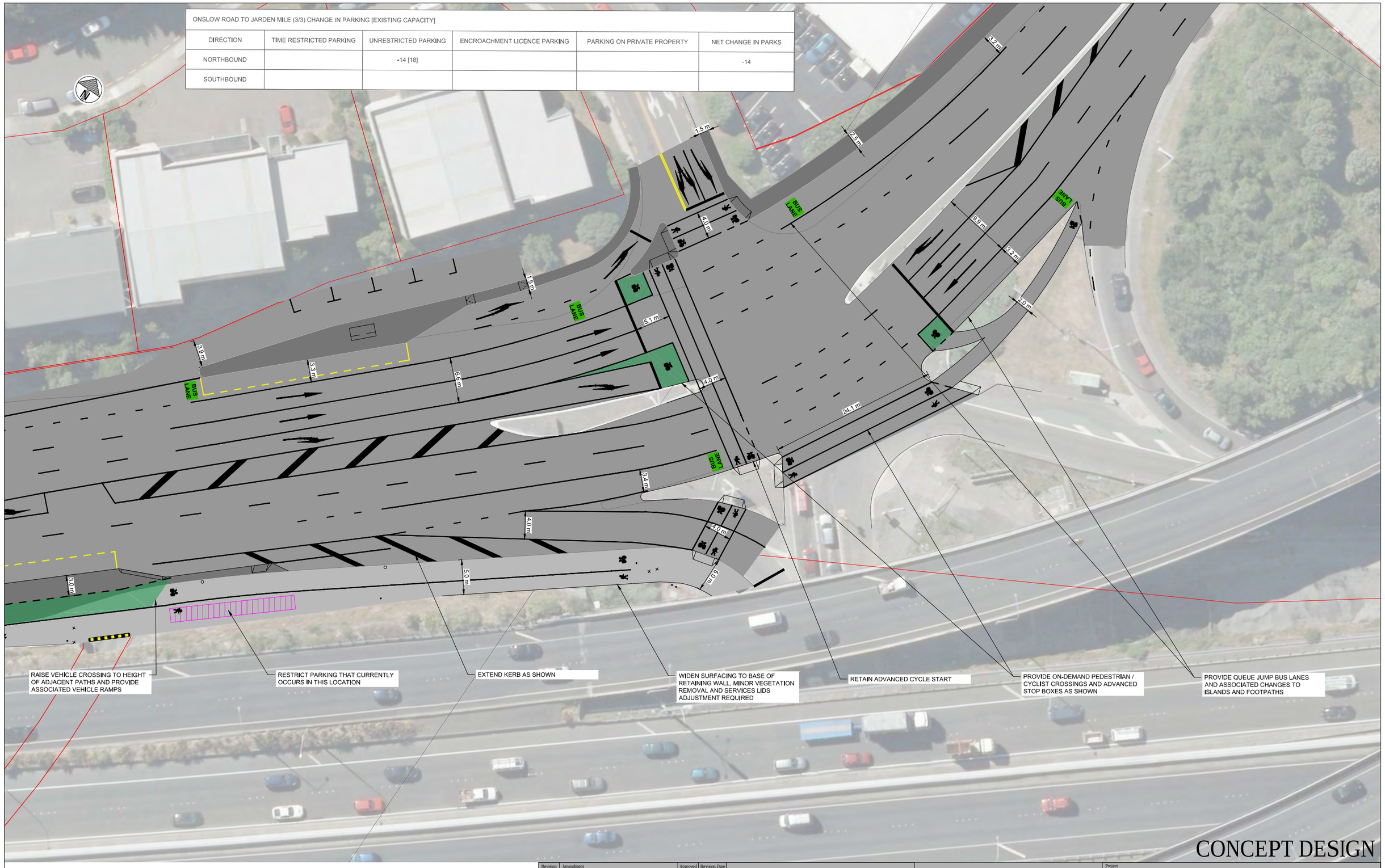
Sheet
OPTION B

Drawing No.	Sheet. No.	Revision
5-C2953.00_C220	15	A

Original Sheet Size A1 [841x594] Plot Date 17 Dec 2015 @ 6:53 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C220.dwg 15

ONSLOW ROAD TO JARDEN MILE (3/3) CHANGE IN PARKING [EXISTING CAPACITY]					
DIRECTION	TIME RESTRICTED PARKING	UNRESTRICTED PARKING	ENCROACHMENT LICENCE PARKING	PARKING ON PRIVATE PROPERTY	NET CHANGE IN PARKS
NORTHBOUND		-14 [18]			-14
SOUTHBOUND					



CONCEPT DESIGN

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100
50
10 mm
0

NOTES:
1) ALL LIGHT COLUMNS, SIGNS, SERVICE MARKERS, ETC ON HUTT ROAD TO BE RELOCATED TO BACK OF PATH
2) ALL VEHICLES CROSSINGS ON HUTT ROAD TO BE RECONSTRUCTED TO WCC STANDARD R-24-721
3) HUTT ROAD SHARED PATH TO BE RESEALED ALONG ENTIRE LENGTH

Revision	Amendment	Approved	Revision Date
A	CONCEPT DESIGN	-	17/12/2015

OPUS
Wellington Office
+64 4 471 7000
PO Box 12-003
Wellington 6144
New Zealand

Drawn	Designed	Approved	Revision Date
ST	ST	ES	17/12/2015

Project No.	Scale
5-C2953.00	1:250

Project: HUTT ROAD
SUSTAINABLE TRANSPORT IMPROVEMENTS

Sheet: OPTION B

Drawing No.	Sheet. No.	Revision
5-C2953.00_C220	16	A

Original Sheet Size A1 [841x594] Plot Date 17 Dec 2015 @ 6:53 p.m. Path \\wesv01\GroupLib\LocalAuthorities\Wellington City\Proj\5-C2953.00 Hutt Rd & Thorndon Quay Sustainable Trnspt Upgrades\800 Drawings\(C) Civil\5-C2953.00_C220.dwg 16

Appendix H: Cost Estimates

Hutt Road Two-way — OE

Option Estimate

Date of estimate:		Jul-15
Estimate prepared by:		S Thornton
Estimate reviewed by:		B McPhedran / S Harte

			Base Estimate				Comment/Assumptions
Item	**Description**	**Unit**	**Quantity**	**Rate**	**Amount**	**Subtotals**	
...					0		
1...	**Aotea Quay to Kaiwharawhara Road (645m)**				0	**878,630**	
1.1..	Pavement and Surfacing				0		
1.1.1.	Standard Kerb and Channel	m	423	100.00	42,300		From WCC Maintenance Rates
1.1.2.	Kerb and Channel Carriageway Reinstatement (700mm)	m	423	50.00	21,150		From WCC Maintenance Rates
1.1.3.	Remove Existing Kerb and Channel	m	423	10.00	4,230		
1.1.4.	Reconstruct Footpath (75mm deep M/04 + 25mm AC)	m2	472	35.00	16,520		From WCC Maintenance Rates
1.1.5.	Replace Footpath Surfacing (25mm AC)	m2	3,398	30.00	101,940		From WCC Maintenance Rates
1.1.6.	Standard Pedestrian Drop Kerb	ea	3	610.00	1,830		
1.1.7.	Tactile Markings	ea	3	60.00	180		From WCC Maintenance Rates
1.1.8.	Heavy Duty Vehicle Crossing (3m useable width, 6m footpath)	ea	2	2,750.00	5,500		Based on WCC Maintenance Rates
1.1.9.	Heavy Duty Vehicle Crossing (6m useable width, 6m footpath)	ea	11	4,750.00	52,250		Based on WCC Maintenance Rates
1.2..	Traffic Services				0		
1.2.1.	Relocate Signal Poles	ea	3	10,000.00	30,000		
1.2.2.	Relocate Detection Loops	ea	4	1,500.00	6,000		
1.2.3.	Judder bars at accesses (3m long)	ea	1	500.00	500		Assume plastic / rubber bolt down type
1.2.4.	Judder bars at accesses (6m long)	ea	10	1,000.00	10,000		Assume plastic / rubber bolt down type
1.2.5.	Signs and Poles (Parking / Clearway, Cycling, Regulatory)	m	645	30.00	19,350		Based on WCC Maintenance Rates
1.3..	Pavement Markings				0		
1.3.1.	Reflectorised Markings (Lines, Letters, Symbols, Arrows,	m	645	10.00	6,450		Based on WCC Maintenance Rates
1.3.2.	Remove / Black-out Existing Markings	m	100	37.50	3,750		Based on WCC Maintenance Rates
1.3.3.	Green Surfacing	m2	572	65.00	37,180		From WCC Maintenance Rates
1.4..	Extraordinary Works				0		
1.4.1.	Relocate Bus Shelter	ea	1	5,000.00	5,000		
1.4.2.	Relocate Bus RTI	ea	1	5,000.00	5,000		
1.4.3.	Kaiwharawhara Stream Bridge Extension	m2	65	4,500.00	292,500		
1.4.4.	Site Clearance	m2	100	10.00	1,000		
1.4.5.	Relocate Bollards	ea	4	200.00	800		From WCC Maintenance Rates
1.5..	Drainage and Services				0		
1.5.1.	Remove and Replace Single Sump with Cycle Friendly Grate	ea	4	2,500.00	10,000		From WCC Maintenance Rates
1.5.2.	New Sump Lead 225mm	m	4	300.00	1,200		From WCC Maintenance Rates
1.5.3.	Relocate Light Columns and Replace with LED's	ea	16	6,500.00	104,000		Rate provided by WCC 25/09/15
1.5.4.	Relocate Services Adjacent to Kaiwhatawhara Stream Bridge	LS	1	100,000.00	100,000		
...					0		
2...	**Kaiwharawhara Road to Rangiora Avenue (690m)**				0	**430,230**	
2.1..	Pavement and Surfacing				0		
2.1.1.	Standard Kerb and Channel	m	280	100.00	28,000		From WCC Maintenance Rates
2.1.2.	Kerb and Channel Footpath Reinstatement (400mm)	m	280	50.00	14,000		From WCC Maintenance Rates
2.1.3.	Kerb and Channel Carriageway Reinstatement (700mm)	m	280	50.00	14,000		From WCC Maintenance Rates
2.1.4.	Remove Existing Kerb and Channel	m	280	10.00	2,800		
2.1.5.	Remove Existing Traffic Islands	m2	23	20.00	460		
2.1.6.	Remove Footpath	m2	123	20.00	2,460		
2.1.7.	Reconstruct Footpath (75mm deep M/04 + 25mm AC)	m2	375	35.00	13,125		From WCC Maintenance Rates, includes additional 250m2 for reconstruction of existing parking areas.
2.1.8.	Replace Footpath Surfacing (25mm AC)	m2	3,075	30.00	92,250		
2.1.9.	Standard Pedestrian Drop Kerb	ea	1	610.00	610		From WCC Maintenance Rates
2.1.10.	Tactile Markings	ea	1	60.00	60		From WCC Maintenance Rates
2.1.11.	Heavy Duty Vehicle Crossing (3m useable width, 5m footpath)	ea	6	2,250.00	13,500		Based on WCC Maintenance Rates
2.1.12.	Heavy Duty Vehicle Crossing (6m useable width, 5m footpath)	ea	8	4,000.00	32,000		Based on WCC Maintenance Rates
2.2..	Traffic Services				0		
2.2.1.	Signs and Poles (Parking / Clearway, Cycling, Regulatory)	m	690	30.00	20,700		Based on WCC Maintenance Rates
2.2.2.	Judder bars at accesses (3m long)	ea	6	500.00	3,000		Assume plastic / rubber bolt down type
2.2.3.	Judder bars at accesses (6m long)	ea	8	1,000.00	8,000		Assume plastic / rubber bolt down type
2.3..	Pavement Markings				0		
2.3.1.	Reflectorised Markings (Lines, Letters, Symbols, Arrows,	m	690	10.00	6,900		Based on WCC Maintenance Rates
2.3.2.	Remove / Black-out Existing Markings	m	200	75.00	15,000		Based on WCC Maintenance Rates
2.3.3.	Green Surfacing	m2	621	65.00	40,365		From WCC Maintenance Rates
2.4..	Extraordinary Works				0		
2.4.1.	Remove Bollards	ea	10	50.00	500		From WCC Maintenance Rates
2.4.2.	Relocate Small Power Transformer	ea	1	5,000.00	5,000		
2.4.3.	Cycle Grab Rails	ea	4	1,000.00	4,000		Based on WCC Maintenance Rates for Pedestrian Barrier
2.5..	Drainage and Services				0		
2.5.1.	Relocate Light Columns and Replace with LED's	ea	15	6,500.00	97,500		Rate provided by WCC 25/09/15
2.5.2.	Remove and Replace Single Sump with Cycle Friendly Grate	ea	2	2,500.00	5,000		From WCC Maintenance Rates
2.5.3.	New Sump Lead 225mm	m	2	300.00	600		From WCC Maintenance Rates
2.5.4.	Remove and Replace Double Sump with Cycle Friendly Grate	ea	1	4,500.00	9,000		From WCC Maintenance Rates
2.5.5.	New Sump Lead 300mm	m	1	350.00	1,400		From WCC Maintenance Rates
...					0		

3...	**Rangiora Avenue to east of Onslow Road (660m)**				0	**444,676**	
3.1..	Pavement and Surfacing				0		
3.1.1.	Standard Kerb and Channel	m	242	100.00	24,200		From WCC Maintenance Rates
3.1.2.	Mountable Kerb	m	355	80.00	28,400		From WCC Maintenance Rates
3.1.3.	Nib Kerb	m	440	85.00	37,400		From WCC Maintenance Rates
3.1.4.	Kerb and Channel Footpath Reinstatement (400mm)	m	-	50.00	0		From WCC Maintenance Rates
3.1.5.	Kerb and Channel Carriageway Reinstatement (700mm)	m	597	50.00	29,850		From WCC Maintenance Rates
3.1.6.	Remove Existing Kerb and Channel	m	242	10.00	2,420		
3.1.7.	Remove Existing Traffic Islands	m2	261	20.00	5,220		
3.1.8.	Replace Footpath Surfacing (25mm AC)	m2	3,058	30.00	91,740		From WCC Maintenance Rates
3.1.9.	Concrete Infill (100mm deep)	m2	119	90.00	10,710		From WCC Maintenance Rates
3.1.10.	Reconstruct Footpath (75mm deep M/04 + 25mm AC)	m2	242	35.00	8,470		From WCC Maintenance Rates
3.1.11.	Standard Pedestrian Drop Kerb	ea	2	610.00	1,220		From WCC Maintenance Rates
3.1.12.	Heavy Duty Vehicle Crossing (6m useable width, 5m footpath)	ea	4	4,000.00	16,000		Based on WCC Maintenance Rates
3.2..	Traffic Services				0		
3.2.1.	Signs and Poles (Parking / Clearway, Cycling, Regulatory)	m	660	10.00	6,600		Based on WCC Maintenance Rates
3.2.2.	Relocate Signal Poles	ea	3	10,000.00	30,000		
3.2.3.	Relocate Signal Controller	ea	1	5,000.00	5,000		
3.2.4.	Relocate Detection Loops	ea	1	1,500.00	1,500		
3.2.5.	Judder bars at accesses (6m long)	ea	4	1,000.00	4,000		Assume plastic / rubber bolt down type
3.3..	Pavement Markings				0		
3.3.1.	Reflectorised Markings (Lines, Letters, Symbols, Arrows,	m	660	10.00	6,600		Based on WCC Maintenance Rates
3.3.2.	Remove / Black-out Existing Markings	m	200	37.50	7,500		Based on WCC Maintenance Rates
3.3.3.	Green Surfacing	m2	343	65.00	22,295		From WCC Maintenance Rates
3.4..	Extraordinary Works				0		
3.4.1.	Cycle Grab Rails	ea	4	1,000.00	4,000		Based on WCC Maintenance Rates for Pedestrian Barrier
3.4.2.	Relocate Bus Shelter	ea	1	5,000.00	5,000		
3.4.3.	Pedestrian Fence (Wire Mesh)	m	242	40.00	9,680		From WCC Maintenance Rates
3.4.4.	Supply and Install 300mm High Batterboard (Footpath) with posts at 2m centres	m	242	55.50	13,431		From WCC Maintenance Rates
3.4.5.	Site Clearance	ea	284	10.00	2,840		
3.5..	Drainage and Services				0		
3.5.1.	Remove and Replace Single Sump with Cycle Friendly Grate	ea		2,500.00	0		From WCC Maintenance Rates
3.5.2.	Remove and Replace Double Sump with Cycle Friendly Grate	ea		4,500.00	0		From WCC Maintenance Rates
3.5.3.	New Sump Lead 225mm	m		300.00	0		From WCC Maintenance Rates
3.5.4.	New Sump Lead 300mm	m		350.00	0		From WCC Maintenance Rates
3.5.5.	Relocate Light Columns and Replace with LED's	ea	10	6,500.00	65,000		Rate provided by WCC 25/09/15
3.5.6.	Remove and Replace Single Sump with Cycle Friendly Grate	ea	2	2,500.00	5,000		From WCC Maintenance Rates
3.5.7.	New Sump Lead 225mm	m	2	300.00	600		From WCC Maintenance Rates
...					0		
4...	**East of Onslow Road to Jarden Mile (1100m)**				0	**1,269,730**	
4.1..	Pavement and Surfacing				0		
4.1.1.	Standard Kerb and Channel	m	505	100.00	50,500		From WCC Maintenance Rates
4.1.2.	Mountable Kerb	m	517	80.00	41,360		From WCC Maintenance Rates
4.1.3.	Nib Kerb	m	975	85.00	82,875		From WCC Maintenance Rates
4.1.4.	Kerb and Channel Carriageway Reinstatement (700mm)	m	270	50.00	13,500		From WCC Maintenance Rates
4.1.5.	Remove Existing Kerb and Channel	m	200	10.00	2,000		
4.1.6.	Remove Existing Traffic Islands	m2	34	20.00	680		
4.1.7.	Concrete Infill (100mm deep)	m2	166	90.00	14,940		From WCC Maintenance Rates
4.1.8.	Reconstruct Footpath (75mm deep M/04 + 25mm AC)	m2	822	35.00	28,770		From WCC Maintenance Rates
4.1.9.	Replace Footpath Surfacing (25mm AC)	m2	5,500	30.00	165,000		From WCC Maintenance Rates
4.1.10.	600mm depth pavement (sub base and basecourse)	m2	346	90.00	31,140		From WCC Maintenance Rates
4.1.11.	Standard Pedestrian Drop Kerb	ea	19	610.00	11,590		From WCC Maintenance Rates
4.1.12.	Tactile Markings	ea	10	60.00	600		From WCC Maintenance Rates
4.1.13.	Mill and Repave AC (30mm)	m2	8,600	40.00	344,000		From WCC Maintenance Rates
4.1.14.	Heavy Duty Vehicle Crossing (3m useable width, 5m footpath)	ea	1	2,250.00	2,250		Based on WCC Maintenance Rates
4.1.15.	Heavy Duty Vehicle Crossing (6m useable width, 5m footpath)	ea	1	4,000.00	4,000		Based on WCC Maintenance Rates
4.2..	Traffic Services				0		
4.2.1.	Relocate Signal Poles	ea	4	10,000.00	40,000		
4.2.2.	Pedestrian / Cycle Signal Poles and Aspects	ea	8	10,000.00	80,000		
4.2.3.	Reconfigure Signal Controller	ea	1	10,000.00	10,000		
4.2.4.	Relocate Detection Loops	ea	10	1,500.00	15,000		
4.2.5.	Judder bars at accesses (3m long)	ea	1	500.00	500		Assume plastic / rubber bolt down type
4.2.6.	Judder bars at accesses (6m long)	ea	1	1,000.00	1,000		Assume plastic / rubber bolt down type
4.2.7.	Signs and Poles (Parking / Clearway, Cycling, Regulatory)	m	1,100	30.00	33,000		Based on WCC Maintenance Rates
4.3..	Pavement Markings				0		
4.3.1.	Reflectorised Markings (Lines, Letters, Symbols, Arrows,	m	1,100	10.00	11,000		Based on WCC Maintenance Rates
4.3.2.	Remove / Black-out Existing Markings	m	50	75.00	3,750		Based on WCC Maintenance Rates
4.3.3.	Green Surfacing	m2	639	65.00	41,535		From WCC Maintenance Rates
4.4..	Extraordinary Works				0		
4.4.1.	Site Clearance	m2	2,274	10.00	22,740		
4.4.2.	Relocate Bus Shelter	ea	2	5,000.00	10,000		
4.4.3.	Supply and Install 500mm High Timber Retaining Wall + posts at 1m centres	m	60	150.00	9,000		Based on WCC Maintenance Rates
4.4.4.	Relocate Large Signs	ea	1	500.00	500		
4.4.5.	Cycle Grab Rails	ea	9	1,000.00	9,000		Based on WCC Maintenance Rates for Pedestrian Barrier
4.5..	Drainage and Services				0		
4.5.1.	Relocate Light Columns and Replace with LED's	ea	27	6,500.00	175,500		Rate provided by WCC 25/09/15
4.5.2.	Remove and Replace Single Sump with Cycle Friendly Grate	ea	5	2,500.00	12,500		From WCC Maintenance Rates
4.5.3.	New Sump Lead 225mm	m	5	300.00	1,500		From WCC Maintenance Rates
...					0		

5...	**Traffic Management**				0	**250,000**	
5.1..	Shoulder Closure	day	200	500	100,000		
5.2..	Lane Closure	day	100	1,500	150,000		
...					0		
6...	**Prelimnary and General**				0	**490,990**	
6.1..	Establisment, Disestablishment, Overheads etc	%	3,273,266	15%	490,990		
...					0		
7...	**Property**				0	**275,126**	
7.1..	NZ Bus Property (110 Hutt Road)	m2	7	872.00	6,104		Land Value = $3,350,000. Land Area = 3843m2
7.2..	WCC Drainage Property (114 Hutt Road)	m2	8	1,146.00	9,168		Land Value = $165,000. Land Area = 144m2
7.3..	Spotlight Property (120 Hutt Road) (Land Swap - Assumed to be Cost Neutral)	m2	-	445.00	0		Land Value = $2,525,000. Land Area = 5681m2
7.4..	KiwiRail (Opposite Onslow Road)	m2	214	1,000.00	214,000		Land Value Assumed
7.5..	Legal Costs	%	229,272	20%	45,854		
...					0		
8...	**Professional Services**					**807,876**	
8.1..	Consultants	%	4,039,382	15%	605,907		
8.2..	Internal Costs	%	4,039,382	5%	201,969		
...					0		
Total Project Estimate					**4,847,259**	**4,847,259**	
Total Project Estimate (Including 15% Contingency)					**5,600,000**		

Appendix I: Road Safety Audit

Wellington City Council

Hutt Road Sustainable Transport Study

Preliminary Safety Review

November 2015

Table of contents

1. Background

1.1 Safety Audit Procedure

This report has been prepared in response to Wellington City Council's (WCC) request to carry out a Safety Audit of the Hutt Road Cycle Path that was prepared as part of the Hutt Road Sustainable Transport Study.

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, that is, minimisation 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 in order 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);
- Detailed Design Stage (Pre-implementation / Implementation); and
- Pre-Opening / Post-Construction Stage (Implementation / Post-Implementation).

A road safety audit is not intended as a technical or financial audit and does not substitute for a design check on 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 Guideline, (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 shall 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 to be completed by the designer, safety engineer and client for each issue documenting the designer response, client 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 Safety Audit Team (SAT)

The road safety audit was carried out in accordance with the "NZTA Road Safety Audit Procedures for Projects Guideline", (Interim Release May 2013) and also reference made to its earlier document (dated 2004).

The assessment team was as follows:

- Curtis Lee, GHD Limited, Wellington.
- Simon Prosee, GHD Limited, Wellington.
- Laura Skilton, GHD Limited, Wellington

A site inspection was undertaken on 10 July 2015 where the weather was overcast. A night time audit was not undertaken.

1.3 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 ranking for each safety issue using the Concern Assessment Rating Matrix in Table 1 below. The qualitative assessment requires professional judgement and a wide range of experience in projects of all sizes and locations.

Table 1: Concern Assessment Rating Matrix

Severity (likelihood of Death or Serious Injury Consequence)	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 2 below.

Table 2: Risk Categories

Concern	Suggest Action
Serious	A major safety concern that must be addressed and requires changes to avoid serious safety consequence
Significant	Significant concern that should be addressed and requires changes to avoid serious safety consequences
Moderate	Moderate concern that should be addressed to improve safety
Minor	Minor 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.

1.4 Scope of Audit

This audit is a Concept Stage Safety Audit, focusing on the proposed cycle path on Hutt Road – Thorndon Quay. A briefing meeting with representatives from WCC and the Designer was held prior to the site visit on 29 June 2015.

The SAT is not aware that any previous safety audits have been undertaken on the project.

1.5 Documents Provided

The Safety Audit Team (SAT) has been provided with the following reports for this audit:

- Hutt Road Sustainable Transport Study, Transportation Demand Assessment
- Hutt Road Crash Summary

The Safety Audit Team (SAT) has been provided with the following drawings for this audit:

- Hutt Road Sustainable Transport Improvements, Medium Transport Utility, Drawings 01 A to 26 A
- Hutt Road Sustainable Transport Improvements, High Transport Utility, Drawings 01 A to 26 A

1.6 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 or 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.

1.7 Scope and Limitations

This report: has been prepared by GHD for Wellington City Council and may only be used and relied on by Wellington City Council for the purpose agreed between GHD and the Wellington City Council as set out in section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Wellington City Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Wellington City Council and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information

1.8 Items not considered

The auditors note the following information was not provided and therefore was not able to be audited. This includes, but is not limited to:

- Cross sections and long sections;
- Signage and detailed roadmarking plans;

- Traffic signal plans;
- Intersection and pedestrian crossing sight distances;
- Traffic signal phasing for the signalised intersections and signalised pedestrian crossings;;
- Lighting design; and
- Services, including drainage details.

Due to the incompleteness of the drawings, it is considered a further safety audit is required after the design drawings are completed and the comments in this report have been considered.

1.9 Design Issues

While many of the safety concerns raised in this report are only minor or comments due to the un-likelihood of a death or serious injury crash, many of the issues raised will significantly lower the level of service for cyclists and occur frequently.

It is considered that many of these issues are design issues and should be addressed prior to final preliminary designs.

A full safety audit should then be repeated after completion of the design, in particular on drawings that include the items that have been omitted from the plans, as discussed in Section 1.8.

Furthermore it is considered that some of the facilities are not practical for cyclists and are unlikely to be used by higher confidence cyclists, in particular the facilities at the various traffic signals. These have been discussed in more detail in the relevant sections of this report.

2. All Options – Hutt Road

2.1 Aotea Overbridge – Minor

Frequency Rating	**Infrequent**	Severity Rating	**Very Unlikely**

On the western side of the overbridge, the support column creates a pinch point in the design with a total width of 3.8m for pedestrians and cyclist use, increasing path user conflict. This column can also create a forward visibility issue for cyclists.

The plans state that the unsealed areas are to be sealed. The unsealed areas are minimal and around the edges of the path, while the path surface is uneven and potholed.

Clearance to the underside of the bridge on the western side of the path was approximated to be 2m. Austroads AGRD Part 6a: Pedestrian and Cyclist Paths recommends a vertical clearance of 2.2m for cyclists.

Figure 1 Clearance under Overbridge

Recommendation

Consider changing to a shared path arrangement in the vicinity of the support column to encourage path users to accommodate the width requirements of each other.

Consider areas to be sealed during more detailed design phases.

Investigate vertical clearance. If insufficient clearance is provided, consider encouraging cyclists to use the rest of the path width with an edge-line marking treatment.

Designer Response

Measured height is approximately 2.1m at the northern side. Minor re shaping of the cross-fall or a more significant reshaping with a new sump and lead to be considered at detailed design.

Safety Engineer

N/A

Client Decision

Concur with designer response

Action Taken

No change to current design.

2.2 Removal of Parking – Comment

Vehicles park on the berm north of the Aotea overbridge. The drawings state that parking at the back on the shared path along Hutt Road will be restricted.

It is noted that even though many businesses have their own parking, presently vehicles still choose to park for short durations on the existing footpath, particularly at the childcare centre.

Recommendation

Consider making some of the new on street parking short term at key locations to provide a safer alternative to the current practice of short term parking on the footpath.

Designer Response

No design changes proposed. Recommendation is a matter of enforcement/ which will need to be managed.

Safety Engineer

N/A

Client Decision

Designer to review parking demand from parking survey and provide restrictions if necessary.

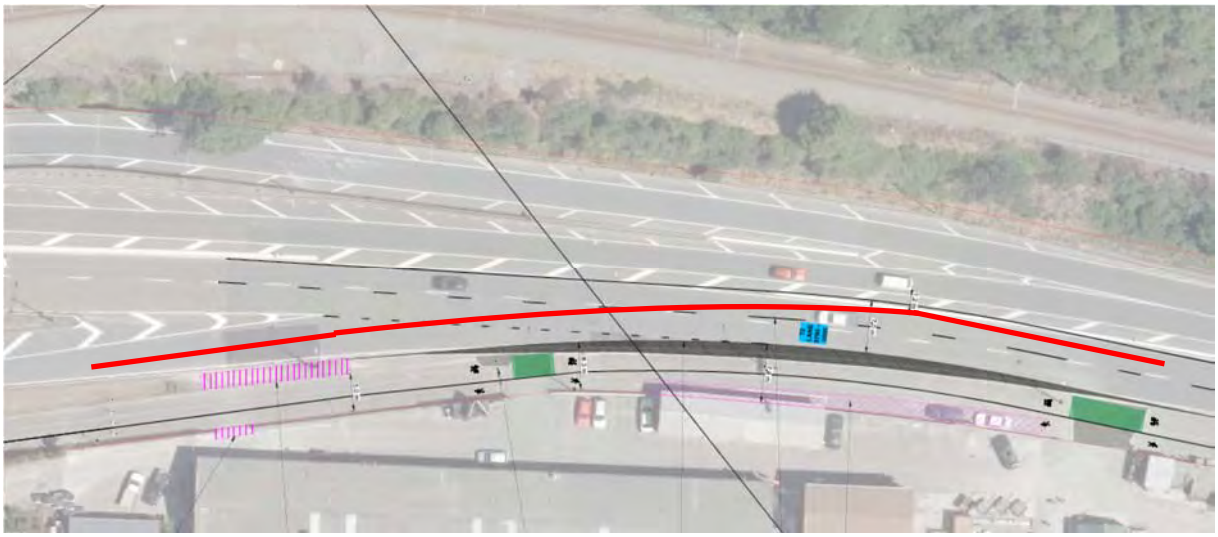
Action Taken

Design updated to show proportion of time restricted parking at certain locations.

2.1 Aotea Off Ramp – Moderate

Frequency Rating	**Common**	Severity Rating	**Unlikely**

Single occupancy vehicles turning onto Aotea Quay may have to make sudden lane changes across the proposed T2 lane.



Recommendation

Review the appropriateness of the T2 lane east of the Aotea Off-ramp.

Designer Response

Existing gantry provides advanced lane-use signage to provide guidance.

No change proposed.

Safety Engineer

N/A

Client Decision

Existing gantry provides good guidance to drivers. Supplementing the gantry signage the T2 lane markings could be moved to slightly different locations so vehicles are more likely to change lanes early if exiting.

Action Taken

No change to design.

2.2 Kaiwharawhara Road Intersection – Moderate

Frequency Rating	**Common**	Severity Rating	**Unlikely**

It should be noted that the aerial photo of the design drawings are out of date and that there are some green pavement markings and advances stop boxes at the intersection not shown on the plans.

The kerbside lane of the existing double right turn from Kaiwharawhara road leads directly into the T2 lane. This may result in unfamiliar drivers making sudden merge manoeuvres in close proximity to an intersection.

Recommendation

Review T2 lane markings and signs in vicinity of the intersection. Consider installing temporary advanced warning of the T2 lane on Kaiwharawhara Road.

Designer Response

Propose T2 lanes advanced warning signage.

Safety Engineer

N/A

Client Decision

Concur with designer response.

Action Taken

Advance warning signage provided on Kaiwharawhara Road.

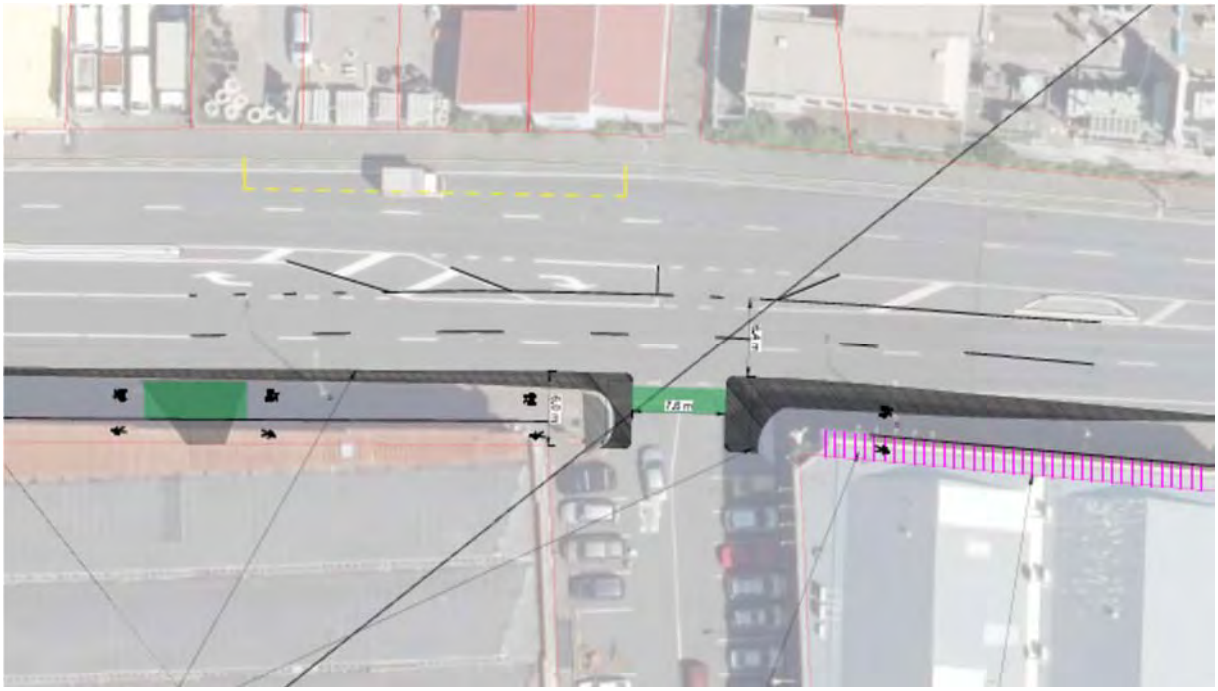
2.3 Westminster Street Intersection – Minor

Frequency Rating	**Occasional**	Severity Rating	**Unlikely**

The radius of the kerb has been significantly reduced. Trucks may need to cross centre/lane lines in order to turn at this intersection. The Stop line on Westminster Street is not shown.

The right turn bay turning into Westminster Street has been narrowed and tapers on the approach to Westminster Street down to what appears to be 2.2m width. This may cause turning vehicles to overhang into adjacent traffic lanes.

The green surfacing across Westminster Street encourages cyclist priority through the intersection. It is not clear from the design whether cyclists are intended to have priority at this location.



Recommendation

Check swept paths for turning vehicles.

Consider providing a consistent and sufficient width of right turn bay in the vicinity of the intersection.

Ensure that priority is clearly defined and safely accommodated for drivers and path users at the intersection.

Designer Response

Propose minor adjustments to kerb lines and markings to address tracking / width concerns.

Safety Engineer

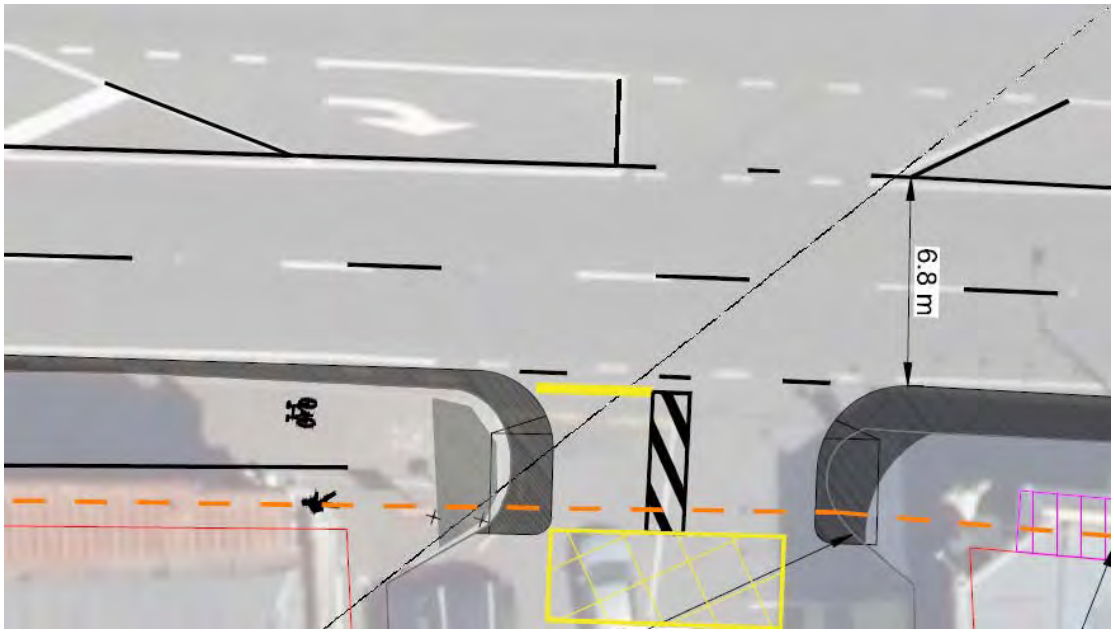
N/A

Client Decision

Provide at least 2.5m for marked turn bay. Remove proposed green surface markings across roadway. Adjust kerb lines as necessary for vehicle tracking.

Action Taken

Design updated as shown below.



2.4 Wide Lane – Minor

Frequency Rating	**Occasional**	Severity Rating	**Unlikely**

North of Westminster Street it appears that the kerb has been relocated towards the buildings and on street parking has been provided within a clearway. It is assumed the clearway is AM peak only.

The kerbside lane width appears to vary in widths of up to 6m, which can accommodate parking and a moving traffic lane. Potentially in off peak periods this will be used for both purposes. However, it is likely that buses and cars travelling in this lane will become 'squeezed out' by the changing width available adjacent to an occupied carpark.

Recommendation

Check kerbside lane width and consider providing a consistent width.

Designer Response

No change to kerb at this location. Propose to mark parks offset from kerb.

Safety Engineer

N/A

Client Decision

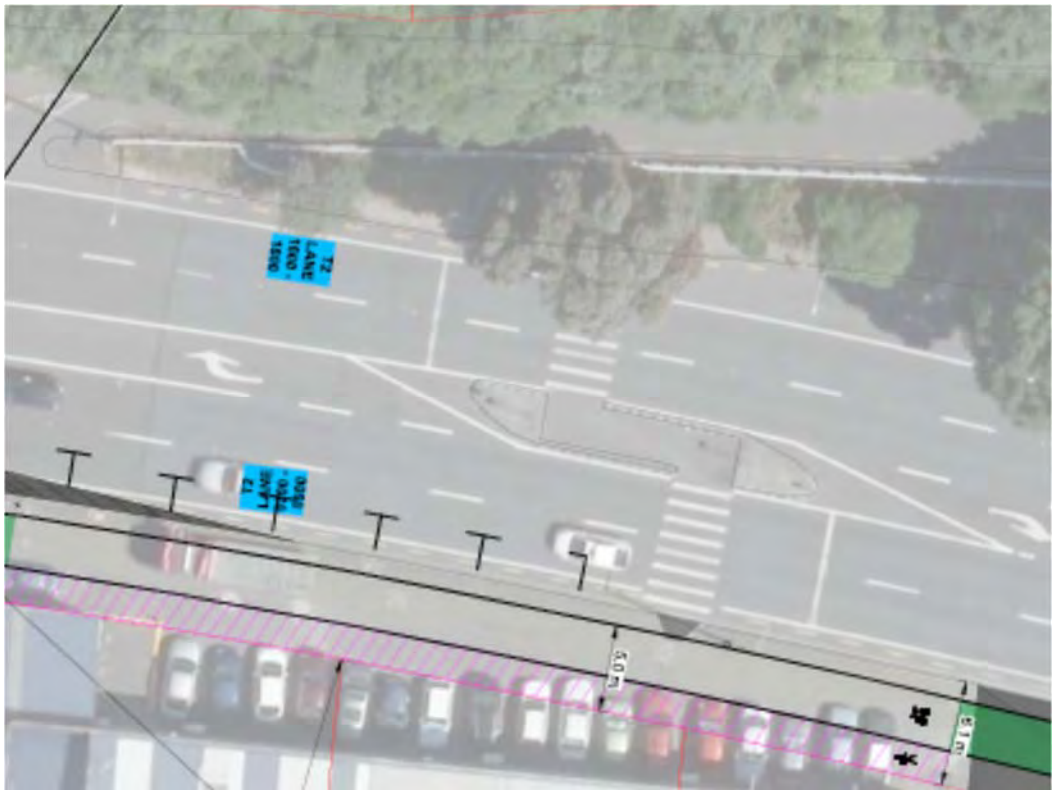
Retain full time parking where possible, and provide clear lane markings to guide drivers in the area.

Action Taken

Design clarified to address concerns.

2.5 Pedestrian Crossing - Rangiora Avenue – Comment

As all the pedestrian crossings in the rest of the study area are being signalised, consideration should be given to signalise the pedestrian crossing at Rangiora Avenue. The existing crossing is located in an area with a 60km/h speed limit, and a higher speed environment. The existing crossing crosses multiple lanes in the same direction and queued vehicles can obscure visibility, as was noted in the crash history report.



Recommendation

Consider expanding the project scope to include signalisation/conversion to a vehicle priority refuge type crossing, of the staggered pedestrian crossing near Rangiora Avenue.

Designer Response

No change proposed.

Safety Engineer

N/A

Client Decision

It is difficult to justify signalising the crossings in terms of value for money. It is very low use, and the proposal does not make it less safe than it is currently. Recent upgrades have been done with coloured and textured surfaces to improve the safety of this crossing. No further changes at this time are proposed.

Action Taken

No change todesign

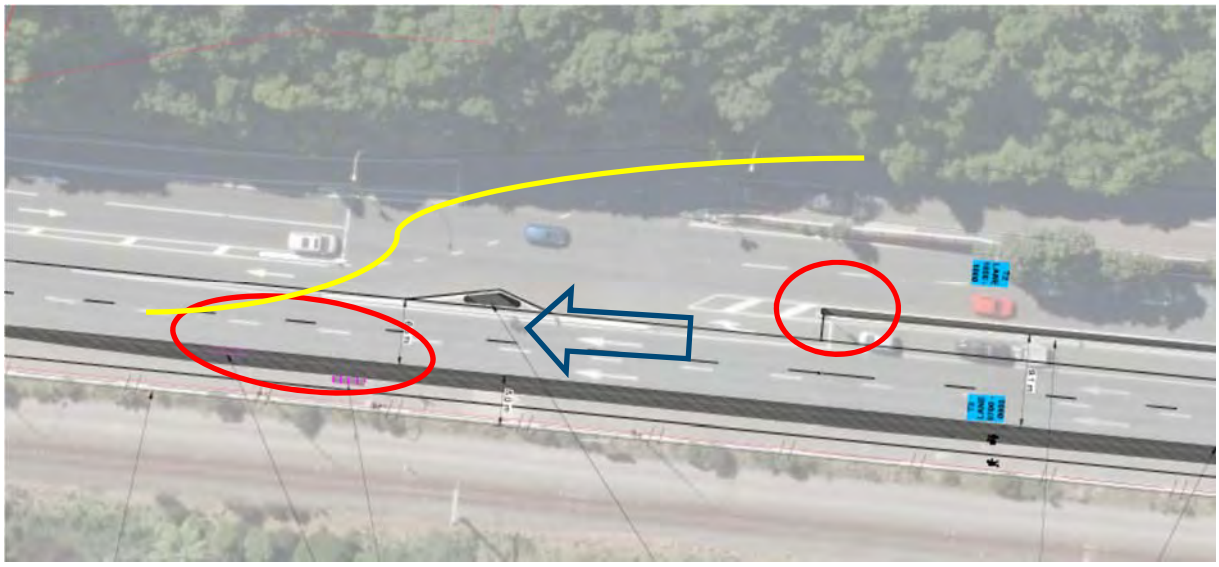
2.1 Onslow Road Intersection – Significant

Frequency Rating	**Common**	Severity Rating	**Likely**

Onslow Road is a principle road and a major access to Khandallah. Due to the acuteness of the Onslow Road approach, some vehicles were observed to cross lane lines to turn to and from the north. The design reduces lane widths at this intersection and may increase the significance of these turning vehicle swept path conflicts.

The existing drop-kerb for cyclists to get onto the cycle path is generally unused as cyclists prefer the service station driveway due to the increased width, flatter grade, and less acute angle.

Due to the seagull signal, when cyclists turn right out of Onslow Road they are expected to execute a right hand merge with southbound through vehicles. In addition, there are no crossing facilities provided for northbound cyclists to access Onslow Road from the cycle path.



Recommendation

Consider improving cycle access between Onslow Road and the cycle path.

Check turning vehicle swept paths at the intersection. Consider maintaining existing widths or other treatments for any conflict points.

Designer Response

New drop-kerb access shown on drawings (to an appropriate standard for cyclists).

No change proposed.

Safety Engineer

N/A

Client Decision

Provide option for cycle crossing at island. Consider widening into Kiwirail lands or additional width from northbound traffic lanes if necessary.

Action Taken

Design updated to provide cycle refuge in island as shown below.

2.1 Tree Removal and Wind – Moderate

Frequency Rating	**Infrequent**	Severity Rating	**Likely**

Some of the existing trees on the eastern side of Hutt Road that separate Hutt Road from SH1 will be removed or trimmed as part of the works in order to widen the cycle path and footpath. In some locations, the removal of these trees may increase the amount of wind from the harbour and cause stability issues for cyclists.

Recommendation

Investigate where tree removal/trimming may create a wind hazard. Consider other wind mitigation measures such as new planting adjacent to the new path.

Designer Response

No change proposed at this time. Detailed design to consider whether wind mitigation measures are warranted.

Safety Engineer

N/A

Client Decision

No changes required at this time – similar or better conditions anticipated compared to the rest of the route. Trees will be retained where possible.

Action Taken

No change to design.

3. All Options – Intersection with Ngauranga Interchange

The existing signalised intersection at Ngauranga has been altered, including new footpaths and bus stop designs. Presently the intersection operates at capacity and there are long queues in the evening for vehicles going from Hutt Road to SH2 with the queues often extending beyond the right turn bay. This is partially due to queuing from the downstream on ramp.

Southbound cyclists either come from SH1, the SH2 cyclepath or the SH2 shoulder. Those on the SH2 cycle path use the footpath under the motorway and stay on the raised cyclepath. Cyclists from SH1 or the SH2 shoulder are on the road and require a crossing location to get onto the cycle path. Generally observations show that this is undertaken south of the bus stop at the drop kerb.

Northbound cyclists undertake a variety of alternative movements depending on their confidence and ability. Some cross the mid-block road at their own risk to access SH1, others cycle the wrong way on the west of the southbound lanes to access SH2, others stay on the cycle path and use the flush markings adjacent to the footpath (getting access at the Stock Effluent driveway) and others use the crossing facility by the free left turn island.

3.1 Southbound Bus Stop - Comment

The southbound bus stop is used not only as a bus stop but also for a pick up location for tradespeople. Frequently during the morning peak you will see vans pulling over in the bus stop to collect people. This is one reason why vehicles are parked in the area. No allowance appears to have been made for this in the design.

3.2 Northbound Left Turn to Jarden Mile - Minor

Frequency Rating	**Occasional**	Severity Rating	**Unlikely**

The northbound T2 lane ends prior to the intersection and the left lane effectively becomes a bus lane to give buses a head start at the signals. The left turn to Jarden Mile is adjacent to the bus lane. The bus lane has an in-lane bus stop prior to the left turn lane starting. Potentially left turn vehicles will have to wait for a bus prior to getting into the left turn lane. The queueing space is only around 15 m behind the bus stop before entering the adjacent through lane. This may create queuing back into the through lanes on Hutt Road, resulting in conflict with through vehicles and increased lane changing in an 80km/h speed environment.

This area will also potentially confuse motorists and cause sudden weaving movements to change lanes from the right hand lane, across the T2 lane and then into a bus stop to try and turn left.

Recommendation

Investigate potential queuing resulting from a stopped bus.

Designer Response

No change proposed (peak hour left turn demand = 21-27 vehicles).

Safety Engineer

N/A

Client Decision

Concur with designer response

Action Taken

No change to design.

3.3 Cyclist and Pedestrian Crossings - Minor

Frequency Rating	**Occasional**	Severity Rating	**Unlikely**

There does not appear to be enough stacking within the islands to allow for queuing and two way cycle movements. Cyclists may overhang into the vehicle lanes.

The intersection design does not show any proposed ramps or whether the trafficked areas within the islands will be constructed at-grade.

Recommendation

Consider expected numbers of cyclists and check that sufficient space is provided in crossing waiting areas.

Designer Response

No change proposed. Not expected to be highly utilised.

Safety Engineer

N/A

Client Decision

Further details on ramps and crossings should be shown on plans.

Action Taken

Design updated to show drop kerb details.

3.4 Southbound Cyclists from SH2 - Minor

Frequency Rating	**Occasional**	Severity Rating	**Unlikely**

The majority of SH2 cyclists were observed to be on road on the SH2 off ramp. There is no facility to get them onto the raised cycle path. Should an apron be provided at the crossing point across the free left turn, cyclists will be unlikely to use it due to the approach angles and negotiating speeds required.

While it is appreciated that NZTA are looking at improving the off road cycle path on SH2, this is unlikely to happen before 2018. Furthermore, the footpath underneath the motorway is very narrow may require a lane reduction in order to widen.

Recommendation

Consider a cyclist access facility between the path and carriageway immediately west of the signalised intersection, or consider forming the cyclist crossing ramp to encourage use by on-road cyclists.

Designer Response

No change proposed, as cyclist ramp is provided.

Safety Engineer

N/A

Client Decision

Concur with designer response. The existing ramp will be more highly utilised once other upgrades are done removing the current pedestrian/cycle conflicts.

Action Taken

No change to design.

3.5 Northbound Cyclists to SH2 – Significant

Frequency Rating	**Common**	Severity Rating	**Likely**

Northbound cyclists need to cross two left turns, in addition to the centre of the intersection, in order to access SH2 from the cycle path.

The SH1-SH2 free left turn has not been signalised within the design. Due to high vehicle approach speeds on a downhill grade with poor forward sight distance around the curve, this crossing point could create safety issues during off peak operation when traffic is free flowing.

The advance stop box on the right turn from Hutt Road to SH2 has a short cyclist lead in that is unlikely to allow cyclists to bypass all queued vehicles. This may confuse cyclists and drivers in a high speed environment.

Recommendation

Consider signalising the left turn from SH1 to SH2 in order to provide a safe crossing opportunity for northbound cyclists.

Consider removing or lengthening the cyclist lead in for the right turn from Hutt Road to SH2.

Designer Response

No change proposed. Only catering for very confident cyclists.

Safety Engineer

N/A

Client Decision

Designer should follow-up on their crash analysis to either dismiss or address the SH1 to SH2 slip ramp issue raised.

The overall scheme will likely create some pinch points for northbound cyclists on-road and we anticipate few to continue to use the on-road facilities past Kaiwharawhara. The feeder lane and ASB will cater to only a few very confident cyclists.

Action Taken

No change to design.

Only one minor crash reported in 10 year period (2005-2015).

3.6 Northbound Cyclists to SH1 - Minor

Frequency Rating	**Occasional**	Severity Rating	**Unlikely**

Cyclists using the facilities provided in the drawings will have to cross three separate cycle crossings. This may encourage cyclists to cross out of phase or undertake unsafe crossing paths.

Recommendation

Consider an advanced stop box on the left hand lane for the right turn from SH2 to SH1 to provide an alternative for high confidence cyclists to using two crossing points.

Designer Response

Existing advanced cycle start from island to be retained – comment to be added to drawing.

Safety Engineer

N/A

Client Decision

Concur with designer response

Action Taken

Comment provided on drawings as noted above.

3.7 Pedestrian Crossing Distances - Comment

Some of the pedestrian crosswalks in the design cross multiple vehicle lanes in each direction in one movement. This may result in significant crossing time requirements, or slower walkers being unable to finish crossing within the allocated time.

Recommendation

Consider pedestrian crossing timing during more detailed design phases. Consider staggering the longer pedestrian crossings.

Designer Response

Staged crossings would presumably have to apply to both cyclists and pedestrians as having different ones across the same approach would cause confusion. Client to balance additional vehicle delay with full crossings versus additional cycle and pedestrian delay with staged crossings (phasing can be adjusted to ensure safe phase times).

Safety Engineer

N/A

Client Decision

Agree with recommendation.

Action Taken

No change to design. To be reviewed in more detail at detailed design.

4. General

4.1 Path Surface – Comment

As noted in the March 2014 Concept Design Stage Safety Audit for the Wellington to Hutt Valley Walking and Cycling Link, the existing path is not a smooth surface for users, and has many uneven areas and service covers.

While the design is not yet at the detailed stage, it is worth considering how tie ins between existing surfaces and new surfaces will be constructed, and whether the existing condition of the pavement warrants a complete reseal in order to create a path that is attractive to users and free of minor hazards such as uneven surfaces, slippery service covers and ponding.

Recommendation

Consider pavement and path tie-ins and final surface.

Designer Response

Noted. No change proposed. The majority of the path is expected to be resealed.

Safety Engineer

N/A

Client Decision

The plan is to ensure a smooth seal throughout.

Action Taken

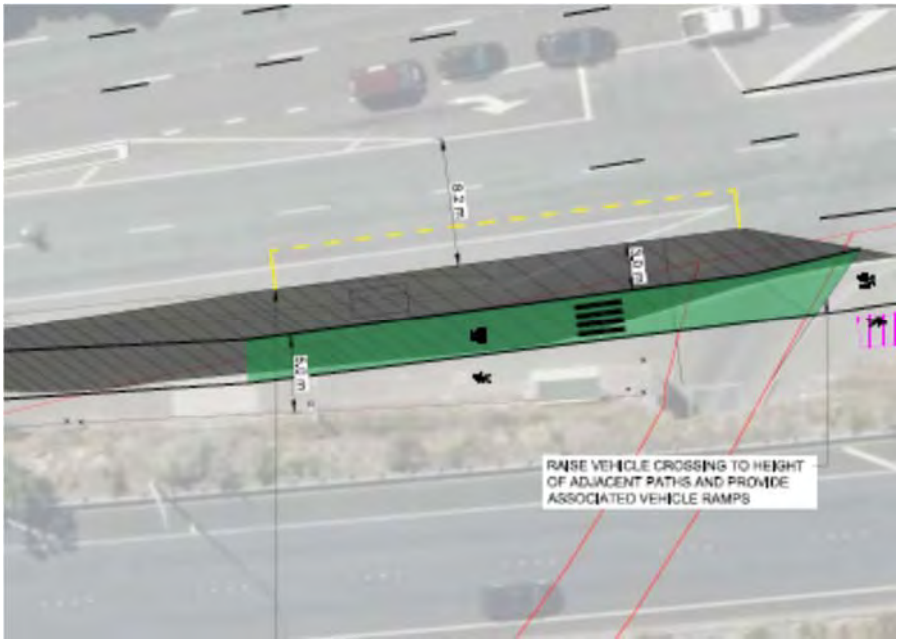
No change to design.

4.2 Pedestrian Crossings on Cycle Paths – Moderate

Frequency Rating	**Common**	Severity Rating	**Unlikely**

The drawings provided do not have enough detail to show the intended design at the pedestrian crossing locations on the cycle path at bus stops and signalised pedestrian crossings. The Traffic Control Devices Rule 2004 requires a pedestrian crossing to have several infrastructure components such as advanced warning diamond markings and belisha poles and beacons/discs. If provided, these would be visible to, and could confuse drivers in the general traffic lanes.

At some locations, such as adjacent to the Ngauranga signals, below, it appears that the pedestrian crossing point to access the pedestrian waiting areas are at grade, ie no kerbs to get on/off. This differs slightly from the above comments where there are kerbs for pedestrians and will make the crossing points clearer. Where there is no kerb, such as this location, it is considered that pedestrians may not use them as there is no physical barrier (kerb) to encourage them to cross at the crossing point. Again, if zebra lines are used here, then full pedestrian crossing components are required.



Recommendation

Consider the appropriateness of pedestrian crossings across the cycle path and appropriateness of forming a legal crossing point.

Consider designing ramps to have gradients no higher than 1:12, including superelevation at the kerbs that presently have parking that are now cycle lanes.

Designer Response

WCC to identify consistent and acceptable treatment for bypasses for use on all projects.

Safety Engineer

N/A

Client Decision

No bus bypasses currently built, and each of these needs to be context specific. Designer should propose a legal and constructible treatment appropriate to the area.

Action Taken

National (Christchurch) and international (Ireland, Canada) examples reviewed.

Zebra markings removed from all cycle path crossings, drop kerbs provided for pedestrians where kerb separates cyclists from pedestrians.

4.3 Signs and Markings – Comment

This safety audit is not complete due in part to the following omissions on the drawings:

- None of the drawings provide details of ramps at crossing points or paving tactiles.
- None of the drawings show signal poles. While there are generic notes that say these will be relocated, it is not sure where and some of the pedestrian footpaths have pinch points.
- Loading zones not shown.
- Cycle markings not shown on all sections of cycle lanes. It assumed that regulations will be met.
- Location of signs are not shown. It is noted that Clearway and T2 signs need to be located at a minimum of 100 m spacing

There is also no clear delineation between the clearway cycle areas and the areas where the cycle lane is no longer in the parking lane (for example see sheet Low Parking, 05 A).

Some of the existing kerb crossings are steep and are in the cycle path. It is noted that on the drawings some have red hatching on them. It is assumed that this means these will be filled in and levelled, however there are no notes on the drawings to confirm this. Where these kerb crossings are relocated, they could create a pinch point in the cycle path.

4.4 Driveways adjacent to Cycle Path – Moderate

Frequency Rating	**Occasional**	Severity Rating	**Likely**

It has been observed that drivers on the Hutt Road pulling out of a driveway tend to look right for approaching vehicles and do not look left towards Wellington, where the cyclists are predominantly coming from during the evening peak, when the driveway movements are heaviest. The crash history summary report noted that on Hutt Road, 73% of cyclist crashes involved a northbound cyclist. The proposed design does not eliminate this problem. At several locations, issues related to sight distance obstruction from parked vehicles, or a lack of green surfacing across the driveway are being addressed by the design.

For example, an activated sign has been placed within the spotlight carpark, the sign is high (above the drivers view shaft for within a carpark) and is on the left, while drivers are looking right. Drivers pulling out of the driveway are likely to wait on the cycle path for a gap in oncoming traffic, and will not see a sign in the property.

Recommendation

Consider improvements at each vehicle crossing on a case by case basis. Ensure warning signage is within driver field of vision. Consider raised profile treatments and reduced angle entries to lower turning vehicle speeds. Consider signage on driveways to supplement proposed green surfacing treatment for increasing driver awareness of the cycle path.

Designer Response

Has been considered as part of design process. No change proposed.

Safety Engineer

N/A

Client Decision

A trial is to take place to determine suitability of using ITS for mitigation. This will feed into the final detailed design for warning signs and ITS used for the project if required. No changes are required until this determination is made.

Action Taken

No change to design.

5. Audit Statement and Conclusion

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. The problems identified have been noted in this report.

A Concept Stage safety audit for the Hutt Road Cycle Path project has been undertaken with 26 issues and 9 comments being identified and are summarised in Table 3 below.

Table 3: Summary of Issues

Serious	Significant	Moderate	Minor	Comment	Total
0	5	9	12	9	35

Signed: Issued on pdf Dated: 17/07/2015

Simon Prosee, GHD Limited

Signed: Issued on pdf Dated: 17/07/2015

Curtis Lee, GHD Limited

Designer: Sam Thornton, Senior Transportation Engineer

Signature……(refer PDF)……Date: 31/07/2015

Safety Engineer: Name…… Position…….

Signature…….. ……Date…….

Project Manager: Name…… Position……..

Signature…….. Date…….

Action Completed: Sam Thornton, Senior Transportation Engineer

Signature……(refer PDF)……..Date: 31/07/2015

Project Manager to distribute audit report incorporating decision to designer, Safety Audit Team Leader, Safety Engineer and project file. Date:……..

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GHD

Level 1, Grant Thornton House
215 Lambton Quay, Wellington 6011
T: 64 4 472 0799 F: 64 4 472 0833 E: wgtnmail@ghd.com

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
1	Laura Skilton	Simon Prosee		Curtis Lee		

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Appendix J: Visualisations

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TRANSIT LANE
7-9AM
4-6PM
MON-FRI
BUS LANE
7AM-9AM
4PM-6PM
MON-FRI
NO
ISUZU
FPE471


ceMakers
TIMBER
MASONRY
DRAINAGE
PANELS
HARDWARE
PAINT
FOR ALL YOUR HOME
& LANDSCAPING NEEDS
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MEH941


Hutt Valley 2
BUS LANE
FIRE SECURITY

Opus International Consultants Ltd
L10, Majestic Centre, 100 Willis St

PO Box 12 003, Wellington 6144
New Zealand

t: +64 4 471 7000
f: +64 4 471 1397
w: www.opus.co.nz