# Indicative Business Case

**Strategic Assessment and Funding Application to Proceed to Detailed Business Case**

## The Nelson Maitai River to Rocks Road Cycle Facility

27th September 2017 Final Revision 3

## Approval

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| DATE: 15TH MARCH 2017 | DATE: 15TH MARCH 2017 | DATE: MAY 2017 | DATE: |
| | | | |

## Revision Status*

| REVISION NUMBER: | IMPLEMENTATION DATE: | SUMMARY OF REVISION |
|---|---|---|
| R1 | 15th March 2017 | Client feedback changes- Update of Option 2 plans and grammar changes |
| R2 | 11th August 2017 | Client feedback and changes made following NCC Council report |
| R3 | 27th September 2017 | Final Format Review |

## Template Version

| REVISION NUMBER: | IMPLEMENTATION DATE: | SUMMARY OF REVISION |
|---|---|---|
| 1.0 | 1 June 2013 | 1st Release |
| 1.1 | 27 June 2013 | Part C. updated |

# Contents

# Executive Summary

This Indicative Business Case (IBC) has been prepared on behalf of the Nelson City Council (NCC). This IBC investigates infrastructure solutions for improved cycling facilities connecting the existing Maitai River shared path to the existing Rocks Road Cycle facilities/ Wakefield Quay: a total project length of 1.2km. The proposed facility is targeted at the ***"interested but concerned"*** cyclists.

*'These users are defined as potential cyclists, who do not currently cycle regularly, but would cycle more often if improved facilities were provided that satisfy their personal safety needs.'*

**Photograph 1: SH6, Haven Road Looking North**

For this user group, separation and protection from traffic is the key personal safety need.

Currently Haven Road SH6 carries 20,000 vehicles/day, with 8% of that traffic being heavy commercial vehicles (large trucks). Existing counts show 500 cyclists use Haven Road per day, with a high proportion of commuter cyclist heading southbound towards Tahunanui Beach in the afternoon. The pedestrian volume is estimated to be 150 pedestrians/day (no formal count has been completed). It is assumed that the pedestrian volume is higher on the inland footpath because of the adjacent commercial businesses.

The existing highway carriageway has 3.7m wide traffic lanes, a 1.8m wide median shoulder, existing on-road cycle lanes of 1.8m to 2m width, parallel on-road parking, a 2m to 2.5m footpath on both sides of the road and a wide central grass median (with trees) of variable width.

The problems identified with the lack of a suitable cycle facility connecting the Maitai River Path to Wakefield Quay/Rocks Road are:

> ***Problem One (40%):*** *The current cycle facilities on Haven Road do not cater for all cycling user groups, especially the interested but concerned users, resulting in suppressed cycling demand and a gap in the cycle network.*
>
> ***Problem Two (30%):*** *The existing cycle users on Haven Road are exposed to a high crash risk.*
>
> ***Problem Three (15%):*** *There is poor community connectivity between the Central City and the Haven Road, Rocks Road and Tahunanui waterfront.*
>
> ***Problem Four (15%):*** *There is uncertainty about the future arterial road traffic capacity requirements, long term road classification as a State Highway, Port Nelson freight access points and The Haven Commercial Precinct Development.*

A key constraint of this project is the impact of any option on the development at the Haven Precinct and both parallel projects have been sharing information.

Four key options have been identified to address these problems which are:

- Option 1 – Do Minimum Option ($0.8M) - This option proposes reducing the existing traffic lanes and median shoulders and widening of existing on-road cycle lanes to 2m, and marking a 0.5m buffer area between the cycle and vehicle lanes to provide improved separation, refer Figure 1. To address the cycle crash black spot at Hay Street, it is proposed to install electronic signs and green LED smart studs to warn turning vehicles

of approaching cyclists, refer Figure 2. To improve connectivity to the Maitai River Shared Path, a new shared path connection will be constructed connecting Wildman Avenue to the shared path as shown in Figure 3. This options also upgrades the existing city bound approach to the Haven Road/QEII Drive roundabout to the current best practise markings.

**Figure 1: Option 1 Do Minimum Photo Simulation with 0.5m Buffer Between Cyclist and Vehicle Lane**

**Figure 2: Examples of Electronic LED Smart Studs and Electronic Cycle Signs Proposed for Hay Street Intersection**


**Figure 3: New Connection from the Existing SH6 Underpass and Maitai River Shared Path to Wildman Avenue**

- Option 2 – Separated Cycle Lanes ($1.8M) - This option proposes to create a separated on-road cycle lane with cyclists protected from traffic by a solid island. This option will have a cycleway connection to the Maitai Bridge using a shared path along QEII Drive SH. The separated cycle lane will be single directional on each side of Haven Road through to Hay Street. From Hay Street onwards we would have on-road cycle lanes as there is insufficient width for the separated cycle lanes to extend further. The safety improvements at Hay Street would be incorporated. The land acquisition along QEII Drive is required but not at Hay Street. This requires the removal of all the on-road parking on the seaward side of Haven Road.

**Figure 4: Option 2 Separated Cycle Lane photo simulation with solid separator island between cyclist and vehicle lane**

**Photograph 2: Example of a mono directional separated cycle lane from Christchurch NZ**

- Option 3 – Shared path on the Seaward Side via QEII Drive, SH6 ($2M) – This option proposed a shared path on the seaward side of Haven Road. It connects through to the Maitai Path and the Maitai Bridge underpass with the shared path extending along QEII Drive. This option has an electronic safety system at Hay Street and incorporates improved on-road cycle lanes for confident cyclists and commuter cyclists heading out of

town to Tahunanui. This option does require land purchase at along both the QEII SH6 frontage and at Hay Street. Some parking is lost along the Seaward side of Haven Road.

**Figure 5: Option 3 Photo Simulation with On-road Facility as per Option 1 with Bi-directional Shared Path on the Seaward Berm**

- Option 4 - Shared path on the Seaward Side of Haven via Vickerman Street ($1.8M) – This option involves creating shared path between Vickerman Street and Rocks Road as per Option 3 above. From Vickerman Street through to the Maitai path and bridge this option would use local internal Port Nelson roads via Vickerman St and Wildman Avenue. This option incorporates the same on-road and safety treatments as Option 3. However, it does not require the land acquisitions along QEII Drive frontage.

The forecasted new users were predicted from a behavioural preference community survey as part of the previous Rocks Road Cycle Facility Project. The user projections are listed in Table 1 below, for each option.

**Table 1: Option New User Forecast**

| Option | New Pedestrians | New cyclists |
|---|---|---|
| 1 | 100 pedestrians/day | 250 cyclist/day |
| 2 | 200 pedestrians/day | 500 cyclist/day |
| 3 | 250 pedestrians/day | 500 cyclist/day |
| 4 | 250 pedestrians/day | 500 cyclist/day |

A Multi Criteria Analysis (MCA) process has been used to select the preferred option with a weighting of criteria of: 50% design aspects; 30% community/stakeholder interests; and, 20% project costs and programme risks.

The final option scoring showed that Option 3 was the preferred solution with option 4 being a close second. The ranking of the options is shown in Table 2 below.

**Table 2: Option Economic Analysis BCR Ratios**

| Option | MCA Score | Benefit cost ratio | Capital Cost |
|---|---|---|---|
| 3 | 9.3 | 6.1 | $2M |
| 4 | 8.5 | 6 | $1.9M |
| 1 | 7.5 | 7 | $0.8M |
| 2 | 2.5 | 6 | $1.8M |

The public and stakeholder consultation process was completed with feedback showing that the majority of responses supported Option 2 (separated cycle lanes), or Option 3 (shared pathway on the seaward side of Haven Road).

A Road Safety Audit was completed in April 2017.

The NZ Transport Agency's (Transport Agency) State Highway Road Safety Engineer, Steve James, endorsed Option 3.

This IBC recommended Option 3, a shared path on the seaward side of Haven Road, has a NZ Transport Agency project profile of High, High, High (HHH), with a Benefit Cost Ratio of 6.1. ***(Note that the official NCC report to Council had this Option 3- shared path, named as Option 2).***

The selected option meets the Urban Cycle Fund Criteria to secure this funding.

It is the Indicative Business Case recommendation that seaward side shared path option, valued at $2m dollars, proceeds to detailed design with construction completion forecasted for June 2018.

# PART A – INTRODUCTION

## 1 Background and Project Scope

This Indicative Business Case (IBC) has been prepared on behalf of Nelson City Council (NCC) to investigate and recommend a preferred option for an improved cycle facility between the Maitai River and Rocks Road, for the ***"interested but concerned"*** cyclists.

*Definition: An interested but concerned cyclist is a cyclist who would like to cycle but does not cycle regularly because of concern for safety or lack of suitable cycle infrastructure.*

The purpose of this report is to recommend a preferred option to proceed to detailed design and construction.

This IBC focuses on selecting a preferred cycle facility type and location, refer Figure 6 below which shows study area and options.

Figure 6: Location of the four options being considered

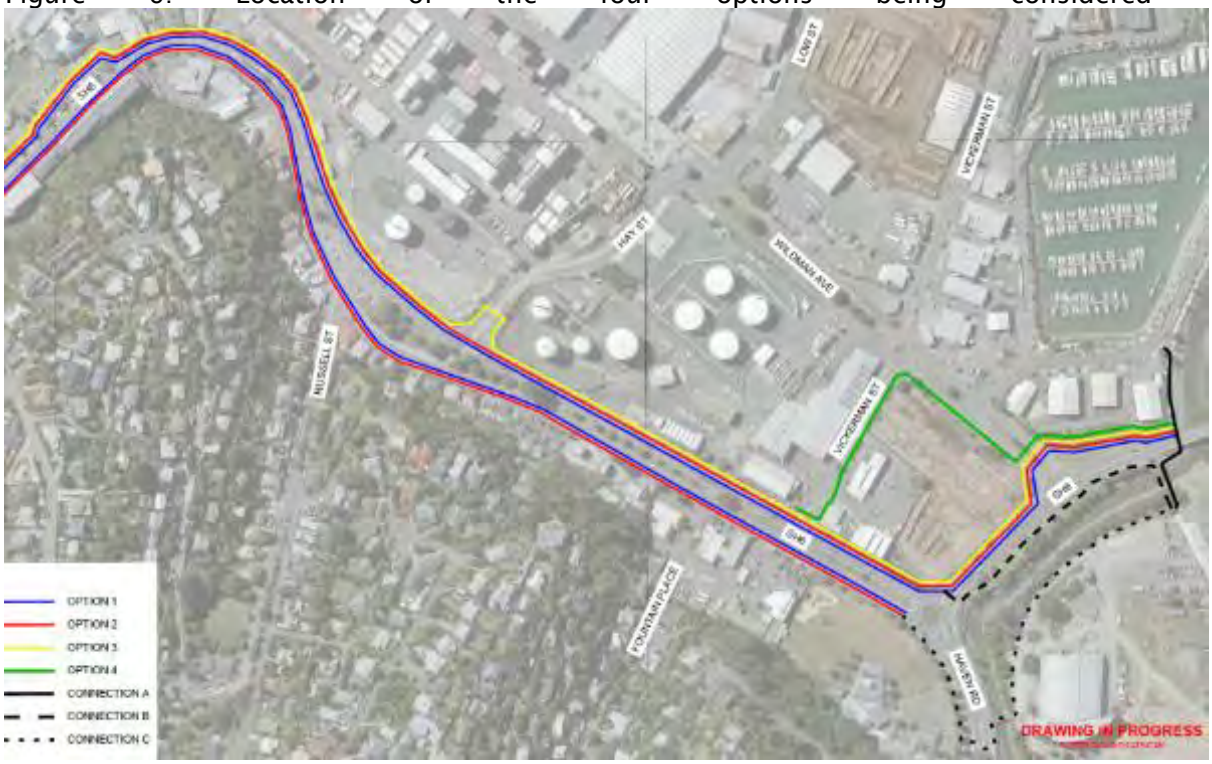


**Figure 6: Location of the four options being considered**

The scope of this IBC was to consider the following four options:

**Option 1:** A do minimum, on-road cycleway improvements and safety improvements at Hay street intersection (blue);

**Option 2:** A single directional separated cycle facility on each side of Haven Road, SH6 (red) with a connection to the Maitai River;

**Option 3:** An off-road shared path facility on the north side of Haven Road, SH6 (yellow) with on-road do minimum improvements, and a connection to the Maitai River; and,

**Option 4:** An off-road facility on Wildman Avenue/Vickerman Street and the north side of Haven Road, SH6 (green).

In addition, three connection alternatives were considered between the existing Maitai River Shared Path and Haven Road. These were:

**Connection A:** A shared path passing under the QEII Drive, SH6/Maitai River Bridge linking up to Wildman Avenue and running along beside QEII Drive;

**Connection B:** A shared path crossing Saltwater Creek and running on the city side of QEII Drive and crossing SH6 at grade; and,

**Connection C:** A shared path across Rutherford Park and crossing Saltwater Creek and Haven Road.

All three of these connections are depicted in Figure 6.

This report is an IBC and the options and cost estimates are preliminary and have been developed without survey, service information or potholing or geotechnical investigations.

# 2 Work Completed to Date

In 2015 a study was completed of possible cycle facilities along Rocks Road, SH6 including pedestrian and cycle counting, and new user forecasts. This project is currently on hold pending the outcome of the Southern Link study, which is looking at traffic congestion solutions between Annesbrook Roundabout and Nelson CBD.

This previous study was publicly consulted and recommended a preferred solution of a shared path facility on the seaward side of Rocks Road with retention of on-road cycle lanes/ shoulders for commuter cyclists. This project had a capital cost in the order of $20 to $25M, depending on the final design widths adopted.

A preliminary safety audit was undertaken in the 2015 project and highlighted issues with using a minimum standard on-road cycle lane on a busy arterial corridor with heavy truck movements. It suggested the use of a higher standard cycle lane width of 2 to 2.2m past parked cars.

Currently NCC are undertaking a scoping study of the Haven Precinct Development. The IBC options have been shared with Haven Precinct Study Team to coordinate both parallel projects.

The Transport Agency's Southern Link Project may affect the state highway corridor. This IBC acknowledges this uncertainty and will consider the flexibility of any recommended options as a key criterion of the MCA.

# 3 Project Governance

## 3.1 Programme Organisation

### Governance

This project is a NCC project and has been manged by the NCC capital projects team. The project's route passes along the state highway corridor so the Transport Agency is a key partner in any final agreed option. No work can be undertaken without the Transport Agency's approval.

### Resourcing

Opus International Consultants (Opus) are the professional planning and engineering consultants who have been engaged to complete the detailed investigation work and prepare the IBC documentation.

# 4 Report Purpose

The IBC documentation and a comprehensive assessment of alternatives are required to secure both NZ Transport Agency financial assistance and statutory planning approval.

In summary, this IBC provides an overview of:

- The strategic assessment;
- The key problems identified and the benefits of investment;
- The possible cycle facility options;
- The preliminary constraints;
- A summary of public consultation;
- A concept plan of options and preliminary cost estimates (without survey, service locations or land valuation);
- Future user number forecasts for each option and economic evaluation;
- The preferred option selected through a multi-criteria assessment process; and,
- A recommendation for a preferred option to proceed forward to Detailed Design.

# PART B – STRATEGIC CASE OVERVIEW

## 5 Strategic Assessment – Outlining the Need for Investment

The proposed cycle connection along Haven Road addresses the problems of; the lack of a suitable cycle facility for interested but concerned cyclists, a high existing crash rate for cycle users, poor community connectivity between the Central City and the waterfront and uncertainty regarding the future road corridor use and function.

### 5.1 General

Prior to considering options or solutions it is part of any business case process to first define the problems that the business case seeks to solve. This Strategic case sets out the problems and the benefits of solving these problems.

### 5.2 Organisation Strategies and Objectives

Nelson City has many high level strategic documents which endorse the Nelson community's desire to encourage and support walking and cycling as a sustainable and active transport form.

This business case builds on these higher-level strategies and objectives by looking in detail at the identified gap in the existing cycle network along Haven Road. This network gap limits the connection between Nelson City and Rocks Road/Haven Waterfront. This link is known as the City to Sea linkage.

**Table 3: Key Policies**

| Strategy/ Policy/ Service Level Definition | Contribution |
|---|---|
| Out and About Active Travel and Active Recreation Policy | Consistent facility provisions and a strong theme of policy within policy documents |
| Long Term Plan (LTP) – Walking and cycling are easy and attractive travel choices | Project will provide infrastructure to enable the LoS of – 'Percentage of community that walks or bikes to work is 25% by 2018' to be met. |
| Regional Transport Plan (RTP) | Contributes to objectives N1(communities with travel choices) and N3(supports energy efficiency). |
| Nelson Plan strategic outcome to connect communities | This connection supports ease of access along this corridor. |

## 5.3 Key Partners for Strategic Case Development

The Strategic Case has been developed in partnership with NCC staff and key stakeholders below.

**Table 4: Key Partners and Stake Holders**

| Stakeholder | Interest | Consulted? |
|---|---|---|
| Walk and Cycle Groups | Active travel. Initial consultation undertaken as out and about policy and primary network developed. | Yes |
| Councillors | Network connectivity, design aesthetic and location. | Yes, through Annual Plan and LTP development |
| Operations | New asset maintenance requirements | Yes |
| NZ Transport agency | NZ Transport Agency P&I – co-investor<br><br>NZ Transport Agency HNO – owner/operator of Haven Road and QEII Drive. | P&I - yes<br><br>HNO - yes |
| Port Nelson | Land purchase/swap likely to be required. | Yes - Initial conversation with Matt McDonald |
| Project Maitai | The Saltwater Creek interest group should be involved in design development. | Not yet consulted |

## 5.4 Defining the Problem/Opportunity

The following key problems are identified:

**Problem One (40%):** The current cycle facilities on Haven Road do not cater for all cycling user groups, especially the interested but concerned users, resulting in suppressed cycling demand and a gap in the cycle network.

**Problem Two (30%):** The existing cycle users on Haven Road are exposed to a high crash risk.

**Problem Three (15%):** There is poor community connectivity between the Central City and the Haven Road, Rocks Road and Tahunanui waterfront (Poor city to sea link).

**Problem Four (15%):** There is uncertainty about the future arterial road traffic capacity requirements, long term road classification as a state highway, Port Nelson freight access points and the Haven Commercial Precinct Development.

The weighting allocated to each of the problems was determined by the following factors:

- Problem One (40%):

  This problem is the major driver for this project and supports the higher-level transport objectives of the Nelson Transport Plan to increase cycling modal share and

targeting the interested but concerned user who requires more separation and protection from traffic. This is the driving reason for the urban cycle fund support.

- Problem Two (30%):

  The attraction of more interested but concerned users is based on improved safety. The Hay Street intersection has a significant crash history. The traffic crash database shows 15 cycle and pedestrian related crashes in the project area (2 serious, 10 minor and 3 non-injury). There is a cluster of 5 cycle crashes at the Hay Street intersection. Due to the high social cost of these crashes, this problem has been given this high percentage rating. The Hay Street/SH6 intersection is one of the top regional cycle crash blackspots.

- Problem Three (15%):

  This problem statement weighting is based on the key strategic goals of the earlier Inner City Enhancement Studies and the more recent Heart of Nelson Study 2009, to improve the City to Sea connection. The Maitai Shared Pathway was the first step in this and this business case seeks to close the gap along Haven Road. The project needs to consider this problem and has been given a 15% weighting as this is considered the starting level for any business case problem. This issue is difficult to accurately quantify but is considered worthy of a separate problem statement.

- Problem Four (15%):

  The waiting of this problem is based on the importance of the Transport Agency's Southern Link Study and strong endorsement by Nelson City Council of the need for a long term transport solution for Nelson. It also acknowledges the ongoing Haven Precinct study. Therefore, consideration of this uncertainty and flexibility of any option is a real problem any viable solution needs to consider.

## 5.5 Status of the Evidence Base

- Refer to the 2015 Preliminary Scheme Plan by Opus
- 'Rocks Road Cycle Facility Safety Audit' report by Via Strada, 2015
- Refer to the 2015 Urban Cycle Fund application by NCC
- Refer to the public survey and user forecast report by Opus for Rocks Road Cycleway
- CAS data

## 5.6 The Benefits of Investment

The potential benefits of successful investigation into the above problems were identified through a benefit mapping process undertaken by Opus. The potential public community benefits for addressing the problems are:

- Benefit One: Improved cycle infrastructure catering particularly for the interested but concerned cycle user.
- Benefit Two: Reduction in cycle crashes.
- Benefit Three: Improved community connectivity between The Maitai Shared Path and Wakefield Quay.
- Benefit Four: A design framework for the provision of cycle facilities for the expected future cycle demand. This will inform the ongoing Southern Link Business Case Study, the state highway one network classification considerations, the Port Nelson freight access points future planning, and the Haven Precinct Commercial Study.

This project's Key Performance Indicators (KPI) that will measure project success are shown in Table 5 following.

**Table 5: Haven Cycle Facility Proposed Key Performance Measures**

| Key Performance Indicators (KPI) | Measure | Existing Level | Target |
|---|---|---|---|
| Increase in pedestrians and cyclists using Haven Road at Hay Street screen line | Pedestrian Daily Volume March | 150 peds/day | 400 peds/day |
| | Cycle Daily Volume March | 500 cyclist/day | 1000 cyclists/day |
| Reduction in CAS reported pedestrian and cycle crashes along Haven Road | Crash rate and severity from CAS over 5 years | 15 crashes/5 years (2 serious, 10 minor and 3 non-injury) | 5 crashes over 5 years (0 serious, 0 minor, 5 non-injury) |
| Reduction in cycle crashes at Hay Street/SH6 Intersection | Crash rate and severity from CAS over 5 years at Hay Street | 5 cycle crashes in 5 years | No cycle crashes in 5 years |
| An increase in public opinion of the connection of the City to Haven Road | Public Opinion Survey<br><br>"Support or strongly support that a strong City to Sea connection exists in Nelson" | Unknown – a base public survey is required | Target an increase in this support – targeting 60% or greater support |
| This project supports the implementation of the outcomes of the Southern Link and Haven Precinct Studies | Any option implemented permits the implementation of other study outcomes | Consultation | Plans shared with other parties and flexibility in design |

# 6 Summary

## 6.1 Purpose

The primary purpose of this IBC is to provide decision-makers with an early indication of the most preferred option for The Maitai to Wakefield Quay cycle connection along Haven Road.

The purpose of this strategic case section of the IBC is to identify the problems being solved, the benefits of the proposed investment and the KPIs that will measure success.

# PART C – ACTIVITY DEVELOPMENT

## 7 Activity Context

### 7.1 Activity Definition

The proposed works covered by this business case involve road remarking, road berm or footpath widening, drainage works, excavation and laying of cables, construction of traffic islands, and landscape planting on Haven Road and QEII Drive, SH6.

#### Heritage/Archaeological Sites and Culture

The route of this project follows the edge of the historic coast which has known Pre-European and early settler pre-1900 occupation and habitation. The works are mainly on already disturbed land which has the existing road or road berm formation. Also, the land around the batters of the existing QEII Drive, SH6/Maitai Bridge are likely to already have been modified.

It is, however, a legal requirement due to the pre-1900 land use, to seek a NZ Heritage approval and to undertake a heritage assessment of this site.

The Auckland Point School is a significant site for local Iwi being a historic Maori settlement site. It is recommended that consultation is undertaken with local iwi, and that conditions are included to cover the artefact discovery protocol.

There is a heritage site memorial marker outside NZ Oil Services Ltd on Haven Road, refer Photograph 3 below. This marker recognises the 1841 immigrant landing site of the first New Zealand company vessels landing in Nelson. This marker is hidden in the garden and could be made a feature. This marker would appear to be on private property. It is an opportunity to develop this memorial as a feature of the path with seating and a history interpretative panel.


**Photograph 3: Heritage Marker of Immigrant Landing Site on Haven Road, SH6**

**Existing corridors**

The existing state highway corridor is managed by the Transport Agency. Being a 50km/hr Regional One Network Road Classification (ONRC) state highway, the road carriageway and road marking are maintained by the Transport Agency and the road berm, vegetation and footpath is maintained by NCC. The street lighting, storm water drainage, bridge structures and safety rails, and signage are also maintained by the Transport Agency.

The proposed cycle safety improvements along the road corridor could attract additional financial support from the Transport Agency's Highway Network Operations (HNO) and will require approval of the Transport Agency's HNO.

It is suggested that if this project proceeds, that a maintenance agreement is prepared to better delineate the ongoing maintenance responsibility of the proposed cycle facilities, markings, and signage.

**Property**

This project is predominantly within the existing legal state highway corridor and designation.

The proposed design for Option 3 requires land acquisition from two property owners. Land is required along the frontage of QEII Drive SH6 from Port Nelson between Wildman Avenue and Haven Road (300m$^2$), refer Figure 7 following, and NZ Oil Services Ltd at Hay Street (225m$^2$), refer Figure 8 following.

All three of these parcels are required to create a road berm, between the shared path and the state highway, to provide a safe buffer for users from road traffic, particularly large Heavy Commercial Vehicles (HCVs). It is possible to reduce the land take at both locations if the road berm is narrowed, if property owners are reluctant to sell their property.

The Hays Street site has already had the boundary fence setback and it may be possible rather than a direct purchase, to obtain an easement. Care will be required to ensure public health and safety minimum clearances to oil installations are maintained.

Property negotiations are being handled by NCC.

The connection to the Maitai River Shared Path requires creating a new connection between the Maitai River and Wildman Avenue as shown in Figure 9 following. The adjoining marine cable business currently occupies some of the legal road. In order to build the new path, this occupation will have to be stopped and moved back onto their property.


**Figure 7: Property Required from Port Nelson between Wildman Avenue and Haven Road for Options 2 and 3, 303m²**

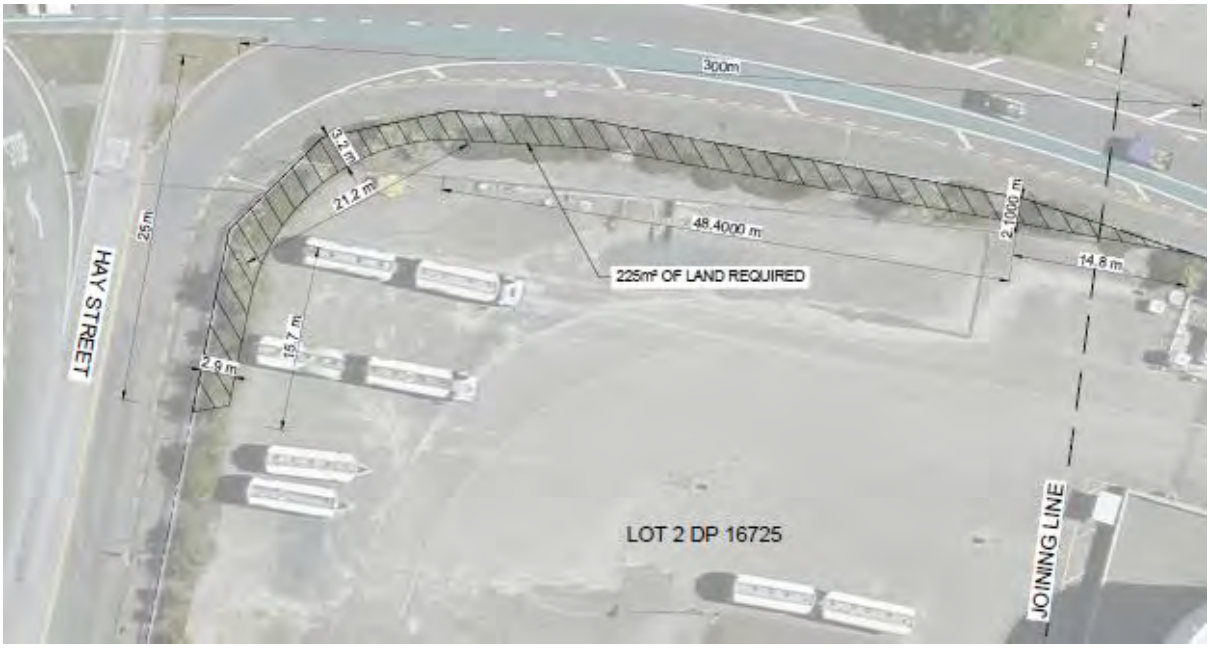


**Figure 8: Property Required from NZ Petroleum at Hay Street for Options 3 and 4**

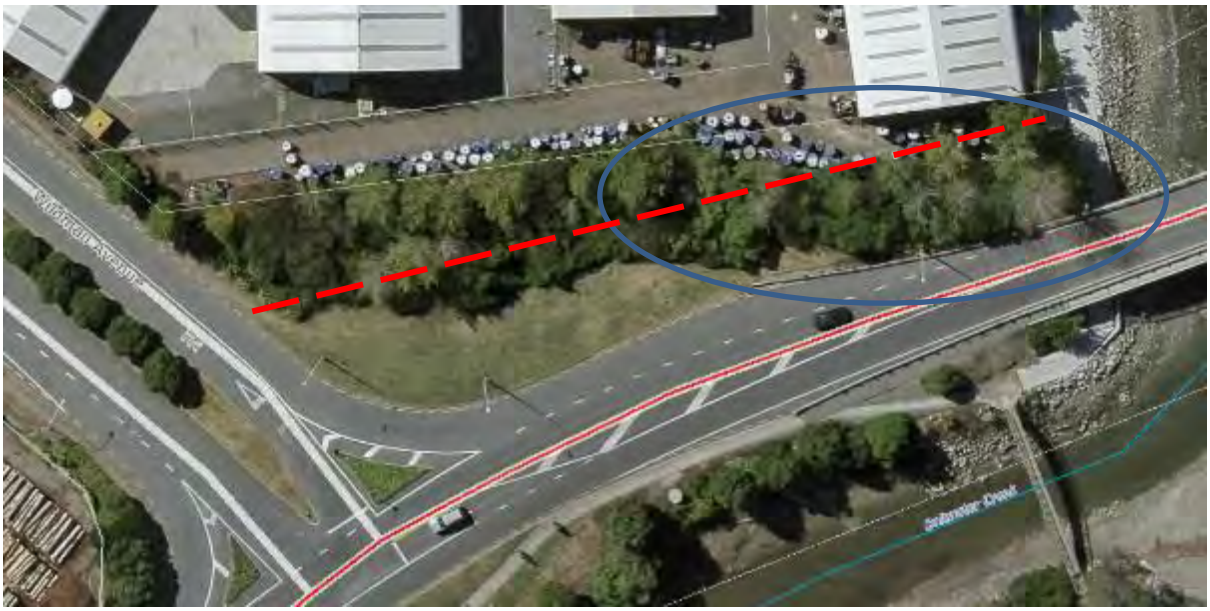

**Figure 9: Connection to Maitai River Path Indicated as a Red Dashed Line for Options 1 to 4**

### Geotechnical and Hazardous Activities and Industries List (HAIL Sites)

Currently no geotechnical investigation or pavement design has been completed.

The proposed options all cross identified HAIL sites and will require HAIL assessments, soil testing, and resource consent to undertake earthworks. Refer Figure 10 below.

**Figure 10: Nelson City HAIL Site Locations from the Nelson Resource Management Plan**

### Urban Design and Landscape

The landscape of this route is predominantly urban/semi-industrial on the seaward side and residential/commercial on the inland side. This route is a gateway to Nelson and has a distinctive tree lined centre island.

It is important that gateway qualities are acknowledged along with connection enhancement of the City to Sea connection. This project includes a cost estimate allowance for a landscape plan, berm planting, gateway landscaping, way finding features, creation of roadside berms, and possible relocation of the heritage marker to create more of feature of this site.

There is also opportunity to have some artistic enhancement with pavement art and theming of the shared path for users. Refer Photograph 4 following.

**Photograph 4: Permanent 3D Street Pavement Art Work.**

### Topography

The topography of the route is generally flat, with a short steep gradient from the Maitai River Path to Wildman Avenue. The connection of the proposed new path to the existing Maitai River Path will need careful consideration of grades and sight lines and may require some small retaining walls.

The widening at the Port Nelson Log Yard will require the relocation of the existing boundary fence and tilt slab retaining wall. There are power cables in this vicinity. This modification could prove to be expensive and has been allowed for in the design. However, during detailed design/ value engineering, the option of removing the road berm and narrowing the shared path could be considered which could eliminate the need to acquire land all together and significantly reduce the capital cost. This could be considered in more detail following a topographical survey. However, the road berm is important for path user safety and separation.

**Figure 11: Port Nelson Log Yard Corner Wildman Avenue and QEII Drive, Showing Tilt Slab Wall and Power Junction Box.**

### Utilities

**A review has been undertaken of NCC utilities and generally the seaward side of Haven Road and QEII Drive are free from any longitudinal underground services. There are several lateral sanitary sewer, water and storm water connections. Along the seaward kerb line of QEII Drive and Haven Road there are 10 storm water sumps. These sumps are generally old style square sumps without back entry or storm water sock rubbish collectors or treatment.**

There are also several fire hydrants in the road carriageway on Haven Road in the city bound lane between Collins Street (old Port Nelson entrance) and Russell Street. As we have proposed for some options to move the kerb line and wheel tracks, it is recommended that these hydrants be relocated to the median outside the wheel tracks to reduce noise and to provide easier maintenance and operational safety.

No utility check has been undertaken for power, telecommunications or petroleum pipe lines.

From walkover observations along Haven Road there are significant fibre optic cables and copper cables from both Chorus and Telecom running along the existing footpath on the seaward side of Haven Road. There are several access chamber boxes. The depth of the cover of these cables is unknown. It is likely that observers will be required onsite for work in this vicinity.

This is an identified risk and will be considered at Detailed Design, where service potholing will be undertaken to check covers and location.

### Government Urban Cycle Fund Financial Assistance

NCC has successfully obtained financial support for this project from the Government's Urban Cycle Fund (UCF). A condition of securing funding is that the physical works are to be substantially completed before June 2018. This is a major driver for the project construction timeline, with June 2018 as the target opening date.

The estimates for the options has been split into three key components:

- On-street safety and delineation improvements;
- Road berm and safety improvements; and,
- Professional services.

# 8 Data Analysis

## 8.1 User Forecast

The Rocks Road annual summer daily cycle volumes are shown in Figures 12 to 15 following, which depict a steady increase in cycling activity along Rocks Road. The cycle counts show an uneven directional flow on Rocks Road, with twice as many cyclist travelling towards Tahunanui than in the opposite direction. At this stage no evidence has been found to explain this difference. The cycle counts also show a higher volume during weekdays, than on the weekend, indicating the importance of this route for commuters.

This count data shows a good level of current walking and cycling usage of Rocks Road; the second highest volume walking and cycle route in Nelson (The Railway Reserve in Stoke is the highest volume corridor). There is the potential to increase the number of cyclists in the city bound direction.

On average, 600 cyclists/day use the Rocks Road existing on-road cycle lanes, refer Figures 12 to 15 following.

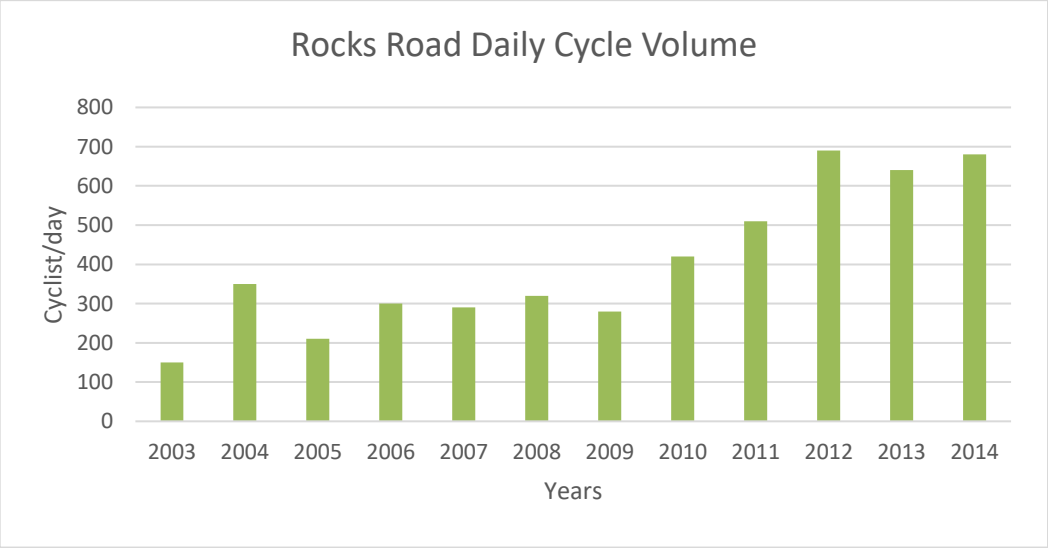


**Figure 12: Rocks Road Annual Summer Cycle Volumes**

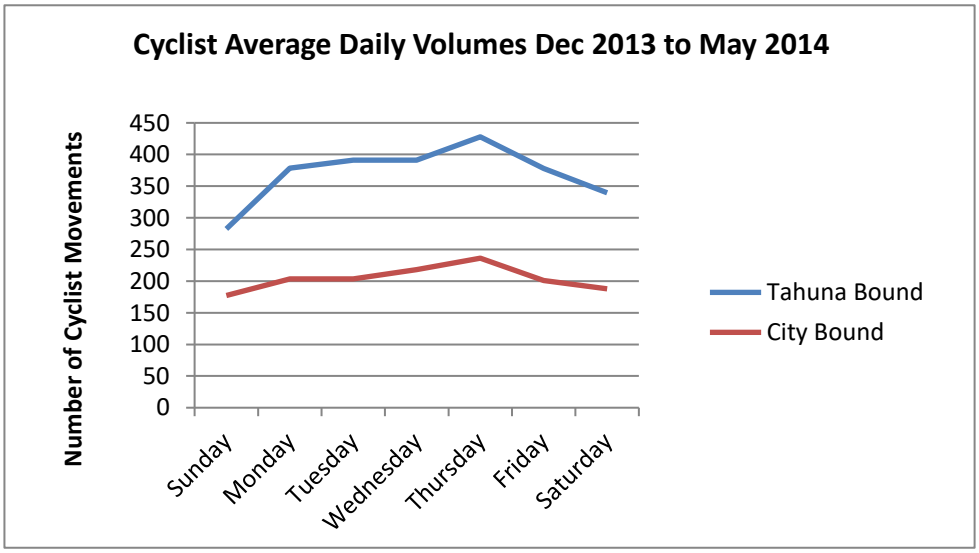


**Figure 13: Rocks Road Cycling Directional Counts**

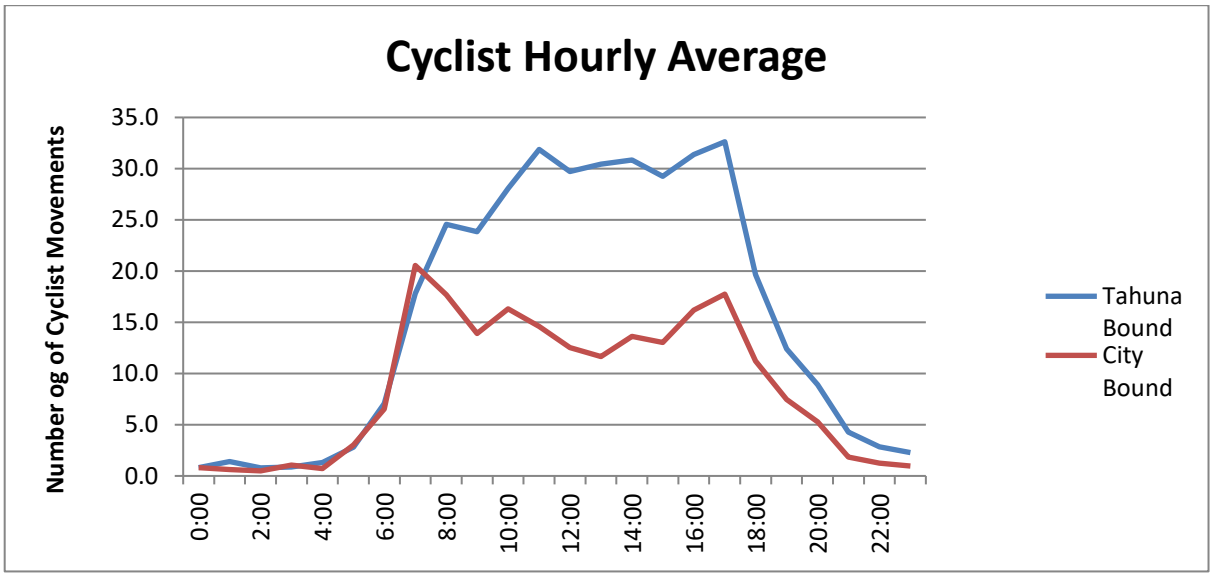


**Figure 14: Rocks Cyclist Hourly Flows**

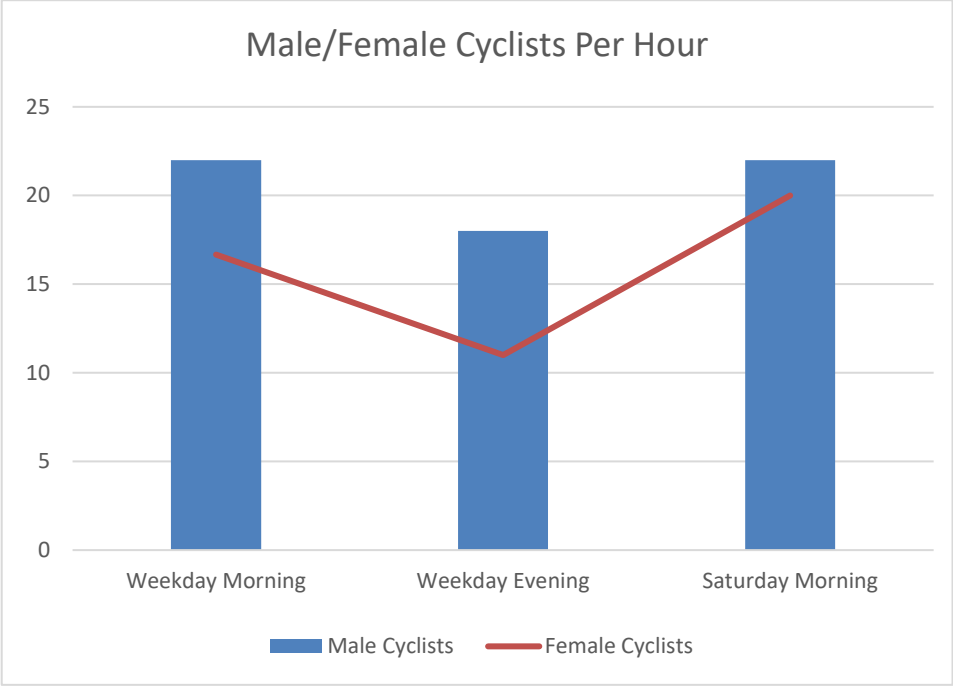


**Figure 15: Rocks Road Cycle Gender Split**

NOTE: The data for females is from a limited survey of cyclists over two days during a week day and weekend, both during daytime and the evening, but would indicate a ratio between 42% to 47% female cyclists. This would indicate female cyclists do not feel significantly unsafe on this road.

A behavioural survey was undertaken of the Nelson Residents Panel to understand the ratio of interested but concerned users we have in Nelson and potential users of Rocks Road. The results are shown in the following Tables 6 and 7. Respondents were grouped into the following stages of change for cycling.

**Table 6: Nelson Walking User Groups**

| Stage of Change group | Percentage of population |
|---|---|
| Precontemplation | 4% |
| Contemplation | 1% |
| Ready for Action **(Interested but concerned groups)** | 9% |
| Action | 13% |
| Maintenance | 72% |

**Table 7: Nelson Cycling User Groups**

| Stage of Change group | Percentage of population |
|---|---|
| Precontemplation | 32% |
| Contemplation | 11% |
| Ready for Action **(Interested but concerned groups)** | 21% |
| Action | 21% |
| Maintenance | 16% |

This shows that the 21% of the population surveyed could be mobilised or activated to become cyclists if improved facilities were provided. This shows a strong suppressed demand.

Given that this data is conservatively estimated, the current level of users and level of users on a proposed improved facility along this corridor are shown in Table 8 following.

**Table 8: Existing and Forecast User Numbers**

| Section No. | Description | Length (m) | Traffic Volume Veh./day | Predicted Cycle/day | | Predicted Ped./day | |
|---|---|---|---|---|---|---|---|
| | | | | Now | 2018 | Now | 2018 |
| Section 1 | Maitai River Shared Path to Haven Road/QEII Drive | 250 | 11,600 | 200 | 400 | 150 | 200 |
| Section 2 | Haven Road/QEII Drive roundabout to Haven Road Precinct | 700 | 19,200 | 500 | 1000 | 150 | 300 |
| Section 3 | Haven Precinct (Excluded) | 150 | 19,200 | 500 | 1000 | 200 | 550 |
| Section 4 | Wakefield Quay development to Plant and Food building | 200 | 19,200 | 600 | 1000 | 200 | 550 |
| Total | | 1300 | | | | | |

## 8.2 Parking survey

A parking survey was undertaken in November 2016 along the route both during a working day and again in the evening to understand the number of car parks and their daily use.

The number of parking spaces along the route are shown in Table 9 below.

**Table 9: On-street parking along Haven Road and Wildman Avenue**

| Parking Section | Akerston to Russell St | Russell St to Wakefield Quay |
|---|---|---|
| Haven Road SH6 inland side | 39 parks | 11 parks |
| Haven Road SH6 seaward side | 34 parks | 6 parks |

| | |
|---|---|
| Port Route Wildman/Hay Street | 49 parks |

NOTE: There is an additional 19 parking spaces in the median opposite Russell Street used by nearby businesses.

The results of the parking survey are shown in Table 10 below. This indicates a high weekday all-day occupancy, which was observed to be predominantly staff of adjoining businesses. There is some residential parking for residents on the inland side as some

properties have no off-street parking. Most businesses on the inland side have customer on-site parking.

**Table 10: On-street Parking Occupancy Weekday and Evening Along Haven Road and Wildman Avenue**

| Parking Section | Akerston to Russell St | Russell St to Wakefield Quay |
|---|---|---|
| Haven Road SH6 Inland side | 56% (13%) | 36% (27%) |
| Haven Road SH6 Seaward side | 56% (12%) | 50% (50%) |
| Port Route Wildman/Hay Street | 39% (14%) | |

NOTE: (bracketed numbers are the occupancy after 7pm)

# 9 Assessment Criteria

To select a preferred option, a Multi Criteria Analysis (MCA) has been undertaken for the options considered in this IBC report. An MCA is a standard best practice approach to objectively evaluating a range of competing criteria, with a scoring system and a weighting for each criteria.

Individual criteria have been combined into three categories, which are shown below with respective total group weighting:

1. Design and Achieving Urban Cycle Fund (UCF) Objectives 50% weighting
2. Community/Stakeholder Interests 30% weighting
3. Project Cost and Programme Risks 20% weighting

The above categories and weightings have been agreed to by the Project Steering Group (PSG) and are shown graphically in Figure 16.

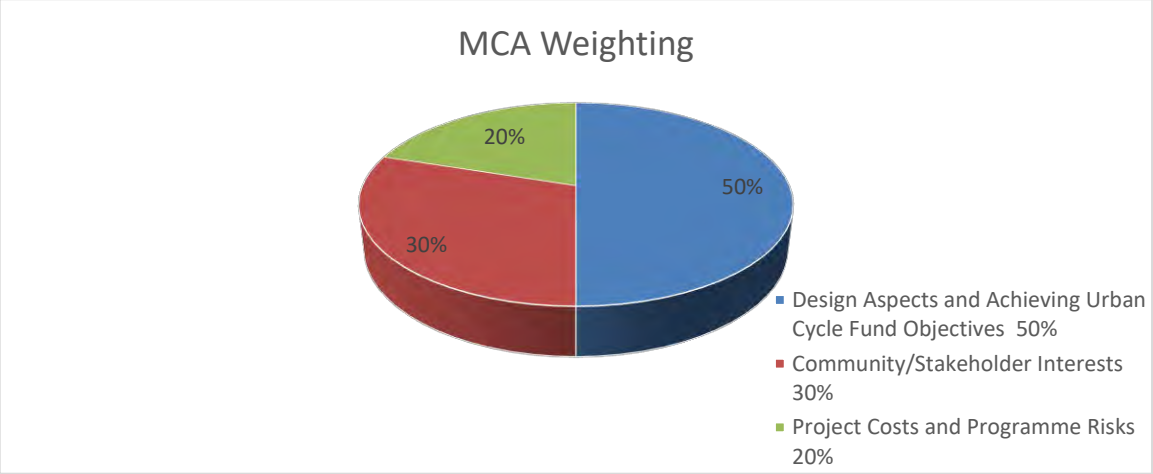


**Figure 16: MCA category weighting**

Each category compares detailed criteria with a scoring scale between -2 and +2. This method is similar to the categorisation and scoring method that was used to evaluate the Christchurch City Council Major Cycle Route projects.

To test the sensitivity of the analysis, various additional scenarios can be run with greater weighting (emphasis) placed on the other groups. For this MCA process three different sensitivity tests were assessed, with greater weighting placed on each of the three categories.

A detailed summary of the MCA weighting, individual criteria, scoring scale and sensitivity scenarios is shown in Table 11, and the full analysis spreadsheet in Appendix C.

**Table 11: Summary of Multi Criteria Analysis**

| **Category** | **Design and Achieving UCF Objectives** | | | | **Community/ Stakeholder Interests Context** | | | **Project Cost and Programme Risks** | |
|---|---|---|---|---|---|---|---|---|---|
| Criteria | Number of Users & Safety | Directness and Coherence | Recreation and Space for supporting Infrastructure | Attractiveness, Social Safety, Environment and Comfort | Culture and Heritage | Local Resident Impact | Wider Social Benefits | Budget Risks | Timing Risks |
| Score | 0 to 2 | -2 to 2 | -2 to 2 | -2 to 2 | -2 to 2 | -2 to 2 | -2 to 2 | -2 to 2 | 0 to -2 |
| Base Scenario | 50% | | | | 30% | | | 20% | |
| | 15% | 15% | 10% | 10% | 10% | 10% | 10% | 10% | 10% |
| Design Adjusted Scenario | 60% | | | | 30% | | | 10% | |
| | 25% | 15% | 10% | 10% | 10% | 10% | 10% | 5% | 5% |
| Community Adjusted Scenario | 35% | | | | 50% | | | 15% | |
| | 15% | 10% | 5% | 5% | 20% | 20% | 10% | 5% | 10% |
| Delivery Risk Scenario | 35% | | | | 15% | | | 50% | |
| | 10% | 10% | 10% | 5% | 5% | 5% | 55 | 25% | 25% |

# 10 Design Philosophy Statement

Part of the accepted approach to designing large scale civil infrastructure improvement projects is to establish the design parameters (standards) for the project that are deemed acceptable and that provide an affordable level of functionality and safety within the acceptable budget. This is termed a Design Philosophy Statement (DPS). The DPS should meet current best practice, be consistent with the project location and surrounding local facilities and be appropriate for the predicted number of users and growth.

To ensure a consistent design approach is undertaken, national design best practise is followed and that the asset owner's levels of service are achieved, the following design recommendations are made. It is recommended that these key DPS decisions are confirmed by NCC and the Transport Agency.

## 10.1 Summary of Recommendations

### 10.1.1 Design Parameters

- An on-road facility will be retained southbound to provide for heavy existing commuter cyclists use of 400 cyclists/day southbound, on the proviso that a shared/separated two-way facility will be provided on the seaward side.
- State Highway traffic lanes will be kept at a minimum width of 3.5m.
- Any shared path facility will be designed with a standard unobstructed width of 3m with a minimum 2.5m width at pinch points only. A 0.5m shy distance will be allowed for any parallel obstructions such as; road kerbs, car parking, vertical boundary fences, and shop entranceways. Isolated poles do not require a shy distance.
- If a separated cycleway is considered then it shall have a solid kerb island separator of a minimum width of 0.5m to 0.85m (beside parking) and for a mono directional facility to be 1.6m wide and a bi-directional facility a minimum of 2.5m wide, but preferably 3m wide.
- On road cycle lanes of 1.6m (with no parking) to 1.8m (beside 2m parallel parking) width will be accepted along Haven Road. If possible, cycle lanes should be widened to 2m past high turnover parallel parking. All on-road cycle lanes along this busy corridor will be painted green past on-street parking and across side roads and busy intersections.
- Any cycle or pedestrian crossing point will be uncontrolled due to the arterial function of this road corridor.
- Priority on any side road crossings (Hay Street and Vickerman Street) will be in favour of cyclists for separated cycle lanes and on-road cycle lanes.
- Shared paths users will giveway to side roads.
- Visually impaired tactile pavers will be provided at all crossing points.
- Parking will be pulled back 8m from access driveways to allow manoeuvre space.

### 10.1.2 Guidelines for Trade-offs

- Existing bus stops will be retained where possible but can be relocated if required. Stopping buses will not be permitted in the live traffic lane, but will be permissible in the cycle lane.
- Existing central median parking will be retained where possible.
- On-street car parking on the northern (seaward) side can be removed if required as sufficient side road parking is available. This is supported by the Transport Agency's 'Safer Journeys for People who Cycle' document which has a safety action to remove on-street parking on arterial cycle routes.

- On-street car parking on the southern inland side can only be removed where there is not a residential property or a fast trade business that relies solely on this parking for day to day operation.

### 10.1.3 Excluded Changes

- All existing side road and U-turn access points will be retained as it is outside this projects scope to limit these access points.

### 10.1.4 Supporting Evidence

The DPS is detailed in the following sections and it has been endorsed by NCC and the NZ Transport Agency HNO. This DPS has been used as the basis for developing the options.

### 10.1.5 Target and Anticipated Users

| Section No | Description | Length (m) | Traffic Volume Veh/day | Predicted Cycle /day | | Predicted Pedestrian /day | |
|---|---|---|---|---|---|---|---|
| | | | | Now | 2018 | Now | 2018 |
| Section 1 | Maitai River Shared pathway to Haven Road QEII | 250 | 11,600 | 200 | 400 | 150 | 200 |
| Section 2 | Haven Road QEII roundabout SH6 to Haven Road Precinct | 700 | 19,200 | 500 | 1000 | 100 | 300 |
| Section 3 | Haven Precinct | 150 | 19,200 | 500 | 850 | 100 | 300 |
| Section 4 | Wakefield Quay development to Plant and Food building | 200 | 19,200 | 600 | 1000 | 200 | 550 |
| Total | | 1300 | | | | | |

### 10.1.6 Standards and Guidelines Used

Apart from the specific parameters identified in this document, the following guidelines will be used to address design conflicts and priorities.

**NZ Transport Agency**

- Cycle Network Design Guidance (2016), NZ Transport Agency
- Current Christchurch City Council Major Cycleway (MCR) Routes Design Guidelines
- Current Nelson City Council Land Development Manual and design in accordance with proposed amendments.

**AUSROADS**

- The current AUSTROADS Design Guidelines

### 10.1.7 Shy Distance Consideration

To avoid conflict with obstacles, cyclists and pedestrians naturally create separation between themselves and obstructions. The average separation distance is commonly referred to as 'shy distance'. A shy distance of 0.5m taken against any vertical walls and vertical kerbs etc will be adopted.

### 10.1.8 On-road Cycle Lane Widths

The recommendations for NZ (NZ Transport Agency cycle network design guidance 2016) currently suggest that 1.6m is the minimum width of any on-road cycle facility in a 50 km/h speed limit and it can include the drainage channel. The 1.6m minimum will be adopted and in addition sumps will be converted to cycle friendly grills without a lip or recessed.

The existing on-road facility southbound towards Tahunanui will be retained for the existing high commuter cycle volume.

### 10.1.9 Car Door Safety Distance Consideration On-road cycle lanes past parked cars

The recommendations for NZ (NZ Transport Agency cycle network design guidance 2016) currently suggest that 1.8m is the minimum width of any on-road cycle facility in a 50 km/h speed limit next to parallel parking (desirable 2m wide reduced to 1.8m where width is limited) and it can include the drainage channel. This minimum 1.8m will be adopted, with a 2m minimum used in high parking turnover areas.

### 10.1.10 Separated Cycle Lane Separator Island Design

Using the MCR Christchurch design guide as recommended by the Transport Agency's Cycle Network Design Guidance 2016, the absolute minimum including the channel is 1.6m with a 0.5m separator for a mono-directional facility, and 3m and 0.6m separators for no parking, and 0.85m separator for parking. This has been reduced to 2.5m for narrow corridors but this facility's safety performance is yet to be assessed. The MCR Christchurch design guide separated cycle land separator island design will be adopted.


**Figure 17: Example of Island Separator of a separated cycle Lane**

#### 10.1.11 Removal of on-street Parking

The removal of parking shall adopt the following design approach:

- On-street car parking on the northern seaward side can be removed if required as sufficient side road parking is available. This is supported by the Transport Agency's 'Safer Journeys for People who Cycle' document which has a safety action to remove on-street parking on arterial cycle routes; and,
- On-street car parking on the southern inland side can only be removed where there is not a residential property or a fast trade business that relies solely on this parking for day to day operation. Again, this is supported by the Transport Agency's 'Safer Journeys for People who Cycle' document which has a safety action to remove on-street parking on arterial cycle routes. However, it is known that parking removal along this corridor would be an issue for local businesses and community.

#### 10.1.12 Minimum width of parking

A parking width of 2m, with narrowing in constrained areas (rather than reducing the cycle lane width) to encourage tighter parking practices is recommended in the NZ Transport Agency cycle network design guidance 2016. This will be adopted.

#### 10.1.13 Parking manoeuvre space

It is accepted that a parking manoeuvre space of 2m should be provided with a remaining vehicle passing space of 2.5m. If this cannot be provided then a safety consideration must be undertaken based on parking turn over, vehicle volume and sight distance.

#### 10.1.14 Bus Stop location and spacing

Bus stops will be retained where ever possible or relocated to an agreed more suitable location.

#### 10.1.15 Minimum width of traffic lanes

Vehicle lanes will be a minimum of 3.5m on the State Highway.

#### 10.1.16 Cycleway and pedestrian crossing points

Any cycle crossing point will be provide as an uncontrolled crossing and where possible will be located at a single lane section of the separated carriageway. A central refuge island will be provided with sufficient width for a cargo or trailer bike unit.

#### 10.1.17 U-turn access points

These are outside this projects scope and will not be considered for closure or restriction.

#### 10.1.18 Side road treatments for shared pathways

Where shared paths cross side roads the priority will be given to vehicles with cyclists giving way.

#### 10.1.19 Side road treatments for separated cycle lanes

Where separated cycle lanes cross side roads priority will be given to the separated cycle lane or the cyclists, consistent with the MCR approach in Christchurch and Auckland.

### 10.1.20 Shared Path Capacity

The new shared path users will range between:

- 400 to1000 cyclists/day; and,
- 100 to 550 pedestrians/day

On the basis that the peak hour is typically 15% of the total volume, a maximum peak hour volume of 150 cyclists and 80 pedestrians could be expected.

Using the VicRoads Research Note 21 Shared Path Capacity Calculation, the ideal shared path width is 3m. Even with continued future growth this would work well into the future, as illustrated in Figure 18 below. Shared path capacity is sensitive to pedestrian volume, so it is important to accurately determine pedestrian users.

Using this design process, a 3m shared path width is required.

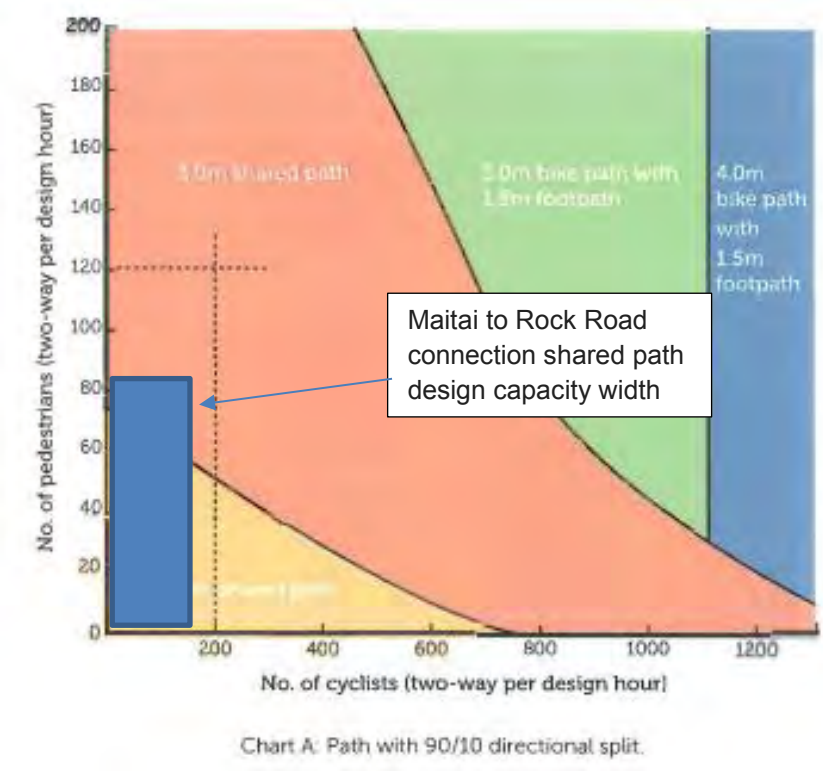


**Figure 18: VicRoads Note 21, Shared Path Capacity**

### 10.1.21 Total Mobility Access and Design

Full mobility access should be provided. A barrier fence assessment is to be undertaken in the Detailed Design.

### 10.1.22 IT Specialist Features

It is recommended that Intelligent Technology Solutions (ITS) are considered in the design of the cycle facility. This could include some of the following:

- Automatic cycle and pedestrian counter;
- Bollard user number display board to encourage users;
- CCTV security camera; and,

LED lighting system at intersections.

# 11 Options Development

## 11.1 Long List of Options (Wildman Avenue to Wakefield Quay)

The conventional process for undertaking an IBC is to consider a long list of options and narrow these down to a shorter list through dismissing options on fatal flaw safety issues or logistical issues which are impossible to overcome. The long list of options and those dismissed are listed below in Table 12.

**Table 12: long list of options considered**

| Option | Description | Fatal Flaw |
|---|---|---|
| A | Do Nothing no action but maintain status quo | |
| B | Do Minimum - Upgrade existing on-road cycle lanes and provide a connection from the Maitai Path to Wildman Avenue. Provide a safety treatment of the Hay Street Crash Blackspot | |
| C | Separated bi-directional cycle lanes on the inland side of Haven Road with a connection to Wildman Avenue | This would require removal of important business parking and crossing of numerous busy commercial accesses. Dismissed due to safety and parking impacts. |
| D | Separated bi-directional cycle lanes on the seaward side of Haven Road with connection to Wildman Avenue | This would require removal of important business parking and crossing of numerous busy commercial accesses. Also, requires widening into median. Dismissed on safety and parking impacts. |
| E | Single directional separated cycle lanes on each side of the road | This would require removal of parking on seaward side but has been retained as acceptable, as it offers the best separated cycle lane option. |
| F | Shared off-road pathway on the seaward side of Haven Road with a connection to Wildman Avenue | A loss of some 8 carparks. Considered acceptable. |
| G | Shared off-road pathway on the inland side of Haven Road with a connection to Wildman Avenue | This route would require significant crossing of many busy accesses and commercial shops. Also, requires all users to cross SH6 at Wakefield Quay to access the Haven Precinct and Rocks Road Facility. Dismissed on safety impacts. |
| H | Shared off-road pathway on the seaward side of Haven Road with a connection to Wildman Avenue, with an inland Port | This route follows isolated internal Port Nelson roads which on CPTED grounds is not desirable for interested but concerned. Dismissed on CPTED issues. |

| | | |
|---|---|---|
| | Nelson road route via Wildman Avenue and Hay street. | |
| I | Shared off-road pathway on the seaward side of Haven Road with a connection to Wildman Avenue, with an inland Port Nelson road route via Akerston Street | |

NOTE: Red shading highlights fatal flaws and options which has been dismissed.

Of the long list of 10 option in Table 12 above, five were considered for further consideration and detailing. These were:

- Do Nothing;
- **Option 1:** Do Minimum - Upgrade existing on-road cycle lanes and a connection from the Maitai Path to Wildman Avenue and safety treatment of Hay Street Crash Blackspot;
- **Option 2**: Single directional separated cycle lanes on each side of the road;
- **Option 3:** Shared off road Pathway on the Seaward side of Haven Road with a connection to Wildman Avenue; and,
- **Option 4:** Shared off-road pathway on the seaward side of Haven Road with a connection to Wildman Avenue, with an inland Port Road route via Akerston Street.

The four preferred cycle facility options are shown in Figure 19 below.

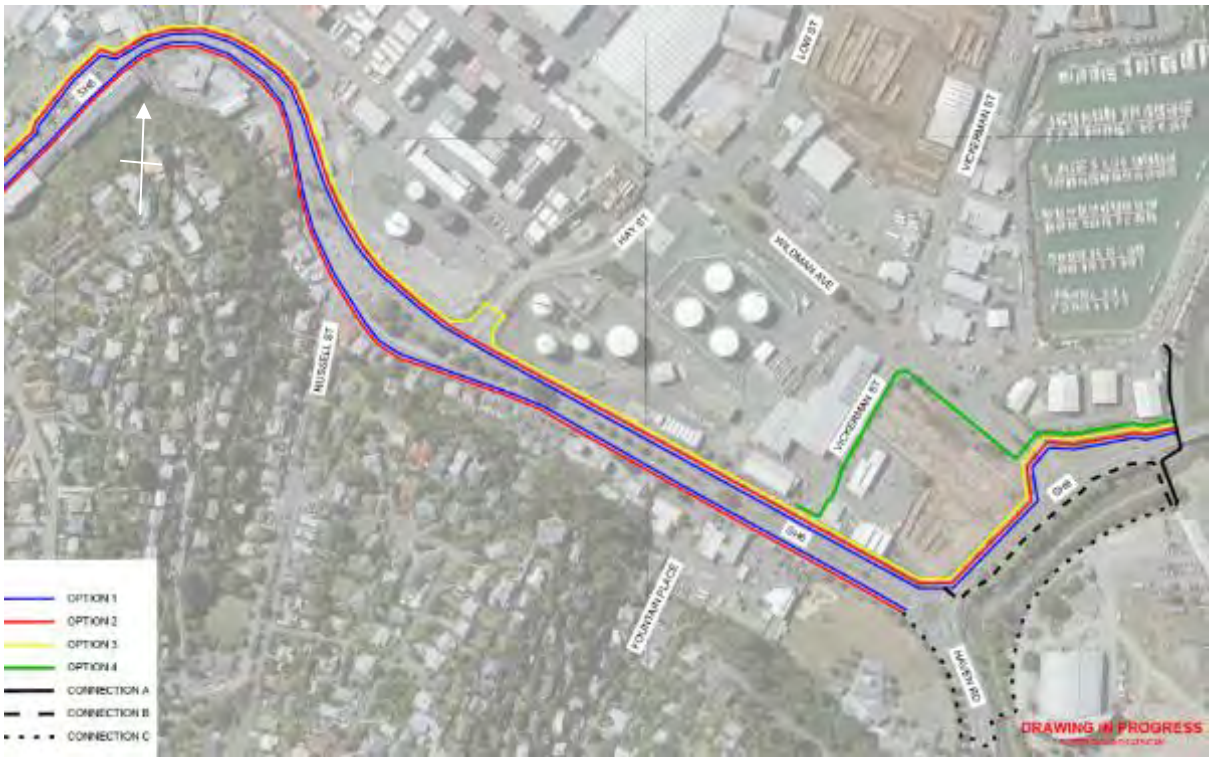


**Figure 19: Options and Maitai Path Connections**

In addition, three connection alternatives were considered between the existing Maitai River Shared Path and Haven Road. These were:

- **Connection A:** A shared path passing under the QEII Drive, SH6/Maitai River Bridge linking up to Wildman Avenue and running along beside QEII Drive;
- **Connection B:** A shared path crossing Saltwater Creek and running on the city side of QEII Drive and crossing SH6 at grade; and,
- **Connection C:** A shared path across Rutherford Park and crossing Saltwater Creek and Haven Road.

These options have been described in detail in the following sections.

## 11.2 Do Nothing

This option involves maintaining the status quo with no improvements to the current facilities, delineation or signage.

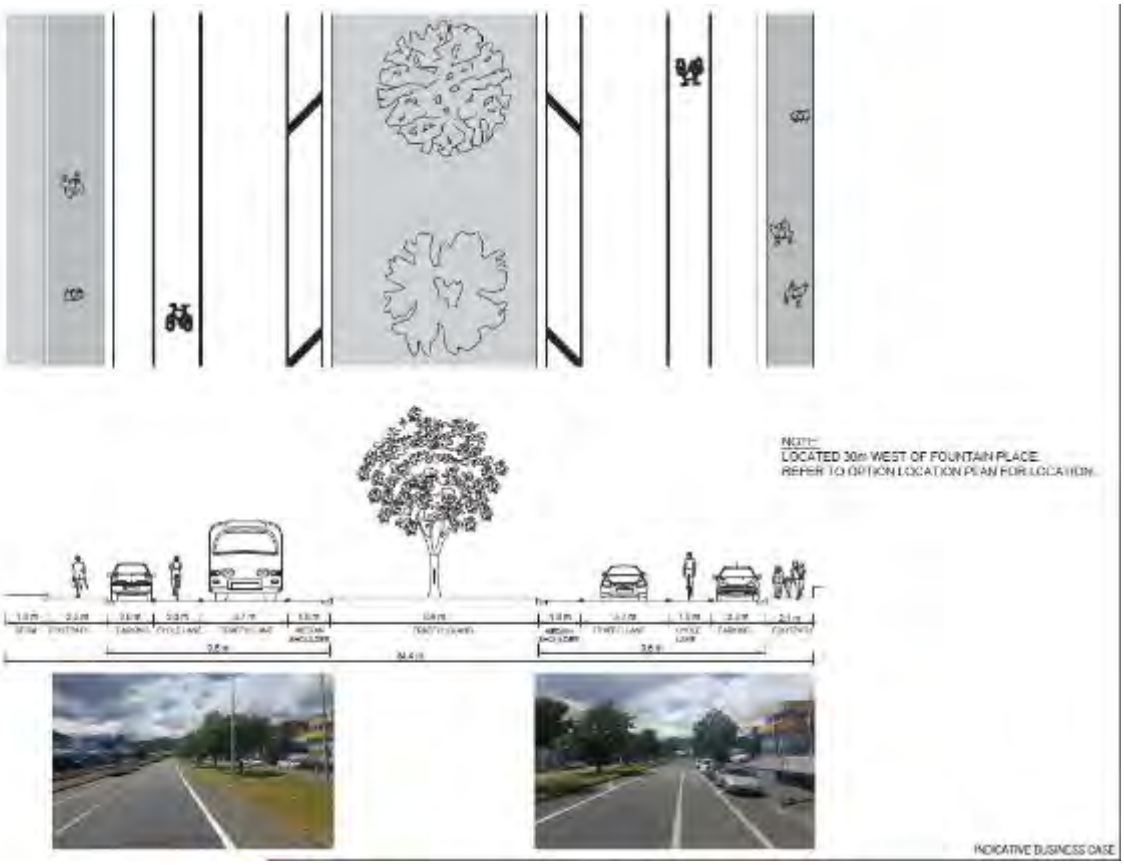


**Figure 20: Existing Road Layout of Haven Road, SH6**

## 11.3 Connections from Maitai River Shared Path Way to Haven Road SH6

A key part of this project is to consider an appropriate connection from the existing Maitai shared path to Haven Road.

Three different connections (connection A, B and C) were considered which have been discussed earlier in section 11.1.

Connection B and Connection C both required difficult crossings at grade of SH6 close to the Haven Road roundabout. Connection C required three separate road crossings and a shared path along the Auckland Point School frontage.

Connection A with a new shared path connection up to Wildman Avenue offered complete grade separation crossing of QEII Drive, SH6 and only required a crossing of Wildman Avenue, which is a medium volume Road.

Connection A was selected as the best link on safety and appeal to our target, the *'interested but concerned'* user. It was concerned unnecessary to undertake any further MCA analysis.

This connection has been incorporated in all four developed options including the Do Minimum Option 1.

### 11.4 Option 1 (Do minimum, $0.8M)

This option proposes to address the missing link to the Maitai Shared Path, improve cyclist safety at the Hay Street intersection, improve the separation of cyclists using Haven Road and upgrade the marking of the existing approach to Haven Road roundabout city bound.

Connection to Maitai Path is achieved through construction of a shared path on the Seaward side of the QEII Drive, SH6/Maitai Bridge up to Wildman Avenue, with a grade refuge type two stage crossing. Refer to Figure 21 following.

The Do Minimum approach assumes cyclists will use internal Port Nelson roads to connect to Haven Road and that the route will be signed from Wildman Avenue.

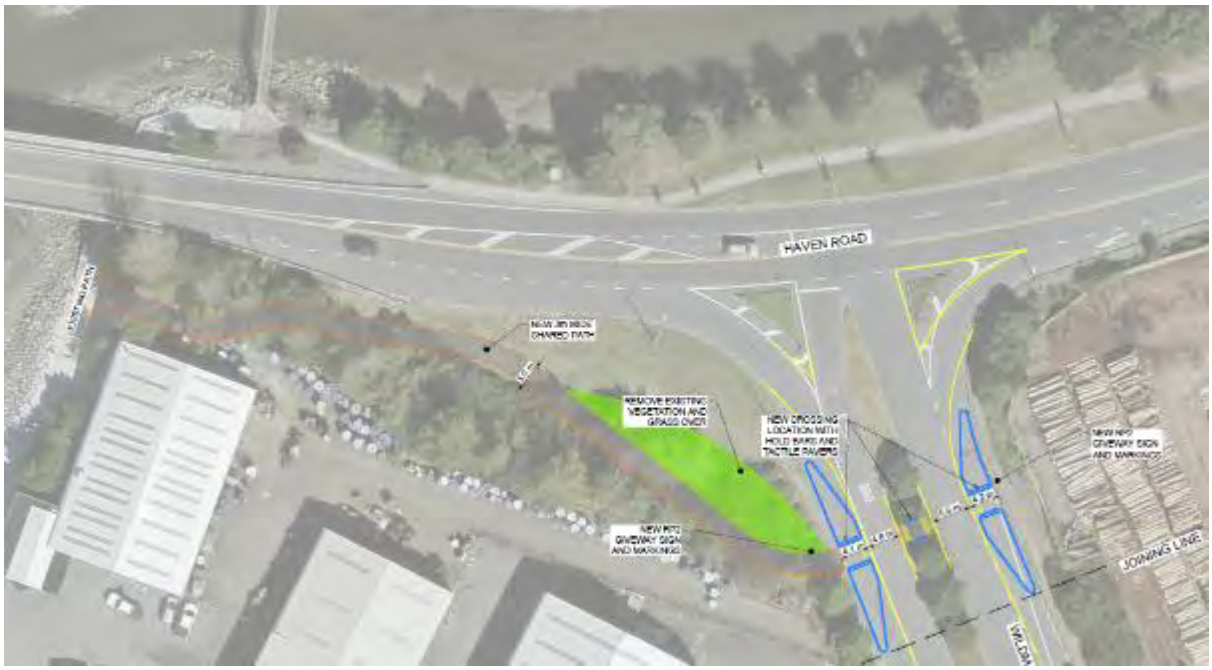


**Figure 21: Maitai Path to Wildman connection**

The Haven Road/QEII Drive, SH6 roundabout approach will be remarked as shown in Figure 22 below to meet current best practise design.


**Figure 22: Haven Road approach City Bound improvements**

Along the state highway section of Haven Road, SH6, the existing on-road cycle lanes will be widened to a 2m width with a 0.5m flush median installed, refer Figures 23 and 24 following. This aligns with the recommendations of the previous road safety audit and also provides a form of separation from traffic but still provides access to all the on-street parking. Additional green painted surfacing will be provided across conflict or turning areas. The central median parking area will be formalised and marked to control its use. This will re-allocate road space and relocate vehicle lanes. There is a risk of differential settlement or rutting with new wheel tracks. The existing parking areas will be delineated better with each parking space marked and no stopping areas improved near accesses.

Option 1 provides an improved level of service for commuter cyclist.

**Figure 23: Option 1 Photomontage Looking City Bound on Haven Road**

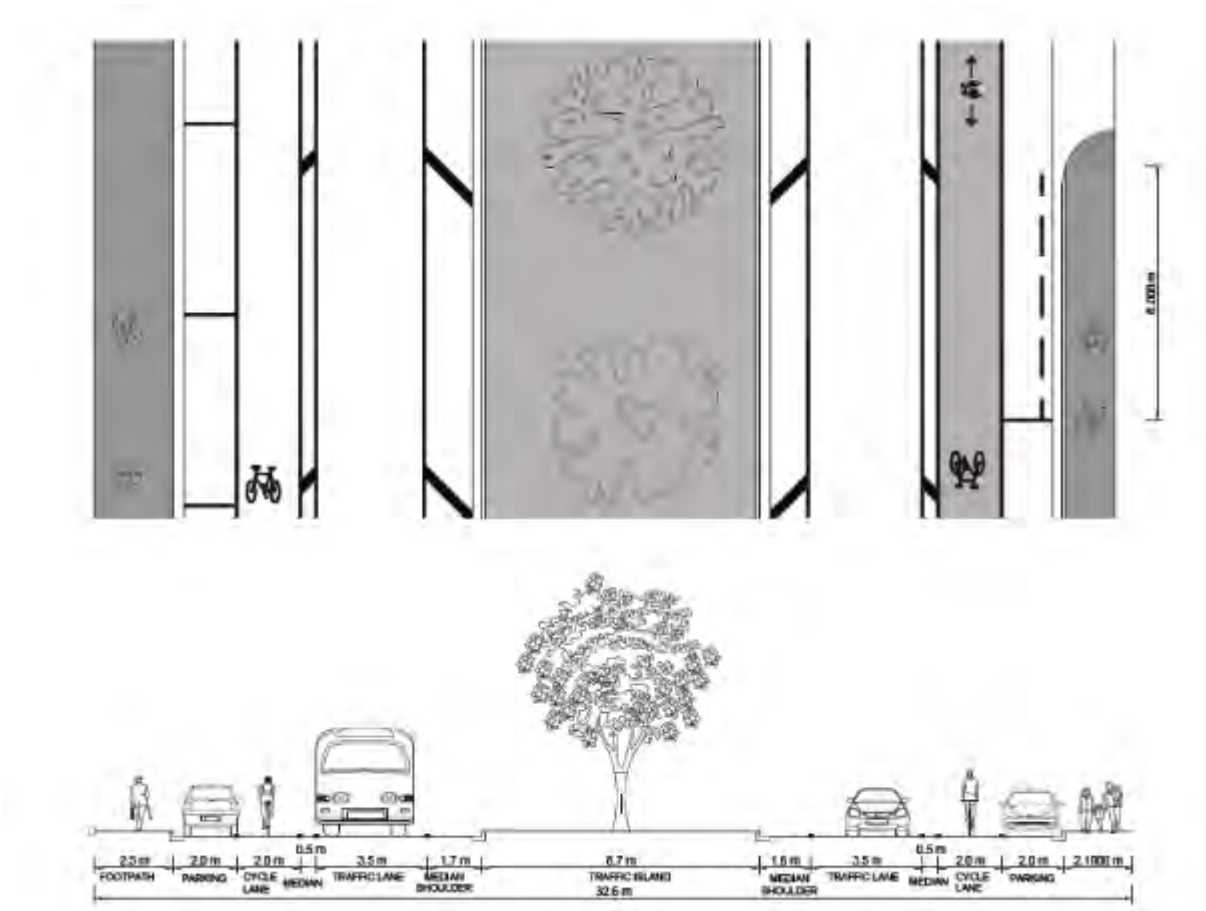


**Figure 24: Mid-block Treatment of Haven Road for the Do Minimum Option 1**

At Hay Street/SH6 an innovative safety improvement is proposed to improve the observance of cyclists for motorist turning in and out of Hay Street. There is a main safety issue of drivers exiting Hay Street failing to give-way correctly to cyclists at this stop controlled intersection, refer Photograph 5 and Figure 25 following.

It is proposed to install LED smart green studs on both sides of the cycle lanes that pass across the intersection. Also, electronic signs will be positioned facing the existing vehicles. A cycle detection loop will detect an approaching cyclist and the green LED stubs and electronic signs will warn the turning vehicle of the presence of the approaching vehicles.

**Photograph 5: Photograph of Hay Street Intersection with SH6**

**Figure 25: International Example of LED Smart Studs and Electronic Sign Used at a Crossing Point**

The project proposes removal of a two on-road car parks, one near the exit to Haven Motors on the seaward side and one south of Hay Street to improve the cycle lane alignment. These are required to improve visibility and safety.

## 11.5 Option 2 (Separated Cycle Lanes, $1.8M)

This option proposes installing separated on-road dedicated cycle lanes. This is considered, nationally and internationally, to be the preferred option for interested but concerned cyclists in an urban environment on busy arterial corridors. This type of facility is expensive with recent costs from Christchurch being in the order of $3Million per km of construction inclusive of intersection treatments.

The proposal involves a 1.6m to 2m wide cycle lane with a 0.8m separator on each side of the road, refer to Figures 26 and 27 following.

This option does impact parking significantly with the removal of all 40 on-road carparks on the seaward side of Haven Road, beside the oil tanks.

This option also includes The Maitai Path connection, the Shared path along QEII Drive connecting Wildman Avenue to Haven Road, Haven Road roundabout approach improvements and the safety improvements at Hay Street.

This option can only be installed on part of the route as the section from Russell Street to Wakefield Quay does not have sufficient room for this layout. It is proposed to convert to the Do Minimum option for this section of the project, some 500m. This

will make this option less desirable as it only provides separation for part of the journey. It will be attractive for existing commuter cyclists.

This option does require the purchase of land from Port Nelson as discussed previously in Section 7.1.3.

**Figure 26: Option 2 Photomontage Looking City Bound on Haven Road**

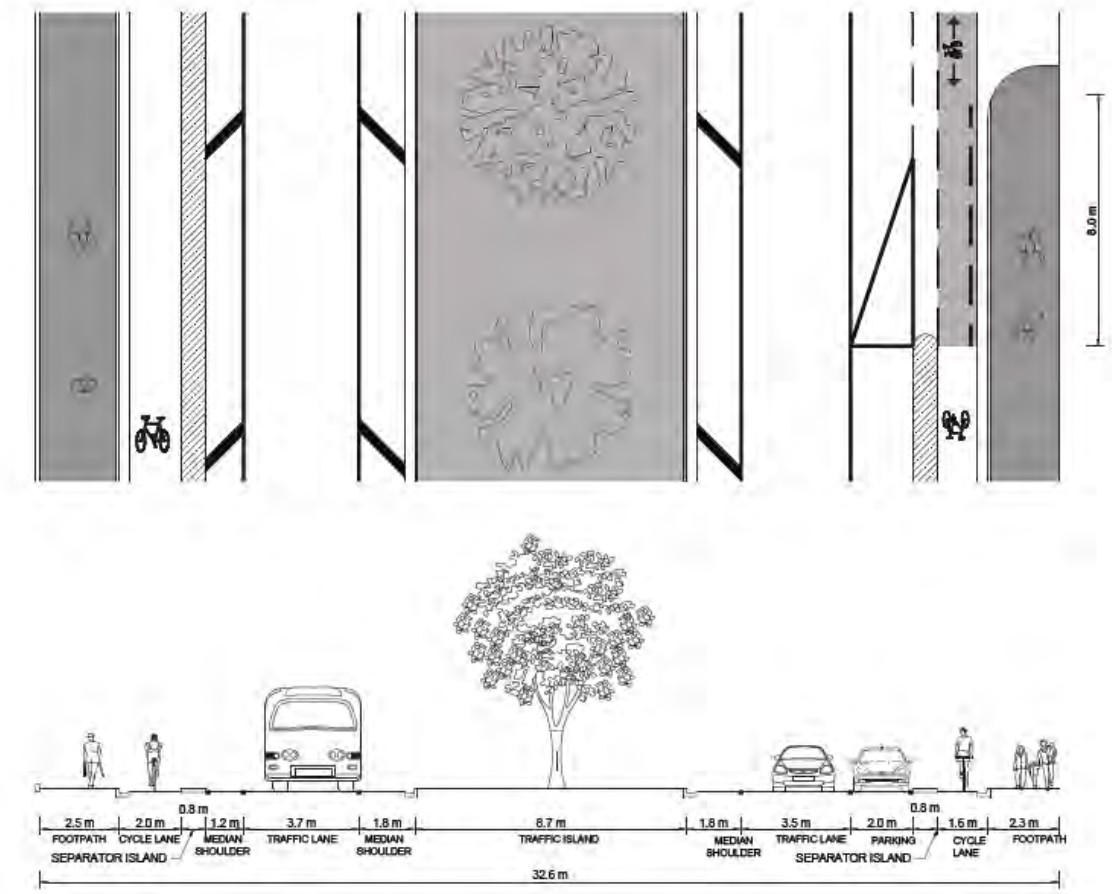


**Figure 27: Option 2 Typical Detail**

### 11.6 Option 3 (Off-road Shared Path Seaward Side, $2.0M)

This option proposes creating a shared path on the road berm from Wildman Avenue to Wakefield Quay. It would also align well with the Rocks Road preferred cycle option of a shared path on the seaward side and connect well to the Haven Precinct.

The shared pathway is generally 3m in width with a 0.5m berm next to the road along most of the project providing for shy distance and separation from parking. Refer Figures 28 and 29 following.

This option also includes The Maitai Path connection, Haven Road roundabout approach improvements and the safety improvements at Hay Street. It also incorporates the on-road improvements of the cycle lanes with the flush shoulder separator where there is sufficient road width.

This option preserves most of the existing parking on the seaward side with the loss of a total of 8 parks out of 40 parks (20%). These removed parks include 6 parks outside the Old Custom House Building near Wakefield Quay and a further two parks along the route to improve Hay Street and The Haven Motors access way visibility.

This option also requires the relocation of two bus stops in the City bound direction from opposite Russell Street and the Custom House to a single new bus stop outside The Haven Precinct.

This option does require the relocation of sections of kerb and channels, movement of traffic lanes and wheel paths, with associated rutting risk. It also requires the purchase of land from Port Nelson and NZ Oil Services Ltd as discussed previously in Section 7.1.3.

**Figure 28: Option 3 and Option 4, Shared Path on the Seaward Side**

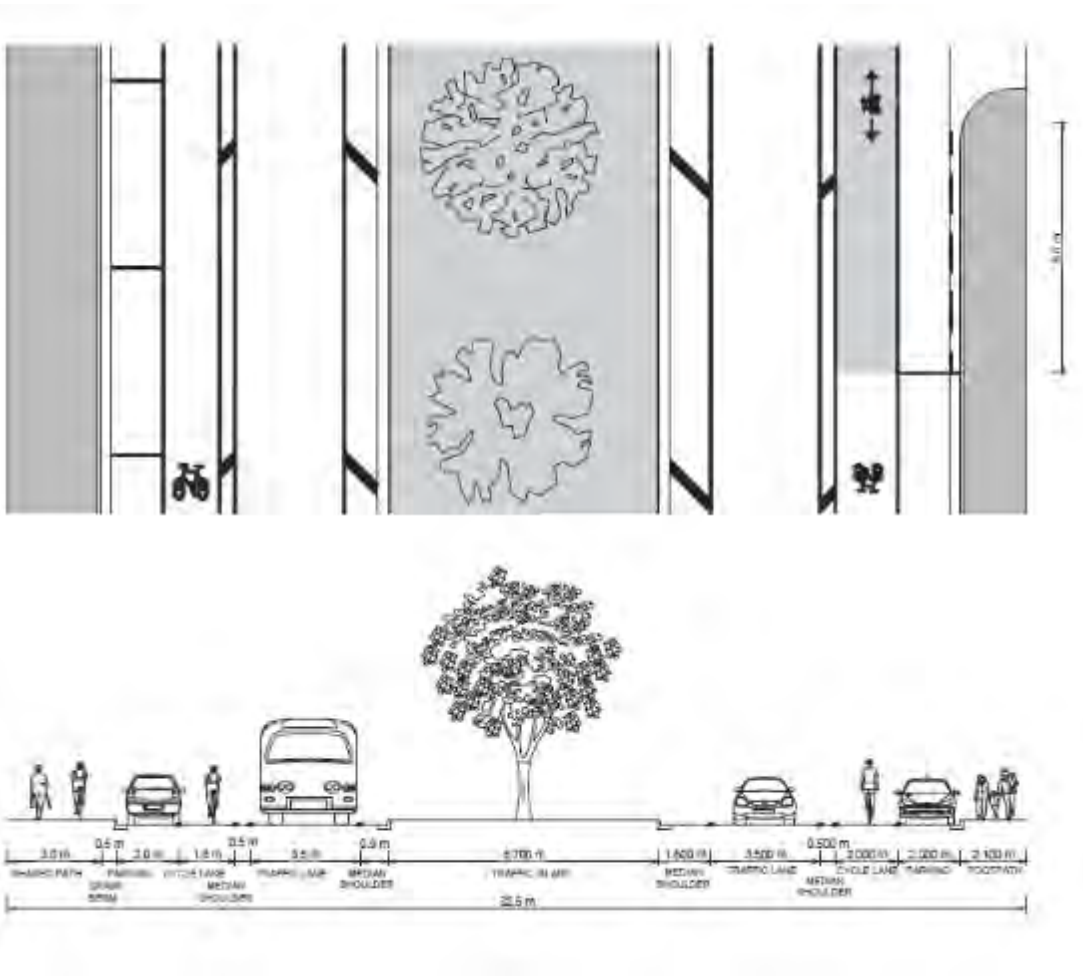

**Figure 29: Option 3 and 4 Layout**

## 11.7 Option 4 (Off-road Shared Path Seaward Side via Akerston Street, $1,9M)

Option 4 is, in principle, the same as Option 3 except in that it follows an alternate route along Wildman Avenue and the Akerston Street Port Nelson fringe industrial area roads. Refer Figure 30 following. This option has not been fully estimated as it is considered a less preferred route compared to Option 3 but has been included for consideration in the MCA process. It is also not preferred as it restricts internal Port Nelson access changes and mixes cyclists with heavy Port Nelson traffic. It also has CPTED personal safety isolation and personal safety issues at night.

This option preserves most of the existing parking on the seaward side with the loss of a total of 8 parks out of 40 parks (20%). These removed parks include 6 carparks outside the Old Custom House Building near Wakefield Quay and a further two parks along the route to improve Hay Street and The Haven Motors access way visibility.

This option also requires the relocation of two bus stops in the City bound direction from opposite Russell Street and the Custom house to a single new bus stop outside The Haven Precinct.

This option does require the relocation of sections of kerb and channels, movement of traffic lanes and wheel paths, with associated rutting risk. It also requires the purchase of land NZ Oil Services Ltd as discussed previously in Section 7.1.3.


**Figure 30: Option 4 Alternative Route.**

# 12 Community Engagement

## 12.1 Public Engagement and Stakeholder Consultation Outcomes

NCC conducted an online submission process on the three main options (Options 1 to 3) through its website.

NCC also consulted directly with key stake holders; Port Nelson and the Transport Agency.

The consultation involved Options 1 to 3 discussed in the previous section and photomontage images of each option.

The public consultation was closed on the 22nd February 2017.

A separate meeting is programmed to be held with the Transport Agency's HNO representatives. NCC will seek to arrange a separate financial support and maintenance agreement. At this stage, no formal feedback has been received from the Transport Agency.

## 12.2 Public Feedback Submissions

Five electronic submissions have been received. Submissions in bold are from organisations representing multiple stakeholders or commercial interests:

Three submissions prefer some sort of physical barrier between cars and cyclists (i.e. Option 2, separated cycle lane), one of which suggests that a seaward-side shared path is an acceptable alternative.

One submission urges progress on the 'preferred option' being a seaward-side shared path. Also suggests consideration of using Hay Street and Wildman Avenue.

Three submissions discuss general cycling issues on sections of road outside of the specific subject project area. However, two of these submissions do also support connection to the Maitai shared path and/or the general route.

One submission supports a shared path for less experienced cyclists with right of way at intersections, and improved on-road cycle lanes for faster cyclists.

One submission from **Port Nelson Limited** is generally supportive in relation to boundary adjustments. Other specific points are:

- Attention is drawn to re-modelling/landscaping of the ex-Nelmac building at 8 Vickerman Street; and,
- Request to see future Southern Link plans for QEII Drive/Haven Road roundabout prior to finalisation of any boundary adjustment at this location.

One submission strongly supports a cycle facility being located on the northern side of Haven Road due to the prevalence of numerous accesses on the south side.

One submission from **Nelson Walkers Unite (NWU)** has strong preference for Option 2, citing concern at the potential for future lack of capacity of a seaward shared path. NWU suggest narrowing of the Haven Road grass median area to provide more room.

One submission from Nelson AA supports Option 3, seaward shared path.

One submission has concerns regarding the cycle route crossing the throats of Vickerman Street and Hay Street and suggests a route via Hay Street and Wildman Avenue.

One submission from Nelsust strongly supports Option 3 – A seaward shared path and on-road commuter lanes, but has concerns regarding crossings of Hay Street, Vickerman Street, and Wildman Avenue suggesting grade separation and/or closure of side roads.

One submission from Bicycle Nelson Bays supports Option 3 as being the most consistent option when considering other local cycling facilities, and because it caters for more cyclist types. Suggests removing parking, and suggests a separated two-way cycle lane on the seaward side.

Submission from Youth Council (101 youth surveyed): Option 1, Do-Minimum, improved on-road cycle lanes – Preferred by 10%, Option 2, Separated Cycle Lanes and Some Shared Path – Preferred by 67%Option 3, Seaward Shared Path & Improved On-road Cycle Lanes – Preferred by 14%.

### 12.3 Submission Summary table

The majority of submissions generally supported the need for an improved cycle facility with 96% supporting an option. It was also clear from the submission s that there was a strong desire for separation from traffic either through an island separator or as a shared path on the road berm.

For the purpose of this report, submissions from larger organisation (made up of many members), were weighted the same as an individual submissions. Each separate submission has been considered as a single submission, with the weighting favouring the majority view.

The submissions overall support either Option 2 or 3, with a slight preference to Option 3. A summary of submissions is shown below in Table 13 and Figure 31 following.

**Table 13: Public Consultation Summary**

| Submission in support of: | Concern with aspects of general route | Broadly supportive of route but no specific option preferred | Option 1<br><br>Do Minimum, improve on-road cycle lanes | Option 2<br><br>Separated Cycle Lanes and Some Shared Path | Option 3<br><br>Seaward Shared Path & Improved On-road Cycle Lanes |
|---|---|---|---|---|---|
| No. of submissions | 1 | 4 | 0<br><br>10% youth council | 4<br><br>67% youth council | 6<br><br>14% youth council |
| Support Converted to Weighted | 1 | | 5 | 9 | 10 |
| Support Converted to % support | 4% | Support spread to all three options | 20% | 36% | 40% |
| Ranking | 4 | | 3 | 2 | 1 |

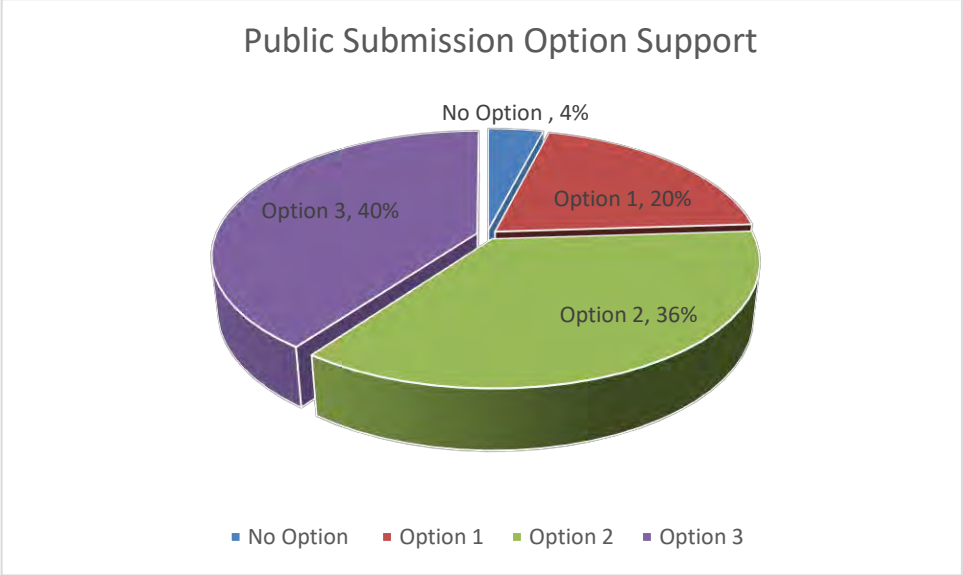


**Figure 31: Summary of Option support from consultation**

# 13 Options Assessment & Evaluation

## 13.1 Options Assessment

The MCA was undertaken by the Consultant's team using a collection of professionals including engineers, planners and two interested but concerned female cyclist who would like to cycle more but are concerned with safety. Both of these potential cyclists live in the Haven Road area and would like to use this route.

The MCA process indicates the preferred option is Option 3. The MCA analysis results are shown below in Table 14. The results are shown for different criteria weightings, to understand which option is preferred if we weigh one criteria higher than the others, refer to the previous Section 9 for further details.

The detailed MCA analysis and sensitivity analysis is included in Appendix C.

**Table 13: MCA Scoring Summary (Green indicates top score, best option and orange the second preference)**

| Options | Standard Scores | Design Weighted Scores | Community weighted Scores | Risk weighted Scores |
|---|---|---|---|---|
| Option 1 Do Minimum | 7.5 | 6.6 | 5.9 | 12.2 |
| Option 2 Separated Cycle Lanes | 2.5 | 6.3 | 0.3 | 0.3 |
| Option 3 Shared path | 9.3 | 12.1 | 7.3 | 5.2 |
| Option 4 Shared path via Port roads | 8.5 | 11.1 | 6.8 | 4.7 |
| | | | | |

NOTE: Green indicates preferred tender under different weightings

# 14 Indicative Assessment Profile

The project was assessed using the Transport Agency's latest Planning and Investment Strategy profiles. An assessment profile of High-High-High (HHH) has been determined for the project using the Transport Agency's funding allocation process as detailed in the following paragraphs.

## 14.1 Strategic Fit — High

The strategic fit measure assesses how the identified problem, issue or opportunity aligns with the Government Policy Statement. Strategic fit for walking and cycling improvements has been used for the assessment of strategic fit.

Following Planning and Investment procedures, the project has been determined to have a 'high' strategic fit. A high strategic fit is given on the basis that the proposed bridge and associated links will form "part of a primary corridor within a walking and/or cycling strategic network in a main urban area, for the purposes of utility cycling, including associated facilities to put the corridor into service".

## 14.2 Effectiveness — High

The effectiveness factor considers the contribution that the proposed solution makes to achieving the potential identified in the strategic fit assessment and to the purpose of the Land Transport Management Act 2003. Effectiveness has been assessed using the six general criteria prescribed in the Planning and Investment Knowledge Base. This assessment found that the effectiveness of the project is considered 'High', the assessment results are detailed in Table 15 below.

**Table 15: Evaluation of the Projects Effectiveness**

| COMPONENT | EXPLANATION | RATING |
|---|---|---|
| Outcomes focused | The project will result in significant change that will directly address the problem identified in the Strategic Fit assessment | High |
| Integrated | The provision of an improved City to Sea link and increased modal share of walking and cycling to 25% of all commuter trips is key transport policy. This project is listed in the Annual Plan and the Urban Cycle Fund programme. | High |
| Correctly scoped | This project fits the Urban Cycle Fund Criteria and is consistent with the scope issued by NCC. | High |
| Affordable | The project is within the capital allocation, is receiving approved external funding, and has a high benefit cost ratio. | High |
| Timely | The project is expected to result in increased pedestrian and cyclist numbers. This in combination with the existing number of pedestrians and cyclists will result in immediate health and environmental benefits being gained. It can be achieved within UCF time limit. | High |
| Confidence | A range of treatment options have been considered. The preferred selection of treatment measures has been peer reviewed and there is confidence in the robustness of assessment. | High |
| **Overall** | **Assessment based on lowest rating of all components** | **High** |

## 14.3 Economic Efficiency High

Economic efficiency considers how well the proposed solution maximises the value of what is produced from the resources used, and the timeliness of intervention. The benefit cost ratio of the preferred project option (Option 3 –shared path seaward side) was calculated to be 6.1. Based on the Transport Agency's Planning and Investment Assessment Framework, the project is deemed to have a 'high 'economic efficiency as the project BCR lies above 5.

# 15 Commercial Case

## 15.1 Estimated Project Delivery

The preferred option 3 can be delivered by the July 2018 Urban cycle fund deadline.

The likely timeline for this project implementation is:

- May 2017 Council endorsement;
- June to August 2018 New Transport Agency Agreement and Land Agreements;
- August 2017 Consent applications for HAIL, earthworks and Heritage approvals;
- August 2017 to November 2017 Construction drawings (DBC);
- December 2017 to January 2018 Contract tendering;
- January 2018 Contract Award;
- December to January 2017 No work on the highway due to high traffic volumes and Holiday period; and,
- February to July 2018 Construction.

## 15.2 Selection of Delivery Model

The appropriate procurement of the physical works has been considered using the Transport Agency's SM021 Contract Procedures Manual, as shown in Figure 32 following.

Due to the relatively low project cost of $1.7M, physical works and the tight time constraints on delivery, it is considered that a traditional measure and value contract is the appropriate procurement method.

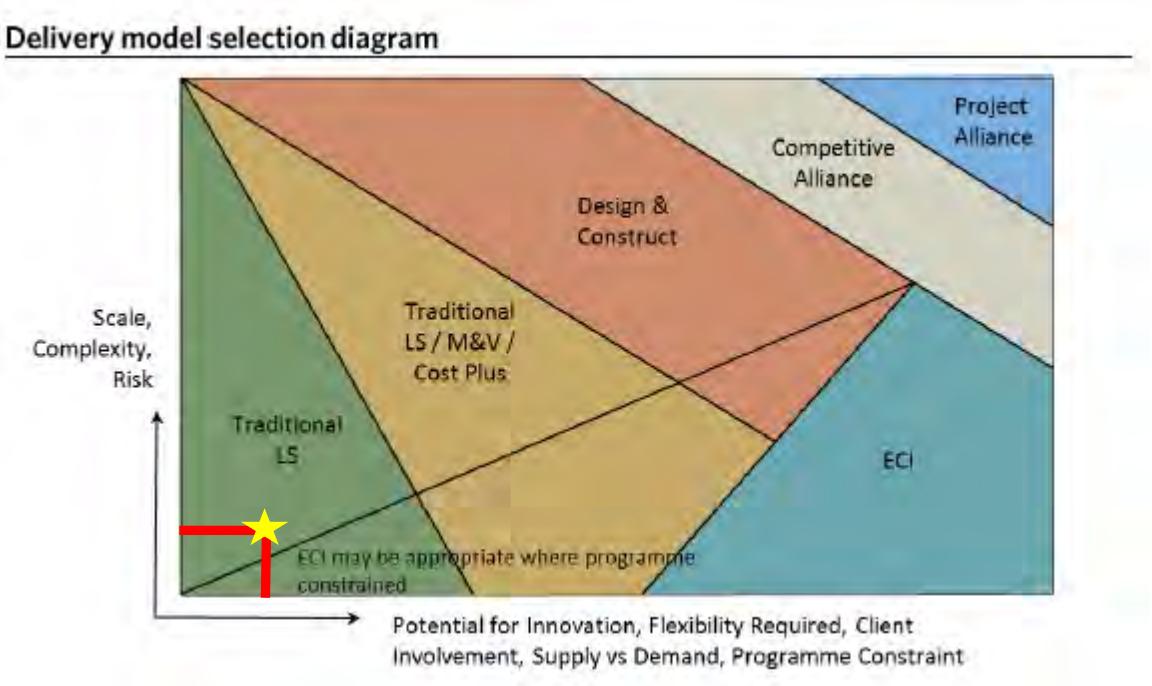


**Figure 32: Delivery Model Selection Diagram from NZ Transport Agency's SMO21 Contract Procedures Manual, Page 10**

### 15.3 Consenting Strategy

It is considered likely that this project will require HAIL land investigation and possible land disturbance approval. Without detailed investigation or HAIL site soil testing or preliminary review it is best at this stage to allow for the need for a land disturbance approval.

### 15.4 Utility Service Approvals

There would appear to be a large number of telecommunication cables and possible fibre cables under the work site of Option 3. It will be necessary to liaise closely with these utility providers and may require observers onsite while work is completed near some cables.

# 16 Financial Case General

The preferred Option 3 has a strong benefit cost ratio (BCR) meets the Urban Cycle Fund's financial assistance criteria and can be completed within the required timeframe.

The prepared estimate has allowances for risk and contingencies of 60%.

There is still a need to complete a topographical survey and confirm utility services, investigate HAIL sites, acquire land and obtain HAIL disturbance consents.

There may also be a need for a building consent for retaining wall structures.

## 16.1 Project Risks

At this stage in the project no formal risk register or safety in design process has been completed. There has been some key risk identified and these have been allowed for in the project estimate, these are detailed in Table 16 following.

**Table 16: Option 3 Risks**

| Risk | Description | Consequence | Likelihood | Overall rating |
|---|---|---|---|---|
| 1 | Heritage issues as pre-1900 activity sites and close to Maori occupation sites | Low | Low | Low |
| 2 | Risk of further cycle and pedestrian crashes creating public pressure for more investment | Low | Low | Low |
| 3 | HAIL site and possible contaminated land and Safety in Design (SID) related issues | High | Medium | Medium |
| 4 | Project costs have been prepared without survey or detailed design drawings | High | High | High |
| 5 | Differential wheel track rutting due to traffic lane movement | Medium | Medium | Medium |
| 6 | Opposition to loss of 8 carparks for option 3 | Low | Low | Low |
| 7 | Concern over shared path conflict with pedestrians | Medium | Low | Medium |
| 8 | Problems with land acquisition | Low | Low | Low |

## 16.2 Peer Reviewed Cost Estimate

No external peer review has been undertaken of the IBC estimate. A safety audit of scheme has been completed. The estimate has had a 30% risk contingency applied along with a 30% price premium for the high local contractor work load.

# PART C – THE WAY FORWARD

## 17 Recommendations

It is the recommendation of this Indicative Business Case (IBC) that Nelson City Council proceed with the preferred seaward side shared path $2M option. This option best meets the assessment criteria, solves the identified projects statements and provides for the interested but concerned cyclist.

# Appendix A – Option Plans


INDICATIVE BUSINESS CASE

NOTE:
LOCATION DATA MEASURED ON-SITE BY HAND, NOT SURVEY ACCURATE.

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## LEGEND

- NEW CYCLEWAY
- NEW KERB OR CROSSING ISLAND
- EXISTING ROAD EDGE
- NEW FENCE
- NEW LAND AQUISITION
- NEW WHITE ROAD MARKINGS
- NEW GREEN CYCLE LANE PAINT
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| Revision | Amendment | Approved | Revision Date |
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Project
NELSON CITY COUNCIL
SH 6 / HAVEN ROAD, MAITAI RIVER TO WAKEFIELD QUAY
CYCLEWAY IMPROVEMENTS

Sheet
CONCEPT PLAN
OPTION 3 - SEAWARD SHARED PATH

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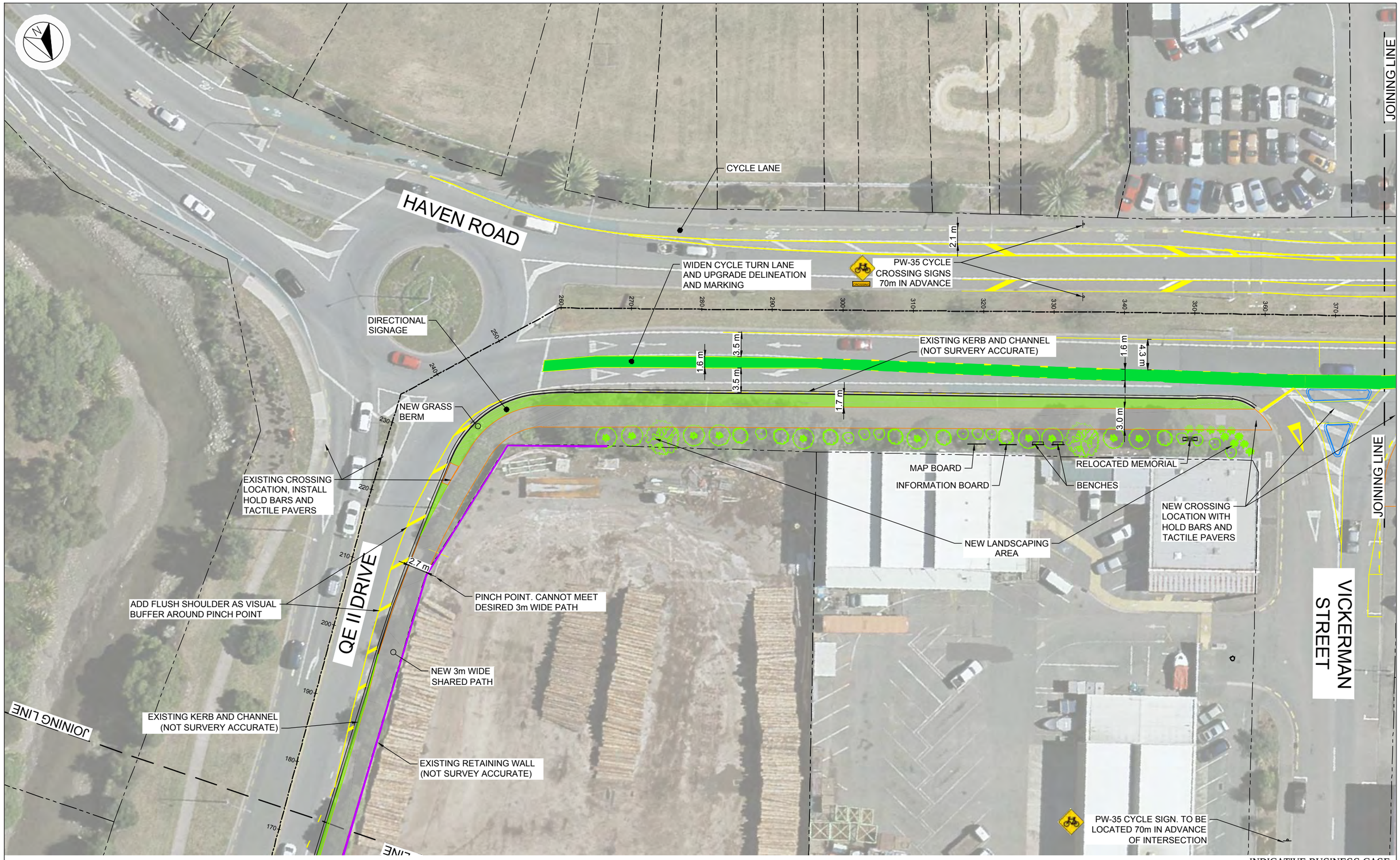


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SH 6 / HAVEN ROAD, MAITAI RIVER TO WAKEFIELD QUAY CYCLEWAY IMPROVEMENTS

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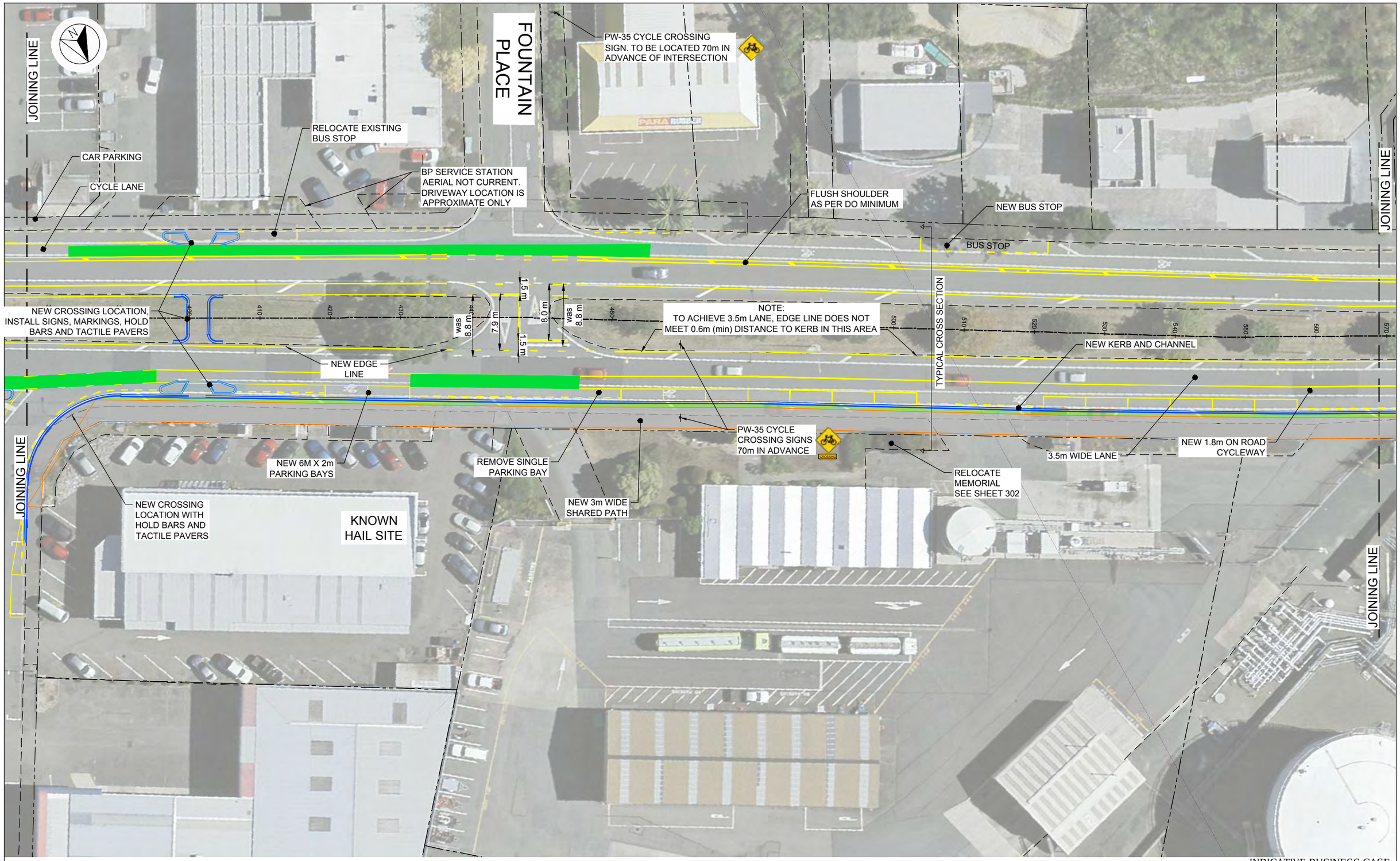


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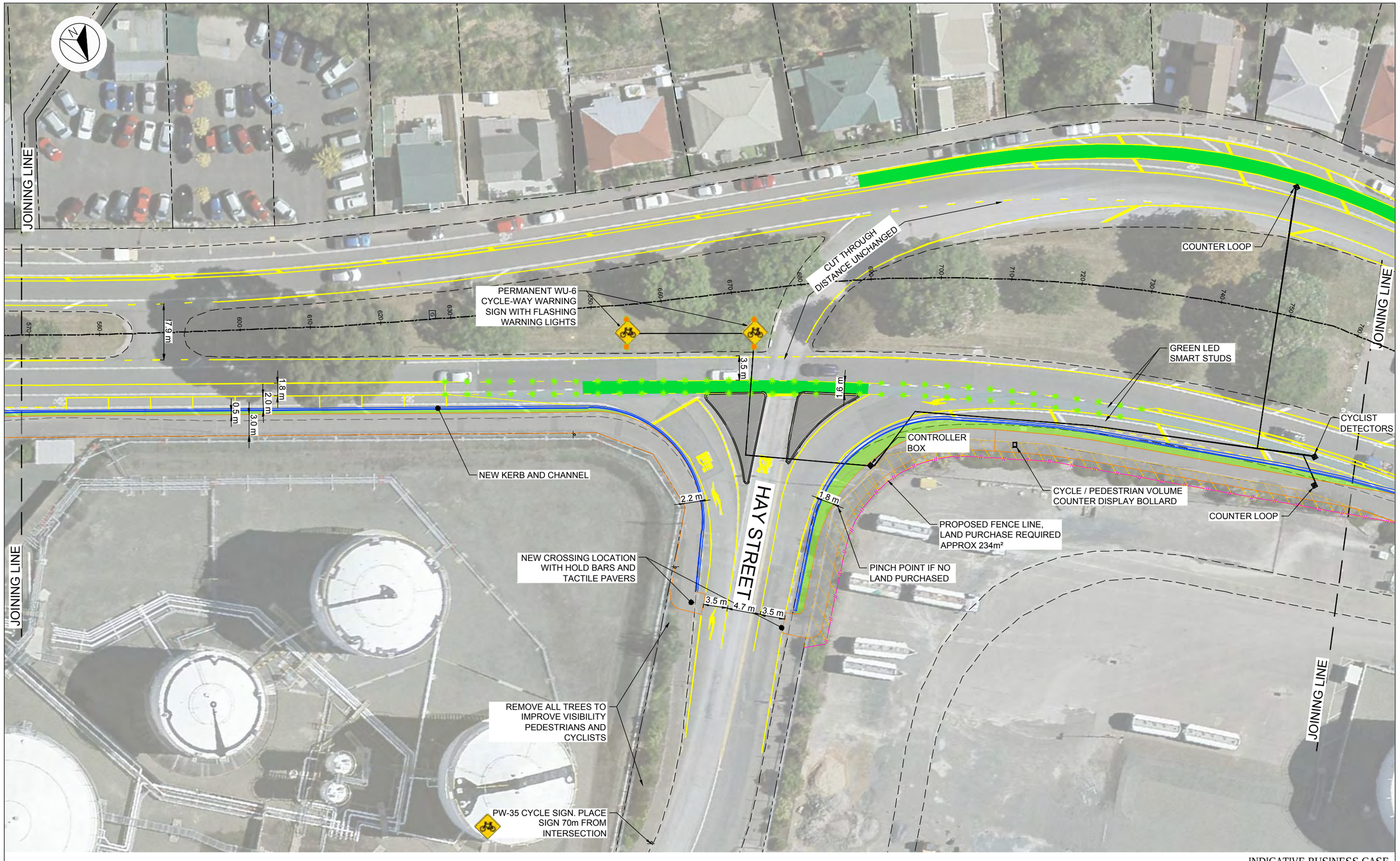


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RUSSELL STREET

PW-35 CYCLE SIGNS

CAR PARKING

NEW EDGE LINE

CAR PARKING

AS PER DO MINIMUM

JOINING LINE

JOINING LINE

CAR PARK WHEEL STOPS

1.5 m

19.0 m

was 18.1 m

20.4 m

was 20.0 m

1.5 m

1.6 m

3.0 m

was 9.6 m

6.0 m

KERB CUT-DOWN

JOINING LINE

NEW KERB AND CHANNEL

NEW 3m WIDE SHARED PATH

BUS STOP TO BE RELOCATED (REFER TO SHEET 206

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COLLINS STREET

EXISTING BUS STOP RELOCATED

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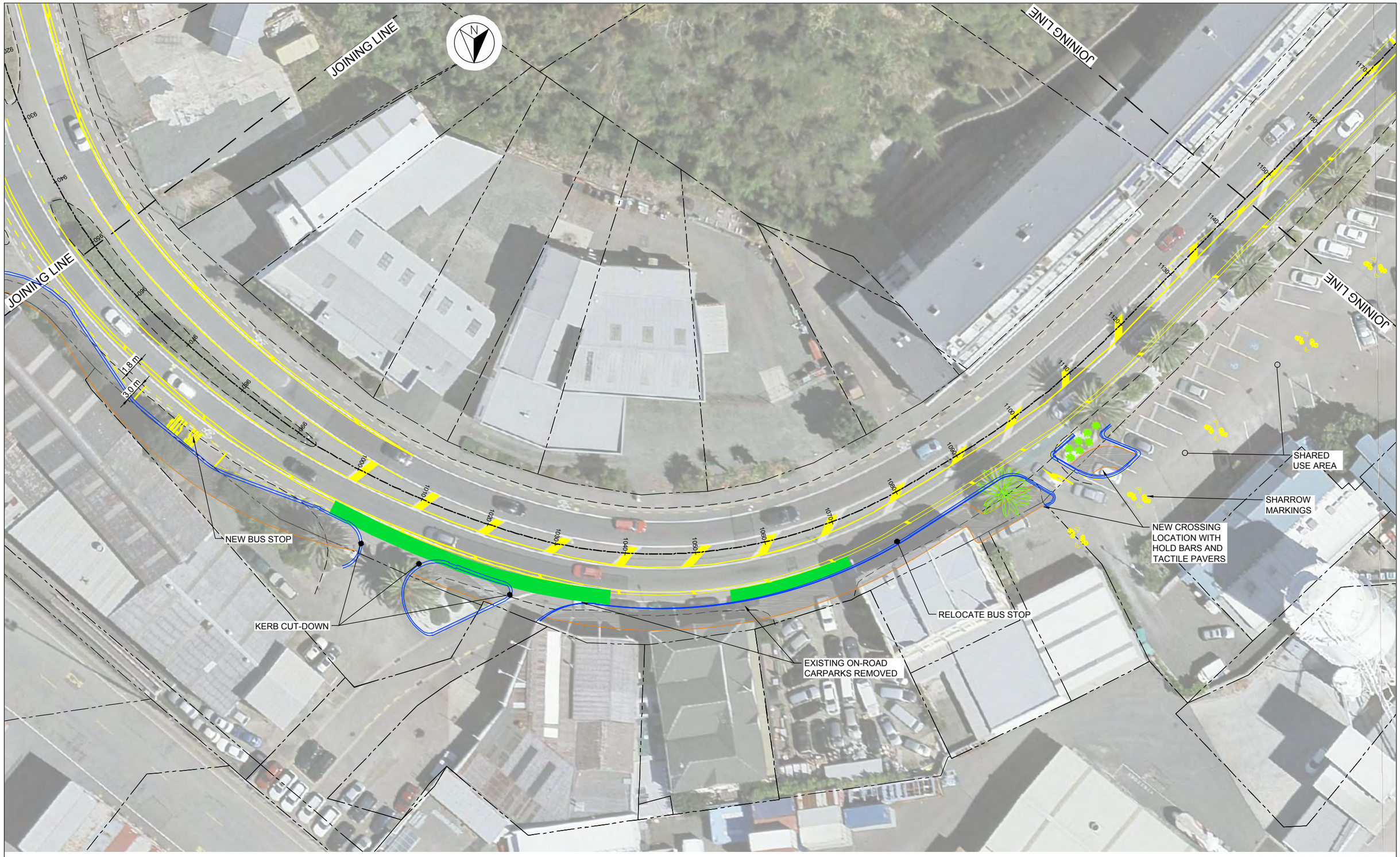


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INDICATIVE BUSINESS CASE

| Revision | Amendment | Approved | Revision Date |
|---|---|---|---|
| A | ISSUED FOR CLIENT REVIEW | MLC | 12.01.17 |
| B | EDITS AS PER CLIENT REVIEW | MLC | 20.02.17 |
| C | EDITS TO ROAD DESIGN | MLC | 24.03.17 |

NELSON CITY COUNCIL
te kaunihera o whakatu
INFRASTRUCTURE

APPROVED
GROUP MANAGER INFRASTRUCTURE
DATE

NCC DRAWING NUMBER
NCC CONTRACT NUMBER

OPUS
Nelson Office
+64 3 548 1099
Private Bag 36
Nelson 7042
New Zealand

| Designed | Approved | Approved Date |
|---|---|---|
| P. KORTEGAST | M. CRUNDWELL | 24.03.17 |
| Drawn | Scales | |
| R. DECK | 1:250 @ A1 1:500 @ A3 | |

Project
NELSON CITY COUNCIL
SH 6 / HAVEN ROAD, MAITAI RIVER TO WAKEFIELD QUAY
CYCLEWAY IMPROVEMENTS

Sheet
CONCEPT PLAN
OPTION 3 - SEAWARD SHARED PATH

| Project No. | Sheet. No. | Revision |
|---|---|---|
| 5-G2581.04 | 307 | C |

Original Sheet Size A1 [841x594] Plot Date 2017-05-03 at 8:50:21 a.m. Path G:\projectdata\2500\5-G2581.04 NCC Panel-Haven Road Cycleway\200 Technical\210 Drawings\Haven Road Option 3 RevC.dwg 307-OPT3

# Appendix B – Option Estimate

**Summary of Options**

| Option Summary | Professional Fees | | | | | | | | Physical works | | | | | Grand total | check |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NCC Managed Costs | IBC | Prof Fees | Construction | Land Acquisition | Testing | Risk | Total | Capital cost | Land | Risk | Price Premium | Total | | |
| **Option 1** | **50000** | sunk | $67,200 | $0 | $0 | $7,000 | $0 | $124,200 | $429,001 | $0 | $128,700 | $128,700 | $686,402 | $810,602 | $810,602 |
| **Option 2** | **50000** | sunk | $179,000 | $0 | $30,000 | $12,000 | $0 | $271,000 | $948,305 | $30,000 | $284,492 | $284,492 | $1,547,288 | $1,818,288 | $1,818,288 |
| **Option 3** | **50000** | sunk | $151,000 | $0 | $75,000 | $12,000 | $0 | $288,000 | $1,023,180 | $75,000 | $306,954 | $306,954 | $1,712,088 | $2,000,088 | $2,000,088 |
| **Option 4** | **50000** | sunk | $150,000 | $0 | $30,000 | $12,000 | $0 | $242,000 | $1,023,180 | $30,000 | $306,954 | $306,954 | $1,667,088 | $1,909,088 | $1,909,088 |

# Appendix C – Multi-Criteria Analysis

| Criteria | Assumptions | Number of Users and User Safety | | Directness and Coherence | | Space for facility support infrastructure | | Attractiveness, Social Safety, Environment and Comfort | | Score | Impact on Commercial Business | | Local Resident | | Wider Social Benefit and Public acceptance | | Score | Budget Risks ($1.8M) | | Timing Risks ( Completion June 2018) | | Score | SCORE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Description** | | ***Safety over route for cyclists<br>***Safety and conflict potential along route for all users<br>***Attracted Volume of users<br>***Addressed Safety Issues at Hay Street<br>Score 2 to -2 | | *** Few complicated manoeuvres<br>*** Match to desire lines;<br>*** Time and distance to travel;<br>*** Connects well to existing cycle network and residential areas<br>*** Connects well to Haven Precinct<br>Score 2 to -2 | | Room to provide:<br>***Accommodates bus stops<br>***Additional car parking<br>***Streetscape berms<br>*** Creates a suitable recreational loop walk<br>***Playground or seating<br>Score 2 to -2 | | Attractiveness, safety, environment and comfort:<br>***Consider CPTED for routes and access<br>***Pleasantness of cycling and walking experience<br>***Lighting where off-road<br>***Comfort of users experience ***<br>Impact on environment and potential to enhance environment<br>***perceptions of personal safety risk<br>Score 2 to -2 | | | Commercial impacts on local busiinesses<br>***Impact on Business Access<br>***impact to on-street parking<br>***Impacts on business operation<br>***connection to associated cycle recreational businesses<br>Score 2 to -2 | | *** Impact on local residents:<br>*** Access to properties<br>*** Impact on on-street parkings<br>***Impact on local road congestion<br>Score 2 to -2 | | Recommendations how the facility fits Strategic Planning:<br>***The Cycle Network Plan<br>*** Regional Transport Plan<br>***Achieves the City to Sea Connection<br>***Supports Great Taste Trail<br>***wider community economic benefits<br>***Community and Political opposition to SCF<br>Score 2 to -2 | | | Increased costs due to:<br>***Property purchase<br>***Complicated facilities<br>***Requires supporting asset replacement<br>***Resurfacing<br>(Budget Risk)<br>Score 2 to -2 | | Programme delays due to:<br>***Land/property acquisition<br>***Legal processes - consents<br>***Legal processes - access<br>*** Additional construction peiod<br>***Additional risk due to unknown ground conditions<br>(Timing Risk)<br>Score 0 to -2 | | | |
| **Weighting** | | | **15%** | | **15%** | | **10%** | | **10%** | | | **10%** | | **10%** | | **10%** | | | **10%** | | **10%** | | **TOTAL** |
| **Option 1 Do Minimum** | **Capital Cost $810,000, 0.5m painted buffer, Connection to Wildman Ave, Electronic Safety System Hay St** | Electronic system good, buffer and width good but may not attract children + interested but concerned | 1.0 | No connection between Wildman Ave and Haven Road, no crossing point | 0.5 | Does provide some recreational space with connection to Maitai River Path. | 0.2 | Good CPTED observance, short shared path section, only modest improvements | 0.5 | **2.95** | Minor loss of parking by Haven Precinct of 6 car parks, maintains all accessways and limited effect on businesses, may reduce vehicle speed | 0.0 | Neutal impact | 0.0 | Will have positive impact as conventional cost effective solution. Allows flexibility for Southern Link changes | 0.5 | **0.5** | Lowest cost will be seen as value for money | 2.0 | No land required, limited parking removal | 2.0 | **4** | **7.45** |
| **Option 2 Separated Cycle Lanes** | **Capital Cost $1,800,000, Shared path connection To Maitai River path, Only can use treatment for 600m, Removes parking Seaward side , Includes Do min** | Aligns with Cycle guide, current best practise, biggest culture shift, can only achieve for 600m, suits commuters well | 1.5 | Extra crossing of SH6 to connect to SCL southbound | 1.5 | Provide some recreational space with connection to Maitai River Path and shared path connection along QEII drive. | 0.5 | Good CPTED observance, short shared path section, removes seaward parking creating safer cycle entirements and better observance from accessways | 1 | **6** | Parking loss of 38 on-road car parks on the seaward side. Maintains business accesses, businesses accesses have to cross separate acceessway which may deter users, land required | -1.0 | Parking on inland side is moved to outside of separator which is a unusual layout for residents | -0.5 | Public Perception of separated cycle lanes may opoose this option , but different from St Vincent as mono directional, only achieve over 600m 0r 60% of route | -1.0 | **-2.5** | Highest cost, but still within budget | -0.5 | Land requirements and commercial opposition to paeking removal, may restrict soiuthern link options | -0.5 | **-1** | **2.5** |
| **Option 3 Shared Path Seaward Side** | **Capital Cost $2,000,000, Shared path connection To Maitai River path, Includes Do min** | Aligns with Cycle guide, current best practise, big culture shift, very attractive to tourists, will support Wakefield Quay development | 2.0 | Provides well for commuters and tourist avoids road crossing | 2.0 | Provide some recreational space with connection to Maitai River Path and shared path connection along QEII drive. Also shared path along entire seaward side will have opportunities for ocvcassional rest spots and recretional facilities. | 1.0 | Good CPTED observance provides both on road options as well as shared path | 1 | **8** | Positive effects for Haven Precinct and Wakefield Quay, only 8 car park park loss outside Anchor building, land required | -0.2 | Neutal impact , with facilities both side of road | 0.0 | Provides options for all users and will reduce vehicle speeds and support connections to Haven Precinct | 2.0 | **1.8** | Moderate cost but strong BCR, within budget | 0.0 | Land requirements and commercial opposition to paeking removal, may restrict soiuthern link options | -0.5 | **-0.5** | **9.3** |
| **Option 4 Shared Path via local Roads Wildman and Vickerman** | **Capital Cost $1,900,000, Shared path connection To Maitai River path, Includes Do min** | Aligns with Cycle guide, current best practise, big culture shift, very attractive to tourists, will support Wakefield Quay development, Isolated at night | 1.8 | Provides well for commuters and tourist avoids road crossing | 2.0 | Provide some recreational space with connection to Maitai River Path and shared path connection along QEII drive. Also shared path along entire seaward side will have opportunities for ocvcassional rest spots and recretional facilities. | 1.0 | Good CPTED observance provides both on road options as well as shared path, Akerston Street section has risk of isolation at night. | 0.5 | **7** | Positive effects for Haven Precinct and Wakefield Quay, only 8 car park park loss outside Anchor building, will enhance businesses along Vickerman Street. Land required | -0.2 | Neutal impact , with facilities both side of road | 0.0 | Provides options for all users and will reduce vehicle speeds and support connections to Haven Precinct | 2.0 | **1.8** | Moderate cost but strong BCR, within budget | 0.0 | Land requirements and commercial opposition to paeking removal, may restrict soiuthern link options | -0.5 | **-0.5** | **8.5** |

| | Base Scenario | | | | Design Adjusted Scenario | | | | Community Adjusted Scenario | | | | Risks Adjusted Scenario | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Design | Community | Risks | Total | Design | Community | Risks | Total | Design | Community | Risks | Total | Design | Community | Risks | Total |
| Option 1 Do Minimum | 3.0 | 0.5 | 4.0 | 7.5 | 4.3 | 0.3 | 2.0 | 6.6 | 2.4 | 0.5 | 3.0 | 5.9 | 2.0 | 0.3 | 10.0 | 12.2 |
| Option 2 Separated Cycle Lanes | 6.0 | -2.5 | -1.0 | 2.5 | 8.5 | -1.8 | -0.5 | 6.3 | 4.5 | -3.5 | -0.8 | 0.3 | 4.0 | -1.3 | -2.5 | 0.3 |
| Option 3 Shared Path Seaward Side | 8.0 | 1.8 | -0.5 | 9.3 | 11.5 | 0.8 | -0.3 | 12.1 | 6.0 | 1.8 | -0.5 | 7.3 | 5.5 | 0.9 | -1.3 | 5.2 |
| Option 4 Shared Path via local Roads Wildman and Vickerman | 7.2 | 1.8 | -0.5 | 8.5 | 10.5 | 0.8 | -0.3 | 11.1 | 5.5 | 1.8 | -0.5 | 6.8 | 5.1 | 0.9 | -1.3 | 4.7 |

# Appendix D – Economic Evaluation

**Option 1 - Do Minimum**

Option description: Remark existing on-road cycle lanes. Widen (by 0.2m) westbound cycle lane. Improvements at the SH6/Hay St intersection

| | | | COSTS | | | | BENEFITS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Construction | | Maintenance | | Pedestrian facility benefits | | | Cycle facility benefits | | | Cycle crash savings (Hay St) | |
| Year (from 1 July of) | Year | Discount factor (6%) | Money of the Day | Present Value | Annual Costs (Money of the Day) | Annual Costs (Present Value) | Number of new pedestrians per day | Annual Benefits (Money of the Day) | Annual benefits (Present Value) | Number of new cyclists per day | Annual Benefits (Money of the Day ) | Annual benefits (Present Value) | Money of the Day | Annual benefits (Present Value) |
| 2016 | 0 | 1.0000 | | | | | | | | | | | | |
| 2017 | 1 | 0.9434 | $ 685,000 | $ 646,226 | | | | | | | | | | |
| 2018 | 2 | 0.8900 | | | $ 15,000 | $ 13,350 | 100 | $ 114,318 | $ 101,743 | 250 | $ 148,190 | $ 131,889 | $ 23,746 | $ 21,134 |
| 2019 | 3 | 0.8396 | | | $ 15,000 | $ 12,594 | 105 | $ 120,034 | $ 100,783 | 263 | $ 155,600 | $ 130,644 | $ 23,746 | $ 19,938 |
| 2020 | 4 | 0.7921 | | | $ 15,000 | $ 11,881 | 110 | $ 126,036 | $ 99,832 | 276 | $ 163,379 | $ 129,412 | $ 23,746 | $ 18,809 |
| 2021 | 5 | 0.7473 | | | $ 15,000 | $ 11,209 | 116 | $ 132,337 | $ 98,890 | 289 | $ 171,548 | $ 128,191 | $ 23,746 | $ 17,744 |
| 2022 | 6 | 0.7050 | | | $ 15,000 | $ 10,574 | 122 | $ 138,954 | $ 97,957 | 304 | $ 180,126 | $ 126,982 | $ 23,746 | $ 16,740 |
| 2023 | 7 | 0.6651 | | | $ 15,000 | $ 9,976 | 128 | $ 145,902 | $ 97,033 | 319 | $ 189,132 | $ 125,784 | $ 23,746 | $ 15,792 |
| 2024 | 8 | 0.6274 | | | $ 15,000 | $ 9,411 | 134 | $ 153,197 | $ 96,118 | 335 | $ 198,589 | $ 124,597 | $ 23,746 | $ 14,899 |
| 2025 | 9 | 0.5919 | | | $ 15,000 | $ 8,878 | 141 | $ 160,857 | $ 95,211 | 352 | $ 208,518 | $ 123,422 | $ 23,746 | $ 14,055 |
| 2026 | 10 | 0.5584 | | | $ 65,000 | $ 36,296 | 148 | $ 168,900 | $ 94,313 | 369 | $ 218,944 | $ 122,257 | $ 23,746 | $ 13,260 |
| 2027 | 11 | 0.5268 | | | $ 15,000 | $ 7,902 | 151 | $ 172,278 | $ 90,754 | 377 | $ 223,323 | $ 117,644 | $ 23,746 | $ 12,509 |
| 2028 | 12 | 0.4970 | | | $ 15,000 | $ 7,455 | 154 | $ 175,723 | $ 87,329 | 384 | $ 227,789 | $ 113,204 | $ 23,746 | $ 11,801 |
| 2029 | 13 | 0.4688 | | | $ 15,000 | $ 7,033 | 157 | $ 179,238 | $ 84,034 | 392 | $ 232,345 | $ 108,933 | $ 23,746 | $ 11,133 |
| 2030 | 14 | 0.4423 | | | $ 15,000 | $ 6,635 | 160 | $ 182,823 | $ 80,863 | 400 | $ 236,992 | $ 104,822 | $ 23,746 | $ 10,503 |
| 2031 | 15 | 0.4173 | | | $ 15,000 | $ 6,259 | 163 | $ 186,479 | $ 77,811 | 408 | $ 241,732 | $ 100,866 | $ 23,746 | $ 9,908 |
| 2032 | 16 | 0.3936 | | | $ 15,000 | $ 5,905 | 166 | $ 190,209 | $ 74,875 | 416 | $ 246,567 | $ 97,060 | $ 23,746 | $ 9,348 |
| 2033 | 17 | 0.3714 | | | $ 15,000 | $ 5,570 | 170 | $ 194,013 | $ 72,049 | 424 | $ 251,498 | $ 93,397 | $ 23,746 | $ 8,818 |
| 2034 | 18 | 0.3503 | | | $ 15,000 | $ 5,255 | 173 | $ 197,893 | $ 69,331 | 433 | $ 256,528 | $ 89,873 | $ 23,746 | $ 8,319 |
| 2035 | 19 | 0.3305 | | | $ 15,000 | $ 4,958 | 177 | $ 201,851 | $ 66,714 | 441 | $ 261,658 | $ 86,482 | $ 23,746 | $ 7,848 |
| 2036 | 20 | 0.3118 | | | $ 65,000 | $ 20,267 | 180 | $ 205,888 | $ 64,197 | 450 | $ 266,892 | $ 83,218 | $ 23,746 | $ 7,404 |
| 2037 | 21 | 0.2942 | | | $ 15,000 | $ 4,412 | 184 | $ 210,006 | $ 61,774 | 459 | $ 272,229 | $ 80,078 | $ 23,746 | $ 6,985 |
| 2038 | 22 | 0.2775 | | | $ 15,000 | $ 4,163 | 187 | $ 214,206 | $ 59,443 | 468 | $ 277,674 | $ 77,056 | $ 23,746 | $ 6,590 |
| 2039 | 23 | 0.2618 | | | $ 15,000 | $ 3,927 | 191 | $ 218,490 | $ 57,200 | 478 | $ 283,228 | $ 74,148 | $ 23,746 | $ 6,217 |
| 2040 | 24 | 0.2470 | | | $ 15,000 | $ 3,705 | 195 | $ 222,860 | $ 55,042 | 487 | $ 288,892 | $ 71,350 | $ 23,746 | $ 5,865 |
| 2041 | 25 | 0.2330 | | | $ 15,000 | $ 3,495 | 199 | $ 227,317 | $ 52,965 | 497 | $ 294,670 | $ 68,658 | $ 23,746 | $ 5,533 |
| 2042 | 26 | 0.2198 | | | $ 15,000 | $ 3,297 | 203 | $ 231,863 | $ 50,966 | 507 | $ 300,563 | $ 66,067 | $ 23,746 | $ 5,220 |
| 2043 | 27 | 0.2074 | | | $ 15,000 | $ 3,111 | 207 | $ 236,500 | $ 49,043 | 517 | $ 306,575 | $ 63,574 | $ 23,746 | $ 4,924 |
| 2044 | 28 | 0.1956 | | | $ 15,000 | $ 2,934 | 211 | $ 241,230 | $ 47,192 | 528 | $ 312,706 | $ 61,175 | $ 23,746 | $ 4,645 |
| 2045 | 29 | 0.1846 | | | $ 15,000 | $ 2,768 | 215 | $ 246,055 | $ 45,411 | 538 | $ 318,960 | $ 58,866 | $ 23,746 | $ 4,382 |
| 2046 | 30 | 0.1741 | | | $ 65,000 | $ 11,317 | 220 | $ 250,976 | $ 43,697 | 549 | $ 325,339 | $ 56,645 | $ 23,746 | $ 4,134 |
| 2047 | 31 | 0.1643 | | | $ 15,000 | $ 2,464 | 224 | $ 255,996 | $ 42,049 | 560 | $ 331,846 | $ 54,507 | $ 23,746 | $ 3,900 |
| 2048 | 32 | 0.1550 | | | $ 15,000 | $ 2,324 | 228 | $ 261,116 | $ 40,462 | 571 | $ 338,483 | $ 52,450 | $ 23,746 | $ 3,680 |
| 2049 | 33 | 0.1462 | | | $ 15,000 | $ 2,193 | 233 | $ 266,338 | $ 38,935 | 582 | $ 345,253 | $ 50,471 | $ 23,746 | $ 3,471 |
| 2050 | 34 | 0.1379 | | | $ 15,000 | $ 2,069 | 238 | $ 271,665 | $ 37,466 | 594 | $ 352,158 | $ 48,567 | $ 23,746 | $ 3,275 |
| 2051 | 35 | 0.1301 | | | $ 15,000 | $ 1,952 | 242 | $ 277,098 | $ 36,052 | 606 | $ 359,201 | $ 46,734 | $ 23,746 | $ 3,089 |
| 2052 | 36 | 0.1227 | | | $ 15,000 | $ 1,841 | 247 | $ 282,640 | $ 34,691 | 618 | $ 366,385 | $ 44,970 | $ 23,746 | $ 2,915 |
| 2053 | 37 | 0.1158 | | | $ 15,000 | $ 1,737 | 252 | $ 288,293 | $ 33,382 | 630 | $ 373,713 | $ 43,273 | $ 23,746 | $ 2,750 |
| 2054 | 38 | 0.1092 | | | $ 15,000 | $ 1,639 | 257 | $ 294,059 | $ 32,123 | 643 | $ 381,187 | $ 41,640 | $ 23,746 | $ 2,594 |
| 2055 | 39 | 0.1031 | | | $ 15,000 | $ 1,546 | 262 | $ 299,940 | $ 30,910 | 656 | $ 388,811 | $ 40,069 | $ 23,746 | $ 2,447 |
| 2056 | 40 | 0.0972 | | | $ 15,000 | $ 1,458 | 268 | $ 305,939 | $ 29,744 | 669 | $ 396,587 | $ 38,557 | $ 23,746 | $ 2,309 |
| | | | **$ 646,226** | | | **$ 263,759** | | | **$ 2,528,382** | | | **$ 3,277,532** | | **$ 334,888** |

Maintenance costs before $ 5,000
Maintenance costs after $ 20,000 + additional $50k electronic maintenance at years 10, 20 and 30

Existing Ped volume 150 day
Option Ped volume 250 day
Number new peds 100 day
Ped benefits $ 2.70 per km per pedestrian

Year 3 to 10 Year 11 +
Annual growth 5% 2%
*(health and environmental benefits for foothpaths)*

Existing cycle volume 500 day
Option Cycle volume 750 day
Number new Cyclists 250 day
Cyclist benefits $ 1.40 per km per cyclist

Year 3 to 10 Year 11 +
Annual growth 5% 2%
*(health and environmental benefits for cycle lanes, cycleways or increased shoulder widths)*

Update factors (to July 2015 dollars)
Walking and cycling benefits 1.16
Crash savings 1.00

| | | |
|---|---|---|
| **BCR calc:** | $ 6,140,802 | Total Benefits |
| | $ 909,985 | Total Costs |
| **Option BCR = 7** | | |

**Option 2 - Mono-Directional Separated Cycle Lane**

Option description: Construct cycle lanes separated from the traffic/parking lanes. Improvements at the SH6/Hay St intersection

| | | | COSTS | | | | BENEFITS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Construction | | Maintenance | | Pedestrian facility benefits | | | Cycle facility benefits | | | Cycle crash savings (Hay St) | |
| Year (from 1 July of) | Year | Discount factor (6%) | Money of the Day | Present Value | Annual Costs (Money of the Day) | Annual Costs (Present Value) | Number of new pedestrians per day | Annual Benefits (Money of the Day) | Annual benefits (Present Value) | Number of new cyclists per day | Annual Benefits (Money of the Day ) | Annual benefits (Present Value) | Money of the Day | Annual benefits (Present Value) |
| 2016 | 0 | 1.0000 | | | | | | | | | | | | |
| 2017 | 1 | 0.9434 | $ 1,818,000 | $ 1,715,094 | | | | | | | | | | |
| 2018 | 2 | 0.8900 | | | $ 25,000 | $ 22,250 | 200 | $ 228,636 | $ 203,485 | 500 | $ 296,380 | $ 263,777 | $ 6 | $ 5 |
| 2019 | 3 | 0.8396 | | | $ 25,000 | $ 20,990 | 210 | $ 240,068 | $ 201,566 | 525 | $ 311,199 | $ 261,289 | $ 23,746 | $ 19,938 |
| 2020 | 4 | 0.7921 | | | $ 25,000 | $ 19,802 | 221 | $ 252,071 | $ 199,664 | 551 | $ 326,759 | $ 258,824 | $ 23,746 | $ 18,809 |
| 2021 | 5 | 0.7473 | | | $ 25,000 | $ 18,681 | 232 | $ 264,675 | $ 197,780 | 579 | $ 343,097 | $ 256,382 | $ 23,746 | $ 17,744 |
| 2022 | 6 | 0.7050 | | | $ 25,000 | $ 17,624 | 243 | $ 277,908 | $ 195,915 | 608 | $ 360,252 | $ 253,963 | $ 23,746 | $ 16,740 |
| 2023 | 7 | 0.6651 | | | $ 25,000 | $ 16,626 | 255 | $ 291,804 | $ 194,066 | 638 | $ 378,264 | $ 251,567 | $ 23,746 | $ 15,792 |
| 2024 | 8 | 0.6274 | | | $ 25,000 | $ 15,685 | 268 | $ 306,394 | $ 192,235 | 670 | $ 397,178 | $ 249,194 | $ 23,746 | $ 14,899 |
| 2025 | 9 | 0.5919 | | | $ 25,000 | $ 14,797 | 281 | $ 321,714 | $ 190,422 | 704 | $ 417,036 | $ 246,843 | $ 23,746 | $ 14,055 |
| 2026 | 10 | 0.5584 | | | $ 75,000 | $ 41,880 | 295 | $ 337,800 | $ 188,625 | 739 | $ 437,888 | $ 244,515 | $ 23,746 | $ 13,260 |
| 2027 | 11 | 0.5268 | | | $ 25,000 | $ 13,170 | 301 | $ 344,555 | $ 181,508 | 754 | $ 446,646 | $ 235,288 | $ 23,746 | $ 12,509 |
| 2028 | 12 | 0.4970 | | | $ 25,000 | $ 12,424 | 307 | $ 351,447 | $ 174,658 | 769 | $ 455,579 | $ 226,409 | $ 23,746 | $ 11,801 |
| 2029 | 13 | 0.4688 | | | $ 25,000 | $ 11,721 | 314 | $ 358,476 | $ 168,067 | 784 | $ 464,691 | $ 217,865 | $ 23,746 | $ 11,133 |
| 2030 | 14 | 0.4423 | | | $ 25,000 | $ 11,058 | 320 | $ 365,645 | $ 161,725 | 800 | $ 473,984 | $ 209,644 | $ 23,746 | $ 10,503 |
| 2031 | 15 | 0.4173 | | | $ 25,000 | $ 10,432 | 326 | $ 372,958 | $ 155,622 | 816 | $ 483,464 | $ 201,733 | $ 23,746 | $ 9,908 |
| 2032 | 16 | 0.3936 | | | $ 25,000 | $ 9,841 | 333 | $ 380,417 | $ 149,750 | 832 | $ 493,133 | $ 194,120 | $ 23,746 | $ 9,348 |
| 2033 | 17 | 0.3714 | | | $ 25,000 | $ 9,284 | 339 | $ 388,025 | $ 144,099 | 849 | $ 502,996 | $ 186,795 | $ 23,746 | $ 8,818 |
| 2034 | 18 | 0.3503 | | | $ 25,000 | $ 8,759 | 346 | $ 395,786 | $ 138,661 | 866 | $ 513,056 | $ 179,746 | $ 23,746 | $ 8,319 |
| 2035 | 19 | 0.3305 | | | $ 25,000 | $ 8,263 | 353 | $ 403,702 | $ 133,429 | 883 | $ 523,317 | $ 172,963 | $ 23,746 | $ 7,848 |
| 2036 | 20 | 0.3118 | | | $ 75,000 | $ 23,385 | 360 | $ 411,776 | $ 128,394 | 901 | $ 533,783 | $ 166,436 | $ 23,746 | $ 7,404 |
| 2037 | 21 | 0.2942 | | | $ 25,000 | $ 7,354 | 367 | $ 420,011 | $ 123,549 | 919 | $ 544,459 | $ 160,156 | $ 23,746 | $ 6,985 |
| 2038 | 22 | 0.2775 | | | $ 25,000 | $ 6,938 | 375 | $ 428,411 | $ 118,886 | 937 | $ 555,348 | $ 154,112 | $ 23,746 | $ 6,590 |
| 2039 | 23 | 0.2618 | | | $ 25,000 | $ 6,545 | 382 | $ 436,980 | $ 114,400 | 956 | $ 566,455 | $ 148,296 | $ 23,746 | $ 6,217 |
| 2040 | 24 | 0.2470 | | | $ 25,000 | $ 6,174 | 390 | $ 445,719 | $ 110,083 | 975 | $ 577,784 | $ 142,700 | $ 23,746 | $ 5,865 |
| 2041 | 25 | 0.2330 | | | $ 25,000 | $ 5,825 | 398 | $ 454,634 | $ 105,929 | 994 | $ 589,340 | $ 137,315 | $ 23,746 | $ 5,533 |
| 2042 | 26 | 0.2198 | | | $ 25,000 | $ 5,495 | 406 | $ 463,726 | $ 101,932 | 1014 | $ 601,127 | $ 132,134 | $ 23,746 | $ 5,220 |
| 2043 | 27 | 0.2074 | | | $ 25,000 | $ 5,184 | 414 | $ 473,001 | $ 98,085 | 1034 | $ 613,149 | $ 127,148 | $ 23,746 | $ 4,924 |
| 2044 | 28 | 0.1956 | | | $ 25,000 | $ 4,891 | 422 | $ 482,461 | $ 94,384 | 1055 | $ 625,412 | $ 122,349 | $ 23,746 | $ 4,645 |
| 2045 | 29 | 0.1846 | | | $ 25,000 | $ 4,614 | 430 | $ 492,110 | $ 90,822 | 1076 | $ 637,920 | $ 117,733 | $ 23,746 | $ 4,382 |
| 2046 | 30 | 0.1741 | | | $ 75,000 | $ 13,058 | 439 | $ 501,952 | $ 87,395 | 1098 | $ 650,679 | $ 113,290 | $ 23,746 | $ 4,134 |
| 2047 | 31 | 0.1643 | | | $ 25,000 | $ 4,106 | 448 | $ 511,991 | $ 84,097 | 1120 | $ 663,692 | $ 109,015 | $ 23,746 | $ 3,900 |
| 2048 | 32 | 0.1550 | | | $ 25,000 | $ 3,874 | 457 | $ 522,231 | $ 80,924 | 1142 | $ 676,966 | $ 104,901 | $ 23,746 | $ 3,680 |
| 2049 | 33 | 0.1462 | | | $ 25,000 | $ 3,655 | 466 | $ 532,676 | $ 77,870 | 1165 | $ 690,506 | $ 100,942 | $ 23,746 | $ 3,471 |
| 2050 | 34 | 0.1379 | | | $ 25,000 | $ 3,448 | 475 | $ 543,329 | $ 74,931 | 1188 | $ 704,316 | $ 97,133 | $ 23,746 | $ 3,275 |
| 2051 | 35 | 0.1301 | | | $ 25,000 | $ 3,253 | 485 | $ 554,196 | $ 72,104 | 1212 | $ 718,402 | $ 93,468 | $ 23,746 | $ 3,089 |
| 2052 | 36 | 0.1227 | | | $ 25,000 | $ 3,069 | 494 | $ 565,280 | $ 69,383 | 1236 | $ 732,770 | $ 89,941 | $ 23,746 | $ 2,915 |
| 2053 | 37 | 0.1158 | | | $ 25,000 | $ 2,895 | 504 | $ 576,585 | $ 66,765 | 1261 | $ 747,426 | $ 86,547 | $ 23,746 | $ 2,750 |
| 2054 | 38 | 0.1092 | | | $ 25,000 | $ 2,731 | 514 | $ 588,117 | $ 64,245 | 1286 | $ 762,374 | $ 83,281 | $ 23,746 | $ 2,594 |
| 2055 | 39 | 0.1031 | | | $ 25,000 | $ 2,576 | 525 | $ 599,879 | $ 61,821 | 1312 | $ 777,622 | $ 80,138 | $ 23,746 | $ 2,447 |
| 2056 | 40 | 0.0972 | | | $ 25,000 | $ 2,431 | 535 | $ 611,877 | $ 59,488 | 1338 | $ 793,174 | $ 77,114 | $ 23,746 | $ 2,309 |
| | | | **$ 1,715,094** | | | **$ 404,788** | | | **$ 5,056,764** | | | **$ 6,555,064** | | **$ 313,760** |

Maintenance costs before $ 5,000
Maintenance costs after $ 30,000 + additional $50k electronic maintenance at years 10, 20 and 30

Existing Ped volume 150 day
Option Ped volume 350 day
Number new peds 200 day
Ped benefits $ 2.70 per km per pedestrian

Year 3 to 10 Year 11 +
Annual growth 5% 2%
*(health and environmental benefits for footpaths)*

Existing cycle volume 500 day
Option Cycle volume 1000 day
Number new Cyclists 500 day
Cyclist benefits $ 1.40 per km per cyclist

Year 3 to 10 Year 11 +
Annual growth 5% 2%
*(health and environmental benefits for cycle lanes, cycleways or increased shoulder widths)*

Update factors (to July 2015 dollars)
Walking and cycling benefits 1.16
Crash savings 1.00

| | | | |
|---|---|---|---|
| **BCR calc:** | $ | 11,925,588 | Total Benefits |
| | $ | 2,119,882 | Total Costs |
| **Option BCR = 6** | | | |

**Option 3 - Seaward Shared Pathway**

Option description: Upgraded on-road cycle lanes, 3.0 m wide shared pedestrian/cycle path on eastern (seaward) side. Improvements at the SH6/Hay St intersection

| | | | COSTS | | | | BENEFITS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Construction | | Maintenance | | Pedestrian facility benefits | | | Cycle facility benefits | | | Cycle crash savings (Hay St) | |
| Year (from 1 July of) | Year | Discount factor (6%) | Money of the Day | Present Value | Annual Costs (Money of the Day) | Annual Costs (Present Value) | Number of new pedestrians per day | Annual Benefits (Money of the Day) | Annual benefits (Present Value) | Number of new cyclists per day | Annual Benefits (Money of the Day ) | Annual benefits (Present Value) | Money of the Day | Annual benefits (Present Value) |
| 2016 | 0 | 1.0000 | | | | | | | | | | | | |
| 2017 | 1 | 0.9434 | $ 2,000,000 | $ 1,886,792 | | | | | | | | | | |
| 2018 | 2 | 0.8900 | | | $ 15,000 | $ 13,350 | 250 | $ 285,795 | $ 254,357 | 500 | $ 296,380 | $ 263,777 | $ 23,746 | $ 21,134 |
| 2019 | 3 | 0.8396 | | | $ 15,000 | $ 12,594 | 263 | $ 300,085 | $ 251,957 | 525 | $ 311,199 | $ 261,289 | $ 23,746 | $ 19,938 |
| 2020 | 4 | 0.7921 | | | $ 15,000 | $ 11,881 | 276 | $ 315,089 | $ 249,580 | 551 | $ 326,759 | $ 258,824 | $ 23,746 | $ 18,809 |
| 2021 | 5 | 0.7473 | | | $ 15,000 | $ 11,209 | 289 | $ 330,843 | $ 247,225 | 579 | $ 343,097 | $ 256,382 | $ 23,746 | $ 17,744 |
| 2022 | 6 | 0.7050 | | | $ 15,000 | $ 10,574 | 304 | $ 347,386 | $ 244,893 | 608 | $ 360,252 | $ 253,963 | $ 23,746 | $ 16,740 |
| 2023 | 7 | 0.6651 | | | $ 15,000 | $ 9,976 | 319 | $ 364,755 | $ 242,583 | 638 | $ 378,264 | $ 251,567 | $ 23,746 | $ 15,792 |
| 2024 | 8 | 0.6274 | | | $ 15,000 | $ 9,411 | 335 | $ 382,993 | $ 240,294 | 670 | $ 397,178 | $ 249,194 | $ 23,746 | $ 14,899 |
| 2025 | 9 | 0.5919 | | | $ 15,000 | $ 8,878 | 352 | $ 402,142 | $ 238,027 | 704 | $ 417,036 | $ 246,843 | $ 23,746 | $ 14,055 |
| 2026 | 10 | 0.5584 | | | $ 65,000 | $ 36,296 | 369 | $ 422,249 | $ 235,782 | 739 | $ 437,888 | $ 244,515 | $ 23,746 | $ 13,260 |
| 2027 | 11 | 0.5268 | | | $ 15,000 | $ 7,902 | 377 | $ 430,694 | $ 226,884 | 754 | $ 446,646 | $ 235,288 | $ 23,746 | $ 12,509 |
| 2028 | 12 | 0.4970 | | | $ 15,000 | $ 7,455 | 384 | $ 439,308 | $ 218,323 | 769 | $ 455,579 | $ 226,409 | $ 23,746 | $ 11,801 |
| 2029 | 13 | 0.4688 | | | $ 15,000 | $ 7,033 | 392 | $ 448,094 | $ 210,084 | 784 | $ 464,691 | $ 217,865 | $ 23,746 | $ 11,133 |
| 2030 | 14 | 0.4423 | | | $ 15,000 | $ 6,635 | 400 | $ 457,056 | $ 202,156 | 800 | $ 473,984 | $ 209,644 | $ 23,746 | $ 10,503 |
| 2031 | 15 | 0.4173 | | | $ 15,000 | $ 6,259 | 408 | $ 466,197 | $ 194,528 | 816 | $ 483,464 | $ 201,733 | $ 23,746 | $ 9,908 |
| 2032 | 16 | 0.3936 | | | $ 15,000 | $ 5,905 | 416 | $ 475,521 | $ 187,187 | 832 | $ 493,133 | $ 194,120 | $ 23,746 | $ 9,348 |
| 2033 | 17 | 0.3714 | | | $ 15,000 | $ 5,570 | 424 | $ 485,032 | $ 180,124 | 849 | $ 502,996 | $ 186,795 | $ 23,746 | $ 8,818 |
| 2034 | 18 | 0.3503 | | | $ 15,000 | $ 5,255 | 433 | $ 494,732 | $ 173,326 | 866 | $ 513,056 | $ 179,746 | $ 23,746 | $ 8,319 |
| 2035 | 19 | 0.3305 | | | $ 15,000 | $ 4,958 | 441 | $ 504,627 | $ 166,786 | 883 | $ 523,317 | $ 172,963 | $ 23,746 | $ 7,848 |
| 2036 | 20 | 0.3118 | | | $ 65,000 | $ 20,267 | 450 | $ 514,720 | $ 160,492 | 901 | $ 533,783 | $ 166,436 | $ 23,746 | $ 7,404 |
| 2037 | 21 | 0.2942 | | | $ 15,000 | $ 4,412 | 459 | $ 525,014 | $ 154,436 | 919 | $ 544,459 | $ 160,156 | $ 23,746 | $ 6,985 |
| 2038 | 22 | 0.2775 | | | $ 15,000 | $ 4,163 | 468 | $ 535,514 | $ 148,608 | 937 | $ 555,348 | $ 154,112 | $ 23,746 | $ 6,590 |
| 2039 | 23 | 0.2618 | | | $ 15,000 | $ 3,927 | 478 | $ 546,225 | $ 143,000 | 956 | $ 566,455 | $ 148,296 | $ 23,746 | $ 6,217 |
| 2040 | 24 | 0.2470 | | | $ 15,000 | $ 3,705 | 487 | $ 557,149 | $ 137,604 | 975 | $ 577,784 | $ 142,700 | $ 23,746 | $ 5,865 |
| 2041 | 25 | 0.2330 | | | $ 15,000 | $ 3,495 | 497 | $ 568,292 | $ 132,411 | 994 | $ 589,340 | $ 137,315 | $ 23,746 | $ 5,533 |
| 2042 | 26 | 0.2198 | | | $ 15,000 | $ 3,297 | 507 | $ 579,658 | $ 127,415 | 1014 | $ 601,127 | $ 132,134 | $ 23,746 | $ 5,220 |
| 2043 | 27 | 0.2074 | | | $ 15,000 | $ 3,111 | 517 | $ 591,251 | $ 122,607 | 1034 | $ 613,149 | $ 127,148 | $ 23,746 | $ 4,924 |
| 2044 | 28 | 0.1956 | | | $ 15,000 | $ 2,934 | 528 | $ 603,076 | $ 117,980 | 1055 | $ 625,412 | $ 122,349 | $ 23,746 | $ 4,645 |
| 2045 | 29 | 0.1846 | | | $ 15,000 | $ 2,768 | 538 | $ 615,138 | $ 113,528 | 1076 | $ 637,920 | $ 117,733 | $ 23,746 | $ 4,382 |
| 2046 | 30 | 0.1741 | | | $ 65,000 | $ 11,317 | 549 | $ 627,440 | $ 109,244 | 1098 | $ 650,679 | $ 113,290 | $ 23,746 | $ 4,134 |
| 2047 | 31 | 0.1643 | | | $ 15,000 | $ 2,464 | 560 | $ 639,989 | $ 105,121 | 1120 | $ 663,692 | $ 109,015 | $ 23,746 | $ 3,900 |
| 2048 | 32 | 0.1550 | | | $ 15,000 | $ 2,324 | 571 | $ 652,789 | $ 101,154 | 1142 | $ 676,966 | $ 104,901 | $ 23,746 | $ 3,680 |
| 2049 | 33 | 0.1462 | | | $ 15,000 | $ 2,193 | 582 | $ 665,845 | $ 97,337 | 1165 | $ 690,506 | $ 100,942 | $ 23,746 | $ 3,471 |
| 2050 | 34 | 0.1379 | | | $ 15,000 | $ 2,069 | 594 | $ 679,162 | $ 93,664 | 1188 | $ 704,316 | $ 97,133 | $ 23,746 | $ 3,275 |
| 2051 | 35 | 0.1301 | | | $ 15,000 | $ 1,952 | 606 | $ 692,745 | $ 90,130 | 1212 | $ 718,402 | $ 93,468 | $ 23,746 | $ 3,089 |
| 2052 | 36 | 0.1227 | | | $ 15,000 | $ 1,841 | 618 | $ 706,600 | $ 86,729 | 1236 | $ 732,770 | $ 89,941 | $ 23,746 | $ 2,915 |
| 2053 | 37 | 0.1158 | | | $ 15,000 | $ 1,737 | 630 | $ 720,732 | $ 83,456 | 1261 | $ 747,426 | $ 86,547 | $ 23,746 | $ 2,750 |
| 2054 | 38 | 0.1092 | | | $ 15,000 | $ 1,639 | 643 | $ 735,146 | $ 80,307 | 1286 | $ 762,374 | $ 83,281 | $ 23,746 | $ 2,594 |
| 2055 | 39 | 0.1031 | | | $ 15,000 | $ 1,546 | 656 | $ 749,849 | $ 77,276 | 1312 | $ 777,622 | $ 80,138 | $ 23,746 | $ 2,447 |
| 2056 | 40 | 0.0972 | | | $ 15,000 | $ 1,458 | 669 | $ 764,846 | $ 74,360 | 1338 | $ 793,174 | $ 77,114 | $ 23,746 | $ 2,309 |
| | | | **$ 1,886,792** | | | **$ 263,759** | | | **$ 6,320,955** | | | **$ 6,555,064** | | **$ 334,888** |

Maintenance costs before $ 5,000
Maintenance costs after $ 20,000 + additional $50k electronic maintenance at years 10, 20 and 30

Existing Ped volume 150 day
Option Ped volume 400 day
Number new peds 250 day
Ped benefits $ 2.70 per km per pedestrian

| | Year 3 to 10 | Year 11 + |
|---|---|---|
| Annual growth | 5% | 2% |

*(health and environmental benefits for foothpaths)*

Existing cycle volume 500 day
Option Cycle volume 1000 day
Number new Cyclists 500 day
Cyclist benefits $ 1.40 per km per cyclist

| | Year 3 to 10 | Year 11 + |
|---|---|---|
| Annual growth | 5% | 2% |

*(health and environmental benefits for cycle lanes, cycleways or increased shoulder widths)*

Update factors (to July 2015 dollars)
Walking and cycling benefits 1.16
Crash savings 1.00

| | | |
|---|---|---|
| **BCR calc:** | $ 13,210,907 | Total Benefits |
| | $ 2,150,551 | Total Costs |
| **Option BCR = 6.1** | | |

**Option 4 - Seaward Shared Pathway via Wildman Ave/Vickerman St**

Option description: On-road cycle lanes cycle lane, 3.0 m wide shared pedestrian/cycle path on eastern (seaward) side. Path detours along Vickerman St and Wildman Ave. Improvements at the SH6/Hay St intersection

| | | | COSTS | | | | BENEFITS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Construction | | Maintenance | | Pedestrian facility benefits | | | Cycle facility benefits | | | Cycle crash savings (Hay St) | |
| Year (from 1 July of) | Year | Discount factor (6%) | Money of the Day | Present Value | Annual Costs (Money of the Day) | Annual Costs (Present Value) | Number of new pedestrians per day | Annual Benefits (Money of the Day) | Annual benefits (Present Value) | Number of new cyclists per day | Annual Benefits (Money of the Day ) | Annual benefits (Present Value) | Money of the Day | Annual benefits (Present Value) |
| 2016 | 0 | 1.0000 | | | | | | | | | | | | |
| 2017 | 1 | 0.9434 | $ 1,900,000 | $ 1,792,453 | | | | | | | | | | |
| 2018 | 2 | 0.8900 | | | $ 15,000 | $ 13,350 | 250 | $ 285,795 | $ 254,357 | 500 | $ 296,380 | $ 263,777 | $ 23,746 | $ 21,134 |
| 2019 | 3 | 0.8396 | | | $ 15,000 | $ 12,594 | 263 | $ 300,085 | $ 251,957 | 525 | $ 311,199 | $ 261,289 | $ 23,746 | $ 19,938 |
| 2020 | 4 | 0.7921 | | | $ 15,000 | $ 11,881 | 276 | $ 315,089 | $ 249,580 | 551 | $ 326,759 | $ 258,824 | $ 23,746 | $ 18,809 |
| 2021 | 5 | 0.7473 | | | $ 15,000 | $ 11,209 | 289 | $ 330,843 | $ 247,225 | 579 | $ 343,097 | $ 256,382 | $ 23,746 | $ 17,744 |
| 2022 | 6 | 0.7050 | | | $ 15,000 | $ 10,574 | 304 | $ 347,386 | $ 244,893 | 608 | $ 360,252 | $ 253,963 | $ 23,746 | $ 16,740 |
| 2023 | 7 | 0.6651 | | | $ 15,000 | $ 9,976 | 319 | $ 364,755 | $ 242,583 | 638 | $ 378,264 | $ 251,567 | $ 23,746 | $ 15,792 |
| 2024 | 8 | 0.6274 | | | $ 15,000 | $ 9,411 | 335 | $ 382,993 | $ 240,294 | 670 | $ 397,178 | $ 249,194 | $ 23,746 | $ 14,899 |
| 2025 | 9 | 0.5919 | | | $ 15,000 | $ 8,878 | 352 | $ 402,142 | $ 238,027 | 704 | $ 417,036 | $ 246,843 | $ 23,746 | $ 14,055 |
| 2026 | 10 | 0.5584 | | | $ 65,000 | $ 36,296 | 369 | $ 422,249 | $ 235,782 | 739 | $ 437,888 | $ 244,515 | $ 23,746 | $ 13,260 |
| 2027 | 11 | 0.5268 | | | $ 15,000 | $ 7,902 | 377 | $ 430,694 | $ 226,884 | 754 | $ 446,646 | $ 235,288 | $ 23,746 | $ 12,509 |
| 2028 | 12 | 0.4970 | | | $ 15,000 | $ 7,455 | 384 | $ 439,308 | $ 218,323 | 769 | $ 455,579 | $ 226,409 | $ 23,746 | $ 11,801 |
| 2029 | 13 | 0.4688 | | | $ 15,000 | $ 7,033 | 392 | $ 448,094 | $ 210,084 | 784 | $ 464,691 | $ 217,865 | $ 23,746 | $ 11,133 |
| 2030 | 14 | 0.4423 | | | $ 15,000 | $ 6,635 | 400 | $ 457,056 | $ 202,156 | 800 | $ 473,984 | $ 209,644 | $ 23,746 | $ 10,503 |
| 2031 | 15 | 0.4173 | | | $ 15,000 | $ 6,259 | 408 | $ 466,197 | $ 194,528 | 816 | $ 483,464 | $ 201,733 | $ 23,746 | $ 9,908 |
| 2032 | 16 | 0.3936 | | | $ 15,000 | $ 5,905 | 416 | $ 475,521 | $ 187,187 | 832 | $ 493,133 | $ 194,120 | $ 23,746 | $ 9,348 |
| 2033 | 17 | 0.3714 | | | $ 15,000 | $ 5,570 | 424 | $ 485,032 | $ 180,124 | 849 | $ 502,996 | $ 186,795 | $ 23,746 | $ 8,818 |
| 2034 | 18 | 0.3503 | | | $ 15,000 | $ 5,255 | 433 | $ 494,732 | $ 173,326 | 866 | $ 513,056 | $ 179,746 | $ 23,746 | $ 8,319 |
| 2035 | 19 | 0.3305 | | | $ 15,000 | $ 4,958 | 441 | $ 504,627 | $ 166,786 | 883 | $ 523,317 | $ 172,963 | $ 23,746 | $ 7,848 |
| 2036 | 20 | 0.3118 | | | $ 65,000 | $ 20,267 | 450 | $ 514,720 | $ 160,492 | 901 | $ 533,783 | $ 166,436 | $ 23,746 | $ 7,404 |
| 2037 | 21 | 0.2942 | | | $ 15,000 | $ 4,412 | 459 | $ 525,014 | $ 154,436 | 919 | $ 544,459 | $ 160,156 | $ 23,746 | $ 6,985 |
| 2038 | 22 | 0.2775 | | | $ 15,000 | $ 4,163 | 468 | $ 535,514 | $ 148,608 | 937 | $ 555,348 | $ 154,112 | $ 23,746 | $ 6,590 |
| 2039 | 23 | 0.2618 | | | $ 15,000 | $ 3,927 | 478 | $ 546,225 | $ 143,000 | 956 | $ 566,455 | $ 148,296 | $ 23,746 | $ 6,217 |
| 2040 | 24 | 0.2470 | | | $ 15,000 | $ 3,705 | 487 | $ 557,149 | $ 137,604 | 975 | $ 577,784 | $ 142,700 | $ 23,746 | $ 5,865 |
| 2041 | 25 | 0.2330 | | | $ 15,000 | $ 3,495 | 497 | $ 568,292 | $ 132,411 | 994 | $ 589,340 | $ 137,315 | $ 23,746 | $ 5,533 |
| 2042 | 26 | 0.2198 | | | $ 15,000 | $ 3,297 | 507 | $ 579,658 | $ 127,415 | 1014 | $ 601,127 | $ 132,134 | $ 23,746 | $ 5,220 |
| 2043 | 27 | 0.2074 | | | $ 15,000 | $ 3,111 | 517 | $ 591,251 | $ 122,607 | 1034 | $ 613,149 | $ 127,148 | $ 23,746 | $ 4,924 |
| 2044 | 28 | 0.1956 | | | $ 15,000 | $ 2,934 | 528 | $ 603,076 | $ 117,980 | 1055 | $ 625,412 | $ 122,349 | $ 23,746 | $ 4,645 |
| 2045 | 29 | 0.1846 | | | $ 15,000 | $ 2,768 | 538 | $ 615,138 | $ 113,528 | 1076 | $ 637,920 | $ 117,733 | $ 23,746 | $ 4,382 |
| 2046 | 30 | 0.1741 | | | $ 65,000 | $ 11,317 | 549 | $ 627,440 | $ 109,244 | 1098 | $ 650,679 | $ 113,290 | $ 23,746 | $ 4,134 |
| 2047 | 31 | 0.1643 | | | $ 15,000 | $ 2,464 | 560 | $ 639,989 | $ 105,121 | 1120 | $ 663,692 | $ 109,015 | $ 23,746 | $ 3,900 |
| 2048 | 32 | 0.1550 | | | $ 15,000 | $ 2,324 | 571 | $ 652,789 | $ 101,154 | 1142 | $ 676,966 | $ 104,901 | $ 23,746 | $ 3,680 |
| 2049 | 33 | 0.1462 | | | $ 15,000 | $ 2,193 | 582 | $ 665,845 | $ 97,337 | 1165 | $ 690,506 | $ 100,942 | $ 23,746 | $ 3,471 |
| 2050 | 34 | 0.1379 | | | $ 15,000 | $ 2,069 | 594 | $ 679,162 | $ 93,664 | 1188 | $ 704,316 | $ 97,133 | $ 23,746 | $ 3,275 |
| 2051 | 35 | 0.1301 | | | $ 15,000 | $ 1,952 | 606 | $ 692,745 | $ 90,130 | 1212 | $ 718,402 | $ 93,468 | $ 23,746 | $ 3,089 |
| 2052 | 36 | 0.1227 | | | $ 15,000 | $ 1,841 | 618 | $ 706,600 | $ 86,729 | 1236 | $ 732,770 | $ 89,941 | $ 23,746 | $ 2,915 |
| 2053 | 37 | 0.1158 | | | $ 15,000 | $ 1,737 | 630 | $ 720,732 | $ 83,456 | 1261 | $ 747,426 | $ 86,547 | $ 23,746 | $ 2,750 |
| 2054 | 38 | 0.1092 | | | $ 15,000 | $ 1,639 | 643 | $ 735,146 | $ 80,307 | 1286 | $ 762,374 | $ 83,281 | $ 23,746 | $ 2,594 |
| 2055 | 39 | 0.1031 | | | $ 15,000 | $ 1,546 | 656 | $ 749,849 | $ 77,276 | 1312 | $ 777,622 | $ 80,138 | $ 23,746 | $ 2,447 |
| 2056 | 40 | 0.0972 | | | $ 15,000 | $ 1,458 | 669 | $ 764,846 | $ 74,360 | 1338 | $ 793,174 | $ 77,114 | $ 23,746 | $ 2,309 |
| | | | **$ 1,792,453** | | | **$ 263,759** | | | **$ 6,320,955** | | | **$ 6,555,064** | | **$ 334,888** |

Maintenance costs before $ 5,000
Maintenance costs after $ 20,000 + additional $50k electronic maintenance at years 10, 20 and 30

Existing Ped volume 150 day
Option Ped volume 400 day — Year 3 to 10 — Year 11 +
Number new peds 250 day — Annual growth — 5% — 2%
Ped benefits $ 2.70 per km per pedestrian *(health and environmental benefits for foothpaths)*

Existing cycle volume 500 day
Option Cycle volume 1000 day — Year 3 to 10 — Year 11 +
Number new Cyclists 500 day — Annual growth — 5% — 2%
Cyclist benefits $ 1.40 per km per cyclist *(health and environmental benefits for cycle lanes, cycleways or increased shoulder widths)*

Update factors (to July 2015 dollars)
Walking and cycling benefits 1.16
Crash savings 1.00

| | | |
|---|---|---|
| **BCR calc:** | $ 13,210,907 | Total Benefits |
| | $ 2,056,212 | Total Costs |
| **Option BCR = 6** | | |