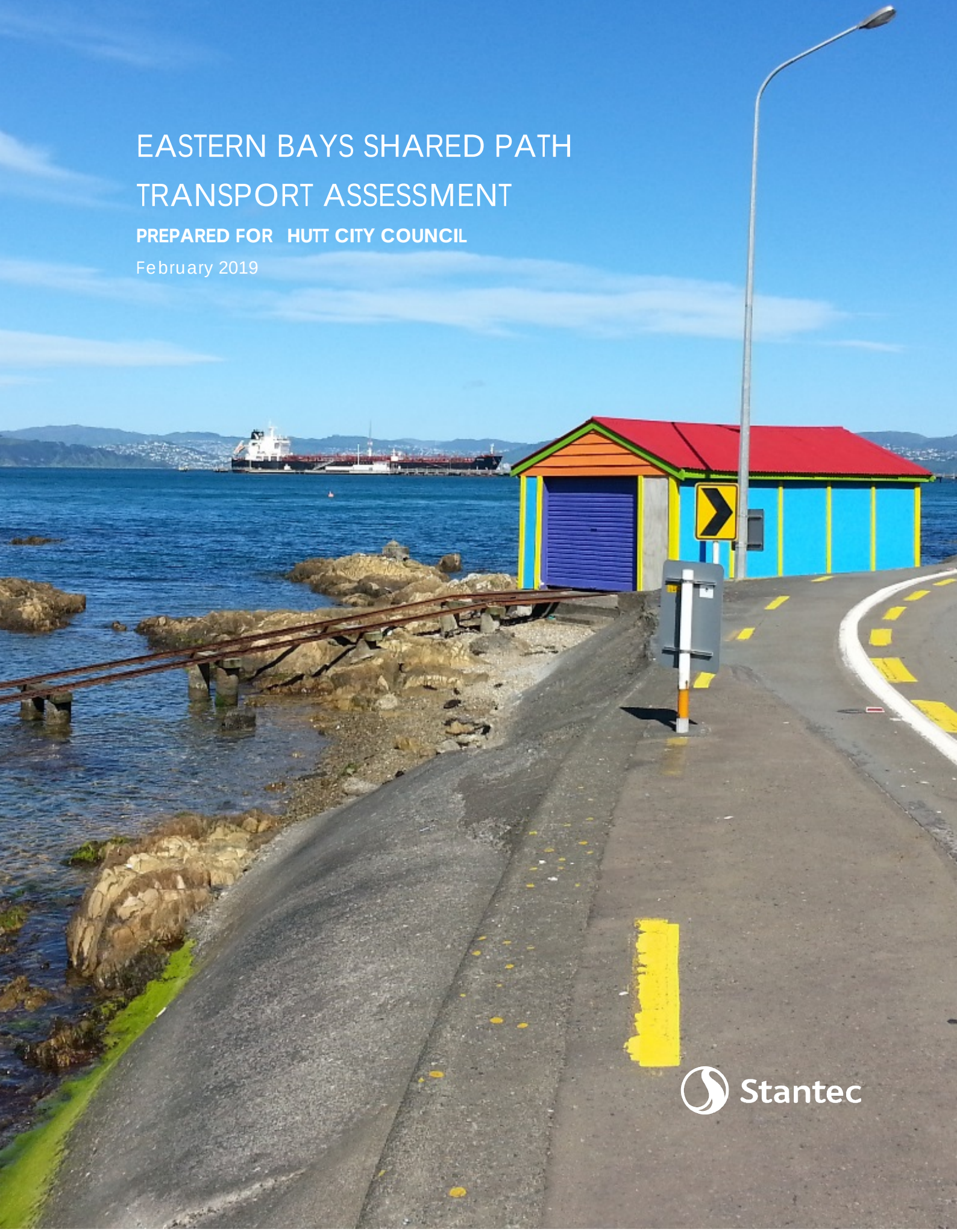
EASTERN BAYS SHARED PATH
TRANSPORT ASSESSMENT

PREPARED FOR HUTT CITY COUNCIL

February 2019



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Hutt City Council

Transport Assessment

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Executive Summary

The construction of a shared pedestrian and cycle specific path along the seaward side of Marine Drive has been an aspiration for Hutt City Council (HCC) and its residents for many years. The Shared Path has featured in past strategies and is a key project under the current strategy "Walk and Cycle the Hutt 2014 – 2019".

The project focuses on improving safety for pedestrians and cyclists travelling along Marine Drive and provides a basis for future opportunities for protecting the resilience of the road and underground services by upgrading the supporting seawalls. Marine Drive provides the only road access to the Eastern Bay suburbs and is therefore a key transport route for the region.

A facilitated objectives, constraints and opportunities stakeholder workshop was held on 8 September 2016. At the workshop, the project team and stakeholder panel identified and agreed the following two key problems:

- **Problem 1**: "Safety of current path and lack of separation prevents walking and cycling and the subsequent health, environmental and economic effects."
- **Problem 2**: "Current facility is at increasing risk of closure and damage from storms and sea level rise and there is no alternative route."

Throughout the development of the Project, alternatives and options associated with the design were investigated and recorded, refer the Alternatives Assessment (Appendix G). The resulting Project was developed and pursued on the seaward side of Marine Drive, the key reasons for favouring the "coastal edge" option.

Figure 1-1 shows the existing situation with the proposed widening graphically superimposed.

Figure 1-1: Proposed shared path showing a typical widening

To achieve the above, the works include:

- A continuous seaward Shared Path with a varying width between 2.5m and 3.5m;
- The replacement and improvement of existing seawalls in parts;

- The placement of rock revetments to protect the foreshore either side of headlands;
- New curved seawalls;
- Beach nourishment;
- Beach access points; and
- Minor repositioning of bus shelters.

A number of benefits will be realised as a result of the shared path, as well as some impacts and subsequent mitigation measures. The transport benefits of the Shared Path are outlined below in Table 1-1.

Table 1-1: Shared Path Benefits

Benefit Type	Description
Safety	Improved actual and perceived safety for pedestrians and cyclists.
Resilience	Improved resilience against climate change, sea level rise and future storm events through proposed seawall improvements and potential longer term additions.
Economic	Increased pedestrian and cycle users on Marine Drive – economic evaluation has assumed some 200 new users. Benefit Cost Ratio (BCR) of 1.3 with a First Year Rate of Return of (FYRR) 5%.
Improved health and well-being	Active transport helps to reduce disease and ill-health associated with inactivity.
Accessibility and Connectivity	Improved social connectivity and opportunities and improved accessibility for the residents of Eastern Bays – within individual bays, between different bays, to and from Lower Hutt and beyond and to other cycle routes.
Mode shift	Reduction in private vehicle use as the number of active users increases – some existing trips, but largely new trips on to the network.
Environment	Reductions in CO_2 emissions and congestion.
Other	Localised economic improvements and increased business for local suppliers of goods and services, particularly through increased tourism activities.

There will also be some transport impacts felt as part of the project. Mitigation measures have been identified to ensure that any transport impacts are reduced, these are highlighted in Table 1-2 below.

Table 1-2: Shared Path Impacts and Mitigation

Impacts	Mitigation
Construction – temporary traffic management and lane closures, increase in construction traffic, increases in journey times and parking shortages due to increased demand.	Staged construction over a 6-year period, bay by bay for a period of 3-6 months per bay. Construction traffic will be limited to low tide and off-peak traffic times. Disruption over a short geographical distance, with partial closures only and for a short duration.
Reduction of informal parking.	Improvements to formal parking areas. The Shared Path may reduce need for on-street parking by enabling walking / cycling access.
Pedestrian crossing demand to increase.	Separators between the shared path and traffic lane will feature regular gaps, allowing pedestrians and cyclists to cross Marine Drive. Transition points provided for cyclists.

Impacts	Mitigation
No on-road cycling facility.	Cyclists can either use the shared path component or continue to use the traffic lane.

Overall, from a transportation perspective, the provision of a Shared Path along Marine Drive is considered to provide significant benefits to the local community and users from further afield that outweigh the impacts.

1. Introduction

1.1 Background

The construction of a shared pedestrian and cycle specific path along the seaward side of Marine Drive, which runs through the Eastern Bays, has been an aspiration for Hutt City Council and its residents for many years. The Shared Path has featured in past strategies and is a key project in providing a safe and integrated network for commuting and recreational purposes under the current strategy "Walk and Cycle the Hutt 2014 – 2019".

The project forms a key part of the Te Aranui o Pōneke (the Great Harbour Way), a walking and cycling route around Te Whanganui-a-tara, the harbour of Wellington, as well as completing the circular link for the Remutaka Trail. The proposed route will link Fitzroy Bay in the east to Sinclair Head in the west, and the urban areas of Wellington, Hutt City and Wainuiomata, further increasing the interconnectivity to an increased number of amenities and services for the residents within the Eastern Bays area. The wider context of the Great Harbour Way ("GHW") is provided below in Figure 1-1 below.

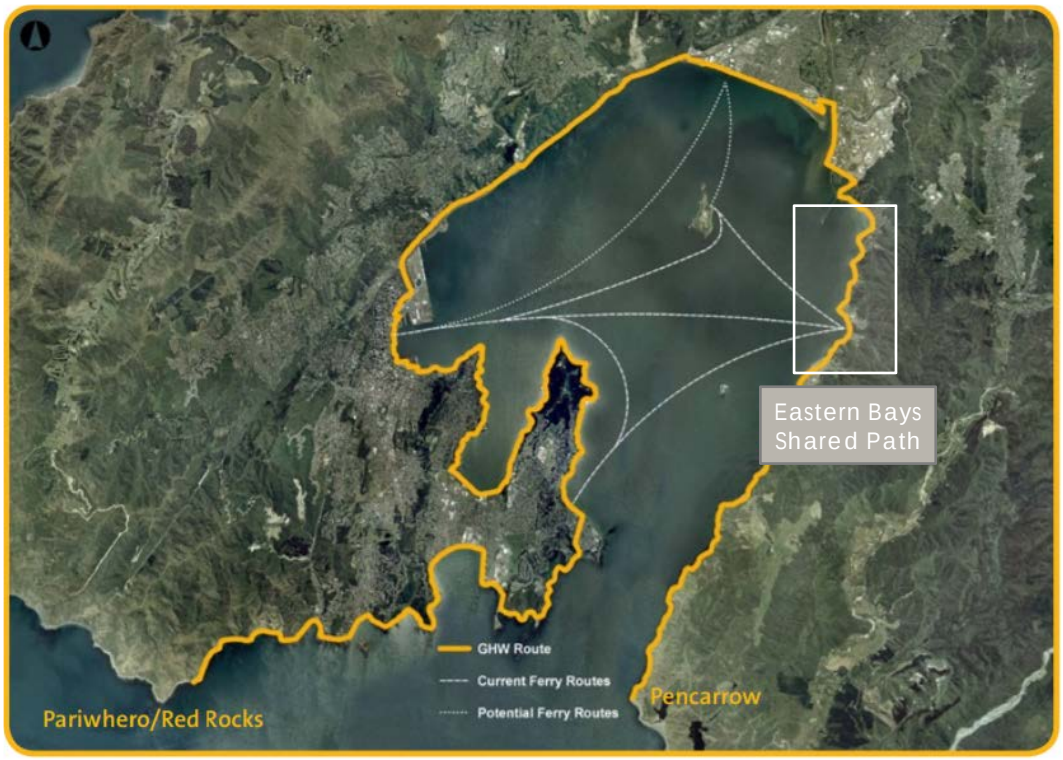


Figure 1-1: The Great Harbour Way (Source: http://www.greatharbourway.org.nz)

Equally, the Project improves, and provides the basis for future opportunities for protecting the resilience of the road and underground services by upgrading the supporting seawalls. Marine Drive provides the only road access to the Eastern Bay suburbs and is therefore a key transport route for the region[1].

Key infrastructure services including the Main Outfall Sewer Pipeline (MOP) are located within the road corridor.[2] The MOP is an 18km long pipeline that conveys secondary treated wastewater from the Seaview Wastewater Treatment Plant (which services 146,000 residents and a large number of local industries) to the outfall at Bluff Point, near Pencarrow Head.[3] The MOP is a regionally significant infrastructure, and along with the road access and other services are important lifeline utilities for the wider community.

[1] Marine Drive is classified as a "Primary Collector" under the One Network Road Classification (ONRC) with traffic volumes up to 8,000 vehicles per day.
[2] It is currently believed the MOP is in good working order, and under existing conditions will remain so for the foreseeable future. There is allowance in long term budgets for replacement or renewal of the pipeline insitu. (Seaview Wastewater Treatment Plant, Main Outfall Pipeline, Condition Report dated August 2016, MWH).
[3] Any damage to the MOP will result in emergency overflows into the Hutt River via the Waiwhetu Stream.

1.2 Project Extent

The project predominantly focuses on improving the safety for pedestrians and cyclists travelling along Marine Drive, whilst also crucially improving the resilience of Marine Drive against through upgrading existing sea walls and providing increased separation from the live carriageway. The project is proposed between:

- Point Howard (in the north) and the northern end of Days Bay; and
- The southern end of Days Bay (Windy Point) to Eastbourne (Muritai Road / Marine Parade intersection, to the south).

There are a number of bays that collectively comprise the Eastern Bays, as shown in Figure 1-2 below. The bays include; Sorrento Bay, Lowry Bay, York Bay, Mahina Bay, Sunshine Bay, Days Bay, Rona Bay, Eastbourne village and Robinson Bay. Collectively, the Eastern Bays cover a significant catchment area comprised mainly of residential and leisure land uses.

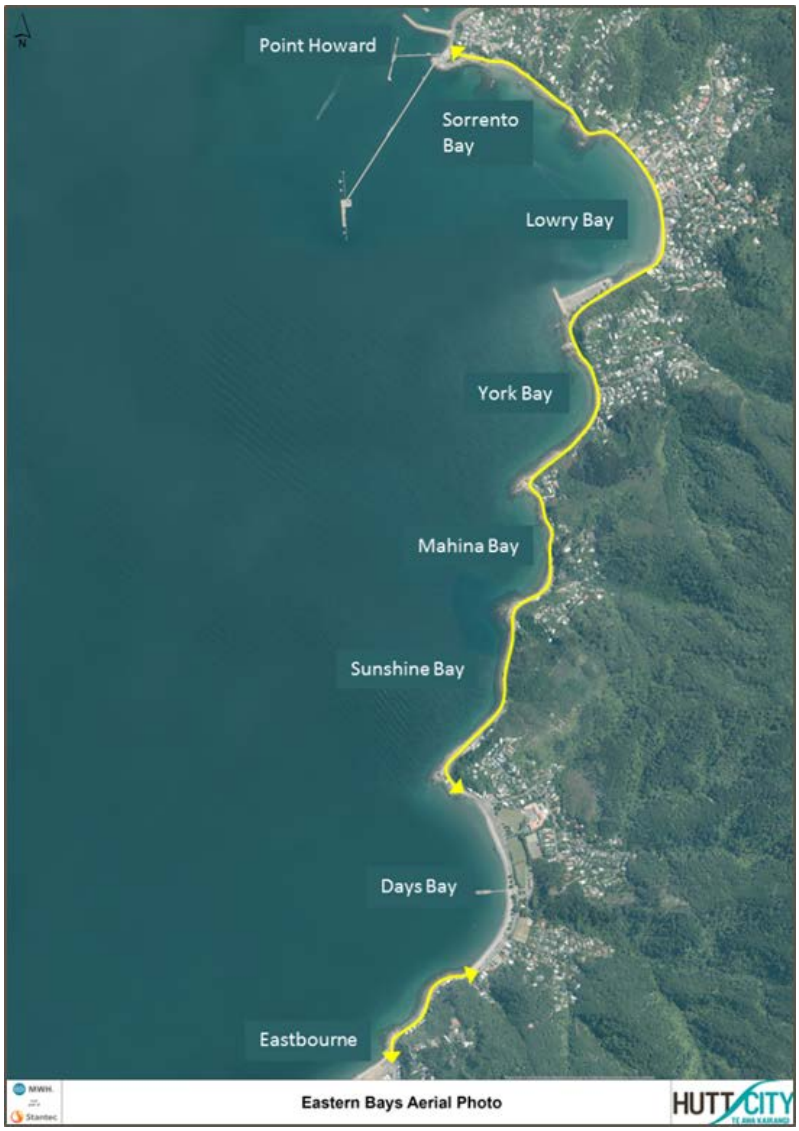


Figure 1-2: Map of Project Area

1.3 Purpose of this Report

The purpose of this Transportation Assessment is to provide a summary of the transportation benefits and potential impacts (and mitigation) associated with the proposed Shared Path. This report also provides background on the existing roading environment and an outline of the option development process.

The following information is therefore presented within this report:

- The existing transportation environment within the vicinity of the site;
- An outline of the recommended Shared Path option;
- A review of the benefits resulting from the introduction of the Shared Path – safety, accessibility, resilience, environment, health and mode shift; and
- A review of the potential impacts and potential mitigation measures proposed.

2. Existing Situation

2.1 Road Network

Marine Drive is classified as a Primary Collector under the One Network Road Classification (ONRC) with traffic volumes of between 6,000 to 8,000 vehicles per day. The coastal road winds its way around several headlands and the Eastern Bays is located along the eastern perimeter of Wellington Harbour between Point Howard in the north and Eastbourne in the south. Approximately five thousand people live along the Eastern Bays with Marine Drive providing the only road access from Petone / Lower Hutt, as well as to the wider strategic road network, to the pockets of residential land use in the Eastern Bays area.

Generally, Marine Drive has a trafficable road width of ~3.5m, but this can fluctuate to ~4.5m wide and also narrow down to around 3.0m in places, particularly around the curves in the road. Marine Drive has a posted speed limit of 50km/h at Point Howard, Sorrento Bay, Lowry/Whiorau Bay, Days Bay and Windy Point. York Bay, Mahina Bay and Sunshine Bay all have a higher posted speed limit of 70km/h.

2.2 Existing Walking and Cycling Facilities

Marine Drive provides very few safe facilities for pedestrians and cyclists. Generally, cyclists are not accommodated for and are mostly expected to use the very narrow road shoulder, or, share the live traffic lane[4]. At a small number of locations, short sections of shared paths are available along the seaward side. These shared paths are predominantly located in areas where new seawalls have been constructed therefore allowing provision of this type of facility, or where considerable width already exists.

The lack of continuity in terms of the existing pedestrian and cycle environment, highlighted by Figure 2-1 and Figure 2-2, is also not conducive to encouraging people to cycle; having to re-join the carriageway at regular intervals provides a heightened sense of danger for cyclists when travelling along this route and using the existing facilities.

The lack of existing provisions for pedestrians and cyclists is reflected within the number of current users along Marine Drive. A short term traffic survey was completed in 2015 on Marine Drive and indicated that approximately 80 cyclists use Marine Drive per day. Pedestrian survey count data is limited, with peak period counts in 2015 showing over 15 pedestrians in the morning peak at Sorrento Bay. A further longer term traffic survey was completed in September 2017 which showed typical use of approximately 110 cyclists per day in the vicinity of Point Howard[5].

Figure 2-1: Example shoulder used for cycling (Lowry Bay)

Figure 2-2: York Bay, section with recent seawall upgrade

[4] Where a road shoulder is provided along Marine Drive, the provision is not considered of appropriate quality to provide a comfortable and / or safe ride for cyclists.
[5] Refer Section 4.2 for further details on existing users

2.3 Public Transport

Marine Drive is serviced by bus routes 81, 83 and 85x. Each weekday there are 95 bus movements on the corridor, with buses operating between 6.00am and 11.00pm. Cumulatively, these bus services provide a total of 11 services during the AM peak period (07:00-09:00) and a total of five services during the PM peak period (16:00-18:00), mainly utilised as a commuter service. Due to the relative geographical isolation of the Eastern Bays and moderate levels of residential land use, this level of service is considered appropriate.

In addition to the bus services, a Ferry service operates between Days Bay Wharf and Queens Wharf (Wellington City Centre), with services also operating to Seatoun and Maitu / Sommes Island as shown in Figure 2-3. The predominant service is between Days Bay Wharf and Queens Wharf and is used by commuters, providing an alternative connection to Wellington City Centre. During the morning and afternoon peak periods, there are a total of two services an hour, with an estimated travel time between 25 to 45 minutes[6]. The travel time and frequency of the Ferry services presents an attractive alternative to other modes i.e. private vehicles[7].

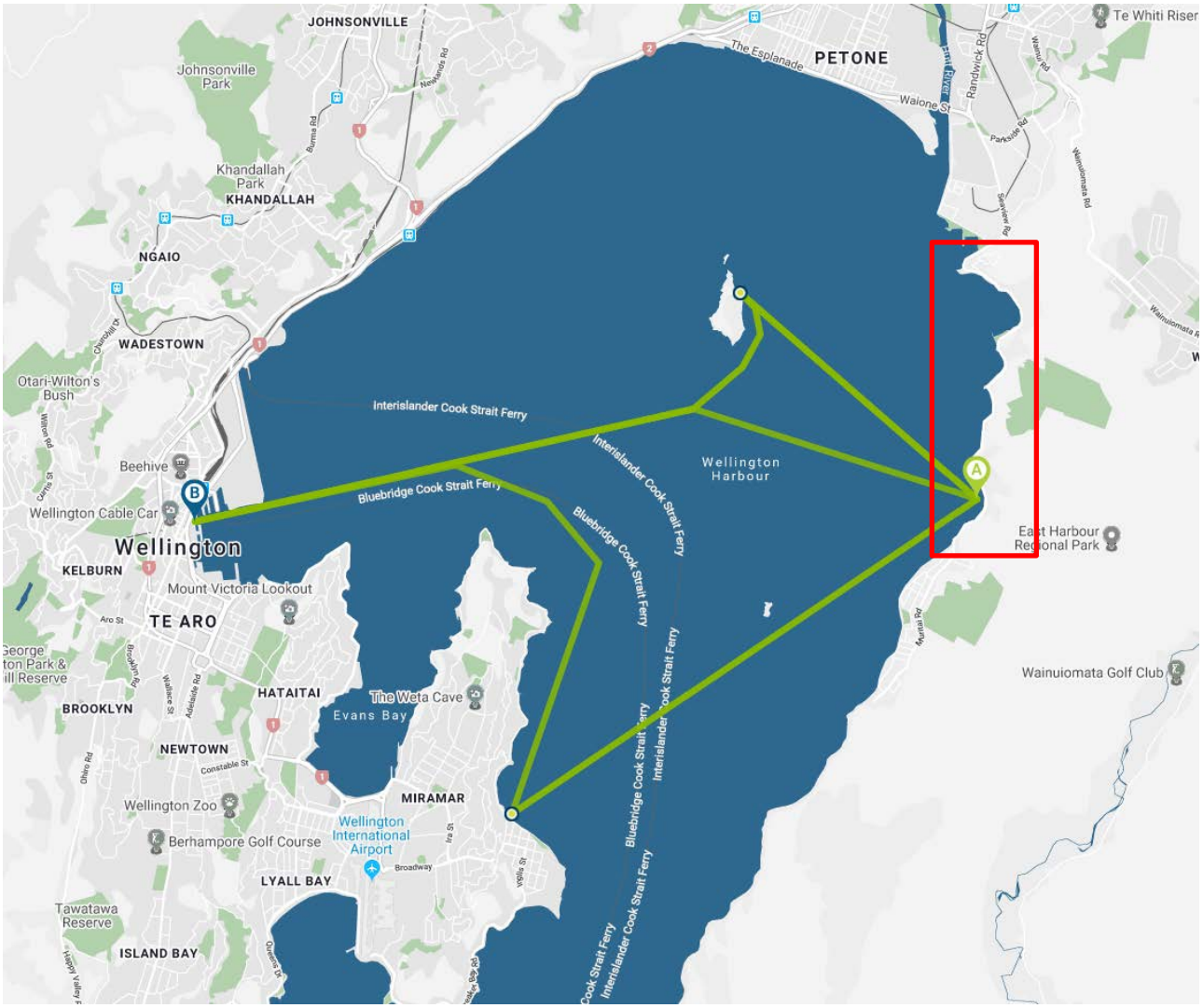


Figure 2-3: Ferry Service Map (Source: MetLink Ferry Service Map)

[6] Direct journey times take approximately 25 minutes, whilst trips incorporating a stop at Seatoun Wharf take an additional 20 minutes (45 minutes in total).

[7] Travel time by car in the morning peak is around 30-50mins (via SH2), the ferry service therefore provides an attractive alternative.

2.4 Existing Crash Data

For the purpose of reviewing road safety along Marine Drive, an examination of the NZ Transport Agency's (NZTA) Crash Analysis System database for the local road network has been undertaken to identify any existing safety issues (with a particular focus on crashes involving pedestrians and cyclists).

The search captured any crashes recorded for the latest complete ten-year period (2008-2017, and all available information for 2018), within a search area that included the entire section of Marine Drive that is proposed to form part of the Shared Path scheme. It was found that a total of five crashes involved either a pedestrian (two crashes) or a cyclist (three crashes) with all crashes resulting in minor injuries being sustained.

Both crashes involving pedestrians were the result of a pedestrian crossing Marine Drive, from the left heedless of traffic, with the vehicle travelling northbound along Marine Drive. Both collisions occurred at Days Bay and are likely to be the result of people crossing the road inattentively, rather than walking along Marine Drive and having insufficient space to do so. It is likely that pedestrians are avoiding walking along Marine Drive due to the lack of existing infrastructure to allow them to do so; this is reflected in the traffic surveys which show relatively low pedestrian usage along Marine Drive.

A total of three crashes involving cyclists have been recorded within the study period between 2008 and 2018. Two crashes occurred when a cyclist lost control whilst being over taken by a vehicle, whilst the other crash involved a vehicle failing to give way and subsequently turning right across the path of an oncoming cyclist. The two crashes involving a vehicle overtaking a cyclist shows that the lack of available space can present an issue to cyclists.

As with the pedestrian crashes, the relatively low numbers of crashes involving cyclists likely reflect the high perceived safety risk of cycling.

Only one of these five crashes occurred in the most recent 5-year period (occurring in 2015), with the other four crashes occurring in 2010 or earlier. It is not considered that the pedestrian and cycle amenities along this route have been improved significantly since 2010. Therefore, the reduction in recorded crashes is more likely to be a result of either the random nature of crashes or an increase in perceived risk reducing the number of pedestrians and cyclists opting to travel along Marine Drive (thereby reducing the probability of a crash from occurring).

2.5 Problems of the existing facility

A facilitated objectives, constraints and opportunities stakeholder workshop was held on 8 September 2016 as part of the Business Case phase of the project to:

- agree on problem statements and themes for investment objectives;
- capture known constraints and opportunities; and
- identify a long list of options for investigation.

At the workshop, the project team and stakeholder panel identified and agreed the following two key problems:

- **Problem 1**: "Safety of current path and lack of separation prevents walking and cycling and the subsequent health, environmental and economic effects."
- **Problem 2**: "Current facility is at increasing risk of closure and damage from storms and sea level rise and there is no alternative route."

A higher priority rating[8] was given to Problem 1 over Problem 2 at 70% vs. 30%. Problem 1 was identified as the main objective of the project, when the project team considered the following statement;

> *"With a limited budget and you could only fix one problem with this project, how would you choose to spend the available budget?"*

[8] Despite higher priority being given to Problem 1, it is considered that Problem 2 is a longer-term issue. Whilst the proposed improvements to the seawalls will only delay the increasing issue of sea level rise, the Shared Path does 'buy some time' in terms of impacts on Marine Drive. In the time gained through the introduction of this project, HCC will need to consider longer-term options for managing the road access to Eastbourne, specifically allowing for adaptation to ongoing sea level rise. As such, this problem is viewed as being critical to the scheme and has been considered as such throughout this report.

Therefore, an optioneering approach was completed to realise the most desirable Shared Path configuration, the results of which are provided in the next section of this report.

3. Recommended Option

3.1 Assessment of Alternatives

The Assessment of Alternatives is described in Appendix G of the resource consent application.

Throughout the development of the Project, alternatives and options associated with the design were investigated and recorded. Given the geography and terrain in the Eastern Bays area and lack of any alternative transport routes, the focus of option development has been on alignments based on Marine Drive.

The resulting Project was developed on the seaward side of Marine Drive and the key reasons for favouring the "coastal edge" option are:

- The presence of steep hill slope on landward side – major earthworks and cuts, especially on headlands, would be required;
- Avoiding disturbance to properties and dwellings;
- Reduced car and pedestrian conflicts – interaction between accessing and egressing vehicles from the landward side of Marine Drive is removed;
- Enhanced connection to the coast resulting in recreational benefits – connects to the Great Harbour Way and Remutaka trail facilities as well as further commuter opportunities;
- Integration with coastal hazard protection and climate change mediation. The path can be provided on an enhanced, consistent and fit-for-purpose seawall. The upgrading of the seawall will alleviate existing and short-term future impacts felt on Marine Drive, such as; road closures and effects on underground amenities resulting from overtopping and undercutting respectively, as a result of sea level rise and subsequent increases in 100 year storm events[9].
- Providing a seawall and treatment options that respond to environmental effects such as fish passage, natural character, etc.; and
- An affordable option with medium to long-term benefits.

Different types of building and design methodologies have also been considered, alternatives investigated include:

- Location of the Shared Path within the road corridor;
- Types of seawall (treatment options);
- Design features; and
- Construction methodologies.

3.1.1 Options Assessment

A key output of the IBC phase was to identify the most suitable width for the shared path to accommodate two-way flows including pedestrians and cyclists, without requiring the acquisition of significant amounts of seaward land, currently providing habitat for local flora and fauna as well as recreational uses relating to the beach.

With these criteria in mind, the IBC identified five potential options:

- Option 1 – only replace seawalls with less than five years of remaining life - the 'do-minimum' option and was considered as a baseline for assessment purposes only.
- Option 2 – 1.5-metre-wide facility - the lowest standard facility and an 'absolute minimum' option.
- Option 3 – 2.0-metre-wide facility – the slightly wider than the minimum consideration but still less than providing the ideal level of service for users.

[9] With only 30cm of sea level rise (i.e. within 50 years) the frequency of the present day "100-year storm' event for coastal flooding in Wellington will have increased to once per year on average (NIWA 2015, PCE 2015).

- Option 4 – 2.5-metre-wide facility - achieved the minimum standard for a shared path.
- Option 5 – 3.5-metre-wide facility - a wider path that achieved the desirable minimum requirement for a recreational shared path.

Through the assessment and shortlisting of preferred options, and consultation with stakeholders and the community, a recommended option was determined and developed further through the DBC[10]. This option meets the intended outcomes and project benefits sought, while aiming to address and mitigate some of the key challenges and constraints that were identified during option development and consultation.

3.2 Option Overview

The preferred option detailed above has been amended and refined in several locations from the option that was consulted upon due to community feedback and further investigations and assessments. Broadly, the key changes are that generally the path is proposed to only be 2.5 metres wide through some of the beach locations to reduce the impact of lost beach resource, some changes to areas of potential revetment and there was almost no support from the community for a boardwalk solution anywhere along the corridor (hence it was removed[11]). The proposal to introduce beach nourishment has also impacted on the selection of a 3.5m wide path at certain beach locations (Point Howard, Lowry Bay and York Bay) allowing for a wider path to be provided.

A description of the recommended option is provided in the Design Features Report, Appendix J of the resource consent application.

The proposed design has taken a staged construction approach and has been developed bay by bay on a site-specific basis, responding to a range of site specific issues including, but not limited to; the structural condition of the existing walls, the width of the existing road reserve, coastal processes (existing and future) and community feedback.

The works include:

- A continuous Shared Path with a varying width of between 2.5m and 3.5m and finished with an asphalt surface, defined by a kerb block on the inland (road) side of the path;
- The replacement and improvement of existing seawalls in parts;
- The placement of rock revetments to protect the foreshore either side of headlands;
- New curved seawalls with either a single, double or triple curve face, to better cope with existing and short-term projected sea level rise and weather events within Eastern Bays;
- Beach nourishment to improve recreation amenity at these locations and to allow for a wider path to be provided;
- Beach access points (for both people and native flora and fauna12); and
- Minor repositioning of bus shelters.

Further details are set out in the Design Features Report (Appendix J) of the resource consent application.

3.3 Design Features

A description of the Design Features of the recommended option is provided in Appendix J of the resource consent application. Relevant design features from a transport perspective are outlined below.

3.3.1 Shared Path

The proposed works include the construction of a Shared Path along a 4.4km stretch of shoreline between Point Howard and the northern end of Eastbourne, excluding the Days Bay beach area. Most of Marine Drive is currently supported by a seawall, with the exception of the prominent rocky headlands at Point

[10] The final option is a mixture of Option 4 and Option 5 and takes in to account the desire for a 3.5m path but also allows for a reduction at some locations where this cannot be achieved – the minimum standard for a shared path is still achieved

[11] A boardwalk option would also not provide the same level of protection against sea level rise as is the case with improving the seawall facilities at selected points through the Project scope.

[12] For flora and fauna, beach access points will be included within the seawalls themselves to ensure that appropriate ecological transitions can be achieved.

Howard, and between Sunshine Bay and Days Bay. The seawall has been rebuilt in parts over the past years and still requires upgrading / remedial works in some locations.

The Shared Path varies in width (between 2.5m and 3.5m) depending on the physical constraints of the bay environments. The path width is measured from the seaward side edge of the path to the seaward side face of the separator kerb as shown on the typical cross section in the visualisation of Sunshine Bay in Figure 3-1 below. The visualisation shows the existing situation and the proposed widening to create a 2.5m wide Shared Path along this section of beach. Figure 3-1 shows a significant improvement upon the existing situation and physically segregates pedestrians and cyclists from the live carriageway with sufficient space for two-way pedestrian and cycle traffic[13]. In peak periods, where a shared path experiences increased flows, shared paths often become 'self-policing' with pedestrians travelling two abreast and cyclists slowing down and passing pedestrians when it is safe to do so.

The path users will experience some variation in width, with 2.5m wide Shared Path sections provided along some beaches while a wider 3.5m width is achieved in other sections. Beach nourishment is proposed at three locations and will allow for additional width to be achieved within the path (which would otherwise be more constrained). There are pinch points at trees and at the heritage buildings (Skerrets Boatshed) and through the Whiorau Reserve the path will be 3m wide. The Shared Path is therefore designed to fit in with the environment and is not a "one size fits all".

The Recreational Assessment, Appendix K of the of the resource consent application, contains a literature review on shared paths, with a width of 2.5m – 3.5m found to be typical for the forecast usage; however, a wider width of 3.5m was recommended due to the recreational nature of the route and the high likelihood of congregation of users during peak periods.

Due to the relatively flat profile of the proposed Shared Path and width, it is considered less likely that users will travel at excessive speeds that might result in a higher risk of conflict as would be the case if this path was provided on a downhill gradient or in a very wide unconstrained environment. The leisure user is also unlikely to travel at high speeds, further justifying the design of the proposed Shared Path being 'fit for purpose'.

Ultimately, the facility is not solely considered to be a movement corridor. While the movement function of the shared path is important, it is also a recreational leisure facility for people to enjoy and during peak periods the leisure facility and greater user density will limit the ability for high speed use.

[13] Cyclists generally require 1m of available space to travel without conflict with other users. Providing a minimum width of 2.5m easily achieves this with 0.5m of buffer. Pedestrians generally require less than 1m.

Figure 3-1: Proposed shared path showing a typical widening

3.3.2 Beach Access

It will be important to maintain beach access for beach users on foot and also for boat or kayak access[14]. The connectivity between the Shared Path and the beach will be achieved through the careful placement and design of ramps and steps. Generally, the design provides a minimum of two accesses per beach which is considered sufficient for those wishing to gain access, whilst not providing too many conflict points with users of the Shared Path. The generic access options include:

- Standard steps;
- Mini steps; and
- Boat ramps.

3.3.3 Separators and Road Crossings

Concrete kerb separators will be used to physically and visually separate the Shared Path from the road. The kerbs would require reflectors on the traffic side for improved night time visibility. Figure 3-2 provides an example of the type of concrete kerb separators that are likely to be used. The benefits of concrete at this location are:

- Concrete separators have the adaptability to incorporate textures and colour and can be easily mass produced once the concrete moulds have been manufactured;
- Concrete is preferable to timber due to structural integrity and cost; and
- Durability in a marine environment that is susceptible to wave over-topping.

[14] The Eastern Bays provide a popular spot for boat and kayak activities

Figure 3-2: Coastal Edge Treatment

3.3.4 Bus Operation

No changes to the bus route or frequency of buses will be required, however minor modifications or relocations to some bus stops (Mahina Bay and York Bay) are proposed. The design of the new bus shelters will include ensuring sufficient width is available when designing the new sea walls and providing a foundation for the new structure. The bus stop structure is an integral part of the local identity and will be designed in consultation with the community to ensure that there is some variation to respond to local prevailing wind and rain. This provides an improved amenity to what is currently being provided.

The provision of bus shelters will be addressed in the Landscape and Urban Design Plan (a suggested condition of the consent).

3.3.5 Signage and Markers

Story boards to include interesting features, such as places of cultural interest, information about the ecological textures of the seawall and in the location where additional vertical pot plant rock pools are added to the curved surface will be provided. Consultation with the local community and Iwi be completed in order to receive appropriate feedback on the designs to ensure that the information provided is historically, ecologically and culturally accurate. A balance will be struck between the amount of signage that is provided so as not to produce a cluttered feeling for users of the Shared Path, whilst at the same time, providing sufficient information that is informative, appropriate and interactive.

This will be addressed in more detail in a Landscape and Urban Design Plan, a suggested condition of this consent.

3.3.6 Path comfort facilities

Seating will be required along the Shared Path at frequent locations. Seating will be prioritised in locations where additional widening of the path can be avoided, in order to minimise costs and environmental effects.

This will be addressed in more detail in a Landscape and Urban Design Plan, a suggested condition of this consent.

3.3.7 Parking

A number of informal parking bays have been established where there is additional shoulder width available. In some locations, this shoulder width will be reallocated to provide for the Shared Path, reducing the extent of beach reclamation and minimising changes to the shoreline. Some seaward parking spaces will be lost, however improvements to the remaining parking areas are proposed. Parking areas will be formalised and perpendicular spaces will be reoriented to parallel parking, providing safety benefits for road users, and maximising the parking space numbers in the available space.

Refer Section 5 for further discussion.

3.3.8 Traffic Services

Traffic services such as safety barriers, signage and marking will form part of the detailed design stage and will be subject to the relevant stages of a road safety audit ensuring safe implementation of the proposed design. The intent would be to only use coloured surfacing in locations of high conflict to avoid visual clutter and to achieve visual continuity of the provision.

4. Transport Outcomes and Benefits

This section outlines:

- The key outcomes expected from the project.
- A summary of the transport economic benefits, including existing and future demand estimates.
- Further commentary on key transport benefits from safety to resilience.

The Recreational Assessment, Appendix K of the resource consent application, considers the community and personal wellbeing, tourism and recreational benefits of the proposed Shared Path.

4.1 Key Outcomes

The key outcomes of the project are to improve pedestrian and cyclist safety and to increase the number of users on the corridor. Equally, the project will improve the current and short-term future resilience of Marine Drive in the face of climate change, sea level rise and increased storm events. Opportunities to enhance tourism as an outcome of the project was also recognised.

The outcomes of the project are expected to be achieved as there is strong community support for the project; residents have identified that the completion of the Eastern Bays Shared Path, and concerns about climate change, are the two most important issues facing the Eastbourne Community.[15] The Eastern Bays Shared Path Project presents an opportunity to integrate an efficient response to both of these issues.

Table 4-1: Recommended option performance against investment objectives (Source: Eastern Bays DBC)

Benefit	Investment Objective	
	Measure	Expected Outcome
To improve safety for pedestrians and cyclists	By increasing the perception of safety, as measured by the community survey	Achievement of continuous separated shared path facility for extent is expected to at least achieve target in safety perceptions (of respondents stating the facility is safe or very safe)
To improve the resilience of Marine Drive against rises in sea level and increases in large storm events	By reducing the total number of hours the road is swept (response / emergency sweeping only) – reducing the likelihood of an over-topping event	Currently only 14% (700m) of the seawall is re-directive. With the proposed solution, around 3km (+2.7km) will be re-directive or revetment, both of which will reduce incidence of material being deposited on the road, and the extent / duration of sweeping
To increase the numbers of pedestrians and cyclists	Increasing numbers of pedestrians and cyclists, as measured by daily counts	Economic evaluation in the DBC has estimated an additional 200 new users

4.2 Strategic Assessment

The 2018 Land Transport GPS identifies four priorities, these are listed as:

- Safety;
- Access;
- Environment; and
- Value of Money.

[15] Eastbourne Community Survey (2014). http://iportal.huttcity.govt.nz/Record/ReadOnly?Uri=3688777
Respondents were asked to rank their three top issues and also to identify the single most important issue for them. The completion of the Eastern Bays shared walk/cycle way was clearly the most important issue (number one for 33 percent of respondents) with concern about climate change and extreme weather events next (16 percent of respondents). Safety in the community, clean seas for swimming and quality public transport were also highly ranked. A number of other local issues were also identified. Since 2014, climate change has become a major issue nationally and globally so would expect this concern to have risen in the community.

Safety and Access are noted as the key strategic priorities, while Environment and Value of Money are listed as supported strategic priorities. An assessment of the Eastern Bays Shared Path was undertaken against the 2018 Land Transport GPS four priorities and this is included in Appendix A of this report. Overall, the proposed Shared Path aligns well with all four priorities of the GPS, particularly safety and access.

4.3 Economic Evaluation

An economic evaluation was undertaken as part of the DBC phase of the project, in accordance with NZTA's Economic Evaluation Manual (EEM) guidelines.

The economic analysis for the project included the following benefits;

- Health and environmental benefits for a cycling facility;
- Safety benefits for a cycling facility;
- Travel time benefits for a cycling facility; and
- Health and environmental benefits for a walking facility.

The key inputs involved in quantifying the health, safety and travel time benefits primarily revolve around the existing and future estimates of walking and cycling, coupled with length of the facility. These inputs and assumptions are outlined in the sections below.

4.3.1 Demand and Key Inputs

A number of base assumptions during the DBC phase were generated on limited survey data and made prior to further count surveys conducted by HCC in September 2017. The original DBC economics were therefore updated as part of this assessment to include the results of the more recent surveys undertaken, and include revised, more conservative, future cyclist projections.

Pedestrian Existing and Future Demand:

- A base of up to 100 pedestrians[16] walking an average of 2.0km has been adopted. It considers that the Ferry service in Days Bay would provide a firm base of pedestrians each day. The normal pedestrian trip length in Wellington is 1.0km, but given the geographical constraints, it is estimated to be longer at 2km for this locality.
- A new user base of 60 pedestrians has been adopted from Walbran[17], adjusted to account for the Shared Path width. This is considered to be conservative given the lack of consistent seaward facilities along the Eastern Bays.

Existing Cyclist Demand:

- A base of 110 cyclists per day has been calculated based on survey count data from Point Howard in September 2017[18].
- The number of cyclists per day was determined by scaling up the raw count data, presented in Figure 4-1 below, based on the Cycle Network and Route Planning Guide (CNRPG) methodology. The CNRPG methodology provides adjustment factors for day of the week, seasonal patterns, weather and the under-reporting factor for automatic tube count data.

[16] Pedestrian survey count data is limited. Short term partial day counts in 2015 however did record over 15 pedestrians in the morning peak at Sorrento Bay. As no consistent seaward facilities existing, current pedestrian base demand is assumed to be concentrated at the bays. The 2017 survey did not include pedestrians as this was an automatic tube count.

[17] HCC Shared Path Funding Application (Walbran, 2015).

[18] The DBC phase assumed a base of 77 cyclists per day calculated based on survey count data (partial days) from Sorrento Bay in March 2015. Counts were completed during two weekday morning periods (Tuesday 10th and Thursday 12th; 6:30am – 9:00am) and a mid-morning weekend day (Saturday 7th; 10:00am – 12:00pm).

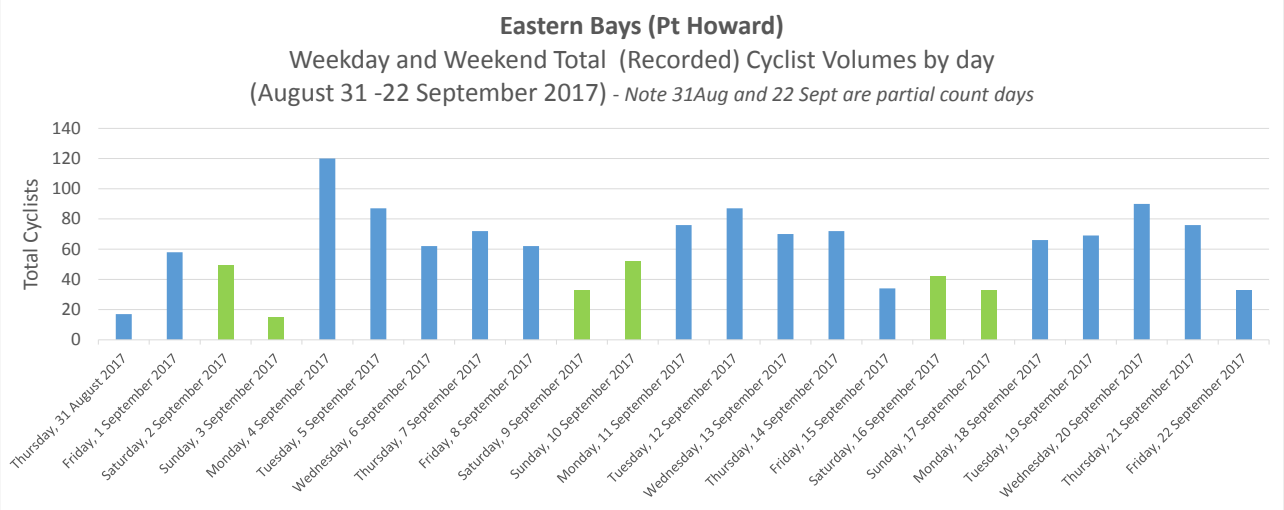


Figure 4-1: Eastern Bays (Point Howard) - Observed Cyclists Volumes 2017 (tube count survey)

Future Cyclist Demand

- The EEM cycle demand tool (Worksheet A20.1 of EEM) was used to predict new users. The new cyclists generated by this tool were estimated to be those in the immediate Eastbourne catchment. This equates to approximately 50 new local cyclists.
    - It is envisaged that significantly more users will come from further afar, in a recreational capacity, to cycle around the Great Harbour Way cycleway (or part of), the Remutaka Cycle trail loop and other planned new cycleways[19].
    - The standard buffer area calculation of 50 new cyclists was assumed to account for all the commuter and work related cyclists, but less than half of the likely 'new' recreational cyclists. Therefore, if the 50 new local users generated by the cycle demand tool equates to 40% of the total new cyclists, there is an estimated additional 70 recreational users per day attracted from further afar (i.e. the remaining 60%).
    - This results in a total estimate of 120 new cyclists per day as a result of the Shared Path, as presented in Table 4-2 below.

Table 4-2: Estimated Existing and Future Usage

	Existing Use	Expected (new)	Total (existing and future)
Pedestrians /day	Up to 100	+60	Up to 160
Cyclists /day	110	+120 (50 local, 70 regional)	230
Total /day	Up to **210**	**+180**	Up to **390**

Pedestrian and Cyclist Growth

- NZTA Research Report 340[20] was used to estimate the appropriate growth rates for cyclists. Based on Census data, presented in Figure 4-2 below, a 4.5% growth in cyclist trips to work was recorded for Hutt City between 2006 and 2013.
    - The Hutt City growth rate has been adopted instead of the higher Eastbourne rate as a conservative approach (4.5% instead of 9.2%). This background cycling rate equates to a cycle growth rate 9.2% for a separated facility (Option 3.5m) based on RR340 methodology.
    - As the above growth rates are considered high to be sustained over a 40 year analysis period, staggered growth rates were adopted to account for uncertainty:
        - **Opening to 15 years**: 9.2%;

[19] Other Greater Wellington projects include i.e. Wainuomata Hill and the Beltway, Refer Figure 4-4.
[20] Research Report 340: Estimating Demand for New Cycling Facilities in New Zealand (NZTA, 2007)

- **Year 15-30:** 4.5% growth, reflecting census growth trends (Hutt City);
- **Year 30 onwards:** 2.1% growth, reflecting census national growth trends.

- A pedestrian growth rate of 1.0% has been adopted. Hutt City pedestrian growth was -0.9% between 2006 -2013 census data. Wellington pedestrian growth was 1.6%, so a conservative 1.0% was adopted for the economic analysis.

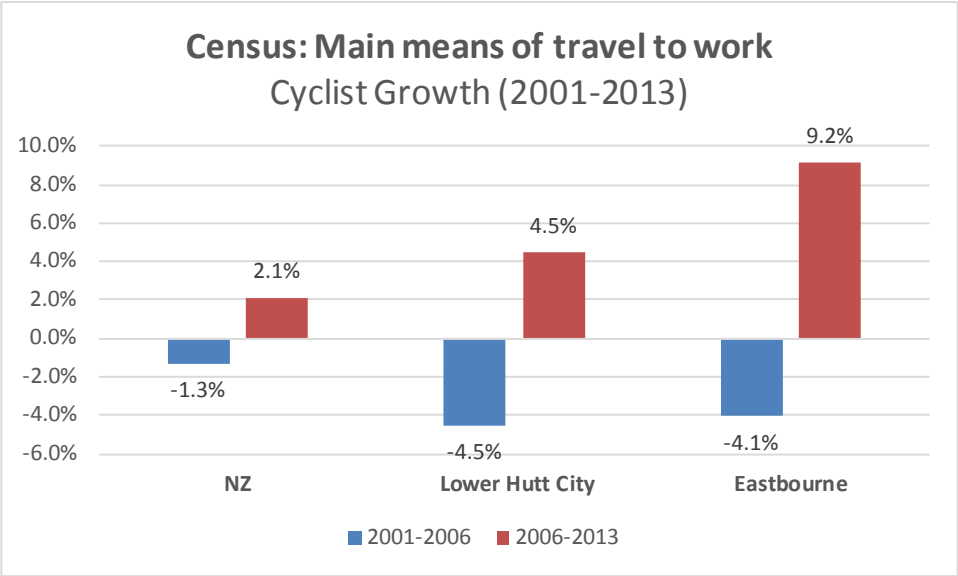


Figure 4-2: Census Cycling to work mode share – Historic Growth Comparison

Other Key Economic Inputs

- The length of the cycling facility is taken as 6.1 km. This is the distance from the southern section of the facility (near Wellesley College) to Marchbanks Street where the existing coastal path ends. The adopted length has been assumed to be a weighted average between the local users making average trips (3.0 km) and wider recreational users making longer trips (capped at 6.1 km to be conservative). This results in a weighted average cyclist trip length of 4.55 km[21].
- The do-min cyclist travel speed of 13 km/h was adopted from Google Maps. A slightly faster travel speed of 18 km/h used for the option as typically wider separated facilities provide improved cycling levels of service (LoS).
- User travel time costs are adopted from Table A4.1(a) of the EEM. For this project, a weighted average user cost has been calculated based on an estimated split of users across recreational, commuting and work travel purposes, as outlined in Table 4-3 below.

Table 4-3: Estimated Value of Time ($/hour)

	Assumed % Split	Value of Time ($/hour) (ped & cyc)
Recreational	80%	$4.25
Commuting	15%	$6.60
Work travel purpose	5%	$21.70
Weighted Average	**100%**	**$5.48**

[21] With the introduction of eBikes and eScooters, the average distance travelled is also likely to increase. The introduction of this kind of transport means that the reach of the project is likely to be more than is stated above, which is therefore considered to provide a conservative evaluation.

4.3.2 Economic Analysis Summary

Table 4-4 and Figure 4-3 below provide a summary of cost benefit analysis of the proposed Shared Path, highlighting that the project has a positive benefit cost ratio, with the majority of the benefits relating to the health and environmental benefits of the facility.

Table 4-4: Economic Assessment

	Facility Health Benefits (Walking and Cycling)	Travel Time Benefits	Safety Benefits	NPV Total Benefits	NPV Costs	BCR	FYRR
Option 3.5m (2.5m beaches) – *Updated cyclist counts and revised expected cyclists*	$10.7M	$2.7M	$0.6M	$14.1M	$10.7M	1.3	5%

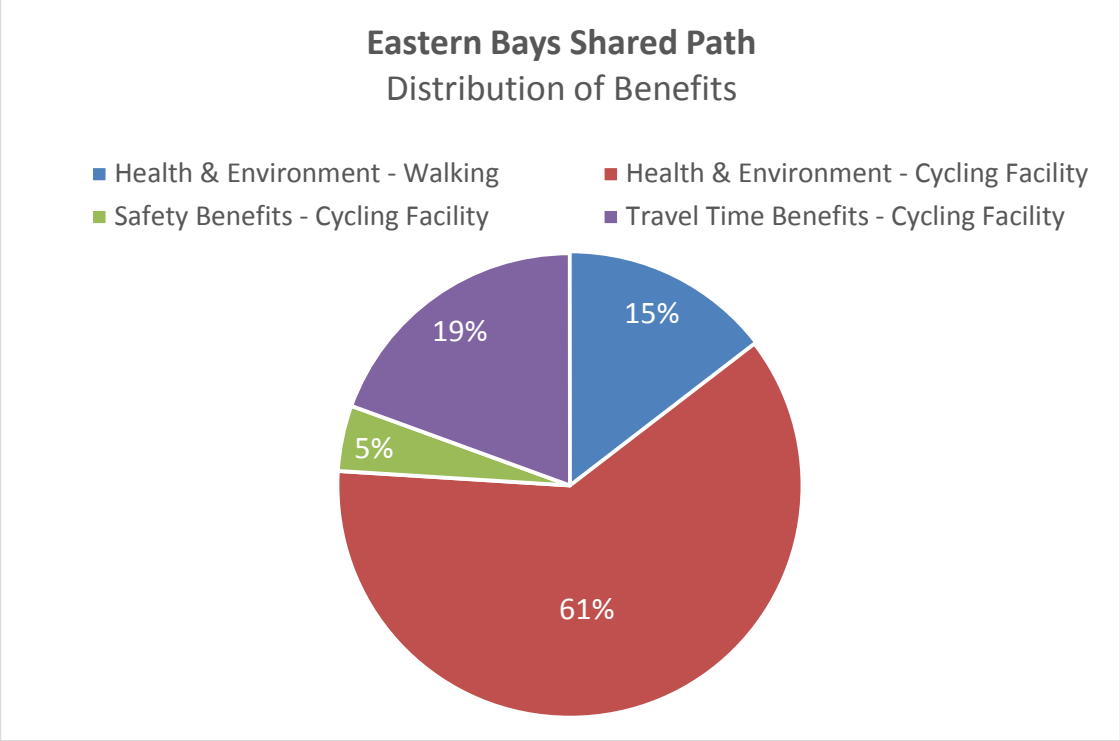


Figure 4-3: Eastern Bays Shared Path: Distribution of Benefits

The estimated cost of the project is $14.3M[22] with a Benefit Cost Ratio (BCR) of 1.3 and a First Year Rate of Return (FYRR) of 5%.

4.3.3 Sensitivity Analysis

Numerous assumptions and estimates are used when forecasting future project costs and benefits. A sensitivity analysis tests a range of scenarios using upper and lower bounds of key variables.

The analysis also adds rigour to the economic analysis and tests the validity of the results. A range of sensitivity tests have been undertaken for a number of assumptions for the recommended option only, with the results outlined in Table 4-5 below.

The results show that the BCR ranges from 0.7 to 1.8 with the project benefits being the most sensitive to estimated future cyclist volumes and cyclist growth rates. The only scenario which results in a BCR of less than 1.0 corresponds to a future estimate of only 50 new cyclists using the facility. This is considered to be unlikely based on similar projects both regionally and nationally.

[22] Estimated cost as at the DBC phase (2017)

Table 4-5: Option Sensitivity Testing

Option 3.5m Sensitivity	Sensitivity – Low BCR		Base BCR		Sensitivity – High BCR	
	Low BCR	Note	Base BCR	Note	High BCR	Note
Capital Costs	**1.0**	Expected Estimate + 25% ($17.9)	**1.3**	Expected Estimate ($14.3M)	**1.7**	Base Estimate ($11.3m)
Cyclist Volumes	**0.7**	+50 new cyclists: assume 100% are local users (no wider attraction)	**1.3**	+70 new cyclists: assume 40% local and 60% wider recreational users	**1.6**	+150 new cyclists: assume 25% local and 75% wider recreational users
Cyclist Growth	**1.0**	2.1% (NZ growth 2006-2013)	**1.3**	9.2% (0-15yr) 4.5% (15-30) 2.1% (30+)	**1.6**	9.2% (as per RR340)
Construction Time / Staged Implementation	**1.2**	48 months	**1.3**	24 months	**1.4**	12 months
Pedestrian Growth	**1.3**	0%	**1.3**	1%	**1.8**	2%
Future Pedestrian Volumes	**1.2**	+20 new peds	**1.3**	+60 new peds	**1.8**	+200 new peds
Travel Time Benefits (Cyclist Speed)	**1.3**	13 km/h (do-min)	**1.3**	18 km/h	**1.3**	20 km/h
Resilience – Storm recurrence interval	**1.3**	15 year recurrence	**1.3**	10 year recurrence	**1.4**	5 year recurrence

A number of benefits are not directly quantifiable. The sections below provide further commentary on key transport benefits, both qualitative and quantitative, ranging from safety to resilience. It is noted that the costs and benefits relating to beach nourishment have not been included in the economic evaluation.

4.4 Accessibility and Connectivity Benefits

4.4.1 Future Active Transport Network

The key driver for this project is to develop a safe and connected walking and cycling facility that will reduce reliance on private vehicles, as well as reducing the social exclusion felt by some of the communities along Hutt City's Eastern Bays, and to provide links to other parts of the wider network for commuting and recreational purposes.

Figure 4-4 below highlights how the Eastern Bays Shared Path Scheme will link to the wider transport network, providing connections to other nearby urban areas which serve as desired destinations for the commuter and recreational user.

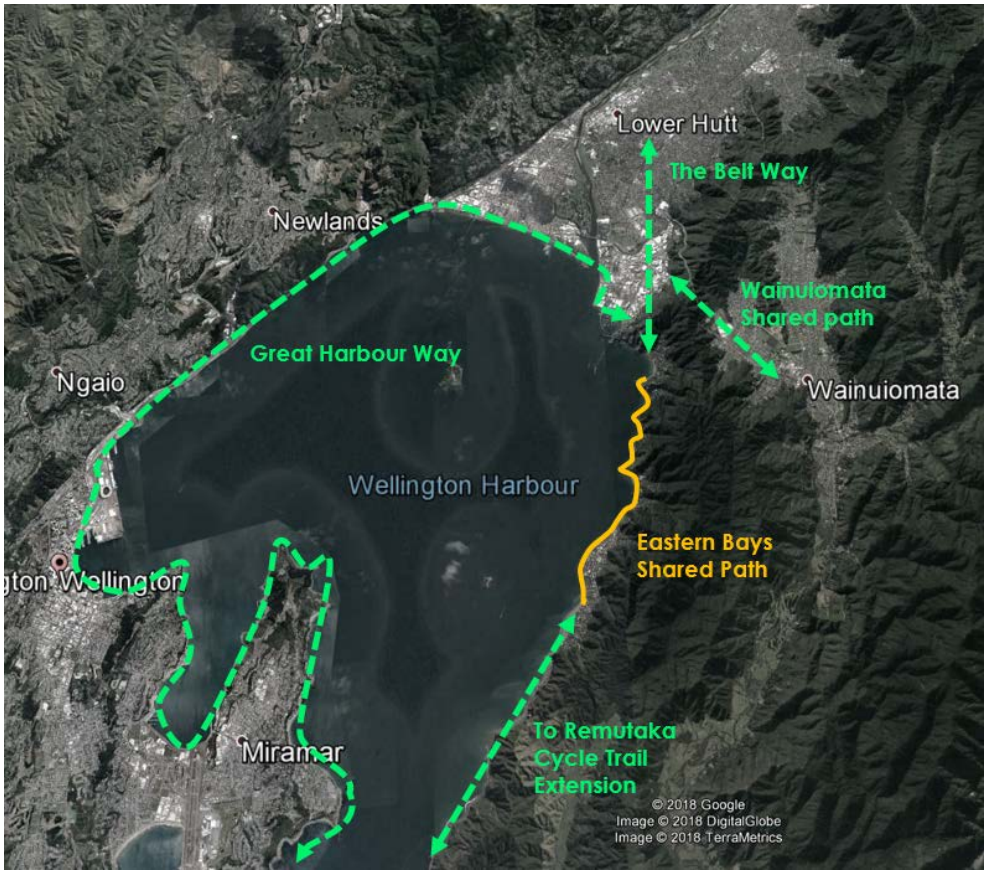


Figure 4-4: Eastern Bays Shared Path Scheme – Context to the Wider Network

The Remutaka Trail loop is shown below in Figure 4-5, with the Orongorongo to Petone extension[23] outlined in dashed blue.

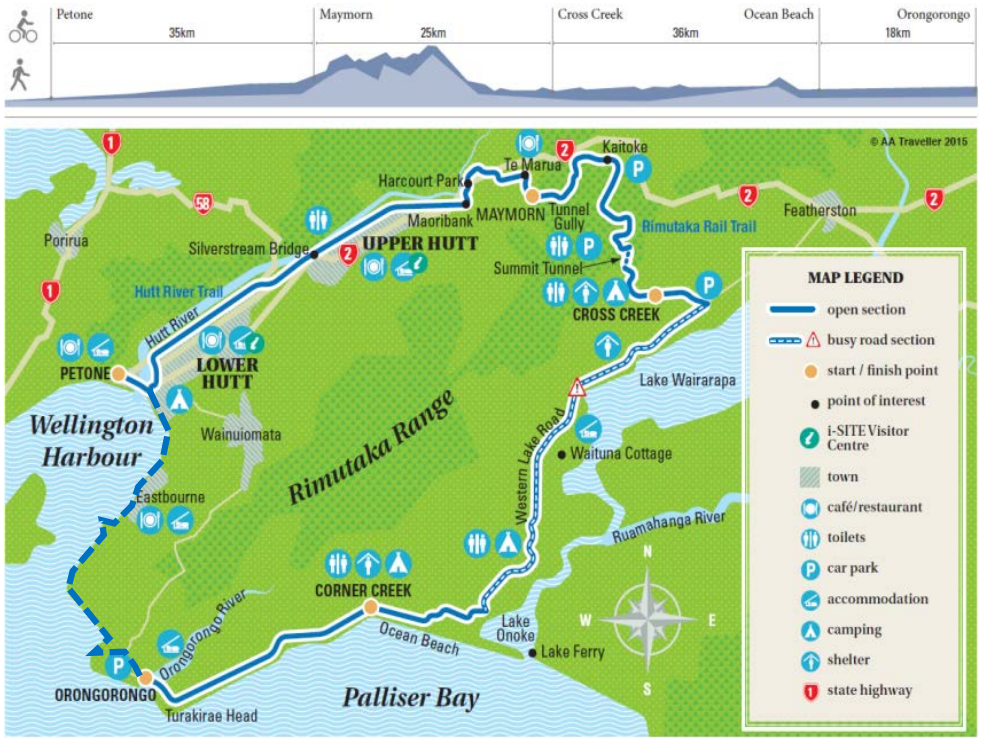
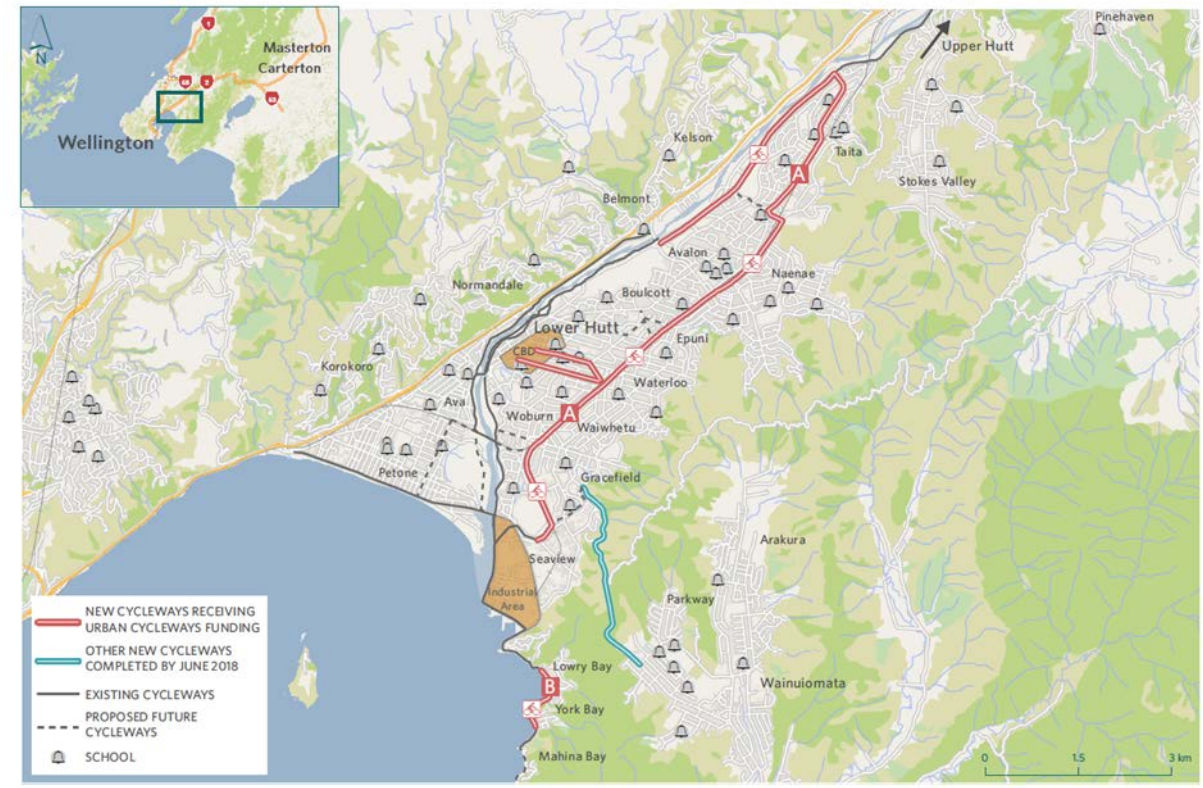


Figure 4-5: Remutaka Cycle Trail (Source: https://wairarapanz.com)

[23] http://remutakacycletrail.co.nz/remutaka-rimutaka-cycle-trail-map/

In August 2014, the Government announced the $100 million Urban Cycleways Fund (UCF). This led to the $333 million Urban Cycleways Programme (UCP) being implemented from late 2014 to June 2018. The programme, managed by the NZ Transport Agency (NZTA), provides increased investment to accelerate the delivery of cycling networks in main urban centres, and incentivises partners to increase their investment in cycling and walking projects.

The Eastern Bays Shared Path is one of the Lower Hutt Urban Cycleway projects funded from the UCF with further investment from Hutt City Council (HCC) being provided. The projects are shown on a map in Figure 4-6 below, the Eastern Bays project is labelled as 'B' on the map.



Urban Cycleways Funded Projects in Lower Hutt

Figure 4-6: Urban Cycleway projects in Lower Hutt (Source: NZ Transport Agency)

The Eastern Bays project forms a key part of the Te Aranui o Pōneke (the Great Harbour Way) around Te Whanganui-a-tara, the harbour of Wellington. The proposed route links Fitzroy Bay in the east to Sinclair Head in the west.

4.4.2 Improved Network Accessibility and Connectivity Benefits

The project provides a safe and integrated network for commuting and recreational purposes and will form a key part of the GHW in Wellington. One of the objectives of the GHW is for it to become part of a wider network that connects communities and provides opportunities to showcase the natural, cultural and historical values of the harbour. It will therefore form part of a network with both regional as well as national benefits.

At the strategic level, the Eastern Bays Shared Path would play a key role in connecting the residential areas along Marine Drive to Hutt city centre and Wainuiomata district. From these better serviced urban areas, the Shared Path will form part of a comprehensive cycleway network within the Wellington region that connects Eastern Bays – Lower and Upper Hutt – Wellington – Porirua - Kapiti.

The connection to Hutt City also provides pedestrians and cyclists with the opportunity to access different modes of public / sustainable transport to complete the second leg of their journey, utilising the public transport services that are provided within Hutt City[24] (extensive bus network and a well-established Rail network).

[24] A journey that uses more than one mode of transport is known as a multi modal journey

The Shared Path has featured in past strategies and is a key project in providing a safe and integrated network for commuting and recreational purposes under the current strategy 'Walk and Cycle the Hutt 2014 – 2019, demonstrating the importance placed on walking and cycling schemes within the Hutt City region, as well as New Zealand as a whole.

The path is expected to offer alternative transport choices through which community cohesion can be enhanced, thereby providing amenity benefits and improving access to local facilities along the corridor. The Shared Path provides positive social outcomes which promote health and social well-being.

In addition, the path will be uniquely located to provide access to the Ferry terminal at Days Bay, for both commuter and leisure users. The Ferry terminal located at Days Bay provides harbour links to Seatoun Wharf, Wellington City and Sommes Island. Therefore, commuters could utilise the Shared Path to access the Ferry, which they could then use to gain access to Wellington City. The leisure user on the other hand may use the path as an end of trip attraction, or to use this as part of their overall journey, to access the Ferry Terminal and then travel to one of the other locations. The Ferry service at Days Bay therefore provides an extremely unique travel option as well as unlocking wider connections to other parts of Wellington.

The economic evaluation estimates that there will be approximately $2.7M of cycling travel time benefits introduced from the scheme over the 40 year analysis period. The travel time savings relate to the increased attractiveness of the Shared Path coupled with the improved level of service, enabling an average cycling speed increase compared to the existing situation.

4.5 Mode Shift – General, Multi modal and Positive Environmental Outcomes

The fundamental aim of the Shared Path is to increase the number of active users present along Marine Drive. The new path will provide a substantial improvement on the current facility (which has an inconsistent width and is of variable quality and suitability for both pedestrians and cyclists) and will provide a valued community asset.

As outlined in Section 4.3.1, as a result of the proposed Shared Path, pedestrian and cycle trips are expected to increase along Marine Drive. Whilst some of these trips will represent existing trips, a large proportion are expected to be new trips upon the network, with some of these trips likely to result from a mode shift (i.e. people who once completed their journey by private vehicle, will now be completing their trip by either walking or cycling). This mode shift will be predominantly felt with the commuter traffic cohort, traditionally present on the road network during the busiest times of the day (morning and afternoon).

With the introduction of battery powered rental devices such as eBikes and eScooters[25], the potential for longer commuter and recreational journeys could be realised. With the connection to the Great Harbour Way scheme, it is considered that residents of the Eastern Bays area could utilise these devices for journeys further afield than would otherwise be the case on foot or when using a more traditional form of bicycle.

In addition to a complete mode shift (i.e. people who previously drove that now walk/cycle), the path will also encourage a multi-modal shift. For example, if a resident of the Eastern Bays area wishes to access Wellington for work, they may not want to walk/cycle to whole way due to the significant distance required to travel to complete this journey. It is valid to assume that people may walk / cycle from the Eastern Bays area, to a point where public transport provisions are more regular and or provide access to a larger catchment area, to complete the rest of their journey by rail or bus.

It is also reasonable to assume that tourists, particularly those visiting areas such as Days Bay, may prefer to walk or cycle along the Marine Drive rather than to drive, either via a total mode shift or a multi-mode shift. The presence of a Shared Path would encourage this type activity along Marine Drive which provides spectacular views of Wellington Harbour along its length. In addition, it is also reasonable to assume that users of the Remutaka Trail, the Great Harbour Way and other local routes, refer Figure 4-5, would be attracted with the introduction of improved cycling facilities. Therefore, walking and cycling may be considered a more desirable mode of transport to appreciate this area as a local amenity.

Providing a mode shift away from the private vehicle, towards the more active and sustainable travel options of walking and cycling will have a direct impact on reducing the levels of CO_2 emissions produced

[25] Lime eScooters are now available in Lower Hutt and Upper Hutt. https://www.stuff.co.nz/national/109351561/lime-escooters-arrive-in-the-wellington-region. The battery-powered scooters can travel up to 27kmh and have a maximum range of 48 kilometres. They can be used on the footpath and road.

by the use of the high carbon emitting private vehicle. Reducing the number of vehicles that are present along Marine Drive will further encourage walking and cycling as the perception of safety increases.

The reduction in the use of the private vehicles brings a reduction in the overall congestion on the local road network. Whilst Marine Drive is seen to operate well within capacity, Hutt City and Wellington do experience congestion, particularly during the AM and PM network peaks. Removing even a small proportion of private vehicle trips, by way of encouraging a mode shift, will therefore have a positive knock-on effect of reducing congestion by reducing the overall demand on the local road network.

The environment also plays an important role in shaping habitual behaviour patterns such as walking behaviour. The aesthetics of the local environment, the convenience of facilities for walking (footpaths, tracks), accessibility of places to walk to (shops and beach), level of traffic on roads, and composites of environmental attributes have all been found to be associated with walking for particular purposes resulting in increased physical wellbeing[26]. The provision of the shared footpath is expected to further encourage people to make walking and cycling part of their weekly routine. The separated nature of the facility is expected to encourage walking and cycling to school.

4.6 Health and Environmental Benefits

Providing infrastructure along Eastern Bays to promote the use of active transport modes is a recognised way of improving the overall health and wellbeing of individuals who choose to take advantage of the facility. An increase in safety (perceived or actual) and increased connectivity enhances social well-being in the community by bringing people together and sharing experiences. Studies have shown that with an increase in exercise on a weekly basis there is a corresponding increase in overall health of the individual, both from a physical and a mental perspective[27].

Therefore, the Eastern Bays Shared Path project provides a great opportunity for the residents within the Eastern Bays area and further afield, to increase their cardiovascular outputs through the use of the Shared Path, reaping the health benefits resulting from the increase in exercise.

The economic evaluation indicated that the vast majority of benefits, approximately $10.7 Million or 75% of the net benefits, are attributed to the health and environmental benefits resulting from the increased number of cyclists and pedestrians expected to use the facility.

A recent submission to the HCC Long Term Plan 2018-2028 by the Doctors for Active Safe Travel (DAST) provided a summary of the key health benefits of active transport[28]. The section below provides a snapshot of their key findings.

In high and middle-income countries, physical inactivity has become the fourth leading risk factor for premature mortality due to the increases in disease and ill-health associated with inactivity[29]. Declining rates of functional active travel have contributed to this population level decrease in physical activity, and evidence suggests that rising levels of obesity are more pronounced in settings with greater declines in active travel.

A recent 5-year prospective study of over 250,000 people (median age 52), published in the British Medical Journal[30], found that cycling reduced:

- The risk of all-cause mortality by 41%;
- The risk of any cancer by 45%; and
- The risk of cardiovascular disease by 46%.

The relationship between exercise and relative health risks is highlighted Figure 4-7 below:

[26] Regional Public health, 2010. Healthy Open Spaces: A summary of the impact of open spaces on health and wellbeing. Regional Public Health Information Paper, March 2010, Lower Hutt. http://www.rph.org.nz/content/f4c7f1f1-0945-42c0-8498-6890f099b5b6.cmr

[27] *Physical Exercise and Psychological Well-Being: A Population Study in Finland* Journal of Preventative Medicine, Vol 30, Issue 1, January 2000

[28] Doctors for Active, Safe Transport, 2018, Submission to the Lower Hutt City Council on the Long Term Plan 2018-2028

[29] World Health Organization, 2010, Global recommendations on physical activity for health.

[30] British Medical Journal, 2017, Association between active commuting and incident cardiovascular disease, cancer, and mortality: prospective cohort study

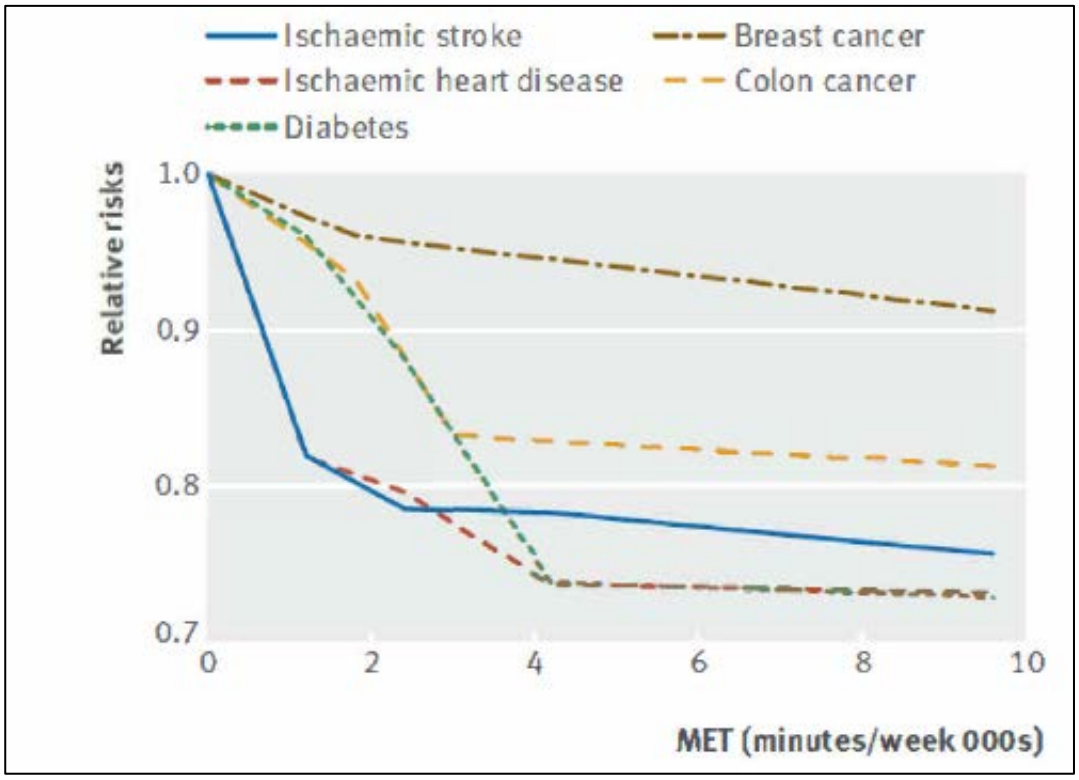


Figure 4-7: Health benefits of exercise[31]

With the introduction of the Shared Path, comes the opportunity to allow people to travel to work and / or social events by walking or cycling. Rather than becoming an additional task that is required through the day, this becomes part of their daily schedule. For example, providing someone with the option to travel to work via the Shared Path may take them an hour a day (30 minutes in each direction). Over a week, this would amount to an additional five hours of exercise they wouldn't otherwise achieve, resulting in the all the associated health benefits of exercise, without a significant impact to their daily schedule.

The provision of the Shared Path also provides a free, easily accessible social activity for all users, both residents and leisure users. With great views across Wellington Harbour and good amenities provided at Days Bay, it is not unreasonable to assume that people would use the path for recreational purposes. These users would therefore also benefit from increased cardiovascular output and the health benefits associated with this, that they would otherwise miss out on if they were to complete the same journey using a private vehicle.

4.7 Safety Benefits

When infrastructure is designed and implemented, one of the fundamental goals underpinning design is safety. In terms of road safety, the key to providing a safe environment is to reduce the chance of death and serious injury from occurring as a result of the overall design and interaction of users. In the case of Marine Drive, whilst there is not a strong correlation between vehicle and vulnerable road user (VRU) crashes[32], whenever vehicles and VRUs are forced to share road space, especially in a higher speed and constrained environment, it is only a matter of time before a death of serious injury crash occurs. Vulnerable road users are much more susceptible to sustaining injuries categorised as serious or higher due to the lack of protection when compared to travelling in a motorised vehicle.

The most effective way to reduce the chance of crashes between vehicles and VRUs occurring is to separate the two user groups, which the Shared Path achieves successfully. Whilst the potential for a crash

[31] British Medical Journal, 2013, Physical activity and risk of breast cancer, colon cancer, diabetes, ischemic heart disease, and ischemic stroke events: systematic review and dose-response meta-analysis for the Global Burden of Disease Study

[32] Due to the low levels of pedestrians and cyclists currently using Marine Drive and the perceived safety risk

involving a vehicle and a VRU is not removed entirely[33], the probability of this scenario occurring is significantly reduced under the proposed scheme.

Based on the estimated existing and future users, the economic evaluation estimates that there will be approximately $0.6M of cycling safety benefits introduced from the scheme over the analysis period.

A key intangible benefit of a separated Shared Path is the reduction in perceived risk. The proposed Shared Path removes pedestrians and cyclists from the live carriageway to an area in which they feel much safer. Whilst it is still possible for crashes to occur between pedestrians and cyclists, due to the shared use nature[34] of the path, the rate of incidence is not considered to be significant due in part to the proposed path width of up to 3.5m. Research has also shown that there is a safety in numbers[35] effect with cycling facilities; where, as the numbers of cyclists increases, the crash rate decreases. Due to the speed differential between pedestrians and cyclists also being much lower, if a crash does occur, the severity of the crash will be significantly lower than if a vehicle was involved.

4.8 Resilience Benefits

With the introduction of the Shared Path comes the opportunity to construct, upgrade or repair some of the adjacent seawalls. Some areas of seawall have been identified as ineffective or reaching the end of their operational lifespan. Therefore, these seawalls cannot provide sufficient protection against wave over-topping events or undermining to the foundations of the road itself occurring. Therefore, Marine Drive is particularly vulnerable to road closures and delays. Road closures and/or reduced operation results in both social and economic impacts to the Eastern Bays community[36]. Over time sea levels are forecast to rise, aggravating the situation. The Ministry for the Environment (MfE) (2017) projections[37] forecast a 16 cm sea level rise by between 2030 and 2040 (depending on global emissions trajectories). Further sea level rise will increase the frequency of all coastal inundation with sea level rise of 0.5 m forecast to be reached sometime between ~2070 and ~2110[38] and sea level rise of 1.0 m sometime after ~2115.

Key infrastructure services, including the main outfall sewer pipeline (MOP) is located within the road corridor and has been identified as being particularly susceptible to damage if appropriate protection is not provided. The continued protection of this amenity is therefore considered a high priority for the Eastern Bays community.

The project will improve the current and short-term resilience of Marine Drive through the deflection of wave energy. In turn, the following benefits will be experienced:

- Reduced economic costs from road closures and delays;
- Reduced clean-up costs;
- Better protection of vulnerable underground amenities; and
- Increased protection against existing and future storm events.

It is acknowledged that this project will not be the final solution to addressing the problem of sea level rise, rather, this project provides a fundamental building block in the process to better equip Marine Drive against sea level rise, whilst also buying some time to understand what the future, longer term solution may look like.

[33] Under the unlikely circumstances, a vehicle could still leave the carriageway and enter the shared path and vice versa for a pedestrian / cyclist. Further, it is expected that a proportion of the commuter 'strong and fearless' cyclists will continue to cycle on-road.

[34] The path is shared use in nature, this will reduce the overall speed that cyclists choose to travel at as they will be aware of potential conflict with other users

[35] Predicting Accident Rates for Cyclists and Pedestrians, NZTA Research Report 289

[36] HCC Eastern Bays Road Resilience Funding Application (Walbran, 2015) noted that the June 2013 storm event cost HCC $280,000 and that these events could expect to occur every three years with sea level rises. This economic evaluation for Eastern Bays adopted the same storm cost; however, is much more conservative by estimating the frequency at every ten years. The recommended option, with the improved seawalls, were assumed to result in a significant reduction in the storm costs compared to the do-minimum.

[37] Ministry for the Environment Coastal Hazards and Climate Change Guidelines, 2017. http://www.mfe.govt.nz/publications/climate-change/coastal-hazards-and-climate-change-guidance-local-government

[38] At which point current 100-year storm events are expected to occur on average, once a year.

4.9 Other Benefits

The Recreational Assessment Appendix K of the resource consent application considers the community and personal wellbeing, tourism and recreational benefits of the proposed Shared Path.

Due to the physical aspect of walking and cycling, people often start a walk with the end goal of purchasing refreshments in the middle or at the end of their journey. With this in mind, it is safe to assume that with an increase in the number of pedestrians and cyclists along Marine Drive, this will likely have some commercial benefit to local businesses (as more customers are attracted to the area than is currently the case and will inevitably spend money - although this not readily quantifiable).

It has also been noted that a plan to see some 200 mountain bike trails improved across the Wellington region – from Kapiti to central Wellington, to Wairarapa and Hutt Valley – was released in 2018[39]. These trails are to be mapped, sign-posted and advertised with the Department of Conservation grades of difficulty. The three to five year overhaul is expected to increase the level of tourists coming to the Wellington region specifically to cycle. Therefore, it is considered that there is significant potential for the Eastern Bays project to encourage and open up further opportunity for this kind of user to gain access to some of the trails within the area. The Eastern Bays region will subsequently reap the rewards in terms of increases in economic output.

[39] Stuff Article, November 2018: https://www.stuff.co.nz/travel/news/108918276/come-for-the-coffee-stay-for-the-mud-wellingtons-trail-overhaul

5. Transport Impacts and Mitigation

As with any infrastructure improvement project, the local road network will experience some impact, ranging from construction effects to longer term impacts such as managing greater demand.

Potential transportation impacts to be experienced on Marine Drive as a result of this project, along with potential mitigation measures, are outlined below.

5.1 Construction Impacts

Disruption during the construction of the Shared Path will be inevitable and unavoidable with the requirement for temporary traffic management and lane closures throughout the scope of the works, to construct the seawalls and Shared Path.

During construction, there will be an increase in traffic movements to and from the construction sites. Given that Marine Drive has a relatively narrow carriageway and there is limited access to the seawalls, it will be necessary to close one lane of traffic at certain times during the construction. This will consequently impact upon the accessibility of pedestrians and cyclists as well as impact on the journey times of vehicles.

The limited and informal parking in the Eastern Bays, coupled with the increasing parking demand from contractors, could result in a parking shortage within the area that construction is taking place.

5.1.1 Mitigation

An indicative construction programme for the project will be developed to mitigate the impacts during construction period as much as is practicable. The programme is developed to understand the duration of the project to enable a better understanding of cost; to recognise the potential complexities in the construction programme, allowing identification of potential opportunities and to recognise the critical path activities; and to mitigate potential effects on the environment and community. This programme will be incorporated into the Construction and Environmental Management Plan (CEMP) to be prepared as a condition of the consent.

The construction will likely be staged over a longer period (possibly up to six-years), completing each bay in totality to provide consistency and completeness in each bay and to avoid the risk of small inconsistencies arising, given the methodologies of different contractors which may undertake the work across successive years. Each section is likely to take about 3-6 months (depending on bay length, season of work and complexity) to complete.

Currently it is proposed to complete Windy Point first, followed by Point Howard/Sorrento, and then Lowry/Whiorau Bay, over three separate financial years. This will be followed by the other Eastern Bays. The construction of the first stage of the project should commence in 2019. The staged implementation is subject to change following further discussions with HCC and confirmation of funding availability. The residents living within the construction area will also be informed and consulted on construction schedules.

Minimising the impact for all road users and the community will be imperative and this will need to be balanced with providing access for construction vehicles. The timing of works will also need to consider the tides, as most works in the foreshore will likely need to be done at low tide, so the combination of low tide and off-peak traffic will limit the window for construction works to be carried out.

5.2 Operational Impacts and Mitigation

As outlined above, the intention is for the works to be done in stages with contracts being let for one bay at a time on an annual basis. Therefore, disruption to traffic (and other modes) will only be over a short geographical distance, typically with partial closures only, and for a short duration. This approach enables greatly flexibility to adapt and adjust mitigation measures for the range of impacts outlined below.

5.2.1 Asset Management

The main implication for ongoing maintenance is the clearing and cleaning of storm debris from the path and along the Shared Path separator. However, constructing seawalls that reflect wave energy (such as single and double curve walls), as well as options that provide additional height in the future will reduce incidences of overtopping during storm events and high tides during both existing and future storm events.

Resurfacing of a carriageway with an adjoining separated Shared Path is more complicated due to the separator that forms an obstruction. However, the lifespan of a Shared Path is longer than the adjacent traffic lanes due to reduced loading and will require resurfacing less often. Increased road marking

(including green paint across accesses), signage and barrier maintenance will add increased asset management costs for this corridor.

A further long term benefit of the Shared Path, compared to the existing situation, is the likely reduction in maintenance costs if a storm event was to occur, where the debris would likely impact the Shared Path itself (rather than the traffic carriageway), reducing sweeping and traffic management costs.

Therefore, the net increase in long term maintenance costs are expected to be negligible.

5.2.2 Parking

Parking will be retained where possible adjacent to the Shared Path on the seaward side – however some informal parking will inevitably be lost due to limited space availability. There are existing formal parking areas at Point Howard - Seaview Terminal side and Point Howard (landward side at the ablution building), Whiorau Reserve (Lowry/Whiorau Bay) and Days Bay. This parking will remain and is unaffected by the Shared Path.

There are a number of areas along Marine Drive where there is additional shoulder width used for informal parking, most notably at Point Howard and Windy Point. In some locations, this shoulder width will be reallocated to provide for the Shared Path, reducing the extent of beach encroachment and minimising changes to the shoreline.

While there may be some reduction in seaward side informal parking areas, improvements to the remaining parking areas are proposed. Parking areas will be formalised at Point Howard and Windy Point (both currently perpendicular or angle parking) and spaces will be re-oriented to angle and parallel parking respectively. This will provide safety benefits for road users, maximising the parking space numbers in the available space.

Furthermore, it is considered that the Shared Path may even reduce the requirement for on-street parking provisions with some prospective users. With the presence of the path, people who may have originally visited the Eastern Bays area within their private vehicles now have the opportunity to do so by walking or cycling. It is a reasonable assumption that a number of vehicle trips and associated parking demand will be removed from the local road network as these road users will now choose to walk or cycle.

5.2.3 Safety

5.2.3.1 Crossings

The crossing demand is expected to increase with the number of pedestrians and cyclists attracted by the facility.

The separators between the Shared Path and traffic lane will feature regular gaps, providing space for pedestrians and cyclists to cross to the landward side ensuring connectivity between the Shared Path and likely trip attractors located along the landward side of Marine Drive.

At the southern extent of the path, a transition point will be provided for southbound cyclists to cross the carriageway and continue their journey, albeit on the traffic lane and shoulder. Pedestrians have access to a board walk along the shoreline at Days Bay.

At the northern extent of the works, an existing Shared Path currently terminates at the Seaview Terminal at Point Howard on the seaward side. The new Shared Path will be integrated into the existing path, and pedestrians and cyclists will not need to cross the carriageway.

An existing zebra crossing at Point Howard provides the only formal crossing point within the scope of works. No additional formal crossing points are proposed for this project. Additional guidance signage will be considered in the detail design phase.

5.2.3.2 Bus Operation and Shelters

Marine Drive is serviced by bus routes 81, 83 and 85, linking Eastbourne to Wellington CBD via Petone (route 85 also services Lower Hutt). Each weekday there are 95 bus movements on the corridor, with buses operating between 6am and 11pm. No changes to the bus route or frequency of buses will be required, however minor modifications or relocations to some bus stop locations are proposed. For example, it is proposed to move the bus stop at Mahina Bay fifty metres south, to avoid further encroaching onto the useable beach space at this bay.

Potential conflicts of Shared Path users at bus stops will need to be managed. The Shared Path will be diverted behind the bus shelters in all locations along the project length. This is best practice design when integrating shared paths / cyclists with bus stops. Line marking and signage will be used to highlight areas of potential conflict to minimise the safety risk. However, the proposed Shared Path along the foreshore will

substantially improve pedestrian safety and access to and from the bus stops along the route for visitors and local residents.

Any movement of bus stops, or redesign of shelters will need to be approved by Greater Wellington Regional Council.

5.2.3.3 Side friction

Intersections linking to Marine Drive are located on the landward side of the corridor, minimising the conflict between turning vehicles and Shared Path users. However, there are a few isolated locations where vehicles will need to cross the Shared Path. These include:

- Lowry Bay - parking area and boat ramp at the Whiorau Reserve at the southern end of Lowry Bay
- Point Howard – cyclists must cross both legs of a loop road access to Point Howard terminal. Sightlines may be compromised by a large rocky outcrop adjacent to Marine Drive.

These conflicts will be considered further during the detailed design stage and could include mitigation measures such as coloured surfacing to highlight conflict areas to road users.

5.2.3.4 On-road cyclists

While the aim of this project is to provide a safe and connected walking and cycling facility, it is inevitable some cyclists will continue to ride on Marine Drive. Given the challenges and constraints in obtaining the additional width for the Shared Path, it is not feasible to provide further width for on-road cycling. As such, more confident cyclists will need to use the traffic lane or the Shared Path.

6. Summary

This assessment has detailed the existing situation that is present along Marine Drive, along the eastern perimeter of Wellington Harbour in an area known as the Eastern Bays in Hutt City. It has been concluded that the existing infrastructure provides insufficient amenities to support and encourage walking and cycling at present. Through the process of optioneering, a proposed scheme has been developed which provides a shared use walking and cycling path, whilst at the same time, supporting seawall upgrades and repair.

The introduction of the proposed scheme is expected to result in a number of positive benefits including:

- An improvement in the actual and perceived safety of pedestrians and cyclists along Marine Drive;
- Improved resilience against climate change, sea level rise and existing and future storm events through proposed seawall improvements;
- Improved social connectivity and opportunities and improved accessibility for the residents of Eastern Bays – within individual bays, between different bays, to and from Lower Hutt and beyond and to other cycle routes;
- An increase in modal shift away from the private motor vehicle towards more sustainable choices of transport, including; walking, cycling, public transport and a mixture of all of these. This results in positive environmental impacts, including; a reduction in CO2 emissions, improved noise and air quality and a reduction in network congestion;
- Positive individual health benefits through increased daily activity; and
- Localised economic improvements and increased business for local suppliers of goods and services, particularly through increased tourism activities.

As well as the benefits the scheme will impart, the potential transport impacts have been considered. Overall the transport impacts are considered minor in nature. It is considered that these impacts can be managed or mitigated and do not pose a significant deterrent to the overall project, the potential impacts include:

- Temporary construction traffic impacts;
- Marginally increased maintenance costs;
- Reduction of informal parking; and
- Increased crossing demand relating to the seaward path and the landward amenities.

Overall, from a transportation perspective, the provision of a Shared Path along Marine Drive is considered to provide significant benefits to the local community and users from further afield. The benefits are considered to substantially outweigh the outlined, predominantly short-term impacts (which are able to be mitigated or managed).

Appendices

Appendix A Strategic Assessment against the GPS

Eastern Bays Shared Path assessment against the 2018 Land Transport GPS

The earlier investigation stages of the Project (Indicative and Detailed Business Cases) were previously assessed against the 2015 Land Transport GPS. With a new Government sworn into office in October 2017, they set upon creating a new Land Transport GPS to match their priorities and direction.

The following information outlines an assessment of the Project against the four priorities of the 2018 Land Transport GPS (herein referred as the "GPS"). The four priorities are; Safety, Access, Environment and Value for Money. Safety and Access are noted as the key strategic priorities, while Environment and Value for Money are listed as supporting strategic priorities.

1. SAFETY

Objective: *A land transport system that is a safe system, free of death and serious injury.*

Paragraph 37 states that *"…. GPS 2018 supports investment towards improving the safety of cyclists and pedestrians. Improving the safety of cycling and walking is a key part of improving accessibility and uptake of cycling and walking as preferred transport modes. It also enables transport choice".*

- The Project meets this objective by providing a separated Shared Path facility for active modes and vulnerable users, of a consistent width and standard of design.

2. ACCESS:

Objective: *A land transport system that provides increased access to economic and social opportunities.*

Paragraph 58 states that *"The transport system contributes to liveable cities by providing easy and efficient access and effective transport choice. This requires roads, rail, public transport, walking and cycling networks to work together to increase access to opportunities."*

- The Project enables greater transport choice for Eastern Bay residents by providing a walking and cycling Shared Path where provision is currently extremely limited. Any users who switch mode choice from private vehicle to cycling (or walking) are helping improve access for the remaining vehicular traffic by reducing congestion levels.

Paragraph 69 states *"Creating spaces within the streetscape that are attractive and safe for people to sit, gather and walk and cycle supports the objectives of creating a safer and more accessible network, as well as key outcomes around improving health and well-being".*

- The Project creates a safe and attractive foreshore Shared Path for people to use. There are also improvements to foreshore access through new and improved steps included as part of some seawall sections. The facility should attract users to walk and cycle along it, which will help to improve their health and well-being.

Objective: *A land transport system that enables transport choice and access.*

Paragraph 87 states *"Walking, cycling and public transport are very important in supporting an efficient, sustainable and affordable transport system. Enabling more people to use active modes and public transport can also contribute to improved health outcomes as people regularly incorporate active travel into their daily life, increasing levels of physical activity".*

Paragraph 92 states *"GPS 2018 supports investment in: provision of good quality, safe, fit-for-purpose walking and cycling infrastructure".*

- The entire premise of the Project is to improve walking and cycling facilities for the Eastern Bays residents and for those users from further afield to use this popular and picturesque coastline. Longer term the Eastern Bay Shared Path will connect into the 'Great Harbour Way', which creates a walking and cycle route around Wellington harbour

Objective: *A land transport system that is resilient*

Paragraph 103 states *"GPS 2018 prioritises investment to improve resilience on routes where disruptions pose the highest economic and social costs. This also includes investments to improve resilience to gradual change (e.g. erosion and sea level rise) and high impact events of low to medium probability (e.g. earthquakes)".*

- While the Shared Path route from Eastbourne to Petone / Lower Hutt would not classify as a route that imposes the highest economic and social costs (due to the small population), by building the improved facility and the necessary seawall improvements, it provides improved resilience against the gradual change of sea level rise (and has been designed with future adaptability provision to raise the seawall level). This in turn provides much improved resilience for the adjoining road corridor, which will benefit from less disruptions due to washouts of the old seawalls currently.

Paragraph 106 states *"GPS 2018 supports investment for the best solutions on the most critical transport routes, in regions that have only one viable route in and out, for example. This includes recovery activities for transport routes into and across North Canterbury and for urban areas such as Auckland, Wellington and Christchurch, which are vulnerable to high impact natural events".*

Paragraph 107 states *"...This includes investment in non-transport infrastructure, such as flood mitigation infrastructure, where this has clear transport benefits and is used to improve resilience at the economically and socially most critical points of the network".*

- Marine Drive is the only road into and out of Eastbourne and the Eastern Bays south of Point Howard. Therefore, improved resilience of the transport network is generated by the seawall upgrade for the new Shared Path facility. The road corridor is susceptible to damage caused by wave action from high seas during a storm event.

3. ENVIRONMENT:

Objective: *A land transport system that reduces greenhouse gas emissions, as well as adverse effects on the local environment and public health*

Paragraph 116 states *"...Enabling the transport sector to support better environmental outcomes involves minimising the adverse effects of transport".*

Paragraph 117 states *"There are a range of investment and non-investment initiatives that can be used to address the environmental effects of transport. These include: .... promotion of active modes (such as new cycleways) and shared mobility".*

Paragraph 118 states *"...It also means providing people with real alternatives to using cars, including convenient and safe access to public transport and safe, well maintained active transport infrastructure".*

- The Project is an upgraded shared path that is planned to increase the volume of cyclists commuting for work and leisure in the Wellington region.

Paragraph 121 states *"There is a range of potential greenhouse gas abatement opportunities in the transport sector. These can be classified as opportunities to: ...shift to lower emissions modes of transport, such as public transport and active modes...".*

- It is envisaged that the improved Shared Path will encourage transport users to move to the emission-free modes of walking and cycling.

Paragraph 123 states *"While greenhouse gas emissions and climate change have cumulative effects on a global scale, there is also a need to manage local effects of land transport. Some of the areas where transport has an adverse effect on the local environment and public health include: ...reduced water and soil quality (particularly from contaminated stormwater run-off and sediment during construction); disruption to natural landscapes, vegetation and biodiversity...".*

- With any new construction project there is the risk of sediment run-off, particularly a concern when working at the coastal waterline. A prerequisite of any construction management plan will be to include an in-depth strategy on how to counteract this during construction, so that construction related environmental effects or minimised and preferably removed.

- One negative environmental outcome of this project is the disruption to the natural landscape by the construction of new seawalls where currently none (or only minor / limited scale) exist, and which can include sections of coastal reclamation to provide space for the Shared Path. This will disrupt the aesthetics and use of the natural landscape at these locations.

4. VALUE FOR MONEY:

Objective: *A land transport system that delivers the right infrastructure and services to the right level at the best cost*

Paragraph 132 states *"Delivering the right infrastructure and services requires a wide range of options to be considered. It is expected that options that improve the performance of the current network are considered alongside options for providing new infrastructure where possible".*

- The Project has been through the Indicative and Detailed Business Case procedures which considered a number of options for different width Shared Path facilities. All options were assessing the improvement of an existing cycle facility that was inconsistent in width and in some locations, not provided for at all. The project is forecast to deliver a positive economic return in terms of the investment required.

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