
Accessing Wellington's Port Area

Aurecon for the NZ Transport Agency

10 September 2016

VERSION V6

Programme Business Case



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GLOSSARY OF TERMS

ADT	Average Daily Traffic
AWPA	Accessing Wellington's Port Area
BCR	Benefit Cost Ratio
BERL	Economic consultants
CBD	Central Business District – Wellington's commercial heart
CPL	CentrePort Ltd
EEM	The Transport Agency's Economic Evaluation Manual
FTE	Full-time Equivalent (workforce measure)
GDP	Gross Domestic Product
GPS	Government Policy Statement on Land Transport (statutory document setting out Government requirements and funding ranges)
GWRC	Greater Wellington Regional Council
HCC	Hutt City Council
HCV	Heavy Commercial Vehicle
Horizons	Manawatu-Wanganui Regional Council
HOV	High Occupancy Vehicle
IBC	Indicative Business Case
KPI	Key Performance Indicator
KRL	KiwiRail Ltd
LTMA	Land Transport Management Act, 2003
LTP	Long-term Plan (10-year plan for local authorities)
N2A	Ngauranga to Petone investigation project
NIMT	North Island Main Trunk Railway (Wellington to Auckland)
NLTF	National Land Transport Fund
NZTA	New Zealand Transport Agency
PBC	Programme Business Case
P2G	Petone to Grenada project
Project Phoenix	KiwiRail/Interislander plan for new ferries linked to new terminals at Wellington and Picton
PT	Public Transport
RLTP	Regional Land Transport Plan (statutory document setting regional ten-year priorities)
RLTS	Regional Land Transport Strategy (former statutory document, replaced by RLTP)
RONS	Road of National Significance
SAR	Scheme Assessment Report
SATURN	Traffic assignment model (operated by GWRC)
SH#	State Highway #
SMART	Specific, Measurable, Attainable, Relevant, Timed
TDM	Travel Demand Management
TEU	Twenty-foot Equivalent Unit (standard container)
TG	Transmission Gully - RONS
Transport Agency	The New Zealand Transport Agency
vpd	Vehicles per day
vkt	Vehicle kilometres travelled
WCC	Wellington City Council
WTSM	Wellington Transport Strategic Model – a four stage transport model

EXECUTIVE SUMMARY

The Programme Business Case (PBC) for Wellington's port area is the next step in a process to develop a robust and appropriately sized set of interventions relating to this critical area at the entrance to Wellington's CBD. It has resulted in the agreement of some immediate actions to reduce delays at the port entrance and some possible ways forward for the longer term – depending on different scenarios and trigger points.

Through the PBC process, the investment partners identified and agreed two problem statements and two potential benefits through a series of stakeholder workshops.

Problem 1: *Access* and space to, from, through and within the port area** is constrained and inefficient impacting growth. (70% weighting)*

*Current, future, multi-modal, including freight

** Whole of port area, including inside the port gate

Problem 2: *The Port is a key enabler to recovery after a HILP event, but the network infrastructure to and from the Port Area is vulnerable to such an event, further risking the Region's ability to recover. (30% weighting)*

Benefit 1: *Efficient access to, through and within the port area. (70% weighting)*

Benefit 2: *Increased resilience of the transport network into and out of the port area. (30% weighting).*

These were developed into investment objectives and a range of alternatives and options were identified with stakeholders, that were combined into various programmes that performed at differing levels against the investment objectives.

A Recommended Programme was agreed with partners. It is predominantly small-scale infrastructure changes, linked to some demand management actions. This programme will return moderately against the investment objectives (removing the delays of up to five minutes at the CentrePort main exit/entry point, enabling controlled pedestrian connection between the port and the CBD, making ferry access more legible and adding 20% to the rail capacity), at moderate cost. The recommended programme is mainly geared towards immediate issues, matching the scale of the current problem, as shown by the evidence.

There are, in addition, a range of other programmes that have been developed, that can be advanced once other projects are clearer in their direction and scope.

The matters that will need to be resolved to allow any commitment to further investment to be made include:

- Progressing the KiwiRail/Interislander/CentrePort plans for a very substantial re-development of the Interislander ferry terminal area ("Project Phoenix")
- Understanding the scenarios for the Ngauranga to Airport (N2A) corridor as part of the Get Welly Moving initiative
- Analysing the possibility of a fourth southbound lane on the motorway between Ngauranga and Aotea Quay – which must be considered in conjunction with a) and b).

The investment areas that give immediate return with the practical elimination of unnecessary delays at Hinemoa Street, enhanced usability of rail access and more direct and safer access to the Interislander ferry terminal and should proceed in any circumstances are:

- Change the layout at the main Hinemoa port entrance to provide two right-turn lanes into Aotea Quay
- Rearrange the internal road layout on the port to facilitate greater use of the new southern entrance by non-operational port traffic
- Modify the rail sidings within CentrePort to provide additional capacity
- Introduce improved ferry access on Aotea Quay, probably to replace the current signalised intersection giving access to the railyards (and potentially allowing access to the Interislander terminal from the motorway)
- Provide a direct pedestrian connection between the office development on the port area and the CBD
- Undertake significant travel planning in relation to the Harbour Quays office development to reduce the employee use of cars to access the offices (and provide attractive routes towards the CBD for pedestrians)
- Carry out a range of optimisation and demand management measures including reviewing signal timing, port gate operation and information provision.

The types of investment that may be justified in conjunction with Project Phoenix and are linked to the Lets Get Welly Moving initiative include direct access off and on to the motorway with a possible new off-ramp from a potential fourth southbound lane from Ngauranga and an elevated on-ramp and new access arrangements for ferry passengers only on the Hutt Road. Until Project Phoenix has advanced, however, these costly investments cannot be properly considered. The best way to do so will be an integrated business case.

The investments noted above address the main problem identified in the business case – constrained and inefficient access to, through and within the Port Area. None directly addresses the second problem, the need to support the Port's role in an HILP event. All infrastructure changes would, however, be built to modern codes so over time there should be more resilience built into the network.

There is very substantial backing to improve access to the Port in the relevant statutory plans – including explicitly in the Regional Land Transport Plan (RLTP) – and doing so aligns with the Government's priorities in the Government Policy Statement (GPS).

Next Steps

Recommended next steps are:

- The Transport Agency and Wellington City Council, in conjunction with CentrePort, to commit to progressing the immediate actions – indicative business cases - define each party's role. Agree potential funding arrangements for possible early implementation and where National Land Transport Funding is required progress the next indicative or detailed business case phase
- will need to be defined and further agreements made for funding early implementation
- KiwiRail/Interislander/CentrePort and the Transport Agency/Wellington City Council to commit to progress the Project Phoenix business case as a joint project that will properly consider the access questions (including a possible off-ramp from a fourth southbound lane, an elevated on-ramp and a passenger terminal on the Hutt Road).

The joint business case should interface with the Lets Get Welly Moving business case but remain separate from it.

OVERLAY

This 'overlay' is an intermediate level précis of the business case, enabling readers to obtain more information on the business case than in the Executive Summary without needing to read the main document.

Background

The Strategic Case in relation to the Wellington port area (see Figure 1), established that there are sufficient evidential problems relating to access to, through and within the port area to warrant developing this Programme Business Case (PBC). The PBC in turn has confirmed that there are real operational problems on the immediate network that create the need for short-term investment and further investigation.

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Figure 1- Wellington Port Area

The PBC partners (the NZ Transport Agency, Wellington City Council (WCC), Greater Wellington Regional Council (GWRC), KiwiRail/Interislander and CentrePort) reviewed the original strategic case and agreed the slightly modified problems and benefit statements:

Problem 1: *Access* and space to, from, through and within the port area** is constrained and inefficient impacting growth. (70% weighting)*

*Current, future, multi-modal, including freight

** Whole of port area, including inside the port gate

Problem 2: *The Port is a key enabler to recovery after a HILP event, but the network infrastructure to and from the Port Area is vulnerable to such an event, further risking the Region's ability to recover. (30% weighting)*

Benefit 1: *Efficient access to, through and within the port area. (70% weighting)*

Benefit 2: *Increased resilience of the transport network into and out of the port area. (30% weighting).*

Evidence reviewed to confirm the problems covered:

- Travel times across the local network
- Variability of speeds
- Legibility assessments
- Analysis from Lifelines studies
- Information from CentrePort itself and local operators (including KiwiRail, the Interislander, Blue Bridge, and Toll holdings)
- Operation of the ferry marshalling areas
- Transport modelling from GWRC

Aspects of the problems - in particular relating to poor legibility, limited access for the office developments within the port to the CBD, sub-standard access for pedestrians (relating to the cruise terminal and ferries and awareness of congestion on Aotea Quay) were confirmed from a targeted Customer Insights survey carried out by the Transport Agency.

The need to address the problems, and especially improve access to the port, is specifically mentioned in all the relevant transport planning documents and fully accords with the Government's stated priorities and guidance to the Transport Agency in the Government Policy Statement.

Transport planning context

The transport planning context for the Port Area PBC is complex, and needs to be understood to appreciate the possible direction for recommendations from this business case.

SH2 Programme Business Cases

The Port Area PBC is one of three being prepared concurrently in the Wellington region. The other two cover the length of State Highway 2 from Ngauranga to Masterton. Many journeys that pass through the port area – including commercial freight vehicles – will be affected by travel conditions being studied by these business cases as well as those locally on Aotea Quay. Naturally, when considering their journeys, state highway customers are concerned at their end-to-end travel times and variability as revealed in the Customer Insights. The implication is that matters that may concern customers located in the port precinct may not be focused on the immediate area. The ports actions will also affect traffic and travel on the state highway network as evidenced by the recent opening of the Waingawa rail freight hub. This is predicted to reduce the number of heavy vehicle movements for logs along the state highway corridor taking pressure off of parts of the such as the Rimutaka Hill, and providing cost efficiencies for forest owners in the Wairarapa.

Evidence on travel times analysed for the PBC showed that excess travel time (as represented by the difference between peak and off-peak conditions) and variability in travel times between Petone on SH2 and Johnsonville on SH1 and the port gate were more significant on the state highways than on the local network.

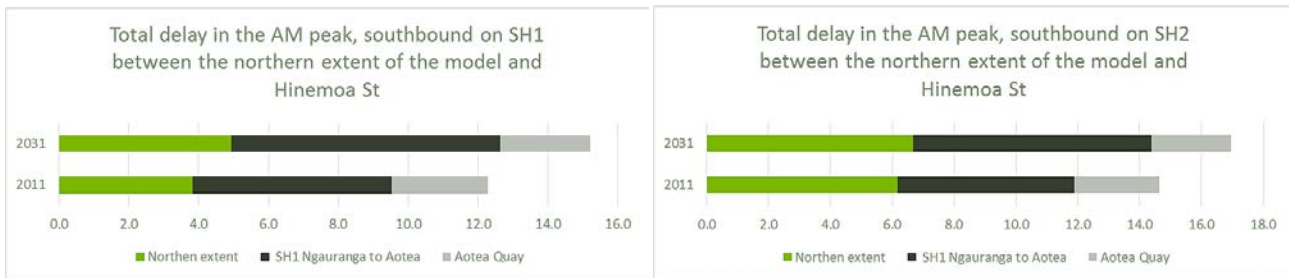


Figure 2 - Total delay in AM peak on SH1 and SH2

This finding has obvious implications when considering questions of reducing delay in accessing the ferry terminals and port – as well as central Wellington itself.

Ngauranga to Aotea Quay SAR

In addition to the current PBCs, a Scheme Assessment Report (SAR) was developed in 2012 for the Ngauranga to Aotea Quay section of State Highway 1¹. The SAR was the basis for the Smart Motorway project that has been in construction during the currency of this PBC. The SAR justified the addition of a northbound lane gain at Aotea Quay, which opened on 23 June 2016. The lane gain is particularly significant for this business case as it is expected to substantially relieve the delays on Aotea Quay northbound in the evening peak. Analysis for the PBC showed that the average speed is currently around 21km/hr northbound in the PM peak. If the lane gain operates as anticipated there should be an appreciable increase in speed (and capacity) meaning that the bottle-neck on Waterloo Quay/Aotea Quay will be largely at the signalised intersections. There will consequentially be greater justification for investment in these locations as Aotea Quay will be able to accept the higher throughput at the signals.

The Ngauranga to Aotea Quay SAR evaluated the opportunity of adding a fourth southbound lane to complement the added northbound capacity. The SAR found that the economic appraisal did not support construction of the southbound lane – termed Stage 4 – as it was twice as costly as the additional northbound lane (which has been constructed within the highway boundaries). It was recommended that Stage 4 is deferred “until other factors such as the future of the Interislander, Terrace Tunnel duplication, and the seismic risk considerations of the Thorndon Overbridge are further developed and their impact on the proposed four-lanes southbound are better understood.”

The future of the Interislander terminal remains unclear, as discussed below. Similarly, there is no certainty in relation to the Terrace Tunnel, which is within the Lets Get Welly Moving remit.

Ngauranga to Airport (N2A)

The N2A corridor is bounded by the Ngauranga interchange to the north, the Regional Hospital in Newtown to the south, and Wellington International Airport to the east. It includes State Highway 1, the local road network, the rail network terminating at Wellington station, and key routes for passenger transport, walking and cycling.

The key principles for development of the N2A transport corridor are:

- A high quality and high frequency passenger transport ‘spine’
- A reliable and accessible ‘ring’ or bypass route for vehicles

¹ SH1 Ngauranga to Aotea Quay Scheme Assessment Report, Beca/Fletcher for NZ Transport Agency, September 2012

- Inter-connected, safe, and convenient local street, walking, cycling and passenger transport networks
- Highly accessible and attractive 'activity' or shopping streets².

As the N2A study, known as the Lets Get Welly Moving business case is taking time to understand Wellingtonians' priorities through its *Let's Get Wellington Moving* initiative, a clear way forward may be some time away³.

Project Phoenix

During the course of developing this PBC, the KiwiRail/Interislander stakeholders observed that they had been asked by the KiwiRail Board to develop a business case in relation to future terminal arrangements at Wellington and Picton allowing for the next generation of ferries. Their initial thinking included potential use of the Kaiwharawhara reclamation, new off- and on- motorway ramps and a passenger terminal on the Hutt Road (for passengers being dropped-off, and for public transport and walking and cycling access). The project had been given the name Project Phoenix. It is possible that Phoenix could include relocation of the Bluebridge ferries and/or the cruise ship terminal.

Clearly if Project Phoenix proceeds, it will have a radical impact on landside movements and requirements. As yet, there have been only preliminary discussions between the Phoenix proponents and either the Wellington City Council (WCC) or the Transport Agency.

Wider transport context

The Wellington Region is generally experiencing low growth on the road network 0.5% per year on SH1 and almost no change on SH2. Modelling suggests that the trend will continue with an average growth to 2031 of less than 0.5% per year. A boost is anticipated with the opening of the Kapiti Expressway in 2017 and Transmission Gully in 2020. Some relief to the wider Ngauranga corridor is expected if the Petone to Grenada link should proceed.

With this relatively low on-road traffic growth, the modelling carried out by GWRC shows that the current problems of travel delays and unreliability are expected to increase only moderately. Importantly, as noted above, the large part of the peak period delays to the port gate are expected to remain on the state highway network. Inter-peak periods are likely to remain effectively free flowing.

CentrePort

CentrePort serves both the trade between the North and South Islands via the Interislander and Bluebridge services and the international import and export trade. Major commodities include oil products (at the Seaview terminal in Lower Hutt), containers and bulk cargo (especially logs). In 2015 CentrePort handled 2m tonnes of exports and imports worth \$3.3b⁴.

In 2015, according to BERL⁵ estimates, three million ferry passengers were carried with an estimated 775,000 visiting Wellington as tourists. CentrePort also hosts the cruise liner terminal with 80 ships carrying 150,000 tourists in the 2014/2015 season.

² <http://www.gw.govt.nz/N2ACorridor/> accessed 12 June 2016

³ *ibid*

⁴ Economic Impact of CentrePort on Central New Zealand 2015, BERL, May 2016, quoting CentrePort Annual Report

⁵ *Ibid*

It is estimated that CentrePort contributes directly and indirectly approximately \$2.5b to the central New Zealand GDP, annually.

The evidence is that delays to road freight access to the port on the immediate local road network occur only in the peak periods and are relatively moderate given the port's location close to the CBD of New Zealand's capital city. Some of these delays can be addressed by lower cost interventions including changes to signal timings and separating freight from car traffic entering and leaving the port land.

Nevertheless, port management stress that to operate as effectively as possible in New Zealand's vital tourism and export sectors it needs unfettered access, including for its growing rail-based freight. Port management are concerned that CentrePort's ability to operate optimally may be constrained by understandable concerns if – as expected – increased rail use results in longer closures of the Waterloo crossings to general traffic and pressure for more rail shunting slots.

The possibility of rail crossing closures resulting in traffic backing up on to the motorway negating the capacity and safety advantages of a fourth southbound lane were raised in the SAR⁶. To date these concerns have not been verified.

Given a Ministry of Transport study⁷ finding that it would be an economic disadvantage for New Zealand if ports such as Wellington were not to provide direct international services, and the importance of CentrePort for a wide region including the Manawatu and Taranaki, it may be that additional investment to ensure CentrePort's optimal operation is worth consideration.

There is very substantial backing to improve access to the port in the relevant statutory plans – including explicitly in the RLTP – and doing so aligns with the Government's priorities in the GPS. The latter emphasises economic growth and productivity through the provision of better access to markets, employment and business areas, and for freight vehicle productivity.

A possible prior consideration could be state highway status of the Quays to the seaport gate – to match the status of the route to the airport. This decision would best reside with the outcomes of the Lets Get Welly Moving business case.

Recommended programme

In the light of the complex and somewhat uncertain circumstances described above, the recommended programme to address the confirmed problems is in three parts.

The first part of the programme is justified in terms of the standard benefits normally considered by the Transport Agency. It comprises:

- Changing the layout at the main Hinemoa Port entrance to provide two right-turn lanes into Aotea Quay
- Rearranging the internal road layout on the port to facilitate greater use of the new southern entrance by non-operational port traffic
- Undertaking significant travel planning in relation to the Harbour Quays office development to reduce the use of cars to access the offices (and provide attractive routes towards the CBD for pedestrians)
- Reconfiguring the on-port rail sidings
- Providing a revised layout on Aotea Quay to access the Interislander ferry terminal.

⁶ Op cit, Risk Assessment, p. 80

⁷ Freight Futures Scenarios Study Ministry of Transport, 2014.

The anticipated order of magnitude cost of this programme is \$27m - \$33m with an indicative BCR of 0.9 – 1.5. It is recommended that this programme can immediately be progressed through indicative or detailed business cases and can take advantage of the new northbound lane on the Urban Motorway from Aotea Quay, which provides the downstream capacity needed for the additional throughput at Hinemoa Street to be effective. The likely funding partners are the Transport Agency, WCC and CentrePort.

This alternative is expected to give early benefits by helping to improve the efficiency of access to and within the port area.

The second and third programme would be linked to Project Phoenix and the Lets Get Welly Moving business case project, respectively. The second alternative could consist of significant investment to add off- and on-ramps to the motorway, a fourth southbound lane between Ngauranga and Aotea Quay and a new passenger ferry terminal on the Hutt Road. In order to consider such measures holistically, it is recommended that there be a joint business case developed in partnership between KiwiRail/Interislander and the Transport Agency/WCC to address the access requirements alongside the terminal and shipping aspects.

The interface with N2A is important for this alternative as it is through that project that questions relating to the required CBD access and the future role of the Quays beyond the port gate will be determined – affecting how any fourth southbound lane and off-ramp(s) would be configured.

These alternatives have order of magnitude costs of \$200m - \$280m and BCRs of the order of 0.3 – taken as stand-alone projects. Their full value would be expected to be greater as part of integrated programmes with Project Phoenix and N2A.

The third variant would include the increased capacity southbound to be consistent with N2A, but would not link to Project Phoenix and would therefore have a lesser level of enhanced Interislander ferry terminal development.

A fourth alternative would target efficient, unconstrained operation of CentrePort. This programme would therefore be justified by wider economic development considerations and would not be expected to be funded out of the NLTF. The additional elements above alternatives two and three could be grade-separation of the rail link to the port or relocation of Aotea Quay to the west through the current railyards allowing much closer integration between the port and the freight operators.

PART A – THE STRATEGIC CASE

1 INTRODUCTION

1.1 The Problems and Benefits

This *Accessing Wellington's Port Area Programme Business Case* confirms that there is a significant strategic case to address problems in the vicinity of Wellington's commercial port – CentrePort – located on Aotea/Waterloo Quays adjacent to SH1 near the entrance to Wellington's CBD. Evidence assembled and analysed demonstrates that the problems identified in the Strategic Business Case are sufficiently serious for project partners to consider the investigation of possible interventions.

While the problem statements have been refined and clarified to better reflect a more detailed examination of the evidence and stakeholder thinking, their basic meaning remains unchanged.

The problem statements as now adopted by the investors, with the support of the principal stakeholders, are:

Problem 1: *Access* and space to, from, through and within the port area** is constrained and inefficient impacting growth. (70% weighting)*

*Current, future, multi-modal, including freight

** Whole of port area, including inside the port gate

Problem 2: *The Port is a key enabler to recovery after a HILP event, but the network infrastructure to and from the Port Area is vulnerable to such an event, further risking the Region's ability to recover. (30% weighting)*

Similarly, the benefits to be delivered are essentially unchanged, though again they have been refined and clarified as a result of the evidence, analysis and discussion among the investors and stakeholders.

Benefit 1: *Efficient access to, through and within the port area. (70% weighting)*

Benefit 2: *Increased resilience of the transport network into and out of the port area. (30% weighting).*

This PBC draws together the results of the analysis of the evidence, the conclusions of a structured workshop-based approach to identifying a wide range of possible options to intervene and how a preferred programme has been selected. It shows the assessment of the recommended programme against the problems and how it should yield the intended benefits – as measured by a set of SMART KPIs.

The PBC recommends that the investors should develop an indicative/detailed business cases for the core elements of the recommended programme. They comprise a series of relatively low cost elements that would primarily be the responsibility of Wellington City Council (WCC) and CentrePort.

The PBC has been developed in partnership between the investors and principal stakeholders - the Transport Agency, WCC, CentrePort, GWRC and KiwiRail (including as owners of the Interislander). Bluebridge – Strait Shipping – has also been an active, participating stakeholder.

1.2 Location

The port area, shown in Figure 3, includes CentrePort, the Interislander and Bluebridge Ferry Terminals, rail marshalling yards and the surrounding local and state highway network, including SH1, Aotea Quay, Waterloo Quay, Hutt Road, and associated adjacent local roads. Land-side access into the port is by both road and rail.

Access considerations to the port are multi-faceted: they include road and rail access for port operations and freight forwarders, road and pedestrian access to the mixed land-use activities on port land – including the different requirements of offices and the cruise ship terminal - and the need for rail freight to cross arterial roads. There is also a considerable volume of city centre commuter traffic passing through and freight, car and foot passenger flows to and from the ferry terminals.



Figure 3 - PBC location

2 PROGRAMME CONTEXT

This chapter outlines the geographic and environmental, social, economic and transport context to the PBC.

2.1 Geographic and environmental context

The port area lies on the western side of Wellington Harbour. It is in many ways defined by the Wellington Faultline, which passes under the motorway where it crosses Aotea Quay and beneath the Interislander ferry wharves to run roughly parallel with the coast to Petone, but some tens of metres off-shore as a result of erosion. The earthquakes associated with the various faultlines in the region (especially the 1855 rupture of the Wairarapa fault) provided the shore platform for the transport and utility services that now run from Wellington to and through the Hutt Valley from Thorndon. As a result, the port area is both highly constrained with all the major infrastructure serving Wellington – including the elevated motorway and the at-grade rail lines - passing through it to the north and west; and the harbour and railyards to the south and east.

The 35,000 seat Westpac stadium is located immediately opposite the port on previous railyard land. It has road access only from Waterloo Quay with a single entrance also serving 750 car parking spaces. A rail connection to the port passes under the elevated stadium entrance.

Whilst being physically close to the city centre and the inner-city suburb of Thorndon, the port area feels somewhat separate, as it is largely isolated from the city fabric by the rail yards and the stadium. This context has been changing in recent years as land to the south-west of the active port has been progressively developed with large office buildings, providing a transition towards the CBD. These developments are continuing under the brand “Harbour Quays” with further development planned.

Meanwhile, many of the port's traditional buildings have also moved to being used commercially, including for the main office of the GWRC.

The port area largely comprises land that has either been subject to uplift in successive earthquakes (notably the 1855 event) or has been reclaimed over many years. Much of the reclamation was carried out with uncompacted fill, though there are also engineered zones, including some of the wharves.

A 3.5 ha area immediately to the north of the ferry terminal, designated the Kaiwharawhara reclamation, is currently largely unused and covered in scrub. Its future use has, at times, caused debate with suggestions from some environmental groups that it should become a reserve; though it has always been designated for operational port use.

Two large cement silos are located adjacent to the ferry terminal. Evaluation in 2009⁸ suggested they might cost some \$20m - \$50m to relocate.

⁸ Strategic Case, p. 12

2.2 Social context⁹

Census 2013 data show that the Wellington region's population has increased at a similar rate to the national average (about 10% between 2001 and 2013). This rise has been faster in Wellington City and Kapiti than elsewhere in the region. In absolute terms, Wellington City (191,000) and Lower Hutt (98,000) account for nearly two-thirds of the region's population. The Wellington CBD population has grown by 45% since 2001.

The high growth rates in Wellington and Kapiti are primarily a result of:

- large housing and employment developments at Paraparaumu and Waikanae
- new subdivisions in Wellington's northern suburbs
- a large number of new apartment dwellings in and around the Wellington CBD.

Under a 'medium' future population growth forecast, which is representative of how the region has tracked in the recent past, a further 10% increase in population is forecast to occur between 2013 and 2031, with a continued focus of growth in Kapiti and Wellington City¹⁰.

The Wellington region's population is ageing. Between 2001 and 2013 the percentage of the total population aged 65 years or over increased from 11.1% to 13.2% while other age groups have decreased in proportion or remained relatively constant¹¹. These trends are likely to continue into the future as the baby-boomer generation reaches retirement, average life expectancy continues to increase and birth rates remain low.

An emerging trend is people taking advantage of technological improvements in communications – internet, mobile phones, cloud computing – to work remotely, reducing the need to travel. The 2013 Census shows a small increase in persons working from home (compared with 2006), a trend that is likely to continue into the future.

Development along the Wellington City growth spine (from Johnsonville to the airport via the city centre, Adelaide Road and Kilbirnie) is also likely to result in lower car dependency. In the CBD specifically, growth is likely to encourage a higher active mode share resulting from shorter commuting distances, limited parking options, and ease of access to amenities.

The net result of the demographic and lifestyle changes described above, whilst subject to a degree of uncertainty, is likely to be a future where only relatively minor changes in travel patterns occur and average per capita car and public transport trip rates also remain relatively unchanged.

⁹ Sourced from RLTP Section B

¹⁰ Based upon Statistics New Zealand Local Authority projections

¹¹ ibid

2.3 ECONOMIC CONTEXT

In 2015 the Wellington Region was the third most populous region in New Zealand with a resident population of 481,187. There were 230,200 full-time equivalent employees (FTEs) in the region. GDP generated in the Wellington Region was approximately \$25.8b. The business services sector was the greatest contributor to overall GDP¹².

Alongside population, employment is the other prime driver of travel demand. The spatial distribution of both employment and population determines how much travel people have to do in order to reach their place of work.

There was a 3% reduction in employment across the Wellington Region between 2008 and 2012 owing to the economic slowdown. Over the longer term, however, there was an overall 13% increase in the number of people employed between 2001 and 2013. Wellington (approx. 56%) and Lower Hutt (approx. 18%) have a greater percentage of the region's jobs than they have of the region's population¹³, explaining some of the current commuter travel patterns across the region.

Regional employment is anticipated to grow at a slightly faster rate than population. Forecasts show that, in percentage terms, employment growth (unlike population growth) will be more evenly spread between the local authorities within the region¹⁴.

In absolute terms most new jobs are likely to be added in Wellington City CBD, placing an even greater reliance on the radial transport network for getting people to/from their place of work.

GDP is forecast to grow across the whole region at an even rate of 1.8% per annum, a rate similar to the average growth rate of the past 20 years¹⁵. Historically, growth in GDP and vehicle kilometres travelled (VKT) were closely linked. In recent years, however, GDP and travel demand appear to have started to 'decouple', with GDP having risen over the past 10 years whilst VKT has remained relatively static. As a result of this emerging trend, it is likely that future increases in travel demand will be linked to a range of factors other than just GDP growth, notably population and employment.

¹² The Wellington Region Situation analysis 2015: A Snapshot, BERL, February 2016

¹³ Based upon Statistics New Zealand Local Authority projections

¹⁴ Based upon Statistics New Zealand Local Authority projections

¹⁵ NZ Treasury long term trends and forecasts

Economic significance of the port

CentrePort commissioned economists, BERL, to assess the economic impacts of the port on Central New Zealand (Economic Impact of CentrePort on Central New Zealand 2015, May 2016). The report gives a total – direct and indirect – economic impact of \$2.5b GDP, supporting over 9,000 direct FTE positions across five broad sectors. The impact was assessed over Central New Zealand incorporating Hawke's Bay, Taranaki, Manawatu-Whanganui, Tasman, Nelson and Marlborough, as well as the Wellington Region.

The sectors assessed and employment levels were:

- 250 FTEs from CentrePort's operations
- 4,800 from port customers
- 390 from organisations servicing the port
- 1,400 generated from tourist activity (related to the ferries and cruise ships)
- 2,400 from Harbour Quay tenants.

The GDP estimate by BERL is noted as being some 39% higher than in 2009 and employment 46% higher. There was a 25% increase in the volume of cargo throughput over this period.

Findings of the Future Freight Scenarios Study

In 2014 the Ministry of Transport published the Freight Futures Scenarios Study, carried out by Deloitte. The study was a response to multiple suggestions that New Zealand has too many commercial ports and that some would need in the future to become limited to feeder roles to a small number of hub ports, particularly with the international trend to larger ships (for example, the NZ Productivity Commission, International Freight Transport Services Inquiry April 2012).

The Deloitte study (which focused on container freight) considered ten scenarios with differing ports acting as hubs (up to five, four, three, two and in one scenario only Tauranga having international services). CentrePort, Wellington, was assumed to be a feeder port in all scenarios except the Status Quo. Deloitte found that in *all* scenarios that moved away from the status quo with all 10 New Zealand container ports providing international services (Auckland, Tauranga, Napier, Taranaki, CentrePort, Nelson, Lyttleton, PrimePort (Timaru), Otago, South Port) the costs would increase. These additional costs included increased port costs, domestic freight costs and capital costs on the road, rail and shipping networks. The study showed that there was no scenario in which the gain from reduced international shipping costs offset the increase in domestic transport costs.

The report noted (p.15) that the impact of hubbing would not affect all supply chains equally and that "cargo

2.4 TRANSPORT CONTEXT

2.4.1 Physical provision

The strategic transport network serving Wellington in general, and the port area in particular, is sparse owing to the geography. The two state highways – 1 and 2 – join at the Ngauranga interchange east of the port with no intermediate interchanges before the east facing Aotea Quay on- and off-ramps. The motorway runs in close proximity to the previous state highway route, the Hutt Road, a mixed-use arterial road which carries the local bus services and cycle provision. Separating the two is the railway, which similarly has the combined

tracks of the North Island Main Trunk (NIMT) line (serving the north via Porirua) and the Hutt Valley/Wairarapa line. The rail serves both passenger and freight services.

The only alternative road access to Wellington, other than the motorway and the Hutt Road, is via a sub-standard arterial route that connects to SH1 at Johnsonville and winds through suburbs such as Khandallah, Ngaio and Wilton towards Karori and Northland. This route has connections to the Hutt Road via steep local roads including the Ngaio Gorge, and to the CBD via the Karori tunnel and the Kelburn viaduct.

The ferry terminals within the port area are the connection point for both road and rail services to the South Island and can, in some ways, be considered to be part of the state highway and strategic rail network linking-up the country.

The local road network includes Aotea Quay and Waterloo Quay, which connect both to the motorway and Hutt Road, serving the port area and provide a principal entrance to Wellington's CBD. The main road entrance to the KiwiRail freight yards is a traffic signal-controlled intersection on Aotea Quay. The Quays are classified as part of the Strategic Road Network from the motorway as far as Hinemoa Street – the primary entrance to CentrePort, Refer Figure 3.

The alternative access to Wellington CBD from the Hutt Road is Thorndon Quay, serving mixed retail/light commercial premises and carrying the bus services from the north. There is no connection from the state highway urban motorway to Thorndon Quay. The access points into the CBD from the motorway are closely spaced off-ramps at Murphy Street, Hawkestone Street and The Terrace.

Cycling and pedestrian facilities in the area are limited. The cycle route from the Hutt Valley and the northern suburbs is along Hutt Road and Thorndon Quay. There is a semi-covered walkway on the northern side of Waterloo Quay principally for cruise ship passengers. The raised Fran Wilde Walkway connects the Wellington Railway station, Thorndon Quay and Waterloo Quay for walking to the Westpac Stadium. It has no weather protection.

2.4.2 Travel patterns

Census journey to work data for the Wellington region, between 2001 and 2013 show there has been a large increase in the number of journey to work trips made by active modes (36%) and a moderate increase in journey to work trips made by public transport (20%) over the twelve years. The number of journey to work trips undertaken by car increased by only 5% during the same period.

Nationally, growth in vehicle traffic volumes (car and heavy commercial vehicle (HCV)) on state highways began to slow around 2000, despite the HCV component continuing to grow. Since 2005, total traffic volumes on the state highway network have decreased by around 1%¹⁶. HCV traffic during this period increased by about 3%. These findings are similar to trends observed in many other developed countries during this period.

In the Wellington region, vehicle kilometres travelled (VKT) on state highways has remained broadly static over the past decade to 2011/12.¹⁷ A similar trend can be observed for travel volumes on local roads, indicating that shorter distance local vehicle trips have also remained largely static.

¹⁶NZ Transport Agency, State highway traffic data booklet

¹⁷Ministry of Transport, Transport Monitoring Indicator Framework, TV001

Approximately 1.15 million vehicle-based trips (car, road freight and public transport combined, excluding rail freight) are made every day across the region.¹⁸ Around half of daily public transport trips and 40% of daily car trips occur during the morning and evening peak periods.

2.4.3 Freight

Wellington is a major freight hub between the North and South Islands and for the export of bulk freight (predominantly primary products). SH1 and the NIMT railway line are the main transport corridors for freight to the region from the North Island. The section of SH2 south of Petone is also a significant freight corridor. Interisland ferries connect road and rail freight with the South Island (around 2.0 million tonnes and 0.9 million tonnes in 2012 respectively). Bluebridge also offers a Cook Strait passenger and freight service. Other types of coastal shipping carry freight from CentrePort to other New Zealand or international ports.

Freight trips to and from the Wellington region amounted to 5.1 million tonnes in 2012, while purely internal road and rail trips carried 6.4 million tonnes¹⁹.

2.4.4 One Network Route Classification

Purpose

The One Network Road Classification (ONRC) provides the Investor with an appraisal of the effectiveness of the existing road network and the network following the implementation of the recommended programme. This assessment benchmarks the status of the road against a consistent set of customer levels of service (CLoS) used by all Road Controlling Authorities and across all the PBCs.

Functional classification

SH1 has been classified as a National High Volume road under the ONRC. Aotea and Waterloo Quays meet the criteria for a High Volume road with over 21,000 vehicles per day including at least 2,500 trips by HCVs. It also meets the required economic and social criteria that it provides the primary access to a port that handles 2m tonnes of exports and imports worth \$3.3b²⁰.

Road category	Road name	Road characteristics	Criteria road meets
National (High Volume)	SH1 (Ngauranga to Aotea Quay)	3,500 HCV trips per day 88,000 ADT Freight throughput > 2 million tonnes	> 1,200 HCV trips per day 20,000 – 35,000 AADT Freight throughput > 2 million tonnes
National (High Volume)	Aotea Quay	2,500 HCV trips per day 21,000 vehicle trips per day Freight throughput of 2 million tonnes	> 1,200 HCV trips per day 20,000 – 35,000 AADT Freight throughput > 2 million tonnes
National (High Volume) And Regional (west of Hinemoa Street)	Waterloo Quay	2,500 HCV trips per day 21,000 vehicle trips per day Freight throughput of 2 million tonnes	> 1,200 HCV trips per day 20,000 – 35,000 AADT Freight throughput > 2 million tonnes

¹⁸ Estimate: Wellington Transport Strategy Model

¹⁹ Ministry of Transport. "National Freight Demand Study" March 2014.

<http://www.transport.govt.nz/research/nationalfreightdemandsstudy/>.

²⁰ Economic Impact of CentrePort on Central New Zealand 2015, BERL, May 2016, quoting CentrePort Annual Report

3 PARTNERS AND KEY STAKEHOLDERS

This section outlines the principal partners to the business case, who will have a responsibility for delivering on the investment.

3.1 INVESTMENT PARTNERS AND STAKEHOLDERS

The principal partners for the PBC are:

NZ Transport Agency

The Transport Agency is a principal investor through its Planning and Investment Division. It is also responsible for the State Highway network and linkages to nationally significant infrastructure via its Highways and Network Operations (HNO) Division. The Transport Agency has major public investment in the study area and is leading the business case investigations in collaboration with the other stakeholders.

Wellington City Council

WCC has statutory responsibilities in relation to overall land use and movement planning, local infrastructure provision and consenting. WCC owns and manages the arterial links of Aotea Quay, Waterloo Quay and Hutt Road. WCC's spatial plan objectives are particularly relevant to the PBC.

CentrePort Limited

CentrePort Ltd (CPL) is a pivotal stakeholder in terms of significant land holdings, complex operational requirements and its major ability to assist achievement of change within the study area. The port's aims and expectations for growth are a driver for the business case as well as being one of its major dependencies – ie the level of increased freight accessing the port by road and rail will affect the scale of PBC Problem 1 and help to determine the level of investment that may be required.

Greater Wellington Regional Council

GWRC has regional statutory responsibilities in relation to transport planning, public transport, civil defence, the Harbour Master function and regional environmental management. GWRC is also the major shareholder in CPL (the balance of shares being held by the Horizons (Manawatu-Wanganui) Regional Council).

KiwiRail/ Interislander

KiwiRail Ltd (KRL) is a major user of CentrePort and has a significant operational presence in its own right with specific needs to operate efficiently and safely in this part of Wellington. It has its freight yards and live passenger and freight lines within the study area, including those crossing Waterloo Quay into CentrePort. KRL owns the Interislander ferry service, which has its Wellington terminal in the very restricted area between the rail lines and the harbour partly beneath the SH1 Thorndon Flyover.

Bluebridge

Bluebridge is a major user of CentrePort and has a significant operational presence in its own right with specific needs to operate efficiently and safely in this part of Wellington. Bluebridge has a terminal close to the CBD and shares access with CentrePort.

3.2 STAKEHOLDERS

In addition to the investors and principal stakeholders the following organisations constitute major stakeholders for the PBC. Each has been engaged in its development to varying degrees.

Stakeholders	Focus areas
Hutt City Council	The local authority adjoining WCC with equivalent functions and responsibilities
Freight operators	Freight access to the port
Heavy Haulage Association	Freight access to the port, including for High Productivity Motor Vehicles (HPMVs)

Table 1 - Stakeholders

The port area PBC had additionally to take note of other PBCs being prepared in in the Wellington region, especially on SH2. It is important that they acknowledge each other as there may be common facets – such as traffic volumes – that need to be consistent. There are also interrelated issues. For example, freight companies accessing the port from the Wairarapa are concerned to maximise on-road reliability and minimise journey time, which may be more affected by conditions on SH2 than in the port area itself.

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4 STRATEGIC ASSESSMENTS – OUTLINING THE NEED FOR INVESTMENT

4.1 DEFINING THE PROBLEM

For the Strategic Case, a facilitated investment logic mapping workshop with stakeholders was held on 12 May 2014.

The following problems were identified:

- Problem one: Current network access for freight to and from Wellington's Port is constrained and inefficient resulting in economic loss due to delay
- Problem two: Future congested road and rail access has the potential to restrict the Port's ability to grow freight and passenger capacity
- Problem three: The Port is a key enabler to recovery after a HILP event, but the network infrastructure to and from the Port is vulnerable to such an event, further risking the City's ability to recover.

For this Programme Business Case a further workshop was held on 14 March 2016 with equivalent investors, problem owners and stakeholders. Following evidence presented and discussed at the workshop, it was agreed to refine and clarify the problem statements as follows:

Problem 1: Access* and space to, from, through and within the port area is constrained and inefficient impacting growth - 70% weighting**

*Current, future, multi-modal, including freight

** Whole of port area, including inside the port gate

The problem statement was revised as the original first two statements were seen to overlap significantly and did not include the important dimension of 'space'. There was also an over-emphasis on freight in the opinion of the stakeholders and given typical HCV percentages of 10% and a dominance of travel through the port area to the CBD.

Problem 2: The Port is a key enabler to recovery after a HILP event, but the network infrastructure to and from the Port Area is vulnerable to such an event, further risking the Region's ability to recover - 30% weighting

The second problem statement was modified only to expand the area of concern to the region rather than just the city.

The revised Investment Logic Map for the identified problems is attached as Appendix A.

4.2 THE BENEFITS OF INVESTMENT

Similarly, the potential benefits of successfully investing to address the problems were originally identified by the stakeholders as:

Benefit one: Road and rail infrastructure that enables efficient access to the Port

Benefit two: Economic growth enabled by road and rail network access

Benefit three: Minimised economic impact of high impact low probability events

The 14 March 2014 workshop recognised that the benefits could be expressed better. They were refined as:

Benefit 1: Efficient access to, through and within the port area - 70% weighting

Benefit 2: Increased resilience of the transport network into and out of the port area - 30% weighting

The revised benefit map is attached as Appendix B.

4.3 ALIGNMENT TO EXISTING STRATEGIES/ORGANISATIONAL GOALS

4.3.1 NZ Transport Agency

The Transport Agency's Statement of Intent and Investment Assessment Framework describe the priorities for delivering on the government's policies for transport.

The Agency's priorities are guided by the Government Policy Statement on Land Transport²¹ (GPS). The GPS includes multiple statements that provide direction in developing the PBC, for example:

"Transport is an enabler of economic activity, allowing New Zealand to make the most of its opportunities. To maximise the return from our land transport network, we need to continue unlocking key congestion points, so people and freight can be moved swiftly and safely to their destinations." (Minister's Foreword, p. 1)

"GPS 2015 continues the approach started in 2009 of putting the wealth-generating capacity of our economy at the top of the agenda. It focuses on investments that will improve connectivity and reduce the costs of doing business. It maintains the impetus on improving the safety of travel, and puts a spotlight on the continued delivery of measurable value from land transport investment." (Introduction, p. 40)

Government's long-term results under the objective of "A land transport system that addresses current and future demand for access to economic and social opportunities" (p. 17), include:

"Support economic growth and productivity through the provision of better access to markets, employment and business areas".

Under the Objective: A land transport system that is resilient (p. 21), GPS 2015 notes:

"Ongoing investment in improving network resilience as part of network improvements: Improvements are needed at the most critical points to reduce the impacts of disruption."

For the Activity Class Structure (p. 28) the relevant aims are:

- Reduced travel times in key corridors leading to our major metropolitan areas and logistics centres
- Increased productivity where there are constraints on main routes within our major metropolitan areas
- Increased freight vehicle productivity across the network
- Reduce the risks of disruption at the most critical points and deal with disruption efficiently.

²¹ Government Policy Statement on Land Transport 2015/16-2024/25, issued December 2014

Within the Transport Agency Statement of Intent (Sol)²² the long-term Goal to: Integrate one effective and resilient network for customers is supported by three relevant objectives for this PBC:

- Integrate land uses and transport networks to shape demand at national, regional and local levels
- Integrate national and local transport networks to support strategic connections and travel choices
- Improve freight supply chain efficiency.

The strong alignment between addressing the problems and delivering the benefits sought from the PBC and the Government's and Transport Agency's priorities, aims and goals can be seen, with the emphasis on productivity and freight, an integrated approach and on resilience.

4.3.2 Wellington City Council

The Council has set in place an overarching long-term strategic vision for the city called Wellington Towards 2040: Smart Capital²³. It aims to grow and sustain the city as 'an inclusive place where talent wants to live'.

The strategic vision is supported by four community outcomes or long-term goals:

- *Connected city – with improved physical and virtual connections, we can unleash the potential of Wellington's people and businesses.*
- *People-centred city – cities compete more for people in particular the highly skilled, educated people who already make up a large proportion of Wellington's population.*
- *Eco-city – we will build on our current environmental strengths to transition to a low carbon future.*
- *Dynamic central city – by fostering the central city as a hub of creative enterprise, we can lead the region to the next level in economic transformation.*

The Vehicle Network

The Long-term Plan (LTP) states that improvements to the vehicle network are needed and that the City Council: "support NZTA's programme for Wellington, which aims to unlock the city's economic potential by improving transport routes into the city, and from the city to the airport."

Priorities for the WCC specifically include:

- Improving vehicle access to the Port of Wellington (p. 61)

The transport objectives are:

- Increased active mode share
- Road safety
- Reliable transport routes
- Reduced emissions.

Civil Defence and Emergency Management

²² NZ Transport Agency Statement of Intent 2015–19 June 2015

²³ Wellington City Council Long-term Plan 2015 – 2025, adopted June 2015

The focus areas for disaster preparedness within the WCC plan are:

- Earthquake prone buildings
- Water
- Wastewater
- Transportation
- Electricity
- Gas
- Telecoms
- Welfare
- Community preparedness.

It is therefore apparent that the PBC will also align well with WCC's planning both at the strategic level, with a focus on improved physical connectivity, and at the more detailed level with the specific priority to improve vehicle access to the Port of Wellington and with the disaster preparedness focus, including transportation.

4.3.3 CentrePort

CentrePort has significant development plans, demonstrating its commitment to growth. It is planning \$75 million of investment over the next three years, including spending \$17m on a deeper channel to allow bigger vessels to enter the port. CentrePort is seeking a 34-year consent, the longest available, expecting that 14.5m depth will be needed in that time. The port is also looking to increase log storage capability at Kaiwharawhara Point with aspirations to look at really developing the whole ferry side of the business.

Since 2010, the amount of cargo being transported by rail has tripled from 100,000 tonnes in 2010 to 300,000 tonnes in 2015. A major factor has been the introduction of CentreRail services – a daily service operated by KiwiRail but underwritten, organised and promoted by CentrePort. The CentreRail service has been supported in turn by CentrePort's proaction in seeing inland ports developed. For example, the inland port in Whanganui has seen the volume of exports on CentreRail increase from around 30,000 tonnes to 105,000 tonnes. At the beginning of August, a new log road-rail hub was opened at Waingawa close to Masterton as a joint venture between CentrePort and two forestry companies.

Wellington's productivity is "as good as any port in the country"²⁴.

The port's growth expectations are a major driver of PBC Problem 1 and are partly dependent on realising PBC Benefit 1.

4.3.4 Greater Wellington Regional Council

The alignment with GWRC plans and priorities is important for three reasons:

- GWRC is a major local authority which spans a significant geographical area of interest from the Wairarapa and Kapiti Coast to southern Wellington, with a range of functions including environmental management, transport planning and contracting public transport services
- GWRC hosts the Regional Transport Committee, which prepares and adopts the Regional Land Transport Plan²⁵ (RLTP) (previously Regional Land Transport Strategy (RLTS) and Regional Land Transport Programme) which sets out the transport plans for all government organisations – including the Transport Agency and all local authorities in the region.

²⁴ Chief Executive Derek Nind, presentation to Horizons Council 6 April 2016

²⁵ Wellington Regional Land Transport Plan 2015

- GWRC is the majority shareholder in CentrePort and has an influence through CentrePort's Statement of Corporate Intent.

GWRC Community Outcomes

GWRC states its desired community outcomes in its LTP:

- **Strong economy**
A thriving and diverse economy supported by high quality infrastructure that retains and grows businesses and employment.
- **Connected community**
People are able to move around the region efficiently and our communications networks are effective and accessible.
- **GWRC has as a measure for the outcome:** "Maintain or decrease peak AM/PM congestion Peak AM/PM congestion rate of 28.2 seconds delay per kilometre travelled (2010)".
- **Resilient community**
A community that plans for the future, adapts to change and is prepared for emergencies.
- **Healthy environment**
An environment with clean air, fresh water, healthy soils and diverse ecosystems that supports community needs."

Once again, the PBC aligns well with the GWRC intended outcomes with their focus on infrastructure supporting a strong economy, efficient movement and resilience.

4.3.5 The Wellington RLTP

The RLTP contains numerous policies and objectives that are relevant to this PBC. They demonstrate that there is strong backing for the business case and its objectives with frequent references to the need for a quality strategic road network and to freight. The importance of achieving better access to the port is explicitly stated. The need for stronger network resilience is also emphasised.

Under the strategic objective: "A reliable and effective strategic road network", the RLTP identifies improvement areas for the strategic road network as:

- Infrastructure improvements along key strategic routes
- Improving the region's connection to the north through implementation of the Wellington Roads of National Significance (RoNS)
- Improving the safety of the road network
- Providing better east-west connections within the region
- Minimising congestion, including through mode shift to public transport, walking and cycling
- Advocating for the ability to use road pricing tools.

For the objective "An effective network for the movement of freight" it specifies improvement areas as:

- Infrastructure improvements along key freight routes, road and rail
- Facilitating high productivity motor vehicles on key freight routes
- Improving access to key freight destinations such as the port and international airport
- Implementation of the Wellington RoNS
- Studies to better understand freight movements within the region
- Identifying locations for potential facilities such as freight hubs, inland ports, freight storage, heavy vehicle parking

- Encouraging use of public transport at peak times to free up capacity on the road network for freight
- Encouraging use of rail for suitable freight tasks.

For “An increasingly resilient transport network” the improvement areas are:

- Identifying key lifelines and transport infrastructure vulnerabilities (road and rail) and progressing mitigation projects to address resilience issues
- Implementing the Wellington RoNS and a new east-west link between SH2 and SH1 to improve network resilience and provide alternative routes.

One of the areas identified as a key challenge or issue relates to resilience. The RLTP quotes (p. 18) a Wellington Lifelines Group finding that: “a major earthquake could isolate and fragment the region. Restoring access to the various areas of the region is estimated to take anywhere from three days to 10 weeks. Road access to the Wellington CBD may take an estimated 120 days to restore²⁶”.

Further detail from the RLTP and the Regional Freight Plan is contained in Appendix C.

The strong focus on the importance of efficient access to the port in the statutory RLTP – following similar themes in the GPS - provides a basis for considering the needs for improvement over and above what might normally apply.

4.4 ISSUES AND CONSTRAINTS

4.4.1 Transport studies and programme business cases

The Wellington Region is subject to multiple studies that could potentially have a bearing on this PBC. The most significant is the Ngauranga to Airport corridor being considered as part of the Lets Get Welly Moving business case. The N2A corridor is bounded by Ngauranga interchange to the north, the Regional Hospital in Newtown to the south, and Wellington International Airport to the east. It includes State Highway 1, the local road network, the rail network terminating at Wellington station, and key routes for passenger transport, walking and cycling.

The key principles for development of the N2A transport corridor are:

- a high quality and high frequency passenger transport ‘spine’
- a reliable and accessible ‘ring’ or bypass route for vehicles
- inter-connected, safe, and convenient local street, walking, cycling and passenger transport networks
- highly accessible and attractive ‘activity’ or shopping streets²⁷.

If this work should – hypothetically - determine that there should be a significant increase in capacity on the existing SH1 route via the Terrace Tunnel, for example, then that would likely attract traffic off the waterfront route, which currently not only serves parts of the CBD but also serves as an alternative route to the eastern and southern suburbs.

Current progress of the Lets Get Welly Moving business case is taking time to understand Wellingtonians’ priorities through its *Let’s Get Wellington Moving* initiative. A clear way forward may therefore be many months or years away²⁸.

²⁶ WelG/WREMO, March 2013, Transport Access – initial project report

²⁷ <http://www.gw.govt.nz/N2ACorridor/> accessed 12 June 2016

²⁸ *ibid*

Programme business cases are being developed for transport corridor through the Hutt Valley and the Wairarapa including the rail line. The impact of any investments proposed are likely to be marginal in terms of change to traffic levels. Provision of extra road capacity and provision for faster journeys (eg over the Rimutaka Range) might make CentrePort a little more attractive for road freight that is marginal between road and rail or between CentrePort and the Port of Napier. Equally, investment on other routes may change the balance slightly towards the competing ports for some traffic. CentrePort's strategy to move more freight by rail, including its Waingawa Log Hub will influence the heavy vehicle demand to the port area.

These PBCs, may, however, themselves address some of the issues for port area users, as on-road delays and travel time variability may be more substantial on the state highways for some journeys to and through the port than in the port area itself. Accordingly, higher benefits may be achievable through those PBCs than from local interventions.

4.5 UNCERTAINTY LOG

4.5.1 Role, scope and development

The role of the Uncertainty Log is to identify areas of uncertainty that exist in the context of the programme business case and that may be within sphere of influence of the business case. The Uncertainty Log includes the assumptions made that might influence the understanding of the problem statements and which may affect the effectiveness and feasibility of the alternatives and options developed.

The port area is an important economic and transport hub for road, rail and sea modes in Wellington. This transport network is constrained by conflicting operational demands and ultimately by the land area. There is already considerable stress on the existing networks in terms of congestion and conflicts between transport mode demands. Combined with forecast growth figures, these issues are likely to be exacerbated, especially during peak periods.

The Uncertainty Log was progressively developed through the project. Issues have been added as stakeholder meetings and evidence gathering and analysis have taken place. The issues and factors identified are a result of analysis by the technical team and prioritisation on the basis of the evidence, informed by the Transport Agency's published guidance.

Probability	Status
Near certain: The outcome will happen or there is a high probability that it will happen	Policy or funding approval Tenders let Under construction
More than likely: The outcome is likely to happen but there is some uncertainty	Submission of planning consent application imminent Adopted plans*
Reasonably foreseeable: The outcome may happen, but there is significant uncertainty	Adopted plans* Draft plans Development conditional upon interventions going

	ahead
Hypothetical: There is considerable uncertainty whether the outcome will ever happen	A policy aspiration

Table 2 - Uncertainty Log classifications

Factor	Time	Uncertainty	Impact on programme	Comments
Factors affecting transport demand				
CentrePort freight growth forecasts	Ongoing	Reasonably foreseeable	High	<p>Current log export forecasts show a significant amount of growth nationally, almost 40% of existing volumes and peaking around 2030.</p> <p>The National Freight Demand Study (NFDS) forecasts a growth in freight volumes by 58% by 2042.</p> <p>CentrePort is competing for market share within these markets. The extent to which these forecasts eventuate and CentrePort's share will influence demand for freight travel in the study area.</p> <p>The Waingawa log hub has only recently opened so its success in attracting log volumes on to rail to CentrePort has not yet been established.</p>
CentrePort land use changes	Ongoing	Reasonably foreseeable	High	<p>Potential land use changes on CentrePort's site may include double the commercial development footprint (fairly high level of uncertainty about the timing of this). This is likely to influence travel generation from the port area.</p> <p>There are existing proposals for the reclamation site at Kaiwharawhara Point to be turned into an additional log storage area in the short term and potentially developed into a multi-user terminal.</p>
Freight forwarders growth and development plans	Ongoing	Reasonably foreseeable	Low	<p>Growth aspirations in terms of the volume of freight handled may influence demand for freight movements to and from the freight forwarders sites within the study area.</p>
Cook Strait ferry growth in volumes	Ongoing	Reasonably foreseeable	Medium-High	<p>NFDS suggests that freight volumes will increase by 58% by 2042. This will drive the need for higher volumes to be carried across the Cook Strait which may result in larger ferries generating increased and higher density</p>

Factor	Time	Uncertainty	Impact on programme	Comments
				demands on the transport network. In line with increasing tourism numbers and ferry capacity there is the potential for greater passenger/pedestrian demands on the surrounding transport network.
RoNS Programme	2020-2030	More than likely	Medium	The RoNS programme will provide additional capacity to parts of the state highway network that contribute traffic to the study area. There is a potential that this will increase motorised travel demand/density in the study area.
SH1 Ngauranga to Airport Study	2020-2030	More than likely	High	Potential improvements to the Ngauranga to Airport (SH1) route may influence route choice and as a result travel demand in the study area.
SH2 PBC Programme Improvements	2017-2027	Reasonably foreseeable	Low-medium	The programme business cases for this corridor are currently being developed for funding a scheme of potential interventions which may influence travel behaviours and demands in the study area. For example, enhancements in public transport access from Masterton and the Hutt Valley may reduce private vehicle demand or growth in the port area.
Wellington City economic growth and development increasing	Ongoing	More than likely	Medium	Changes in economic activity in the city centre may generate changes in travel demand for all modes.
Active modes programme	2017	Reasonably foreseeable	Medium-High	In master planning for cycling infrastructure developed to date, proposed cycle routes are along the adjacent Thorndon Quay. The current preferred concept option is for a segregated path along Hutt Road connecting into Thorndon Quay. RLTP proposed investments in improved cycle and pedestrian facilities on the periphery of the study area may generate increased demand for active mode provision in the study area. The Great Harbour Cycleway feasibility study is currently being undertaken. The proposed connection between the northern section from Petone to Ngauranga to the city remains uncertain but will likely generate increased demand..
Passenger volumes from	Ongoing	More than likely	Medium	There is an observed pattern of increasing cruise passenger volumes to Wellington.

Factor	Time	Uncertainty	Impact on programme	Comments
cruise vessels increasing				Should volumes continue to increase this will generate pressure to improve pedestrian facilities connecting the cruise terminal with the city centre.
Factors affecting transport supply				
CentrePort Masterplan additional capacity	Ongoing	Unknown	Medium	Should CentrePort increase its capacity to receive and process road and rail vehicles, operators may be in a position to respond with greater supply of capacity to deliver goods.
Integrated Ferry Terminal PBC	Ongoing	Reasonably foreseeable	Medium-high	A Business Case is being developed in partnership between Interislander and CentrePort to redesign the ferry terminal (Project Phoenix). The outputs and timings of the project remain uncertain however if it takes the form of an integrated ferry/cruise passenger complex, there is likely to be a shift in supply with Bluebridge moving from its existing location and an increase in car and freight storage capacity
Network Operations Framework (NOF) recommended outcomes	2016-2017	More than likely	High	The NOF is currently being developed. This will provide direction as to the modal priorities and as a result capacity for various modes on particular corridors. There is uncertainty as to how the outcomes will affect supply of capacity in the port area.
KiwiRail's ability to invest in additional capacity is limited	2016-2017	More than likely	Medium	Existing Government policy has restricted KiwiRail's ability to invest in new wagons or locomotives to increase its ability to supply capacity in the foreseeable future.
Upgrade and purchase of higher capacity ferries	2020	Reasonably foreseeable	Medium	Higher capacity ferries, should they be implemented, will have the effect of increasing the supply of freight and passenger capacity across the Cook Strait.
Resilience Programme Business Cases	2015-2017	More than likely	Low-medium	There is a business case under preparation for funding of a scheme to improve Wellington's resilience to withstand and recover from a major disaster. There is uncertainty as to the implications of any outcomes of this on the PBC.
Implementation of Waingawa Log Hub	2016	Near certain	Medium	Transfer of logs from road to rail at Waingawa may result in more log wagons being shunted across Aotea Quay and less trucks entering the port areas. While already in operation at the

Factor	Time	Uncertainty	Impact on programme	Comments
				time of completing this PBC, its effect is considered Near certain as it is too early to fully understand its effectiveness in practice.
Factors affecting cost				
Supply chain cost	Ongoing	Hypothetical	Low-High	Given the potential range of operational and physical interventions possible, and the range of potential investors in these interventions there is high uncertainty relating to cost in relation to this PBC at this time.

Table 3 - Uncertainty Log

4.6 PROBLEM ANALYSIS - PROBLEM 1

4.6.1 The evidence

Problem 1 relates to constrained and inefficient access and space to, from, through and within the port area impacting growth. It includes the constraints caused by the existing traffic volumes and the impact of future growth across all modes.

To and through

Aotea Quay is a four-lane road that carries an average daily traffic (ADT) volume of 21,000 vehicles. Its flows are strongly peaked with peaks in general traffic coinciding with peaks in port land access for both freight and office/commercial uses. Approximately 12% of the daily traffic flow occurs in the morning peak hour between 07:00 and 08:00. The corresponding afternoon peak occurs between 17:00 and 18:00 accounting for 8% of the daily traffic flows.

The Quays are dominated by trips to and through the city centre, as shown in Table 4. below. 77% of traffic using Aotea Quay in the morning peak travels through the port area with 23% of vehicles terminating their journey at the Port. This proportion of *through* vs *to* traffic is also representative of the freight traffic using Aotea Quay in the morning peak.

Demand on the Quays in the evening peak is dominated by *through* traffic from the CBD with only 5% of northbound traffic terminating at the Port. 40% travels through to Hutt Road and the remaining 55% continues northbound on SH1.

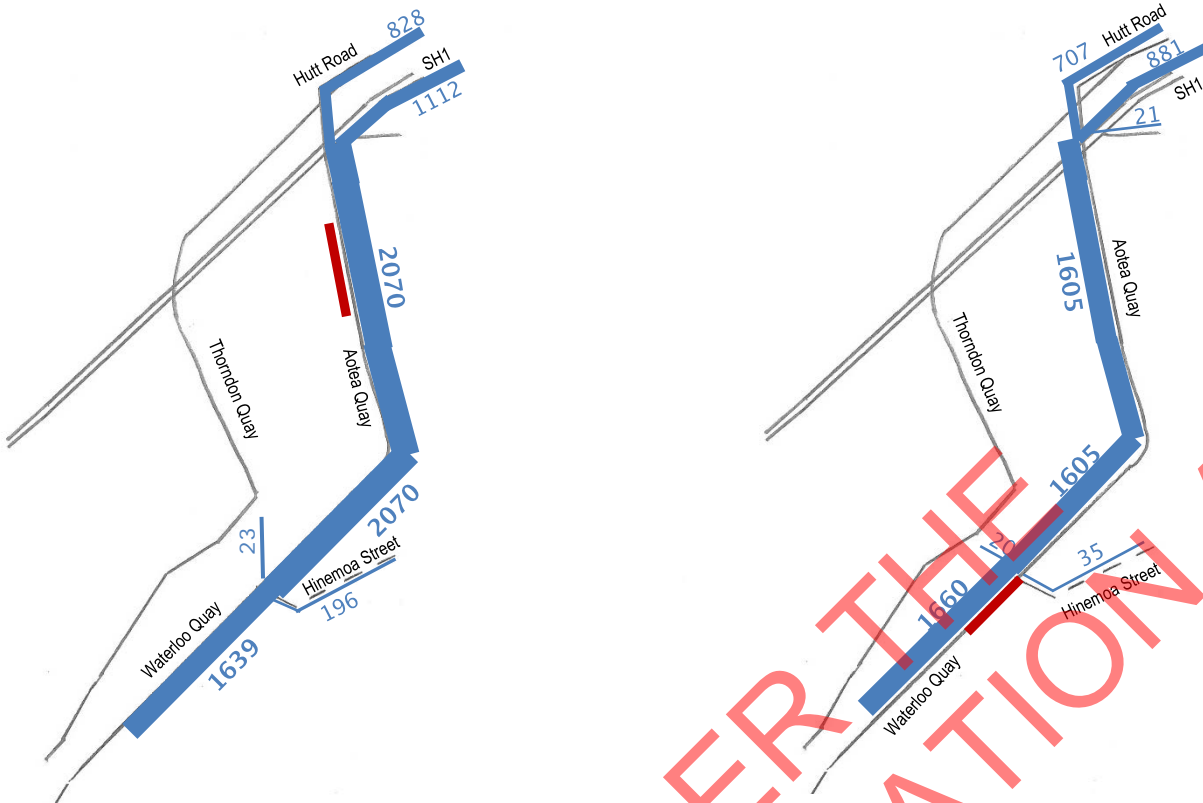


Figure 4 - Select link analysis on Aotea Quay, Northbound AM and Southbound PM

Freight trips along the Quays are characterised by a skewed distribution with a high number of movements during the morning and inter peak periods and fewer trips over the evening peak, as shown in Figure 5 AM peak hour movements are predominantly to the port area from SH2 and from within the Wellington region. Many of these movements conflict with peak commuter traffic into Wellington City. Hourly movements during the inter-peak period are higher than the morning peak. A high proportion of journeys to and from the port are likely to be the result of internal movements within the port area itself with multiple truck movements occurring between freight forwarders and the port gate during the day. There are less than half the number of freight movements in the PM peak compared to the AM peak.

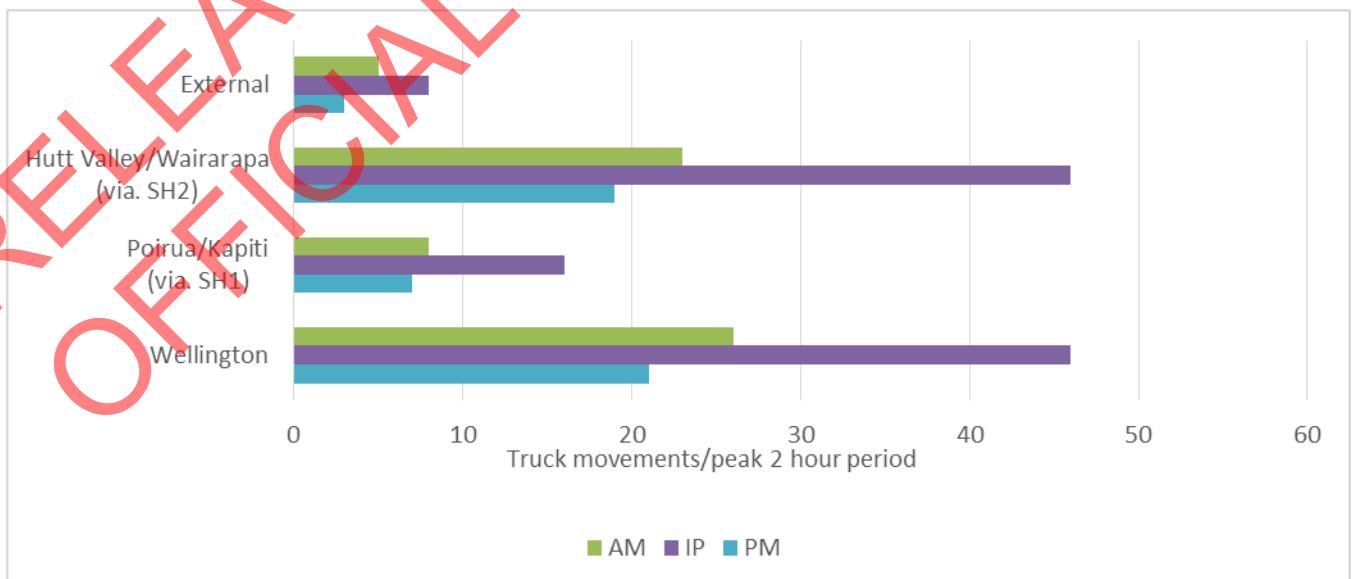


Figure 5 - Destinations for freight journeys from the port (Source: WTSM)

On- road traffic growth

There is minimal forecast growth in overall traffic volumes in the study area as shown in Table 4 - Average percentage traffic growth per year 2013-2033 (source: WTSM)

General traffic volumes along the Quays are predicted to fall slightly, whilst HCV volumes are predicted to increase at an average rate of 1.7% per year. HCV volumes on Hutt Road and SH1 will also increase at an average of over 1% per year. Average percentage traffic growth per year 2013-2033 (Source: WTSM)

Location	Average yearly growth rate		
	Growth in Cars	Growth in HCVs	Total traffic growth
Aotea Quay	-0.36%	1.73%	-0.09%
Waterloo Quay	-0.22%	1.63%	-0.06%
SH1	0.64%	1.55%	0.47%
Hutt Road	0.17%	1.15%	0.17%

Table 4 - Average percentage traffic growth per year 2013- 2033 (source: WTSM)

Journey speeds and delay

Figure 6 and Figure 7 show the delay experienced on Aotea Quay and SH1 between Hinemoa Street and Ngauranga during the AM and PM peaks. Figure 6 and Figure 7 also show the delay experienced further north on the SH1 and SH2 network beyond Ngauranga to the northern extent of the Saturn model. The northern extent of the model is defined as Helston Road overbridge, Johnsonville on SH1 and the BP service station 3.1km from the SH1/SH2 interchange at Ngauranga on SH2.

These outputs show that, in 2031, journeys to the port in the AM peak will experience up to 15 minutes' delay between the northern extent of the model on SH1 and Hinemoa Street and up to 17 minutes from the northern extent of the model on SH2 and Hinemoa Street. The majority of this increase in journey delay from the 2011 base year is a result of delay on SH1 between Ngauranga and Hinemoa Street.

Delay on Aotea Quay accounts for 2.8 minutes of the total journey delay southbound in the morning peak hour 08:00 to 09:00. It is noticeable that the delay on Aotea Quay does not change appreciably between the years.

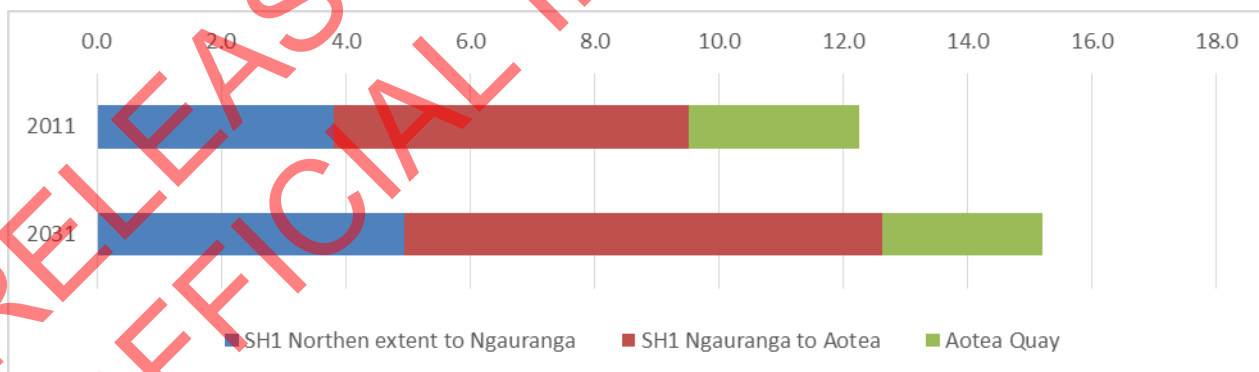
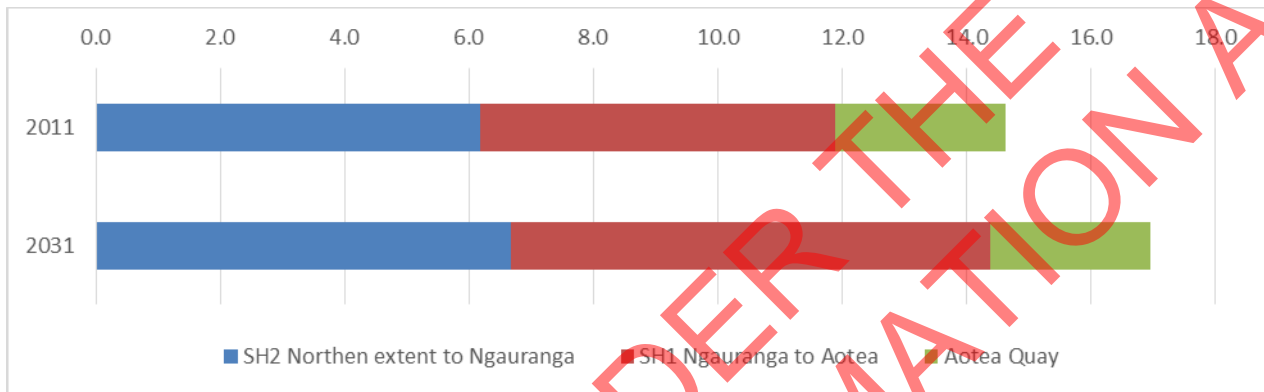


Figure 6 Total delay in the AM peak, southbound from the SH1 northern extent of the model to Hinemoa Street for 2011 and 2031. (Source: GWRC Saturn Model)

As indicated by the green bars, delay in traffic southbound on Aotea Quay accounts for over 65% of the journey time along the Quay, comparatively this is 20% of the overall delay experienced along the SH1 journey in the AM peak.

Figure 7 Total delay in the AM peak, southbound from the SH2 northern extent of the model to Hinemoa Street for 2011 and 2031. (Source: GWRC Saturn Model)



The northbound delay in the model is no longer applicable owing to the recent introduction of a fourth northbound lane between Aotea Quay and Ngauranga.

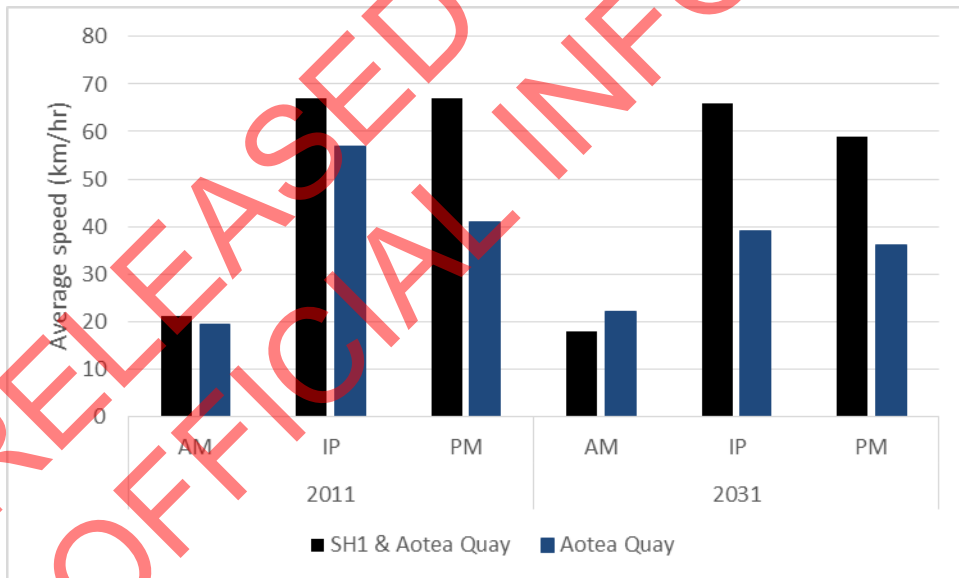


Figure 8 Average speeds southbound from Ngauranga to Hinemoa Street (Source: WTSM)

The average speeds southbound on Aotea Quay and SH1 are 19km/hr and 21km/hr in the AM peak. The model predicts that the average speed on SH1 will reduce to 19km/hr in 2031. The traffic volume on SH1 southbound

is expected to increase from 41,000 vehicles per day to 46,000 vehicles per day by 2033. The consequent reduction in average speed shows that the highway's capacity will become more of a limiting factor.

Commentary provided in the Ngauranga to Aotea Quay report²⁹, suggests that the poor geometry of the Aotea Quay southbound off-ramp along with the shunting movements across the Waterloo Quay level crossing in the AM peak results in traffic queuing back on to the motorway in lane 1³⁰. Drivers who miss the off-ramp queue, stop in lane 2 and force a lane change to join exiting traffic, generating speed differentials across the three northbound SH1 lanes with a low overall average speed as shown in Figure 8.

Journey time variability

Travel time variability is higher along the corridor during the AM and PM peaks in the southbound and northbound directions respectively as a result of increased traffic flows and slower average travel speeds as previously noted. The Smart Motorway SAR used Bluetooth data to calculate the coefficient of variability of journeys along the route at different periods of the day. The outputs of this analysis have been reproduced in Figure 9 and Figure 10 below.

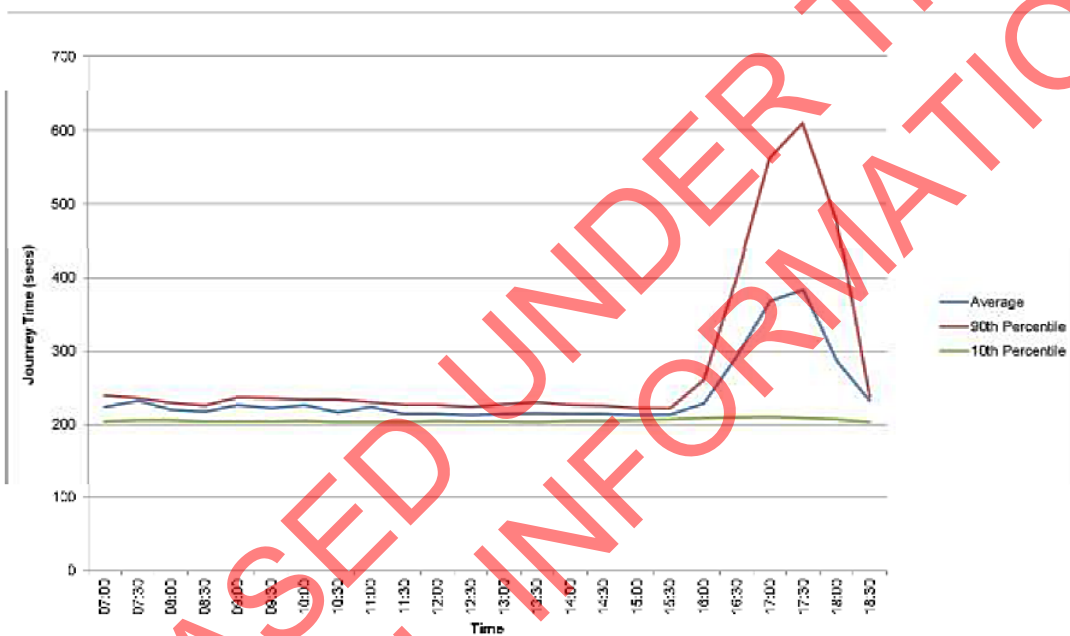


Figure 9 Hobson Street to Petone travel time variability (Excerpt from Smart Motorway SAR)

²⁹ Ngauranga to Aotea Quay SAR, op cit

³⁰ Recent evidence for this phenomenon has not been found, but further investigations are planned.

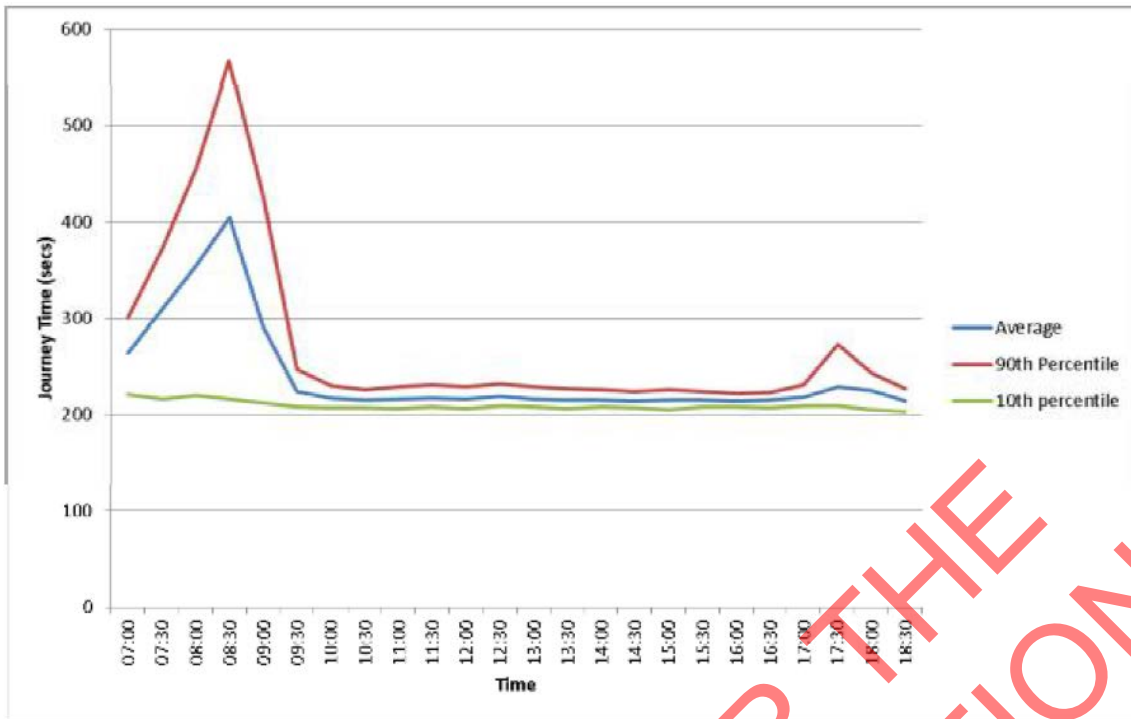


Figure 10 Petone to Hobson Street travel time variability (Excerpt from Smart Motorway SAR, Beca, 2013)

As shown in Figure 9 and Figure 10, travel time variability is low and consistent outside of these peak periods.

Port gate

The Hinemoa Street intersection is the primary road access into and out of the port area.

SCATS data for 17 February 2016 was analysed to determine the demand on this intersection. The existing demand was compared to the theoretical capacity for truck movements only, into and out of Hinemoa Street. This is assumed to be the worst-case egress scenario in terms of vehicle lengths and the headway required per vehicle. Figure 11 and Figure 12 shows the demand and capacity in the AM peak and PM peak respectively. As can be seen, the existing entry into Hinemoa Street operates below the theoretical capacity in both peak periods. The movement for vehicles turning right out of Hinemoa Street into Waterloo Quay is constrained in the PM peak where demand is approaching or exceeding its capacity, creating delay for vehicles leaving the port and increasing journey time variability.

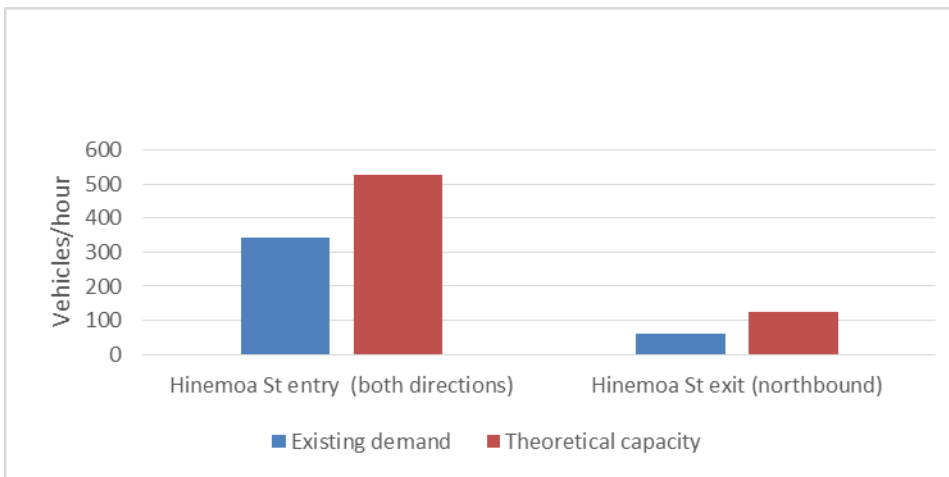


Figure 11 AM peak hour capacity at the intersection of Hinemoa and Waterloo Quay

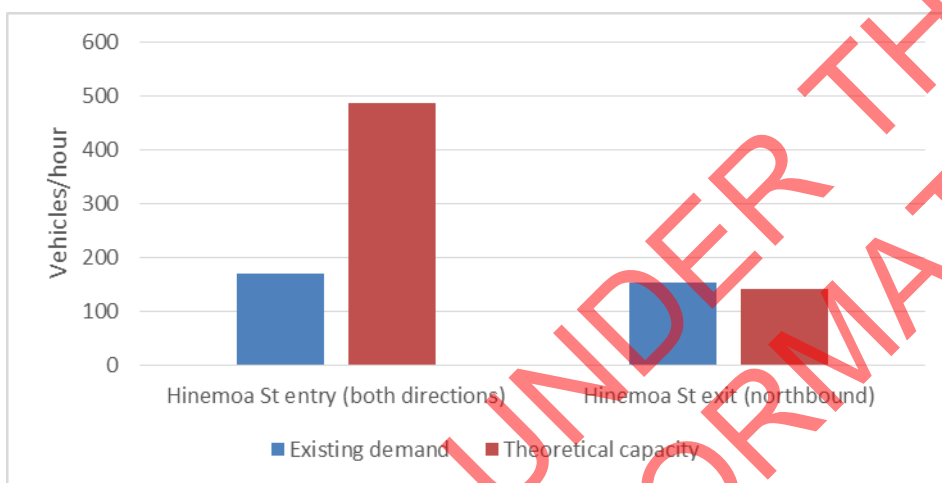


Figure 12 PM peak hour capacity at the intersection of Hinemoa and Waterloo Quay

Daily movement profiles are shown in Figure 14 and Figure 15. During the evening peak there is conflict between the freight function and a dominant commuter flow from the port. This access is constrained as a result of port office park commuters, vehicles arriving off the 5:30 Bluebridge Ferry and some HCVs from the port itself leaving the port area and attempting to join the traffic on Aotea Quay which is also constrained. 65% of these vehicles turn right out of Hinemoa Street into Waterloo Quay/Aotea Quay. Congestion northbound on Aotea Quay and through this intersection, however, prevents the full capacity of vehicles joining the traffic stream during each signal phase³¹. This delay is demonstrated in the WTSM traffic model for the 17:00 to 18:00 peak

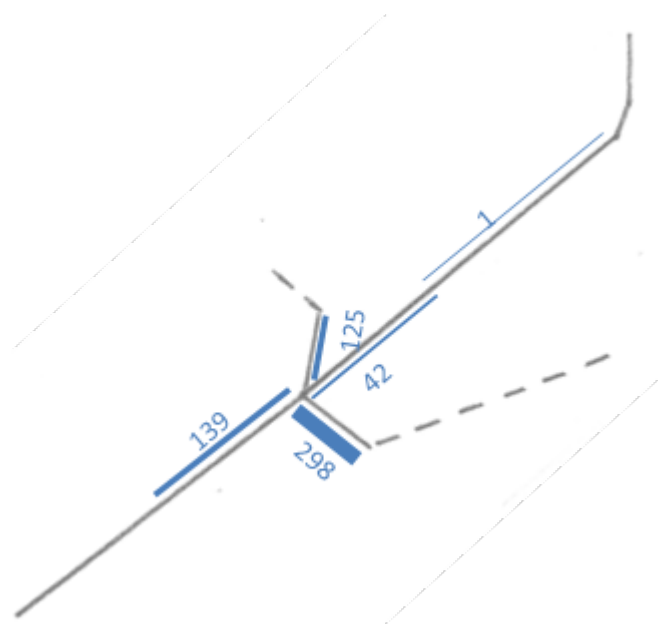


Figure 13 PM peak period delay Hinemoa Street Intersection (seconds), 2031 (Source: WTSM)

³¹ This problem is likely to have been reduced by the recent opening of Aotea Quay.

period. There is a 298 second delay (5 minutes) for traffic leaving Hinemoa Street in the PM peak, Figure 13.

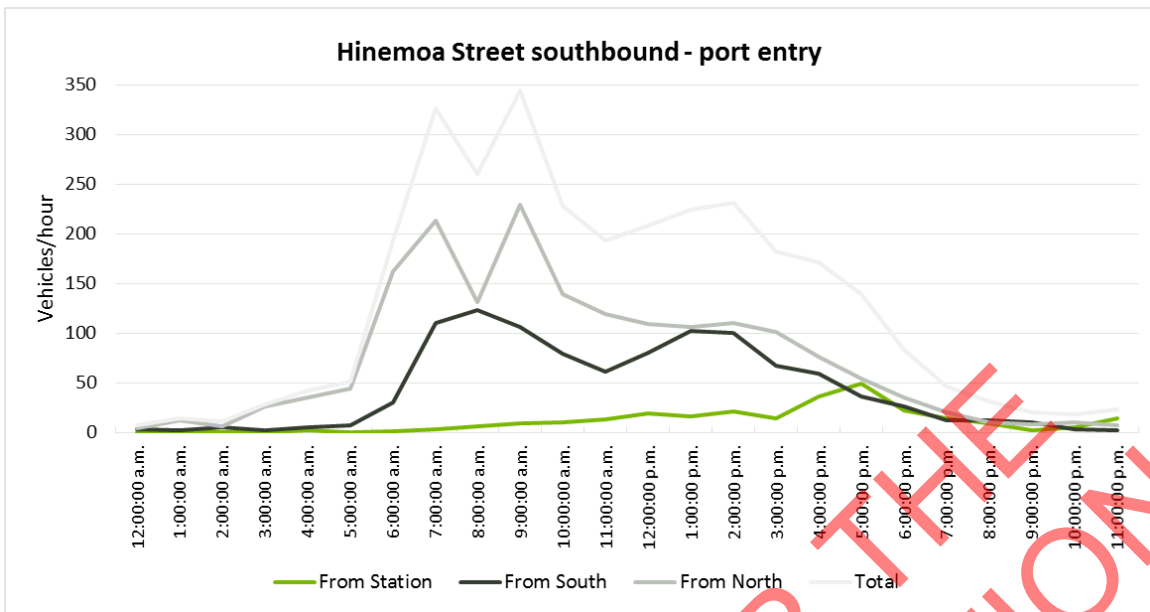


Figure 14 Daily Hinemoa Street southbound traffic profile (Source: SCATS - February 2016)

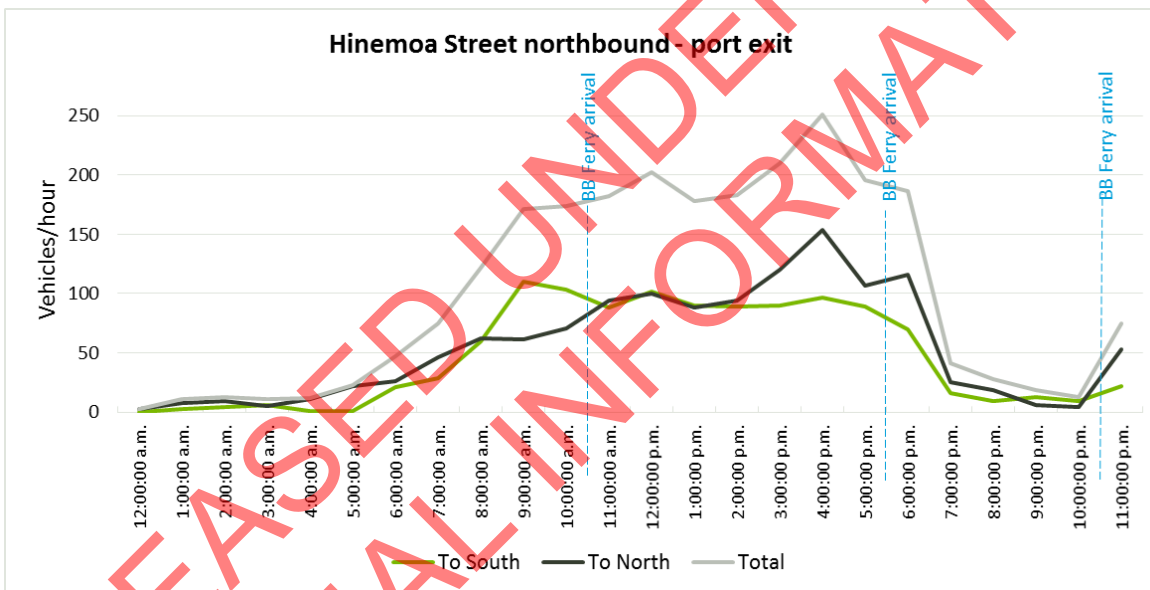


Figure 15 Daily Hinemoa Street northbound traffic profile (Source: SCATS - February 2016)

According to the 2014 Beca traffic study commissioned by CentrePort, in 2016 some 800 HCVs were forecast to access the Hinemoa Street entrance to the Port each day; of which approximately 29% contain logs and the remaining 71% containers or 'other' cargo. 600 HCVs were forecast to exit the port via Hinemoa Street each day, 200 fewer than those that entered. This difference in HCV volumes in and out of the port is likely to be a result of HCVs off the Bluebridge Ferry and container trucks that enter through the western intersection to access the TSL Container Terminal. The existing internal port road network currently directs vehicles to drive through the port area and out at Hinemoa Street.

ERUC data obtained for weekdays over the first three weeks in March 2016 show turnaround times on the port itself (Figure 16). These demonstrate the pre-07:00 arrival density which is not shown in other port gate

data. This figure also displays the relatively constant arrival rate of HCVs throughout the day. Note this plot excludes freight vehicles that have connected with the Bluebridge Ferry.



Figure 16 CentrePort turnaround time and arrival distribution for HCVs (Source: EROAD/Beca)

The signalised intersection into the freight forwarders' yards has little impact on travel time with the exception of in the PM peak where observation suggests that vehicles queuing across this intersection prevent freight from turning right into the yards from the south-bound direction creating minor delay for counter-peak freight vehicles.

Rail Access

Rail access to Wellington and the port area for freight is relatively unconstrained. There are limitations on the port site (inside the port gate) that provide constraints and potential future additional movements will affect the Quay's reliability for traffic. These limitations are associated with the length of the sidings and turn-outs on the port for loading and unloading wagons. When trains arrive at the port, they are broken up into smaller lengths and shunted onto the port in a number of movements.

On a typical day there are approximately 15 shunt movements across Aotea Quay and up to 8 moves into the Burma Road siding from north of the ferry terminal. Many of these shunts occur between 23:00 and 04:45. The shunts that occur during the peak periods have the greatest impact owing to the number of cars that delayed during this period. These peak shunts are scheduled to occur at 07:30, 09:00 and 16:00 to and from the Container terminal and Transport Systems 2000 Limited (TSL) terminal.

Ferry Terminal Access

Access to the Interislander ferry terminal is constrained for both general traffic and freight traffic as well as pedestrians. The layout for access into and egress from the ferry terminal is complicated and non-intuitive, in particular for foreign drivers arriving on a ferry (eg in campervans). The large SH1 overbridge columns (refer Figure 17) and live rail sidings provide significant challenges for visibility and potentially, safety. Poor way-finding signage does not adequately explain the convoluted route.



Interislander operates three ferries providing up to five return sailings per day from Wellington in the peak summer period of December through to March. The capacity of ferry land-side holding is lower than current ferry capacity – resulting in long turnaround times as vehicles cannot be pre-marshalled for efficient loading.

Ferry access (both Interislander and Bluebridge) is “inefficient”. Vehicles leaving the Bluebridge ferry are required to drive east around the office park to access the local road network at Hinemoa Street. There are multiple conflict points with pedestrian and port freight traffic along this route. The existing marshalling and boarding layout prevents vehicles from using the ferry terminal entry from Aotea Quay. Issues with safety were also noted.

Figure 17 Ferry terminal access across live track

Ferry terminal capacity

The existing Interislander ferry terminal marshalling yard lacks sufficient capacity to store vehicles and freight prior to boarding the ferry. There is land-side holding capacity for 23 HCVs, Figure 18, Table 5, however typically more than 28 trucks are transported per sailing in addition to any rail wagons.

There is insufficient land-side capacity to accommodate larger ferry volumes and future

Ferry	Aratere	Kaiarahi	Kaitaki
Deck (lane m)	665	1910	1670
Deck (HCVs)	25	70	60
Rail (lane m)	550		
Passenger	600	550	1350
CEU	228	550	525



Table 5 Interislander ferries' capacities

Figure 18 Interislander ferry terminal land- side marshalling area

projected growth in vehicle and HCV demand.

Rail growth projections

There is considerable growth in the log market with log volumes and wood products forecast to grow by over 30% by 2022 and continue until around 2032 as a significant proportion of trees reach maturity over the next 20 years. Rail growth is predicted as a result with log wagon movements expected to increase from 60 to 100 wagons per day in 2022 at the peak of the log harvests.

4.6.2 Implications of the evidence

The evidence presented above in Section 4.6.1 demonstrates that there is a series of relatively modest issues in the Wellington port area that together substantiate Problem 1. There are delays entering the port in the morning peak – as might be expected given its location adjoining the city centre of New Zealand’s capital. Wellington has a strong CBD in relation to the city’s population and one that draws employees from across the wider region. While many of the commuters use the high quality rail services, there is still a strong demand for road travel from the north and north-east, with Aotea and Waterloo Quays representing a major entrance to the city centre. With the limitations on the state highway route through the city, the Quays are also used as a city centre bypass route, for example to the airport.

Similar conditions have applied until recently in the evening peak with the Quays carrying significant outbound flows that have resulted in relatively low speeds as much of the northbound traffic has to merge with traffic on the motorway heading towards Johnsonville and Petone. The effect of this traffic has been to limit the effective capacity of the signalised intersections – particularly Hinemoa Street – serving port-related freight movements.

During the development of this business case, the SH1 Smart motorway northbound has opened providing a lane-gain for Aotea Quay traffic. The effect of this added capacity needs to be monitored. It appears from observation that it may have increased the flow speed on to the motorway moderately, with the poor geometry of the on-ramp (and drivers' unfamiliarity with the new arrangements) limiting the throughput that is achieved. The effect of the improvement may be to accentuate the up-stream issues at the intersections (and therefore provide greater benefit if those issues are addressed).

The evidence further demonstrates that there are potential safety and capacity issues associated with the closures of the level crossings to road traffic, particularly if rail traffic to the port should increase as planned.

Noting the above, however, it is also clear from the evidence that the most significant delays and unreliability for traffic accessing the port area in the morning peak, and leaving it in the evening are on the main sections of the state highways between Petone and Aotea Quay and Johnsonville and Aotea Quay. This information may be significant when evaluating longer-term interventions.

The evidence fully backs-up the comments with regard to the poor legibility and convoluted access to the Interislander and Bluebridge ferry terminals.

4.6.3 SMART investment objectives

Three investment objectives were established through Workshop One to provide specificity for the first benefit statement. They were checked against the 'SMART' criteria (Specific, Measurable, Attainable, Relevant and Timed).

- Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth
- Reduced delay and journey time variability for travel to, from and through the port area.
- Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.

The investment objectives were measured through a set of KPIs with associated metrics:

- Freight throughput by rail (freight throughput weight)
- Travel time delay
- Travel time reliability – motor vehicles/pedestrians
- Legibility of access to ferries by all modes from key destinations
- Ferry terminal capacity (or throughput) for all modes.

4.7 PROBLEM ANALYSIS - PROBLEM 2

Problem 2:

The port is a key enabler to recovery after a HILP event, but the network infrastructure to and from the port area is vulnerable to such an event, further risking the region's ability to recover: 30%

Benefit 2:

Increased resilience of the transport network into and out of the port area: 30%

4.7.1 The evidence

Problem 2 relates to the resilience of the port area and its role as a key enabler during recovery from a HILP event. It was noted that strategies clearly establish that the port area is a key enabler of recovery from a HILP event. Studies have, however, demonstrated that key elements of the transport network in the study area are vulnerable to such events. There was agreement from stakeholders in the first workshop that Problem 2 is

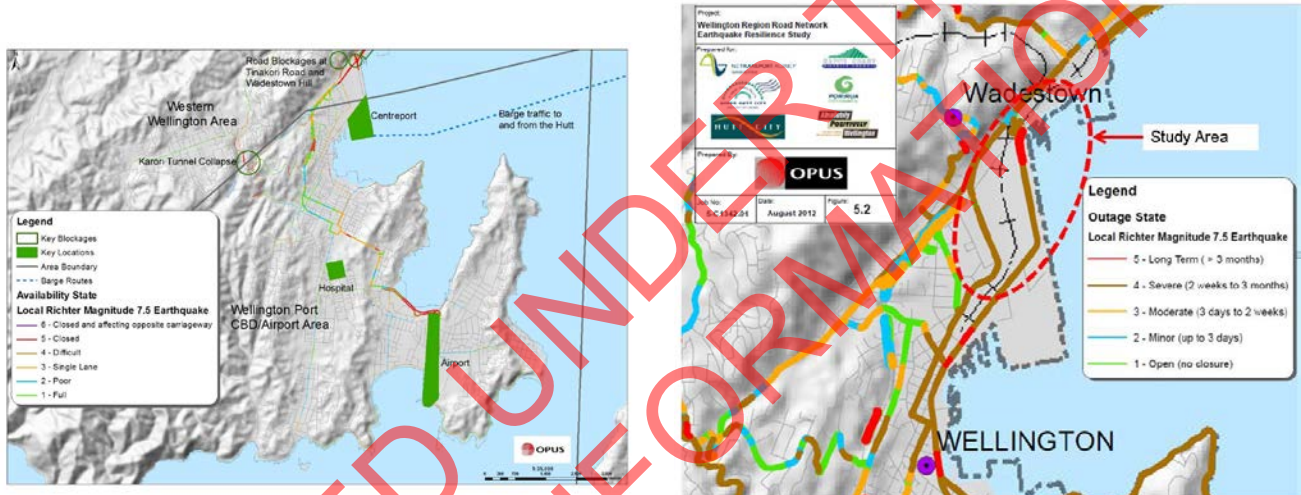


Figure 19 HILP Recovery Vulnerability (Restoring Wellington's Transport Links, Wellington Lifelines, 2013) appropriate and supported by the evidence.

The major source for the evidence is a report by Opus for the Wellington Lifelines Group and WREM (Wellington Region Emergency Management)³². It identifies the following vulnerabilities in and around the port area:

- **Seismic context**

In terms of actual shaking effect from a major Wellington earthquake, the majority of Wellington's infrastructure lies within a zone that would be subjected to shaking intensity of MM9 or MM10. At the fault line itself, it is anticipated that a Wellington Fault rupture would produce a maximum of 4m to 5m in horizontal movement and up to 1m in vertical movement.

- **Transport effects of a major earthquake**

³² Restoring Wellington's transport links after a major earthquake, Initial Project Report, Opus, March 2013

The region will become isolated by normal road access for at least 120 days. This is due to likely landslips on State Highway 1 from Paekakariki to Pukerua Bay; the Paekakariki Hill Road; the Akatarawa Road, and State Highway 2 over the Rimutaka Hill. In addition to isolation, the region will become fragmented due to landslips on the Haywards Hill section of State Highway 58 and the Horokiwi area of State Highway 2, in addition to other regional fragmentation for the short and medium terms.

- **SH1 Ngauranga to Thorndon**

The Southern Rail Overbridge (Hutt Rail Line overbridge) and the Thorndon Overbridge are seismically vulnerable, and are at risk of failure in an earthquake. The catch frames on the Thorndon Overbridge will prevent the concrete beams from falling into the railyard below, but are not strong enough to support traffic on the structure. It is expected that it will take more than three months to restore access along this key section of SH1. The Southern Rail Overbridge is more vulnerable and may fail in a non-Wellington Fault rupture event.

- **Thorndon Quay, from the rail station to the Tinakori Road/Hutt Road intersection**

Thorndon Quay, particularly at its northern end, is vulnerable to large landslips from above. At the intersection with Tinakori Road the potential failure of buried services mean that this intersection may become heavily damaged and inaccessible for a number of days to weeks.³³

- **Aotea Off-ramp**

The Ngauranga to Aotea Quay SAR notes (Table 7.1³⁴) that the Aotea Quay off-ramp is at risk in a 1:100 year return period.

To ensure that a route from Johnsonville to Thorndon is secured as quickly as possible, the asset owners the Transport Agency, Wellington City Council and KiwiRail signed a Memorandum of Understanding (MoU) with their maintenance contractors and key contractors in the area that own earthmoving equipment in the Ngauranga area (Fulton Hogan, Downer, Kiwi Point Quarry, Downer Asphalt, Allied Concrete, Higgins Concrete). The outcome of the MoU is that the above organisations will co-operate after a major earthquake to identify the best route through this corridor and work collaboratively to restore it.

Required logistical arrangements

About 90% of food, fuel and materials deliveries to the region would have to come via sea, through CentrePort, or using craned-container or 'break-bulk' ships unloading to barges, which shuttle deliveries to the main offloading points. As individual areas open up, the majority of food, equipment and materials would be transported into the region through CentrePort. This would equate to approximately 447 20-foot containers per day. This requirement makes access to CentrePort a vital element of any regional transport plan, not just for Wellington City, but for the Hutt Valley and Porirua as well.

4.7.2 Implications of the evidence

The evidence confirms that the port area is critical to the region's recovery from a HILP event and that there are significant deficiencies in the land transport network connecting to it. In the absence of any other route, access from the CentrePort Wharf area to Thorndon Quay (the most likely available access out of the port area) is likely to be through the rail yard, south of the Westpac Stadium.

³³ Ibid, p. 22

³⁴ Op cit, p. 80

4.7.3 SMART investment objectives

The investment objective formed out of Workshop One to provide testing criteria for to the second benefit statement which was also been checked to be SMART.

- The immediate transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.

The associated measure was:

- Access to the port in all HILP events.

4.8 CUSTOMER INSIGHTS

The evidence for the problem statements was strengthened by research carried out by the Transport Agency in collaboration with ThinkPlace Ltd³⁵. The research was specifically linked to the three programme business cases in the Wellington region: the SH2 Te Marua to Masterton corridor; SH2 Ngauranga to Te Marua corridor and Accessing Wellington's Port Area – ie this PBC.

The intent of the research was “to ensure that these PBCs were infused with useful insights that could represent customers in their own voice. This work is a critical investment in ensuring there are strong, rich outcomes for each of the PBCs”.

The approach taken was to conduct face-to-face discussions with over 100 people using intercept interviews, ride-along interviews and in-depth empathy interviews.

Two of the three ride-along interviews with truck drivers had either an origin or destination in the port. The intercept interviews included 20+ cruise passengers, 20+ Interislander ferry passengers, 15+ car commuters (some of whom were using the stadium car park) and 25+ train passengers on the Hutt line. A high proportion of the interviews were therefore directly related to the Port Area.

Key insights from the interviews relating to the port area were grouped in the insights report into three categories: conflicting uses, navigation and isolation.

Conflicting uses

- The port area has a range of dynamic activities that can conflict with one another, ie. ferries, tourists, trucks, stadium users, workers, people transiting. This range of activity can be perceived differently by different users, for example, traffic speed can be intimidating to pedestrians at crossings, but not for drivers using the area as a thoroughfare.
- There are a variety of customer expectations for what transport should be prioritised in the port area which translates to a variety of satisfaction levels
- Delay from train shunting is predictable but rare and has a high impact on those with time sensitive schedules eg truckers, cruise shuttles and cruise tour buses.
- Aotea Quay is a critical connection point for freight companies picking up and dropping off between the port and freight yards.

Navigation

- Access in, out and through is confusing and intimidating for new or infrequent users of the area. Some drivers are uncertain as to the speed limit

³⁵ Customer Insights Informing Programme Business Cases, V2, 31 May 2016

- The Interislander shuttle ferry runs infrequently and is not a well-known option for tourists to use to access this ferry
- Way-finding is poor in this area, particularly for tourists trying to access the Interislander. Truckers described how pedestrians often wander into the freight depots along Aotea Quay, raising safety concerns from trucking companies. Local drivers, too, admit uncertainty if they are having to make stops in the port area including accessing either ferry terminal – “if you make one mistake you end up on the motorway”
- Taxis enter the port area looking for the cruise terminal. Some are unfamiliar with the area and get lost or end up in the way of regular port traffic.

Isolation

- The port area is seen as isolated from the ‘central buzz’ of Wellington City
- Assumptions exist about the port being unfriendly, desolate and disconnected, which stops people from driving or walking through the area.

In addition, some comments were made on the level of congestion – to the effect that while Aotea Quay can be slow it flows, and the level of congestion is currently acceptable.

4.8.1 Confirmation of problems

It would not be expected that the customer insights would relate to Problem 2 as that concerns the role of the port in a HILP event.

The (simplified) version of Problem 1 is: *Access and space to, from, through and within the port area is constrained and inefficient impacting growth.*

The alignment between the elements of the problem statement and the insights is shown in **Table 6** below.

Problem statement	Customer Insight (abridged)
Access is constrained	<ul style="list-style-type: none"> • The port area has a range of dynamic activities that can conflict with one another • Access in, out and through is confusing and intimidating for new or infrequent users of the area
Space is constrained	<ul style="list-style-type: none"> • There are a variety of customer expectations for what transport should be prioritised in the port area • Aotea Quay is a critical connection point for freight companies • Pedestrians often wander into the freight depots along Aotea Quay, raising safety concerns
Access is inefficient	<ul style="list-style-type: none"> • Aotea Quay can be slow • Wayfinding is poor in this area • Delay from train shunting has a high impact on those with time sensitive schedules • Taxis enter the port area and get lost or end up in the way of regular port traffic.

Table 6 Problem Confirmation

PART B – DEVELOPING THE PROGRAMME

5 ALTERNATIVES AND OPTIONS

This section describes the long list of options, which were developed through workshops with the problem owners and analysis by the wider project team and technical specialists. The individual interventions were combined into an array of programme options for short-listing. It presents the programmes as refined through initial feasibility analysis.

5.1 ALTERNATIVE AND OPTION GENERATION

A facilitated workshop was held on 19 April 2016 and attended by representatives from WCC, GWRC, CentrePort, Interislander/KiwiRail, Bluebridge and the Transport Agency. This workshop sought to identify any interventions that may address the problems and investment objectives. The long list of options generated is provided on the following page. It includes ideas generated from the workshop and those added from post-workshop discussions with stakeholders.

The idea generation process targeted interventions that sought to change demand (reduce or slow the problem), increase productivity (optimise or make better use of an existing system) and/or to increase supply (provision of extra capacity to treat or fix the problem).

A summary of these interventions is provided in Table 7 on the following page.

Table 7 Strategic intervention ideas

Workshop ideas				
Direct off-ramp from SH1 into the ferry terminal (and Port)	Relocate Aotea Quay	Freight road inside the port,	New roundabout on Aotea Quay	Reallocate stadium carpark for office park
New joint ferry terminal and reclamation	Second Aotea Quay northbound on-ramp from ferry terminal	Reallocate lanes for freight on the Quay	Make Aotea Quay a state highway	Port to exit some activities – e.g. logs
Direct access from SH1 to Thorndon Quay (on-ramps and off-ramp)	Tidal flow on Aotea Quay for all traffic	New ferry terminal signalised junction on Aotea Quay	Use statutory powers to protect port road and rail access	Freight booking system for trucks
Grade separation of road and rail on Aotea/Waterloo Quays	Connection between Aotea and Thorndon Quays (all modes)	HOV by-pass on-ramp onto SH1 (signalise NB on-ramp if required)	Optimise land use on Port and KiwiRail land	Variable tolls – congestion pricing/time of day on the Quay
New combined cruise and ferry terminal	Hutt Road connection to ferry terminal (pedestrians, drop off, PT)	Re-direct cyclists along Thorndon Quay	More capacity to N2A – enhance city centre access	Use parking charges to influence time of day (on/near Quay)
Inland port – away from port area and move freight outside peak hours.	Improved customer face of ferry terminal to interface with transport network	Fran Wilde Walkway extension to cruise terminal via structure	Rationalise ferry land holdings	Travel plan for office park
Terminate rail in marshalling yards and replace rail crossing with an off-road haul road.	Make more use of Ngaio Gorge Area	Re-configure Hinemoa Street for 2 right turn lanes	No more offices on port – plan change to limit provision.	Assess and provide alternate routes through the City accessing key enablers
Separate access to office park from freight access to the port onto Quay	Grade separated pedestrian link from the Port Office Park to the City Centre.	Re-configure port rail sidings on port to increase capacity	CBD Parking strategy	Provide east-west connections
Provide priority to port traffic at traffic signals (more cycle time only)	Port gate operation improvements: Hours of opening	Increase freight movements at night	Lightering – using small ships to and from large ships	Coordinated port area response plan

Workshop ideas

Rationalise rail yards – reallocate space	Port gate improvements: faster weigh bridge operation	Increase freight movements by rail	Use alternative wharfs away from the main port	Strengthen structures
Bluebridge finger most resilient	Move the Interislander terminal	Reallocation of lane use within port	Connection to Hutt cycle way as emergency road	All new structures built to appropriate strength
Supply of electricity/water/people on the port	Port masterplan	Make Aotea Quay one way only	Double deck Aotea Quay	Double stacked containers
LRT	More space for queuing truck storage in the port	Remove rail access to the Port	Move the main port to Seaview	Cycle lane along Aotea Quay

Post workshop additions

Move cruise terminal to Bluebridge wharves	Manage and share shunt times for journey planning applications	Park and Walk at stadium carpark	Increased capacity southbound on SH1	
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5.2 INTERVENTIONS NOT CONSIDERED FURTHER

Some of the potential interventions were subsequently shown to be infeasible or unlikely to address the problems and were withdrawn from further consideration.

5.2.1 Large Scale Supply

DIRECT ACCESS FROM SH1 TO THORNDON QUAY (ON- RAMPS)

This option was considered to generate very high risks and costs from a design and construction perspective. It is likely to require significant changes to traffic management in the CBD. The grade required to take the motorway on/off-ramps and/or Thorndon Quay over SH1 and rail would be a significant risk. Given that the evidence suggests a large proportion of Quay traffic has destinations south of the CBD, it was unlikely to be effective given scale, cost and risk.

TERMINATE RAIL IN MARSHALLING YARDS AND REPLACE RAIL CROSSING WITH AN OFF-ROAD HAUL ROAD.

Moving freight off rail and on to trucks creates double handling and is likely to have little benefit above addressing the road and rail conflicts associated with the level crossing and improving reliability for general traffic.

PROVIDE A CONNECTION BETWEEN AOTEA AND THORNDON QUAYS (ALL MODES)

Considered very high risk and costly from a design and construction perspective and would require grade separation over the rail lines. It would require significant changes to traffic management in the CBD. Given that evidence suggests a large proportion of Quay traffic has destinations south of the CBD, it was unlikely to be effective given scale, cost and risk.

DOUBLE-DECK AOTEA QUAY

Aotea Quay is operating at significantly less than its theoretical capacity and therefore although double-decking would further increase its capacity, it would not address the access issues associated with the adjoining network. The volumes of freight would not warrant the very high costs associated with the deck structure.

MOVE THE PORT TO SEAVIEW

A proposal to move the freight operations of the port to Seaview and retain the cruise and ferry operations at CentrePort was rejected on the basis that it is largely out-of-scope, would not solve the issues of access to the ferry terminal and would result in significant freight movements back into the city centre.

MAKE THE QUAYS ONE-WAY

The impacts on the traffic network and the diversion of freight traffic through the city centre would have a significant impact on the operations and safety of the entire local network. For this reason, this option was excluded from further analysis.

5.2.2 Policy and Strategy

OPTIMISE LAND USE ON PORT AND KIWIRAIL LAND AND RATIONALISE FERRY LAND HOLDINGS AND MARSHALLING YARDS

These were not considered as options in their own right but rather as actions that may be required to free-up space for other supply options. They have been removed from further consideration as options but have been included as part of the feasibility requirements for a number of other options.

MORE CAPACITY TO N2A ROUTE – ENHANCE CITY CENTRE ACCESS

This concept is outside the mandate of the AWPA PBC.

5.3 PRODUCTIVITY

INCREASING FREIGHT MOVEMENTS AT NIGHT

This concept is associated with the Port gate operation improvements option and hence would be a consequence of the Port gate being open longer so was not considered an option per se.

DOUBLE- STACKING CONTAINERS ON RAIL WAGONS

Elements of the infrastructure, including a number of bridge structures and the overhead power lines, are too low for double-stacked containers on rail wagons to pass underneath.

REMOVE RAIL ACCESS ALL TOGETHER

The removal of rail access, although feasible – is likely to exacerbate the traffic problem. Having more trucks on the network would constrain Aotea Quay and the surrounding network even further especially at bottlenecks such as the Hinemoa Street port entrance and the SH1 northbound on-ramp.

LIGHT RAPID TRANSIT

Provision of light rapid transit (LRT) would not solve the congestion problems along Aotea and Waterloo Quays. LRT might even exacerbate congestion by reducing the road width available for trucks to manoeuvre past each other and undertake turning movements into and out of various access ways. The provision of LRT was not considered feasible, when compared to the efficient and accessible rail services that operate along a similar route. In addition, the catchment is too small to service competing modes travelling along similar routes into the city centre.

5.3.1 Resilience

BLUEBRIDGE FINGER MOST RESILIENT

This option was considered as a statement of fact so was removed from the list of options and was incorporated into other resilience options including the potential reallocation of land use within the port, a coordinated response plan and the strengthening of structures.

5.4 ALTERNATIVE AND OPTION ASSESSMENT

Qualitative feasibility analysis was undertaken of the long list of remaining interventions by highway design, rail, port and logistics, intelligent transport systems and transport planning technical specialists. The output of this assessment included high level feasibility, risk and interdependency analysis along with rough order cost estimates in order to assess the relative magnitude of the interventions. The interventions were further assessed on their performance against the investment objectives and benefit statements.

These option assessments are provided in Appendix C.

6 PROGRAMME OPTIONS DEVELOPMENT AND ASSESSMENT

This section outlines the initial programme options that were generated from the long list of interventions assessed in Section 5.4.

6.1 PROGRAMME DEVELOPMENT

Six programmes were developed around various levels of supply and demand management and productivity. The following initial programmes were formed based on these groupings.

- Land use, policy and demand management actions
- Productivity improvements (getting more from existing assets)
- Small scale supply of new capacity
- Medium scale supply of new capacity
- Large scale supply of new capacity
- Resilience improvements.

The basis for the groupings was to consider together what might be achieved by different forms of intervention – managing demand through differing approaches, higher productivity or different levels of supply. The programmes for testing are cumulative in that to the extent that logic and dependencies allow, programmes with larger interventions also include many of the demand, productivity and smaller scale supply interventions.

It was recognised that these simple initial groupings would subsequently likely to be varied into more of a “mix and match” pulling together the best of each into coherent programmes. Equally, the elements that did not perform so well would not be investigated further.

With the Wellington Port Access PBC being focussed on an area rather than the typical long corridor, the various initial programmes contained multiple site-specific potential interventions that were directed at particular elements of the problems. For example, there were demand management ideas to address congestion at intersections at the southern end and additional capacity options to improve access to the Interislander ferry terminal.

The groupings are shown in Appendix E.

6.2 DO- MINIMUM OPTION

The do-minimum for the Wellington Port Access PBC was a standard do-minimum in accordance with the EEM. It was consistent with GWRC’s WTSM which was the source of forecast traffic flows and journey times.

It therefore included the committed projects in the RLTP, all of which were under construction at the time of the PBC:

- SH1 SMART motorway northbound (which was largely completed during the development of the PBC)
 - SH1 Transmission Gully
 - SH1 Kapiti Expressway
 - SH2/SH58 Intersection.

The Petone – Grenada link was not included as it did not have committed status. Similarly, no improvements were assumed in the do-minimum for the N2A route or on the commuter rail network for the same reason.

6.3 PROGRAMME ASSESSMENT

The indicative programmes were assessed using a standard multi-criteria analysis (MCA) approach by transport planning specialists within the Aurecon team supported by specialist technical advice, as needed and reviewed with Transport Agency representatives. The MCA assessed the individual elements and the combined programmes against the investment objectives, largely qualitatively. The assessment included an estimate of the programme’s contribution against the investment objectives in percentage terms. Weightings in the MCA were drawn from the Benefits map.

The full MCA assessment is included as Appendix C. Table 8 below summarises the findings.

The results of the assessment were discussed in depth with each project partner and the Recommended Programme was refined and the support of partner organisations confirmed. These results were then presented to, and agreed at, a partners and stakeholders workshop 18 July 2016.

Programme Assessment		Productivity & Demand Management Programme	Small Scale Programme	Medium Scale Programme	Ferry Terminal Redevelopment Programme	State Highway Connections Programme	Aotea Quay Upgrade Programme
Outcomes	IO1: Freight throughput by rail	1	2	2	2	2	2
	IO2: Travel time delay	1	1	2	1	1	1
	IO2: Journey time reliability	1	1	2	1	1	1
	IO3: Ferry terminal access legibility	0	2	2	2	2	2
	IO3: Ferry terminal access capacity	0	0	1	1	1	1
IO4: HILP event recovery time	0	0	1	2	2	2	
MCA	Feasibility	+++	++	++	+	+	+
	Affordability	-	-	-	-	-	-
	Public/Stakeholder	-	-	-	-	-	-
Cost	Risk	-	-	-	-	-	-
	Cost estimate (upper and lower bound)	\$5-\$6m	\$27m-\$33m	\$70m-\$96m	\$206m-\$334m	\$198m-\$276m	\$548m-\$821m
BCR	Value for Money	+	+	<1	<1	<1	<1
	Benefit Cost Ratio	1.3	1.3	<1	<1	<1	<1

Table 8 MCA Assessment Summary

7 RECOMMENDED PROGRAMME

7.1 PROGRAMME OVERVIEW

In the light of the interrelationships with other strategic outcomes, as discussed in terms of the transport planning context, the recommended programme to address the confirmed problems is in three parts.

The first part of the programme is justified in terms of the standard benefits normally considered by the Transport Agency. It comprises:

- Changing the layout at the main Hinemoa Port entrance to provide two right-turn lanes into Aotea Quay
- Rearranging the internal road layout on the port to facilitate greater use of the new southern entrance by non-operational port traffic
- Optimising signal timings to address the specific needs of the port area
- Undertaking significant travel planning in relation to the Harbour Quays office development to reduce the use of cars to access the offices and spread the peak
- Providing improved access towards the CBD for pedestrians for the port area
- Reconfiguring the on-port rail sidings
- Providing a revised layout on Aotea Quay to access the Interislander ferry terminal
- Considering changes to the operation and duration of port gate access when conditions are appropriate.

The anticipated order of magnitude cost of this alternative is \$27m - \$33m with an indicative BCR of 0.9 – 1.5. It is recommended that this alternative can immediately be progressed through indicative business cases (IBCs) and can take advantage of the new northbound lane on the Urban Motorway from Aotea Quay, which provides the downstream capacity needed for the additional throughput at Hinemoa Street to be effective. The likely funding partners are the Transport Agency, WCC and CentrePort.

This alternative is expected to give early benefits by helping to improve the efficiency of access to and within the port area. These benefits include providing greater capacity reduced time for trucks to access the port via Hinemoa Street, providing greater ability to move freight by rail, improving legibility of ferry access and improving the legibility and connections for pedestrians. No resilience interventions could be identified for this alternative.



Figure 20: Recommended Programme

The second and third programmes would be linked to Project Phoenix and the N2A project, respectively. The second programme could consist of significant investment to add off- and on-ramps to the motorway, a fourth southbound lane between Ngauranga and Aotea Quay and a new passenger ferry terminal on the Hutt Road. In order to consider such measures holistically, it is recommended that there be a joint business case developed in partnership between KiwiRail/Interislander and the Transport Agency/WCC to address the access requirements alongside the terminal and shipping aspects. The joint business case would include the possible life of sub-programme two.

The interface with N2A is important for this programme as it is through that project that questions relating to the required CBD access and the future role of the Quays beyond the port gate will be determined – affecting how any fourth southbound lane and off-ramp(s) would be configured.

These programmes have order of magnitude costs of \$200m - \$280m and BCRs of the order of 0.3 – taken as stand-alone projects. Their full value would be expected to be greater as part of integrated programmes with Project Phoenix and N2A.

The third variant would include the increased capacity southbound to be consistent with N2A, but would not link to Project Phoenix and would therefore have a lesser level of enhanced Interislander ferry terminal development.

Of note is that the need for or effectiveness of the recommended programme is not influenced by the larger alternatives. The recommended programme is required and is feasible regardless of subsequent decisions.

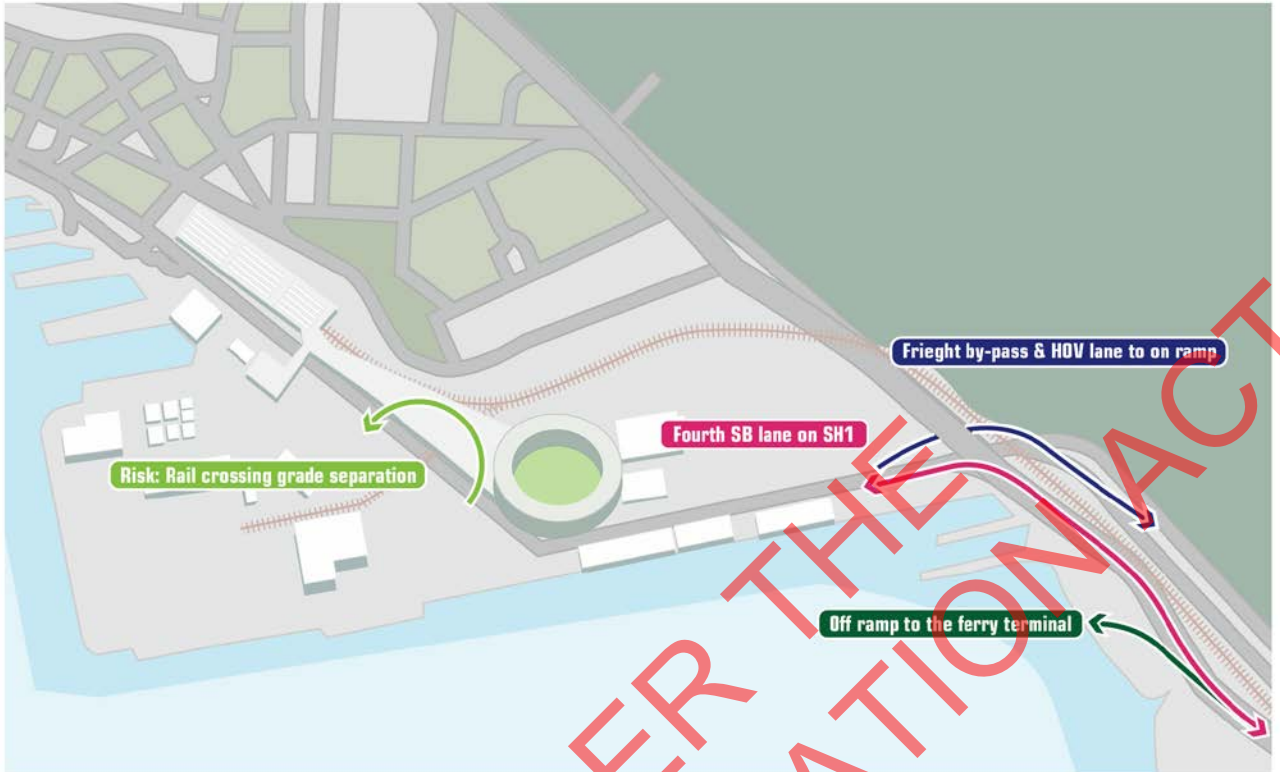


Figure 21: State Highway Connections Programme



Figure 22: Ferry Terminal Upgrade Programme

A fourth sub-programme would target efficient, unconstrained operation of CentrePort. This programme would therefore be justified by wider economic development considerations and would not be expected to be funded out of the NLTF. The additional elements above sub-programmes two and three could be grade-separation of Waterloo Quay over the rail link to the port or relocation of Aotea Quay to the west through the current railyards, allowing much closer integration between the port and the freight operators.

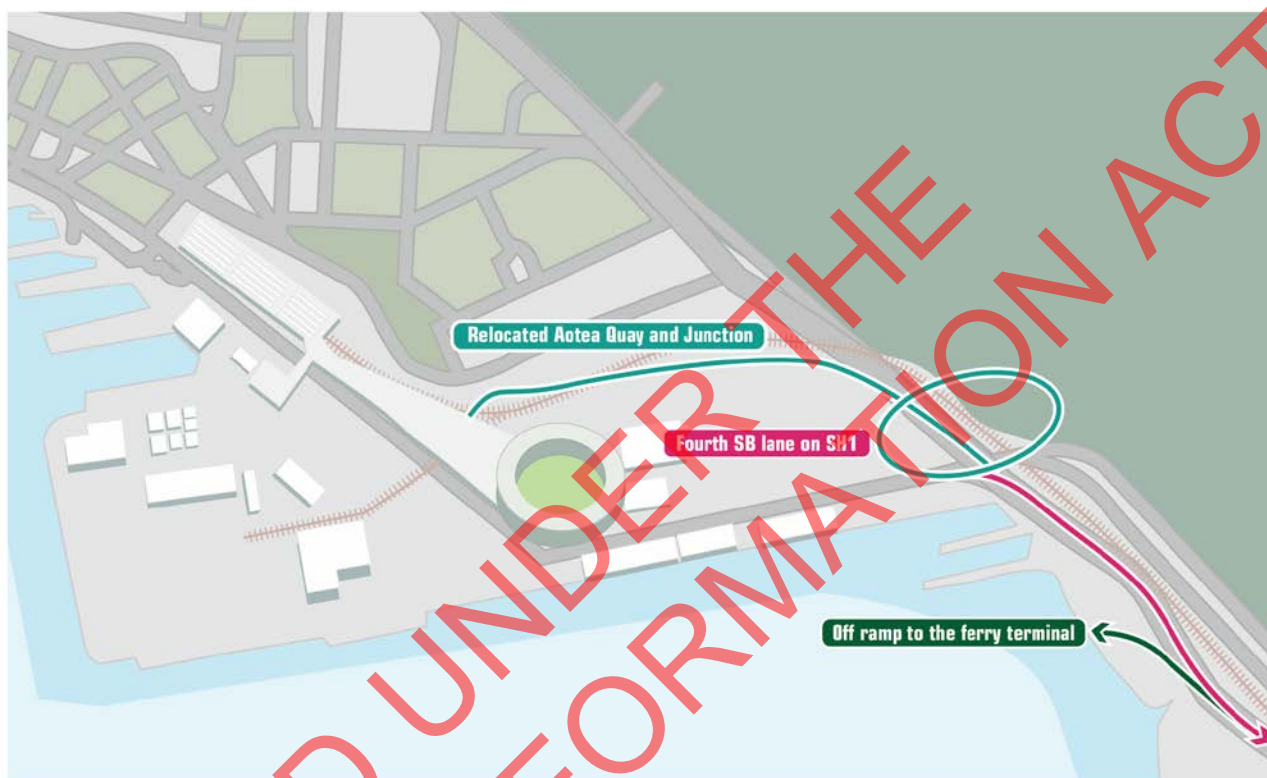


Figure 23: Aotea Quay Programme

7.2 PROGRAMME IMPLEMENTATION STRATEGY AND TRIGGER POINTS

As noted, the recommended programme comprises multiple sub-programmes. The first sub-programme comprises relatively minor actions that can be progressed rapidly through a series of indicative business cases. CentrePort has already indicated its commitment to those in its purview. Some of the measures are required and can be effective in the short term, for example enhancements to Hinemoa Street and providing an additional access for the office park. Other interventions, for example improvements to the operation and opening hours of the port gate are operational issues that CentrePort has indicated it is aware of and can implement when conditions are appropriate. The other immediate actions largely rest with WCC. Again, at officer level, there is expectation that the changes will be supported. The Transport Agency financial backing will be required through normal processes.

The first step for the more substantial sub-programmes will be to obtain alignment with the two projects that represent the main dependencies – Project Phoenix and N2A. For the former, the proposal advanced from this PBC is that there should be a joint business case which will allow the possible land-side access arrangements to the redeveloped terminal to be considered alongside the

ferry requirements. Discussions with KiwiRail/Interislander and CentrePort indicate that they are likely to be receptive to the approach.

Until such an inclusive appraisal has occurred it will not be possible, nor desirable, to advance the sub-programme. It should be noted that the Transport Agency should similarly be engaged with Port of Marlborough and KiwiRail/Interislander in regard to changes in Picton as they affect SH1 in the South Island.

The engagement with the N2A project needs to be proactive, providing input to that project on the findings of this PBC and enabling it to take account of the requirements of the port area, both at its northern end for access to the Interislander ferry terminal location and for the conflict on the Quays between the main flow of traffic to and through the city centre and the port-related freight movements. These movements include those on the rail lines crossing Waterloo Quay.

8 RECOMMENDED PROGRAMME ASSESSMENT

This PBC provides a layered approach providing a recommended programme comprised of demand management, productivity and small scale interventions along with larger programmes that involve significant investment and are connected to and dependent on decisions on related strategic projects, namely Project Phoenix and N2A.

The dependent programme alternatives that involve significant investment perform best in the assessment of effectiveness as they tend to achieve more and resolve the main issues with port access which evidence shows occurs mainly on the state highway network. These are also costly and considering port access problems alone are unlikely to be considered value for money. When port access is considered as a component of solving wider transport problems, these alternatives are likely to provide greater value while retaining their effectiveness.

An additional programme alternative involves removing the severance that Aotea Quay and Waterloo Quay provides to port operations and opening up potential efficiencies in the handling of freight. This programme does not provide good value in terms of requirements for the NLTF, however may be effective as an enabler of wider economic benefits to CentrePort and the Wellington economy.

The recommended programme is a layered approach providing a recommended programme comprised of demand management, productivity and small scale interventions. The PBC identifies larger programmes that involve significant investment and are connected to and dependent on decisions on related strategic projects, namely Project Phoenix and N2A.

The dependent programme alternatives that involve significant investment perform best in the assessment of effectiveness as they tend to achieve more and resolve the main issues with port access which evidence shows occurs mainly on the state highway network. These are also costly and considering port access problems alone are unlikely to be considered value for money. When port access is considered as a component of solving wider transport problems, these sub-programmes are likely to provide greater value while retaining their effectiveness.

An additional programme alternative involves removing the severance that Aotea Quay and Waterloo Quay provide to port operations and opening up potential efficiencies in the handling of freight. This programme does not provide good value in terms of requirements for the NLTF,

however may be effective as an enabler of wider economic benefits to CentrePort and the Wellington economy.

8.1 PROGRAMME OUTCOMES

8.1.1 Recommended Programme performance

The recommended programme provides a modest suite of interventions that includes demand management, productivity and small scale supply of capacity. The supply-side interventions developed for the PBC fell generally into two distinct levels: 1) small scale (under \$10m) and 2) large scale (above \$50m). Immediately available, small scale improvements will address problems and buy some efficiency for all travel as well as enabling room for growth in port activities. The next available interventions are generally major upgrades to state highway access and State Highway 1 itself, which are expensive, but are also likely to address a range of other issues which are outside the scope of this PBC.

The recommended programme is moderately effective in addressing Problem 1, which is:

“Access and space to, from, through and within the port area is constrained and inefficient impacting growth.”

Figure 24 indicates the estimated performance of the recommended programme against the measure adopted for Problem 1 based on the extent to which the programme achieves the desired outcome against each investment objective.

The recommended programme is within the range of cost that relates to the scale of the problem and makes incomplete progress toward resolving the problem. This indicates that there is a disparity between the scale of the problem, which is relatively small and the cost of fully resolving it which is potentially much greater.

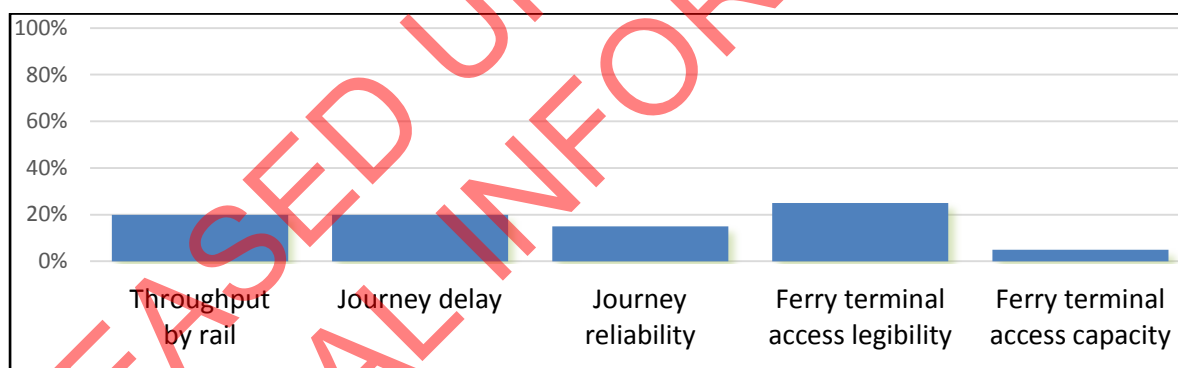


Figure 24: Effectiveness of recommended programme in addressing Problem 1

There is a significant increase in cost between the recommended programme and the larger scale programme alternatives that are more fully effective in addressing the problems. The costs of the larger programme alternatives are considered outside of the scale of the problem as defined in this PBC. The interventions in these programmes are likely to be effective in resolving a range of other transport and economic problems or achieving wider outcomes. Addressing problems with access to, from and through the port area will benefit from these larger interventions and should be a consideration in business cases for them.

The recommended programme is not effective in addressing Problem 2, which is:

“The Port is a key enabler to recovery after a HILP event, but the network infrastructure to and from the Port Area is vulnerable to such an event, further risking the Region’s ability to recover.”

The assessment found that interventions that replaced vulnerable infrastructure or invested in new

infrastructure performed well against measures related to this problem. The larger, more infrastructure-driven programmes were found to be effective. Two factors were considered in arriving at the recommended programme:

- There is a parallel PBC being developed looking into resilience in the Wellington area. This is likely to consider a number of programmes and the findings of this PBC should be included in the resilience PBC.
- The Ferry Terminal, State Highway Connections and Aotea Quay programmes are all effective in addressing this problem and do form part of the wider approach recommended in this PBC.

8.1.2 Contribution and Assessment of Specific Interventions

Hinemoa Street Improvements

The PBC identified that Hinemoa St is inherently capable of handling the requirements of CentrePort's forecast freight growth, although its capacity is currently being limited by only having a single right-turn exit lane, which is the direction of largest demand. Its capacity as a port gate is also being restricted by the reliance on Hinemoa Street as the main access and egress from the developing office park in the port area.

Hinemoa Street currently has approximately 7,000 light vehicles and cars entering weekly, forecast to grow by 20% by 2020 to around 8,500 and 4,000 trucks entering weekly forecast to grow by 30% by 2020 to around 5,500³⁶. CentrePort's traffic data suggests that at least 30%³⁷ of private cars entering Hinemoa Street are not accessing the port, rather they are commuter trips to the various office buildings. The office development is less than 50% complete compared to its consented build-out and the resulting traffic generation is a risk to Hinemoa Street's core role as a port gate. Hinemoa Street is already over-capacity as an exit in the PM peak in the northbound direction.

Adding an additional right turn lane and removing a significant proportion of cars from the Hinemoa Street intersection by providing a separate access for office development in the port area will enable Hinemoa Street to continue to function and cater for growth as an effective port gate. It will remove around 2,000 trips each way from the port gate per week, or around 18% of all movements.

These interventions are considered likely to be effective in securing the potential for growth in access to road freight to CentrePort and enabling the consented development of the port area to occur while managing the effects on wider access.

CentrePort in partnership with WCC are the expected owners of these interventions.

BCR: 1-3

Additional Rail Siding Length

CentrePort has advised during this PBC that it expects rail to take an increasing share of freight to the port. While actual numbers have not been provided, CentrePort is actively pursuing a strategy of purchasing and selling train capacity from the lower North Island and Upper South Island as well

³⁶ CentrePort Traffic Count Data. (CentrePort, 2016)

³⁷ This is conservative based on the location of screenline counts within the CentrePort area. No specific destination data is available.

as increasing use of mode-transfer hubs In Whanganui and Wairarapa in support of this strategy. Kiwirail has advised that the primary constraint to increasing rail throughput to CentrePort is the length and configuration of sidings on the port itself. Kiwirail considers that it has adequate capacity in “slots” for shunting wagons to the port for the foreseeable demand. KiwiRail’s current shunting schedule provides for 288 wagons per day, of which between 140 and 190 are being moved at present³⁸

Kiwirail and CentrePort have identified changes to the configuration of sidings within CentrePort that could realise a potential 20% increase in the ability to receive wagons that form part of the recommended programme.

The owners of this intervention are expected to be KiwiRail and CentrePort.

BCR: <1

Ferry Access Improvements

The legibility, efficiency and capacity of access to ferry terminals has been identified as a core part of the problem and is the focus of one investment objective. The improvements to Hinemoa Street are expected to reduce conflicts for Bluebridge customers with port internal traffic which will benefit ferry access legibility.

The Interislander terminal has numerous conflicts between pedestrian, rail, truck and car movements and suffers from poor legibility. Vehicular access is difficult to sign, read and use while pedestrian access to and from the site is almost non-existent. The interislander terminal is also under-capacity. The size of the land-side holding area is smaller than the largest ferry in the Interislander fleet and the company proposes obtaining larger ferries to cater for forecast growth in demand.

The recommended programme provides for a modest improvement to access to the Interislander terminal by way of a new intersection that provides simpler, less conflicted access for all movements. This would also include controlled pedestrian facilities. This intervention would include activities such as a new intersection, amended kerblines, footpaths, internal stacking and amended circulation. The proposed intervention does not include structural changes to ramps or overbridges. An allowance in cost the estimate has been made for purchasing additional land required for an intersection and circulation.

This could address some immediate issues with legibility of access and will reduce conflicts between modes. The intervention will not fully resolve legibility and conflict issues and will not address the capacity of the ferry terminal.

Responsibility for this intervention would be with WCC, while engagement from KiwiRail, NZTA and CentrePort may be required.

BCR: <1

Pedestrian Connections from the Port Area to the CBD

³⁸ Shunt data provided by KiwiRail, March 2016

Plan Change 48, which became operative in October 2013 provides for the development of commercial and office uses on the CentrePort side of Waterloo Quay. Under the District Plan rules, a net lettable area of 68,200 m² of office space is permitted under the plan. CentrePort advises that the current development has realised less than 50% of the permitted lettable area.

The masterplan included in Plan Change 48 anticipates that the precinct will be connected to the CBD. Waterloo Quay provides severance between the growing number of employees in the office development and the amenities provided by the CBD as well as the Wellington Railway Station.

The current pedestrian crossing points are connected to Hinemoa Street or the Bluebridge access opposite Bunny Street while a more direct desire line exists midway between these points. This desire line is evident with the number of people informally crossing between the two signalised junctions and this was reinforced through NZTA's Customer Insights work in which people surveyed noted the poor connection.

The Masterplan supporting Plan Change 48 appears to suggest a mid-block intersection at the termination of the proposed internal "Promenade" road. The recommended programme suggests that a pedestrian crossing be included at this location to provide a direct connection between the existing and proposed office development with the CBD.

This crossing will improve the reliability, travel time and safety for pedestrian trips to and from the port area and improve the legibility of access to the pedestrian-oriented activities in the port area. The intervention will also be consistent with the provisions of Plan Change 48.

Responsibility for this intervention is expected to rest with WCC and CentrePort

Demand Management and Productivity Measures

Analysis of traffic volume and performance data along with operational characteristics of ferries and CentrePort indicates that the port access route is highly peaked and the peaks of various activities overlap in some cases and differ in others. Over an average 24-hour period, Aotea Quay carries some 25,000 vehicles which is not considered high for a four-lane arterial road, yet the route is congested at peak times with speeds under 25km/h with poor reliability.

The significant majority of trips on the Quays is general traffic accessing the CBD and areas to the south and this is highly peaked based on the daily commute in and out of Wellington. Ferry departure times are driven to a large extent, by a national supply chain dynamic and tend to drive short peaks in demand that coincide with the AM and PM commuting peak. CentrePort and the freight operators in the port area have a pattern that coincides with the AM peak as trucks make early pick-ups for clients. As noted in discussion on the Hinemoa Street improvements, the growing office developments in the port area have a similarly aligned peak and this traffic is causing degradation in access to CentrePort.

Aotea Quay is a main city access route that is located adjacent to a working port and is fronted by two ferry terminals, a rail yard, freight companies, a stadium and is crossed by two railway lines. This creates issues with legibility for users and many conflicts. In particular, the rail level crossings are noted as a conflict that can delay people, although this is not reinforced by operational and performance data or customer insights as an issue. It is likely that the frequency of events is not

¹ Shunt data provided by KiwiRail, March 2016

sufficient.

In order to optimise the use of existing assets, a range of demand management and productivity measures are included in the recommended programme.

A **travel plan** for current and future office developments is expected to increase mode share for walking, cycling and public transport and could be effective in reducing the severity of the peak, encouraging utilisation of spare capacity on the shoulders of the peak.

This would be the responsibility of WCC to initiate, although the ongoing responsibility of implementation could rest with a travel management association or body of tenants or owners.

A **CBD parking strategy** could be effective over time in reducing peak demands on the Quays through changes in the supply, location and pricing of parking. This is likely to be difficult to make fully effective in the short term due to the extent of private ownership of car parking, however a defined parking strategy may be effective in moderating traffic growth as part of a wider suite of strategies and interventions in the long term. This would be the responsibility of WCC.

An **improvement to legibility and information** is identified as a potential improvement to the effectiveness of the route. This should be defined as part of the next phase of work, but could include improved signage and travel information being available in advance of journeys as examples. This would be the responsibility of WCC.

Changes to signal timing and operations were identified as a mechanism to more appropriately prioritise the range of functions and peaks in demand on the Quays. This intervention should be linked closely with the result of the Network Operating Framework (NOF) being jointly developed by WCC, NZTA and GWRC. The port and ferry operations generate a number of “peaks” during the day and the recommended programme proposes the installation of a new access and pedestrian crossing. These factors should drive a review of the way signals are managed so that the performance of the Quays route is optimised. This is expected to be the responsibility of WCC.

While the improvements to Hinemoa Street and an additional access for the office park will create additional capacity in the CentrePort entry for the short term, there are opportunities for CentrePort to further **increase the capacity of the port gate**. This could include a range of measures including extending the hours of operation of the port gate, introducing a booking system for trucks, carrying out more rail movements at night.

The abovementioned options are all considered deliverable within three years.

These measures are not immediately required, although could be effective when conditions in relation to port gate congestion and reliability of access require them. CentrePort is aware of these and is in a position to implement such measures when required.

The performance of the recommended programme against the proposed benefits, as expressed by the investment objectives is shown in Table 9.

Benefit	Investment KPI	Evaluation
Efficient access to,	Access for freight to and from the	The recommended programme provides capacity at and

<p>through and within the port area.</p>	<p>transport network does not inhibit the port area's ability to accommodate forecast growth.</p>	<p>within the port gate area to ensure that immediate access does not inhibit the port area's ability to grow.</p> <p>The recommended programme provides for an increased ability for rail freight to access CentrePort and additional capacity in the port gate for road freight by removing 2,000 private car movements per week from the port gate.</p> <p>This is enough additional capacity to handle the 1,500 additional truck movements per week expected by 2020.</p> <p>The dependent programmes identified in this PBC address delay for road freight accessing the port area which predominantly occurs on the state highway network.</p>
	<p>Delay and journey time variability for travel to, from and through the port area will be no worse than today</p>	<p>Segregating Port freight traffic and office park traffic will provide reliability and journey time savings to trucks accessing CentrePort. These improvements will occur in the PM peak in the short term and as demand increases, allow for sustained benefits at other times.</p> <p>Demand management interventions are expected to allow users to travel off-peak and attain the reliability and travel time benefits associated with travel at this time.</p> <p>Provision of a more direct and well-located pedestrian connection from the port area to the CBD will provide reliability and travel time savings along with improved safety for pedestrians.</p> <p>Delay and journey time reliability problems for trips to, from and through the port area occur on the state highway network. The recommended programme addresses delay and reliability in the immediate vicinity of the port itself which is a minor proportion of the total delay and variability. The dependent programmes are likely to more fully address the problems as part of delivering wider strategic outcomes.</p>
	<p>Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.</p>	<p>The inclusion of a simplified access to the Interislander terminal is expected to improve the legibility of access to the terminal and reduce conflicts. Changes to Hinemoa Street and internal circulation are expected to provide opportunities for a simplified access for Bluebridge customers.</p> <p>As the changes to the Interislander access do not fundamentally change the ferry terminal or the bulk of its internal arrangement, this will not fully resolve problems with legibility and is unlikely to be effective in terms of providing capacity or speed of operation.</p> <p>One of the larger, dependent programmes in this PBC is based around an integrated approach to a new, joint ferry terminal which will fully meet this investment objective.</p>

Increased resilience of the transport network into and out of the port area.	The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.	As the recommended programme does not contain any new connections, new structures or re-built structures, the programme is not considered effective against this investment objective. The larger, dependent programmes are considered effective against this objective through the implementation of new and replacement structures and routes.
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Table 9 Benefit Assessment

8.1.3 Performance against the ONRC customer levels of service outcomes

For each road category, customer level of service (CLOS) outcomes have been prescribed. These 'fit for purpose' CLOS outcomes are provisional and will be refined and amended as required by the Road Efficiency Group.

For the purposes of a programme business case, the performance of Aotea Quay has been assessed qualitatively against the CLOS outcomes, before and after implementation of the preferred programme. This is presented in Table 10.

Where the targets for each indicator are met, these have been highlighted in green. The gaps, where the road does not meet the target CLOS are shown in red. A number of the targets are still under development by the Road Efficiency Group. Where the level of performance against these targets is unknown, the text has been left black.

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Table 10 - Assessment of Aotea Quay against ONRC fit for purpose CLoS targets

Desired outcomes		Qualitative assessment		
Indicator	ONRC performance target	Existing	With the recommended programme	
Mobility	Travel time reliability	<p>High reliability outside of the peak period (± 15 seconds).</p> <p>Reduced reliability during the 2 hour peak periods (± 200 seconds) consistent with its role as a major urban centre access route.</p> <p>Infrequent (5-7 per day) and short delays due to planned rail shunts across the Quay.</p> <p>The Network Operations Plan is currently being finalised will provide a framework for balancing the competing demands of this corridor.</p>	<p>High reliability outside of the peak period (± 15 seconds).</p> <p>Improved reliability during the 2 hour peak periods at signals consistent with its role as a major urban centre access route.</p> <p>Infrequent (5-7 per day) and short delays due to planned rail shunts across the Quay.</p> <p>The Network Operations Plan will provide a framework for balancing the competing demands of this corridor.</p>	
		<p><i>Gap assessment - between Aotea Quay and the target.</i></p>	<p><i>There is inconsistency with the reliability of journey times in the peaks. Scheduled shunts across Aotea Quay result in intermittent delays for road traffic.</i></p> <p><i>Journey time reliability inconsistency during peak periods remains, but is likely to be improved slightly from the existing performance. Scheduled shunts across Aotea Quay will continue to cause delays for road traffic.</i></p>	
	Resilience	<p>Route or viable alternative is always available.</p> <p>Very rapid restoration of route affecting normal operating conditions. Road users are advised well in advance of issues affecting network performance and availability.</p>	<p>There are no recorded events where journeys are lost due to road maintenance not taking place.</p> <p>There are alternate routes that can be used in the event that part of the road needs to be closed.</p>	<p>There are no recorded events where journeys are lost due to road maintenance not taking place.</p> <p>There are alternate routes that can be used in the event that part of the road needs to be closed.</p>
		<p><i>Gap assessment</i></p>	<p><i>Nil.</i></p>	<p><i>Nil.</i></p>
	Optimal speeds (Safety & Efficiency)	<p>Higher speeds on KiwiRAP¹ 4-star dual carriageway roads, or lower or variable speeds where required to support network safety or productivity. [Priority users (buses and freight) provided with separate facilities where appropriate].</p>	<p>Speeds average between 50 and 60km/h outside of the peak period and 20km/h during the peak. The posted speed limit is 70km/h on the straight section between SH1 and Westpac Stadium then lowers to 50km/h for the remainder of its length.</p> <p>Priority for freight is not provided.</p>	<p>Speeds average between 50 and 60km/h outside of the peak period and 20km/h during the peak. The posted speed limit is 70km/h on the straight section between SH1 and Westpac Stadium then lowers to 50km/h for the remainder of its length.</p> <p>Priority for freight is improved at the intersection of Aotea Quay and Hinemoa Street.</p>
		<p><i>Gap assessment</i></p>	<p><i>No priority for freight is provided given its function as a Port Access Road.</i></p>	<p><i>Nil. Intersection improvements considered sufficient to meet freight priority measure.</i></p>

Safety	<p>Mostly forgiving roads and roadsides, equivalent to KiwiRAP 4-Star standard. User hazards absent or mitigated including head on risk. Active road users generally do not have access - if present, they are provided with separate space or are physically separated. Form of road provides road user guidance.</p>	<p>The four lane road has no, or flush, separation along its length.</p> <p>Poor, if any, shoulder width.</p> <p>Multiple roadside hazards including fences and poles.</p> <p>Two rail level crossings with barrier arms - no recorded incidences of trains hitting road users.</p> <p>Poor pedestrian access to and from the Interislander Ferry Terminal area.</p>	<p>The four lane road has no, or flush, separation along its length.</p> <p>Poor, if any, shoulder width.</p> <p>Multiple roadside hazards including fences and poles.</p> <p>Two rail level crossings with barrier arms - no recorded incidences of trains hitting road users.</p> <p>Improved pedestrian access to and from the Interislander Ferry Terminal area and between the office park and the CBD.</p>
	<p><i>Gap assessment</i></p>	<p><i>Lack of central separation and shoulders along with the location of multiple roadside hazards do not meet the requirements for a 4-Star Road.</i></p> <p><i>The presence of rail level crossings and standard of pedestrian facilities do not meet the CLoS targets</i></p>	<p><i>Lack of central separation and shoulders along with the location of multiple roadside hazards do not meet requirements for a 4-Star Road.</i></p> <p><i>The presence of rail level crossings do not meet the CLoS targets.</i></p>
Amenity	<p>High level of comfort, no discernible roughness.</p> <p>Aesthetics of adjacent road environment reflects journey experience needs of higher numbers of through traffic users. Character of scenic/tourist routes protected and enhanced.</p>	<p>The roughness and pavement condition is unknown - no issues identified by stakeholders.</p> <p>Roadside aesthetics are appropriate given the freight nature of the port area.</p> <p>Roadside aesthetics may not be considered appropriate given the gateway role for cruise and ferry passengers to Wellington - does not provide consistent amenity to support these users, with the exception of the covered walkway section between the cruise terminal and Hinemoa Street.</p> <p>Poor legibility and signage for a tourist route.</p>	<p>The roughness and pavement condition is unknown - no issues identified by stakeholders.</p> <p>Roadside aesthetics are appropriate given the freight nature of the port area.</p> <p>Roadside aesthetics not be considered appropriate given the Gateway role for cruise and ferry passengers to Wellington - does not provide consistent amenity to support these users, with the exception of the covered walkway section alongside the Burma road sidings.</p> <p>Improved legibility and signage for passengers will support tourist routes.</p>
	<p><i>Gap assessment</i></p>	<p><i>Lack of, or inconsistent signage and legibility and poor amenity to support a key tourist gateway to Wellington.</i></p>	<p><i>Does not meet amenity requirements for a key tourist gateway to Wellington.</i></p>

Accessibility	<p>Landuse access for road users rare and highly engineered, usually only to highway service centres. Strategic network connectivity for road users due to infrequent connections, generally only to National high volume roads. High volume traffic will be unimpeded by other traffic at junctions. [Mainly express bus services]. Active road users generally do not have access – if present, they are provided with network access and journey continuity by a separate space or are physically separated. Provision of quality information relevant to national road user needs.</p>	<p>Infrequent access along this corridor with few driveways and adjoining roads.</p> <p>Limited access for active users with some separation from traffic.</p> <p>Pedestrian facilities are absent from 2 intersections.</p> <p>Active road user strategy not in place to control demand and access to the corridor.</p>	<p>Infrequent access along this corridor with few driveways and adjoining roads.</p> <p>Limited access for active users with some separation from traffic.</p> <p>Pedestrian facilities will be provided at the re-configured intersection at the entrance to the ferry terminal area.</p> <p>An active road user strategy will be implemented to re-direct cyclists away from Aotea Quay</p>
	<p><i>Gap assessment</i></p>	<p><i>Missing pedestrian facilities at intersections and mixing of active users with freight and general traffic</i></p>	<p>Nil.</p>

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8.2 PROGRAMME RISK

The recommended programme is a small scale programme that does not have a high implementation risk profile. The most significant risk associated with the recommended programme is related to the limited extent to which it addresses the problems identified. This risk is addressed through the development of a range of more significant programme alternatives that should be progressed upon certain trigger points or dependencies.

The specific risks associated with the recommended programme are:

Technical risks

The recommended programme consists of a number of small scale interventions that have a low level of technical risk. Some interventions have limited scope definition at this stage however and some technical risks may not have been identified at this stage. The proposed access improvements to the Interislander terminal may contain some technical risks due the limited space and complexity of movements.

Operational

Given the low impact nature of the recommended programme, operational risks generated by the programme are low. The most significant operational risks relate to the issues not fully resolved by the recommended programme. With an increase in rail traffic to CentrePort there is a risk that this may create additional blockages to traffic on the Quays. The 2012 Ngauranga to Aotea Quay SAR noted an operational risk in relation to traffic queues extending to SH1. Other operational risks relate to the ongoing operation and prioritisation of port and through movements on the Quays.

Financial

Given the small scale of the recommended programme, financial risks are considered low overall. The share of funding however, is spread across a range of organisations and there is risk in the ability of each co-investor to have capital and/or operational funds available in a co-ordinated manner.

Public/Stakeholder

There is potential risk that the public and stakeholder reaction may be negative due to the low scale of interventions. This risk is not considered high due to the lack of overt expectation. Mitigation of this risk is likely to result from the articulation of the larger aspects of PBC being considered as part of the well-publicised N2A programme. There are some localised risks in relation to immediate stakeholders having access disrupted, changed or otherwise impacted by the recommended programme. These include operators such as Bluebridge, office tenants and freight operators.

Environmental and Social Responsibility

There are not risks of note in relation to environmental and social responsibility.

Safety

The evidence analysis did not highlight significant safety issues in the study area. Some interventions

proposed may have a positive impact on potential safety issues such as pedestrians crossing Waterloo Quay and conflicts in relation to the Interislander terminal access. The small-scale nature of the recommended programme does mean that the risk identified in the 2012 Ngauranga to Aotea Quay SAR in relation to traffic queues extending to SH1 from the rail level crossings on Aotea Quay is not addressed.

Economy

The recommended programme does not provide for a major enhancement in the economic productivity of the port area but does align with forecasts. There is a risk that forecasts for port-related traffic (road and rail) are exceeded and that access to the port area becomes a limiting factor in the port area's contribution to regional economic growth.

8.3 VALUE FOR MONEY

The recommended programme, with an estimated cost of \$27m - \$33m is generally aligned with the scale of the problem as defined in this PBC and as a result is considered value for money.

The programme BCR range is around 1. BCRs for individual activities within the recommended programme, to the extent that they are relevant are outlined in Table 11.

Activity	Redirect Cyclists along Thorndon Quay	Separate office park access	Reconfigure rail sidings	Reconfigure Hinemoa Street intersection	Ferry terminal access improvements
Timing	1-3 years	1-3 years	1-3 years	1-3 years	1-3 years
Cost	\$7m	\$1m	\$10m	\$1m	\$5 - \$10m
BCR	1-3	1-3	<1	1-3	<1

Table 11 Recommended programme BCRs

8.4 SENSITIVITY ANALYSIS

Sensitivity analysis has primarily focussed on capital costs. The nature of a PBC means that cost information is conceptual. This is due to some of the interventions not being designed or fully scoped, meaning assumptions in relation to quantities and benchmarks have significant ranges. The study area is complex with many assets and operations overlapping and located in close proximity. For example, many state highway connection options may involve effects on railways and ferry operations. The scope, design and as a result cost of some interventions is complex and highly connected to decisions of multiple organisations or projects as well as existing infrastructure.

Detailed cost ranges for individual interventions are included in Appendix D, along with BCR ranges.

Benefit-side inputs, for example travel times, speeds and volumes have been primarily sourced from GWRC's WTSM Model and as a result are considered relatively certain.

8.5 ASSESSMENT PROFILE

Strategic fit:

H

The recommended programme aligns well with organisational priorities of the partner organisations. The programme is well-aligned with the GPS and consequently NZTA's Statement of Intent as they comment on efficiency of freight and improving economic productivity and problems address improvement to a major port, inter-island ferry terminals and CBD. The recommended programme also aligns well with the visions and outcomes in WCC's Long Terms Plan relating to improved connections and the RLTP in relation to a reliable and effective strategic road network and effective movement of freight.

Of particular note, the problem:

- Is focussed on improving access to areas of employment, including the Wellington CBD as well as a port. In 2015 the Wellington Region was the third most populous region in New Zealand with a resident population of 481,187. There were 230,200 full-time equivalent employees (FTEs) in the region. GDP generated in the Wellington Region was approximately \$25.8b
- Relates to access to inter-island ferry terminals which provide a main and gateway for tourists between the North Island and the South Island and the only means of vehicular transport for tourists between the islands.
- Addresses capacity and reliability for freight, including to a major regional and international port, rail yard, freight operator's facilities as well as inter-island ferries.
- Considers the integration of multiple modes, providing improved connections in a part of the network that involves mode transfer to/from rail, sea and road for both freight and passengers.

Effectiveness of the proposed solution:

M

The recommended programme is a suite of small-scale improvements that address the problem in the port area. As no major additional infrastructure is proposed, the effect on the ability of the port area to assist recovery from a HILP event is limited. As a result, the recommended programme is considered LOW in terms of its effectiveness.

Criteria	Assessment	
Outcomes focus	<p>The expected change against Problem 1 is tangible in that there is potential for an increase in rail capacity to CentrePort, a tangible reduction in time and increase in capacity for vehicles of all modes accessing the CentrePort and an improvement in ferry terminal access legibility through a reduction in conflicting movements.</p> <p>Taking a whole of journey view, the majority of delay for trips to, from and through occurs on the state highway network, which is connected to a range of other transport problems outside of the scope of this PBC. The recommended programme partially addresses the problem by generating improvements to immediate port area access points. Fully addressing the problem will require</p>	M

	<p>inclusion of the issues and evidence in related initiatives.</p> <p>The recommended programme is not effective in resolving Problem 2 which relates to the port area's ability to provide a role in recovery from a HILP event. No new or significantly upgraded transport connections are included that would enhance the port area's ability to provide for recovery following a HILP event.</p>	
Integrated	<p>The recommended programme is consistent with current and future transport plans and does not affect the network function of the route. A key plan for access to and through the Wellington CBD is evolving through the N2A process. The recommended programme does not inhibit the potential for the N2A process to deliver on its purpose.</p> <p>The recommended programme effectively supports the future land use plans for the port area by providing for additional capacity to CentrePort. This includes allowance for growth in port-related activities as well as supporting consented commercial and office development.</p> <p>The port area is a hub for multiple modes of transport. The recommended programme addresses problems across, rail, road and sea modes. However, the scale and extent of the recommended programme is such that the problems are only partially addressed across the modes.</p> <p>The recommended programme includes actions from a number of partners. There has been good levels of engagement across partners and potential co-investors at a senior level throughout the development of the PBC. Cross-party agreement to take relevant activities in the recommended programme forward has been expressed through workshops and stakeholder engagement, although not formally agreed at the time of writing.</p>	M
Correctly Scoped	<p>The recommended programme includes a suite of productivity and demand management interventions targeted at increasing the efficient use of existing assets.</p> <p>In terms of supply, recommended programme is a suite of improvements with an expected cost of \$27m - \$33m, which is generally aligned to the estimated scale of the problem which, when expressed as an NPV of delay is around \$20m.</p> <p>The recommended programme is cognisant of related strategic transport studies, including N2A and the proposed ferry terminal upgrade (Project Phoenix). In this regard, the recommended programme does not propose interventions that would inhibit or affect these studies, instead recommending consideration of port access in the N2A project and a joint business case in the case of Project Phoenix.</p>	H
Timely	<p>The recommended programme is achievable in the short-term as it comprises operational and relatively small-scale physical improvements. The scope of the recommended programme addresses currently evident issues with respect to the</p>	H

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	<p>capacity of Hinemoa Street (the port gate), constraints with respect to rail freight access to CentrePort and legibility of ferry access while allowing for expected growth.</p> <p>While the existence and scale of the problem has been established, the urgency of resolving constraints in access to, from and through the port area is not considered high.</p> <p>Constraints and inefficiencies related to ferry terminal access are considered urgent due to the Interislander's requirement to introduce new, higher capacity ferries in 2020, which exceed the capacity of the existing terminal. It is recommended that resolving the ferry terminal aspect of the problem is carried out by way of a joint business case with the proposed ferry terminal upgrade.</p>	
Confidence	<p>The recommended programme manages future/outcome risk in two ways. Firstly, it provides a programme of an appropriate scale for the problem. This programme is modest in scale, with effects focussed on a small part of the transport network reducing the complexity and potential variables that may affect outcomes. This results in a high degree of certainty that the recommended programme will achieve the outcomes expected. Secondly, the PBC recommends that more significant programme alternatives are considered in the context of related or dependent studies or business cases. This provides confidence that other outcomes are unlikely to be adversely affected by the recommended programme and that risks and outcomes are considered in a co-ordinated manner.</p> <p>The relative simplicity of the recommended programme means that confidence in costs is high considering the early stage in the business case process.</p> <p>The recommended programme does not have significant data gaps, however there are risks with understanding interrelationships with other strategic outcomes.</p>	H
Overall	<p>The recommended programme is considered medium in its effectiveness. The programme is correctly scoped, timely and provides reasonable level of confidence that it will achieve the outcomes envisaged by the recommended programme. However, it is considered that the recommended programme only partially resolves the problems as defined.</p>	M

Benefit and cost appraisal:

L

Preliminary economic analysis indicates that the BCR for the programme is over 1 but less than 3, providing a LOW efficiency.

9 PROGRAMME FINANCIAL CASE

9.1 INDICATIVE COST

The capital cost of the preferred programme is in the range \$27 - \$33m. No significant maintenance or operational costs would be expected.

9.2 FUNDING ARRANGEMENTS

The main costs on the public sector would be expected to fall to WCC with standard Transport Agency contribution, in accordance with the FAR. CentrePort has already indicated that it will be funding the works on the port land to modify the rail sidings.

9.3 AFFORDABILITY

The cost of the preferred programme is modest. WCC officers have indicated their willingness to recommend funding to the Council. The approved RLTP already includes works for the port area to a value in excess of the recommended programme.

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PART C - DELIVERING AND MONITORING THE PROGRAMME

10 MANAGEMENT CASE

10.1 PROGRAMME GOVERNANCE AND REPORTING

10.2 STAKEHOLDER ENGAGEMENT AND COMMUNICATIONS PLAN

10.3 PROGRAMME PERFORMANCE AND REVIEW

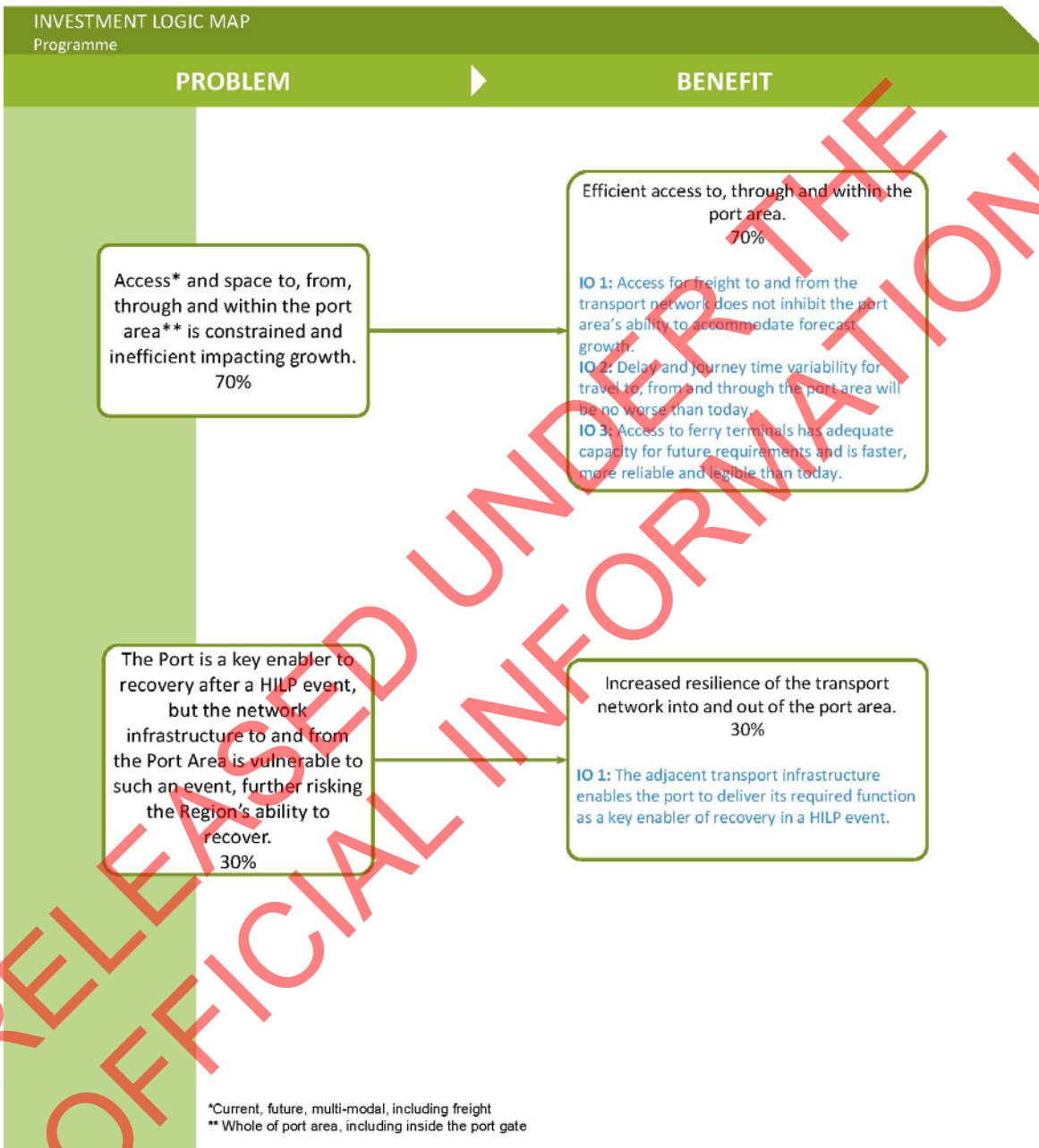
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APPENDIX A – INVESTMENT LOGIC MAP



Investment logic map

Accessing Wellington's Port Area PBC



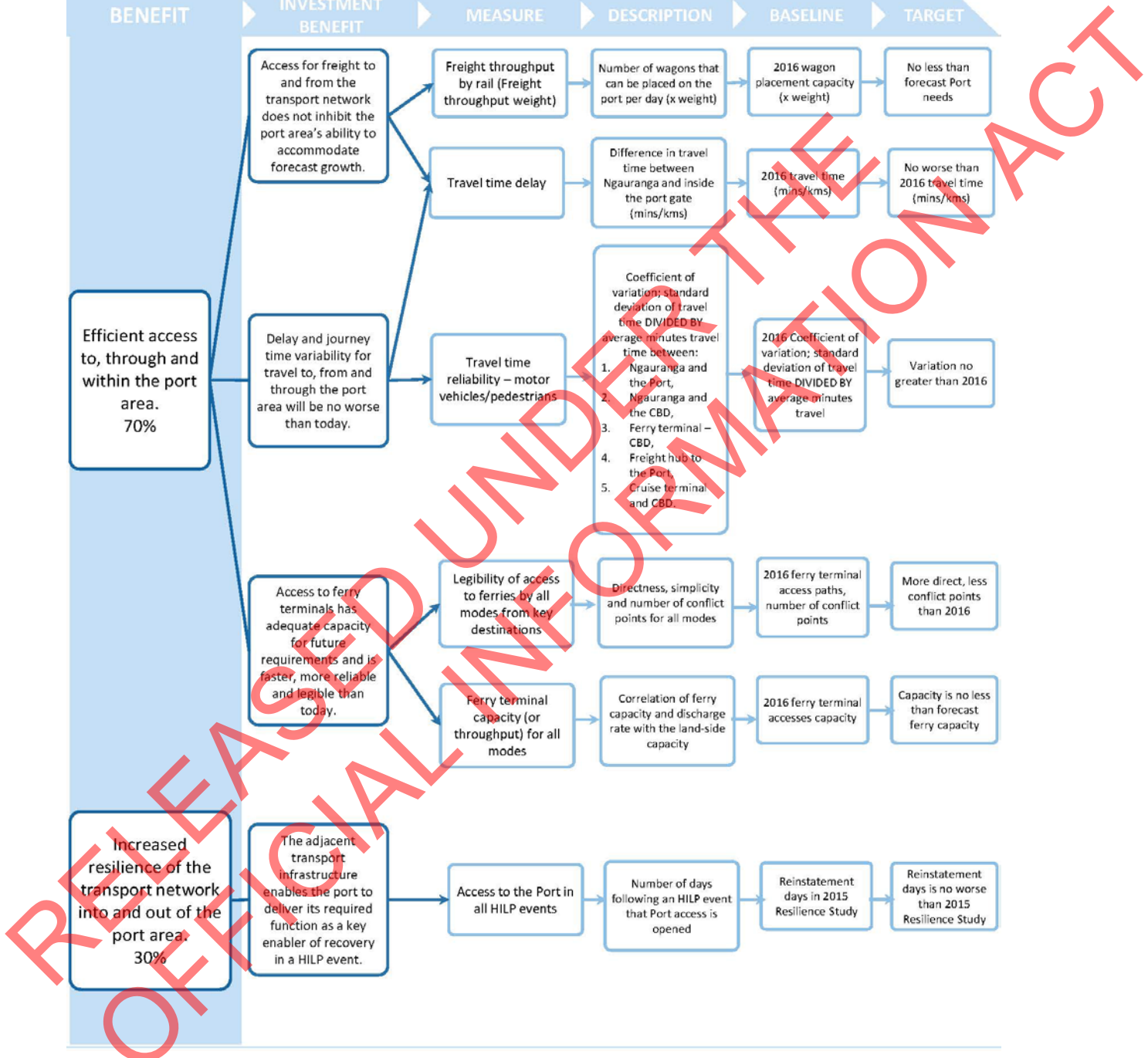
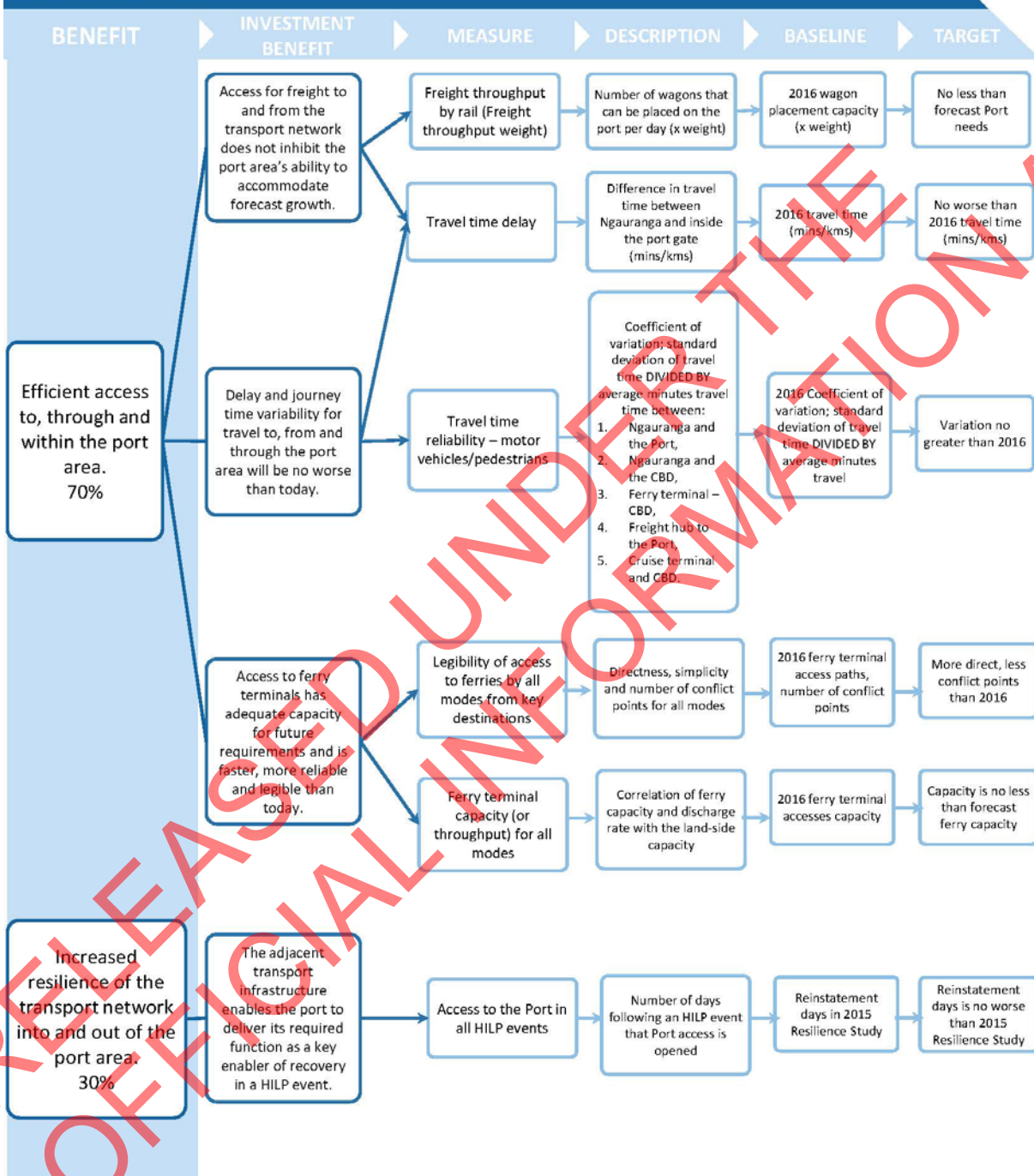
APPENDIX B – BENEFIT MAP

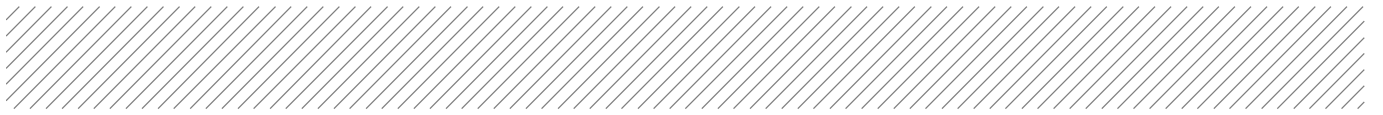


Benefits map

Accessing Wellington's Port Area PBC

BENEFIT MAP





APPENDIX C – Assessment of Alternatives Summary Table

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APPENDIX D – ASSESSMENT OF ALTERNATIVES SUMMARY TABLES FOR EACH OPTION

This section records the long list of programme alternatives which have been considered going into the facilitated workshop on 23 May 2016.

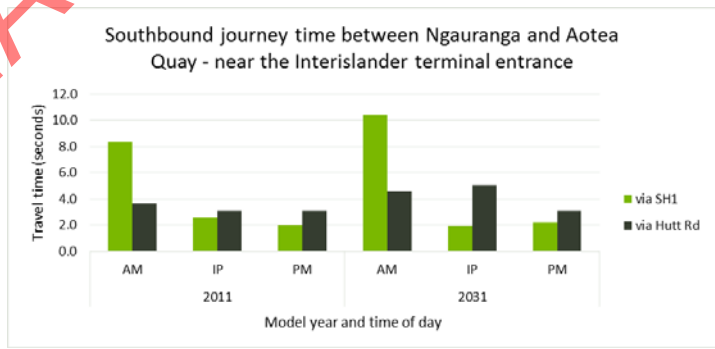
Large Scale Supply options

DIRECT OFF- RAMP FROM SH1 TO THE FERRY TERMINAL

Option description:	A direct off-ramp to provide access from SH1 to the ferry terminal. This option would require construction of a raised off-ramp structure with sufficient clearance above or to the side of the rail sidings which are in operation daily.	
Estimated cost:	Capital cost (\$m):	\$30-50m assuming no bridge structure (if alignment avoids rail siding) \$50-80m if bridge structure over rail required
	Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

<p>Performance against investment objective:</p> <p>Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.</p>	<p>Separates port-bound road traffic and ferry-bound traffic from general traffic before any conflicts occur on Aotea Quay.</p> <p>Measure: Freight throughput by rail</p> <p>No effect.</p> <p>Measure: Travel time delay</p> <p>Provides for slightly reduced travel time for vehicles accessing the Interislander terminal as they can remain on SH1 and directly access the terminal without the need to use Hutt Road and the current circuitous access.</p> <p>Journey times to the Interislander terminal in the AM peak via Hutt Road (5.0 mins) are significantly shorter than by SH1 in 2031 (10.4 mins). A direct off-ramp would not provide a travel time advantage for am peak sailings. At other times, the journey time is expected to be slightly shorter via SH1 and a direct off-ramp (5.0 mins via Hutt Rd and 1.9 mins via SH1 2031).</p>
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Likely to be more effective when combined with an additional southbound lane on SH1 and with a joint ferry terminal where benefits can accrue to all ferry users. Ferry traffic makes up a relatively minor proportion of the overall port area to, through and from traffic.

<p>Performance against investment objective:</p> <p>Delay and journey time variability for travel to, from and through the port area will be no worse than today.</p>	<p>Measure: Travel time delay</p> <p>See above</p> <p>Measure: Travel time reliability</p> <p>Minor positive effect. Improved reliability for ferry-bound trips, to the extent that the access from the network to the ferry terminal is a factor.</p> <p>As the off-ramp makes up a small proportion of the overall southbound journey, the travel time reliability is unlikely to be significantly different.</p> <p>When combined with an exit only lane southbound on SH1 from Ngauranga, the travel time reliability and delay benefits of the off-ramps are better realised and the journey time reliability may improve more significantly</p> <p>This intervention does not assist with trips FROM the ferry to the state highway network and through the wider port area.</p>
<p>Performance against investment objective:</p> <p>Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.</p>	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>Significantly increases the legibility of vehicular access TO the Interislander terminal by reducing number of turning movements required and conflict points to two, compared to approximately seven along the Hutt Road route. Does not improve pedestrian or cyclist wayfinding or enhance legibility for trips FROM the Interislander terminal.</p> <p>Measure: Network capacity to accept and deliver ferry transport needs for all modes</p> <p>An off-ramp directly into the terminal area will enable the Interislander terminal to accept vehicular trips in greater numbers and at a greater rate assuming there is sufficient storage available. Potential new ships could have turn-around times in port of 1 hour 10 minutes if twin level link spans are provided to increase the boarding/alighting rate. Expected requirements will therefore be an arrival rate in the range of 500-600 vehicles and 50-100 trucks per hour, prior to sailing. This will place additional pressure on the existing storage which currently is insufficient for the current ferries with 1,900 lane m and will exacerbated for future ferries which will have capacities of 2,500-3,000 lane m.</p> <p>This intervention is only effective in capacity terms should the terminal storage capacity be increased.</p> <p>Will not enhance discharge rates or capacity FROM ferries.</p>
<p>Performance against investment objective:</p> <p>The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.</p>	<p>Measure: Access to the Port in an HILP event</p> <p>Potential positive effect.</p> <p>If built to a high standard, this link could provide a resilient alternative access to the port area from SH1.</p>
<p>Rationale for selection or rejection of alternative:</p>	<p>If the ferry terminal is significantly upgraded and capacity enhanced there would be a requirement to improve capacity, legibility and reliability of access.</p> <p>It is recommended that this option is considered as part of any significant ferry terminal re-build concept (Project Phoenix).</p>
<p>IMPLEMENTABILITY APPRAISAL</p>	
<p>Feasibility:</p>	<p>This option is feasible. It will however, have a number of challenges associated with height clearances, alignment and construction risks as a result of the constrained coastal environment. May require reclamation of land west of Kaiwharawhara Point.</p>

	<p>Minimum off-ramp spacing 800m preferable between off-ramps to provide adequate signage and weaving length.</p>
Risks:	<p>Does not address getting FROM the port to SH1.</p> <p>Construction and programme risks associated with building above a live rail line. Geotechnical risks building on reclaimed land.</p> <p>If the ferry terminal is not upgraded in conjunction with provision of the off-ramp, there is a traffic risk that the existing insufficient storage will not be able to accept the vehicle arrival rate and result in queuing of vehicles back up the on-ramp onto SH1.</p>
Interdependencies:	<p>May require the amalgamation of land in the vicinity of the Interislander terminal.</p> <p>Ferry terminal off-ramp would require modification at the Interislander terminal and would logically be done in conjunction.</p> <p>Dependent on future of rail in this area – desirable alignment would be to come in over the top of the siding if this (and the marshalling area) were removed.</p>

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INLAND PORT

Option description: Develop or use more of an existing inland port enabling/requiring port-bound freight to be co-ordinated through an inland port and transported to the port outside of business hours by truck or rail (or both), removing conflicts at peak times.

Estimated cost:

Capital cost (\$m):	\$130m for structure, pavements and access (road/rail) + \$10m for lifting equipment
Opex/Maintenance (\$m/30yr):	Highly variable depending on site, scale and function.
	High

INVESTMENT OBJECTIVES

Performance against investment objective:

Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.

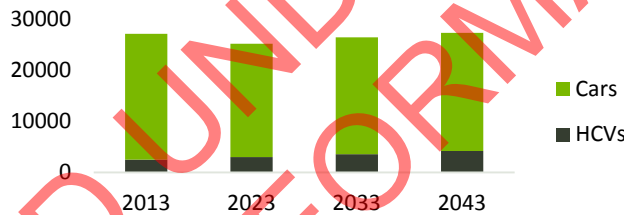
Measure: Freight throughput by rail

Possible increase. While this measure may result in more rail-based traffic to the port, in itself it will not result in additional **access capacity** for rail.

Measure: Travel time delay

Will have a minor effect on overall delay to, through and from the port area. Trucks make up around 10% of the total traffic flow on Aotea Quay. One third of these access Centreport and as a result are potentially removed through an inland port. Removing a proportion of these through increased inland port usage is unlikely to have a measurable effect on travel time delay for trucks and other traffic accessing the port area.

Aotea Quay Base forecast (2-way AADT)



Its effectiveness is further limited by the number of movements it would remove. The largest single origin and destination for truck movements to and from the port area is to the Wellington area. These are short journeys that are unlikely to use an inland port.

AM 2013 – source: WTSM 2013 freight matrices

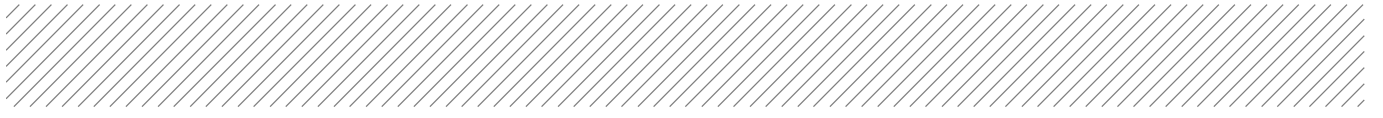
		Destinations							Port	External
		Wellington	Porirua	Kapiti	Lower Hutt	Upper Hutt	Wairarapa			
Origins	Wellington	2787	170	12	344	32	1	51	30	
	Porirua	172	401	21	60	21	1	7	9	
	Kapiti	12	21	628	6	3	0	7	43	
	Lower Hutt	386	64	7	1499	112	4	29	24	
	Upper Hutt	35	21	3	106	315	6	5	5	

	Wairarapa	2	1	0	4	7	949	9	11
	Port	26	4	4	15	3	5	0	5
	External	26	8	40	22	4	11	3	0

<p>Performance against investment objective:</p> <p>Delay and journey time variability for travel to, from and through the port area will be no worse than today.</p>	<p>Measure: Travel time delay</p> <p>See above</p> <p>Measure: Travel time reliability</p> <p>Very minor positive effect, based on above logic.</p>
<p>Performance against investment objective:</p> <p>Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.</p>	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>No effect.</p> <p>Measure: Network capacity to accept and deliver Ferry transport needs for all modes</p> <p>No effect</p>
<p>Performance against investment objective:</p> <p>The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.</p>	<p>Measure: Access to the Port in an HILP event</p> <p>No effect as this intervention does not alter the immediate port access infrastructure.</p>
<p>Rationale for selection or rejection of alternative:</p>	<p>CentrePort already runs inland port operations at Whanganui and Palmerston North, running trains to the port from these locations.</p> <p>This option will not be included in programme analysis as it is outside the ability of public agencies to implement and CentrePort advises it is already optimising this form of operation.</p>

IMPLEMENTABILITY APPRAISAL

<p>Feasibility:</p>	<p>To be feasible it needs to be in close proximity to SH1 and the NIMT line, of a similar size to the KiwiRail Southdown yard (30Ha) including storage facility for empty containers.</p>
<p>Risks:</p>	<p>Increase in local traffic in terms of truck volumes around the locality of the Inland Port.</p> <p>The ability of the port to handle longer trains is the constraining factor. Increased shunt movements across level crossings may cause congestion on Aotea/Waterloo Quay.</p>
<p>Interdependencies:</p>	<p>Dependant on supply of wagons and locomotives to shuttle freight between the inland port and the main port.</p> <p>Would be complemented by grade separation of the level crossings on Aotea Quay and increased siding lengths on the port. If the siding lengths are not increased on the port, the double handling involved in splitting up trains will offset the benefits of consolidation at the inland port.</p> <p>Assumes capacity on the main rail line into Wellington is sufficient to accommodate a greater number of freight movements.</p> <p>Night operations would need to increase in the meantime to warrant demand. It is unlikely that Wellington will receive the container traffic to warrant the efficiency loss of double handling.</p>



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SECOND NORTHBOUND ON- RAMP FROM FERRY TERMINAL

Option description:	Construction of a second northbound on-ramp directly from the ferry terminal. Would likely go under the SH1 and become a left hand merge into the right hand central lane. Or alternately take over and descend to merge with the right hand central lane.	
Estimated cost:	Capital cost (\$m):	\$40-80m
	Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

<p>Performance against investment objective:</p> <p>Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.</p>	<p>Measure: Freight throughput by rail</p> <p>No effect.</p> <p>Measure: Travel time delay</p> <p>Would allow easier access to SH1 northbound from the Interislander terminal, or a joint terminal if combined with that intervention. Likely to enhance the ability of the ferry terminal to deal with growth, however in the context of the wider port area's ability to deal with growth the intervention has only a minor positive effect.</p>
<p>Performance against investment objective:</p> <p>Delay and journey time variability for travel to, from and through the port area will be no worse than today.</p>	<p>Measure: Travel time delay</p> <p>See above</p> <p>Measure: Travel time reliability</p> <p>Minor effect as it serves the Interislander ferry terminal traffic only removing some conflict points. Does not provide advantages to traffic through the port area. The intervention would perform better if coupled with a combined ferry terminal, operated by Bluebridge and Interislander, although even in this situation, the benefits only accrue to a relatively small proportion of freight to, from and through the port area.</p>
<p>Performance against investment objective:</p> <p>Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.</p>	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>Significantly increases the legibility of vehicular access FROM the Interislander terminal. Does not enhance legibility for trips TO the Interislander terminal or pedestrian legibility.</p> <p>Measure: Network capacity to accept and deliver ferry transport needs for all modes</p> <p>Will enable the Interislander terminal to discharge vehicular trips in greater numbers and at a greater rate. Expected requirements will be for 500-600 vehicles and up to 100 trucks in less than an hour. This would place additional pressure on the existing egress from the ferry terminal area.</p> <p>Will not enhance loading rates or capacity TO ferries.</p>
<p>Performance against investment objective:</p> <p>The adjacent transport</p>	<p>Measure: Access to the Port in an HILP event</p>

<p>infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.</p>	<p>Potential positive effect.</p> <p>If built to a high standard, this link could provide a resilient alternative access from the port area to SH1.</p>
<p>Rationale for selection or rejection of alternative:</p>	<p>Included in the terminal upgrade programme. Technical issues means this intervention remains uncertain.</p> <p>Technically, this is a difficult option and its benefits are confined to ferry users, comprising some 1,500 trips per day compared to 5,500 trips per day from the port and 10,000 trips per day from the CBD and port area combined.</p>

IMPLEMENTABILITY APPRAISAL

<p>Feasibility:</p>	<p>May require a 5th northbound lane to provide adequate spacing from Aotea Quay on-ramp lane gain. The vertical geometry will be challenging - to save costs on structure it will likely join in the centre and either be a bridge over or tunnel under the southbound lane. Given site constraints, this is likely to be difficult to achieve.</p>
<p>Risks:</p>	<p>Considered a high risk.</p> <p>Any interactions with the railway will increase programme risk – especially over the NIMT – reduced risk associated with shunting lines.</p> <p>Environmental risk: near the Watercourse outlet</p> <p>More risk associated with this on-ramp than with the off-ramp. May have significant safety concerns relating the SH1 merge and ramp spacing.</p> <p>Geotechnical risks associated with the reclaimed land and the need for large and deep piles in and around the existing structure.</p>
<p>Interdependencies:</p>	<p>Dependent on the removal of rail from the ferry area, preferably including the siding that comes out onto Kaiwharawhara Point.</p>

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FREIGHT/HOV BYPASS ON SH1 ONRAMP

Option description: Add freight/HOV by-pass onramp onto SH1 (signalise NB on-ramp if required). Would require building a new ramp because the existing structure is not up to code in an earthquake. Alternatively the lane could continue at grade until and merge just prior to where the existing ramp begins to climb up to the SH1 – this will be a lower cost option.

This option could also involve an extension of the freight/HOV lane south along Aotea Quay to allow trucks to avoid PM peak queues northbound.

Estimated cost:	Capital cost (\$m):	\$10-15m
	Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

Performance against investment objective:

Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.

Measure: Freight throughput by rail

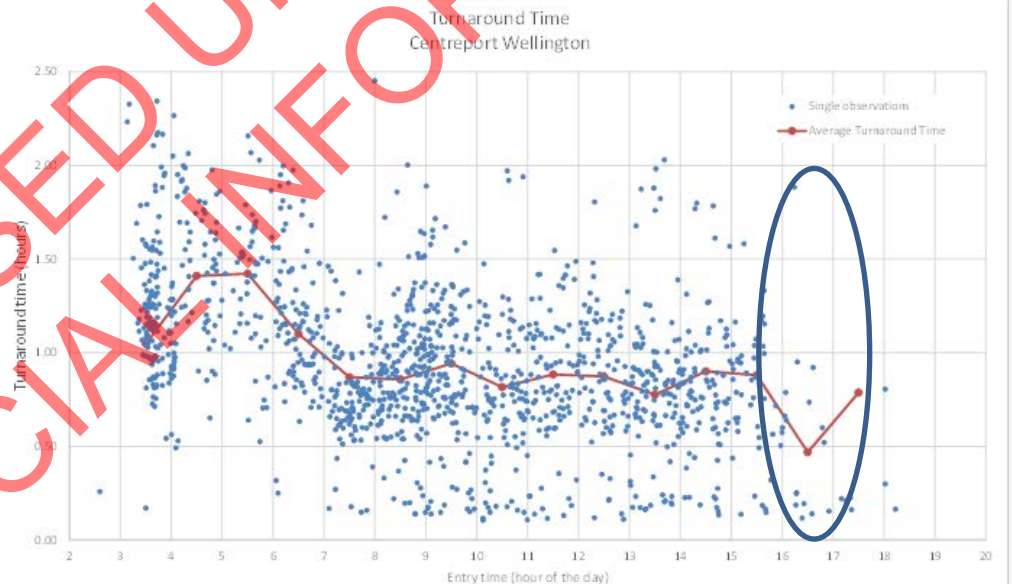
No direct effect. There is a risk that rail access could be slightly negatively affected as the spatial requirements for a widened on-ramp may require movement of rail lines. It is not certain as to the impact of any such change.

Measure: Travel time delay

Provides for a reduced travel time and greater capacity to accommodate growth for trucks northbound in the PM peak. Trucks make up 10-13% of the traffic on Aotea Quay. Queues on Aotea Quay in the PM peak are significant for a short period.

A bypass lane along the on-ramp will be approximately 300m – longer if extended onto Aotea Quay. This will reduce travel time for freight vehicles to a minor degree and the HOV component may encourage more effective use of the asset.

Freight function on Aotea Quay is almost 24 hours. The strongest peak in truck movements is in the AM peak, with less movements in the PM peak.



Centreport truck movements by time of day with PM peak highlighted. (source: Centreport)

At times of the day other than PM peak there is little congestion from which a freight lane will produce a notable time saving for freight vehicles.

The further south the freight bypass is started, the greater the travel time savings and ability to accommodate growth.



Performance against investment objective:

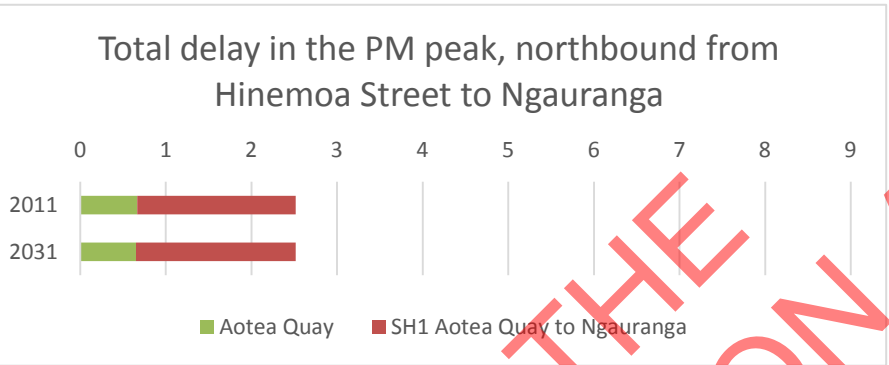
Delay and journey time variability for travel to, from and through the port area will be no worse than today.

Measure: Travel time delay

See above

Measure: Travel time reliability

A significant positive effect for a small proportion of the traffic flow. Improved reliability for a short section of the journey. Note that most delay occurs on SH1 and SH2.



Graph shows current and forecast northbound delay on Aotea Quay and SH1 as far Ngauranga. This intervention would address delay on Aotea Quay and a small proportion of SH1.

Reliability of the journey between the port and Ngauranga is unlikely to be significantly different.

Does not assist trips Ngauranga TO the port or ferry.

Performance against investment objective:

Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.

Measure: Legibility of access to ferry terminals by all modes from key destinations

No effect.

Measure: Network capacity to accept and deliver ferry transport needs for all modes

No effect

Performance against investment objective:

The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.

Measure: Access to the Port in an HILP event

Potential positive effect.

If built to a high standard and separate from the existing structure, this link could provide a resilient alternative access from the port area following an HILP event.

Rationale for selection or rejection of alternative:

This option improves access to the transport network and therefore will be included in further analysis. The benefits are increased if this option is complemented by reallocation of road width for freight along Aotea Quay in particular in the northbound direction and made available to high occupancy vehicles (HOVs).

IMPLEMENTABILITY APPRAISAL

Feasibility:

Would require building a new ramp because the existing structure is not up to code in an earthquake. Alternatively the lane could continue at grade until and merge just prior to where the existing ramp begins to climb up to the SH1 – this will be a lower cost option. The length of by-pass though is likely to be too short to provide sufficient benefits.

Extending the lane south on Aotea Quay would provide additional benefits, however this would require the purchase of the courier building and land from Kiwirail.

Risks:	<p>Any interactions with the railway will increase programme risk.</p> <p>Space is constrained by existing motorway piers – would require land purchase from KiwiRail/Agreement with NZ couriers who occupy the space.</p> <p>Geometric risks: the merge would be on the outside of a right hand corner as the space then becomes constrained by sidings. This will require a departure from standard. Alternatively the rail siding will have to be shifted – this is space constrained by the Hutt Road overbridge piers.</p>
Interdependencies:	<p>Construction of an off-ramp out of the ferry area would reduce the benefits of providing a freight by-pass to the northbound on-ramp.</p> <p>Is likely to only be implementable if the rail sidings are rearranged to make space for the outside lane to merge.</p>

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GRADE SEPARATION OF ROAD AND RAIL ON WATERLOO QUAY

Option description:	Provision of a road over rail bridge with pedestrian facilities. Providing a 1 in 15 grade and 7m clearance above the tracks, the approach would need to be 105m with 100m central platform (~350m elevated structure). Port-bound vehicles would likely bypass the grade separated bridge and turn off directly into the port from a slip lane or at an intersection further to the east along Aotea Quay.	
Estimated cost:	Capital cost (\$m):	\$50 million for structure (7000m ²)
	Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

<p>Performance against investment objective:</p> <p>Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.</p>	<p>Measure: Freight throughput by rail</p> <p>Will reduce the tension between shunting across Aotea Quay and through traffic using the Quay to access the City and in theory allow more shunts. However, the core limitation in capacity is the length of rail sidings to receive the wagons.</p> <p>Based on the current shunt schedule additional capacity exists, however increased use of shunt slots will increase the effects on road users.</p> <p>This option should be complemented by an increase in the port's capacity to receive freight by optimising the existing sidings.</p> <p>Measure: Travel time delay</p> <p>Will not have a significant effect. While shunts have an effect on a small proportion of daily users, this is not great enough to show up in any statistics on journey time or travel speeds due to the intermittent nature of the timing. If rail use increases there may be a more appreciable benefit.</p> <p>Port Efficiency Benefits:</p> <p>While unlikely to generate significant benefits in access TO, THROUGH, and FROM the port area, this option may be capable of delivering benefits to Centreport and Kiwirail in enabling a more effective movement and handling system by removing site constraints imposed by the severance effect of Aotea Quay.</p> <p>These benefits are not captured specifically in the Measures adopted for this PBC and the scope for NZTA to invest, however they are relevant to the port's ability to accommodate growth by removing a physical impediment created by the transport network.</p>
<p>Performance against investment objective:</p> <p>Delay and journey time variability for travel to, from and through the port area will be no worse than today.</p>	<p>Measure: Travel time delay</p> <p>See above</p> <p>Measure: Travel time reliability</p> <p>Minor positive effect. Will improve reliability for the very small proportion of daily users affected by rail shunts. Increased use of rail as an access mode will, however, make reliability worse than today, increasing the benefit to be gained. Given the frequency of shunt crossings, even in a growth scenario, evidence suggests that in an overall sense, reliability benefits will be minor.</p>
<p>Performance against investment objective:</p> <p>Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.</p>	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>No effect.</p> <p>Measure: Network capacity to accept and deliver ferry transport needs for</p>

	<p>all modes</p> <p>No effect</p>
<p>Performance against investment objective:</p> <p>The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.</p>	<p>Measure: Access to the Port in an HILP event</p> <p>Potential minor negative effect.</p> <p>No structure currently exists on Aotea Quay at this point. If a structure is damaged or collapses on the road, it will require clearance and delay usability of Aotea Quay in recovery access to the port.</p>
<p>Rationale for selection or rejection of alternative:</p>	<p>While a reported issue, the impact of rail shunts has not shown up in current travel time and reliability data. Traffic growth and performance degradation on Aotea Quay/Waterloo Quay is forecast to be relatively low. This option will be included in further programme analysis in relation to potential growth of port trade.</p> <p>This is a medium cost solution for a relatively low scale problem for general traffic but may offer advantages for future port operation.</p>

IMPLEMENTABILITY APPRAISAL

<p>Feasibility:</p>	<p>Likely to be feasible. Disruption during construction will be an issue along with visual impact.</p>
<p>Risks:</p>	<p>Construction staging and management for both general traffic, port access for road and rail.</p> <p>Services would require significant relocation works.</p> <p>Management of access to parking structures could be a risk.</p> <p>Visual impacts and community perception of a structure on the waterfront is a risk.</p> <p>Deep foundations owing to previous reclamation.</p>
<p>Interdependencies:</p>	<p>The benefits of this intervention will be realised if freight rail movements are increased and the capacity of the port to receive freight by rail is increased.</p> <p>To accommodate road freight vehicles, an internal port road or alternate port access will be required.</p>

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RELOCATE AOTEA QUAY

Option description:

Relocate Aotea Quay to the north and west of the rail yards, connecting to Waterloo Quay in a location south-west of the port gate.

Due to the nature and alignment of the marshalling yards and main passenger/freight rail lines into Wellington, the relocation of Aotea Quay may require a raised structure to be constructed with piers in-between rail lines.

This is likely to involve realignment of some rail track and relocation of significant structures potentially including Kiwirail operational infrastructure such as the existing locomotive sheds.

Estimated cost:

Capital cost (\$m):	\$150m - \$225m
Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

Performance against investment objective:

Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.

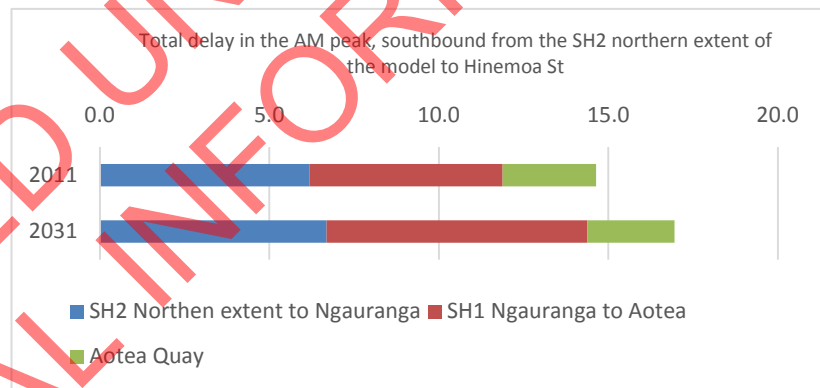
Measure: Freight throughput by rail

Minor positive. Will eliminate conflict between shunting across Aotea Quay and through traffic using the quay to access the City and in theory allow more shunts.

This also assumes that any realignment of the marshalling yard to accommodate the piles of the new road will not be at the detriment of the marshalling and shunting operations.

Measure: Travel time delay

Minor positive. Will enable removal of conflicts between trucks and general traffic between SH1 and Hinemoa Street. In 2031 am peak this will remove 4 minutes of total delay for port bound trucks. The difference between 2011 base delay and



2031 delay would be 1 minute.

Graph shows total AM peak delay in 2031 for traffic from SH2 to Hinemoa St. This is the dominant route for freight. This intervention would eliminate delay on Aotea Quay.

In context, the am peak total delay between Ngauranga and Hinemoa Street in 2031 is expected to be 14 minutes.

This may have a minor positive effect on the transport network not inhibiting port growth.

PM peak 2031 delay northbound is not forecast to be as significant.

Port Efficiency Benefits:

While unlikely to generate significant benefits in access TO, THROUGH, and FROM

the port area, this option may be capable of delivering benefits to Centreport by enabling a more effective movement and handling system by removing site constraints imposed by the severance effect of Aotea Quay.

These benefits are not captured specifically in the Measures adopted for this PBC and the scope for NZTA to invest, however they are relevant to the port's ability to accommodate growth by removing a physical impediment created by the transport network.

Performance against investment objective:

Delay and journey time variability for travel to, from and through the port area will be no worse than today.

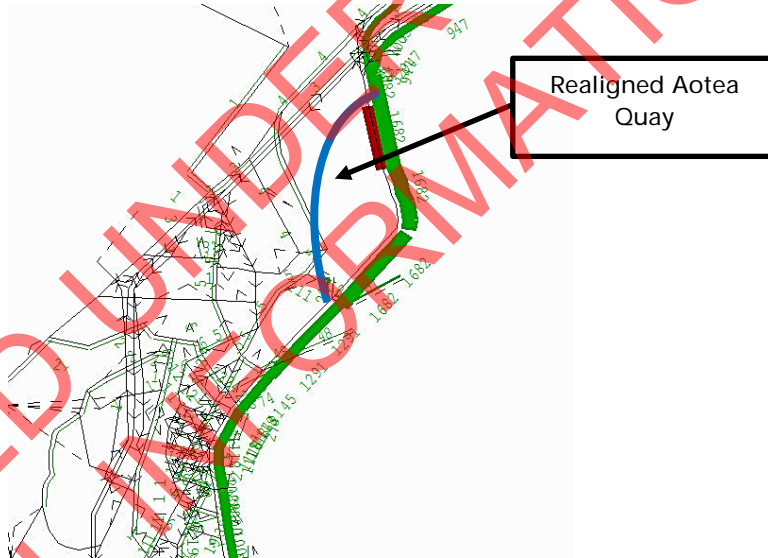
Measure: Travel time delay

See above

Measure: Travel time reliability

Benefit for port traffic.

The proposed connection is almost identical in length and likely to be similar in performance to Aotea Quay and connects two common points. Removal of port-bound trucks from the traffic flow is unlikely to have a significant effect on the travel time and reliability of general traffic trips through the port area. These are the majority of trips on Aotea Quay. There would be a benefit for port-related traffic.



The proportion of trucks in the traffic flow is expected to be around 10% in 2031, of which a large proportion would remain in the general traffic flow on Aotea Quay in this option as they are trips serving the CBD, not the port area.

This will result in a very minor effect on travel time and reliability for traffic through the port area (the vast majority of users) but a reduction in delay of 4 mins in 2031, out of a total delay from Ngauranga to Hinemoa Street of 14 minutes to port bound trips.

There will be a negligible effect for pedestrians using the new link, and potentially a negative effect for those using the existing route along Aotea Quay as a result of having to wait for a greater number of shunts across the level crossing.

Performance against investment objective:

Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.

Measure: Legibility of access to ferry terminals by all modes from key destinations

No effect.

Measure: Network capacity to accept and deliver ferry transport needs for

	<p>all modes</p> <p>No effect</p>
<p>Performance against investment objective:</p> <p>The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.</p>	<p>Measure: Access to the Port in an HILP event</p> <p>Positive effect.</p> <p>Provides an alternative access route to the port that will increase resilience.</p> <p>Construction of new on and off-ramps from SH1 may improve the resilience of this connection between the transport network and the port area, assuming the existing ramps will be strengthened where these two ramps merge and hence reduce the likelihood of their collapse during an HILP event.</p>
<p>Rationale for selection or rejection of alternative:</p>	<p>To be considered as an element in an Aotea Quay- based programme. The benefits of this option lie mostly in port efficiency and ability to handle growth within the port fence. In terms of its effectiveness in the transport network not inhibiting growth, its benefits accrue from removing severance.</p> <p>Aotea Quay is carrying 21,000 vehicles per day with a background growth of ~0.4% per year for cars and 1.7% for HCVs. By 2033 the total flow is forecast to be 26,000 vehicles per day. In daily traffic terms, this is not high for a 4-lane arterial with little side-friction. Aotea Quay is highly peaked in its daily pattern with conflicts in peak periods caused by freight deliveries, port gate opening hours and ferry sailings which create delays at these peak times. At other times, the road operates reliably with little delay for an arterial on a major CBD fringe.</p> <p>Largest proportion of delay to through port area is occurring on, or in accessing SH1 and SH2.</p>

IMPLEMENTABILITY APPRAISAL

<p>Feasibility:</p>	<p>There is a need to consider where the realigned road would tie in with the city centre road network as it will create significant demand at the intersection and will impact traffic flows on other roads.</p> <p>This option would involve significant cross-organisational agreement involving Kiwiraail, Centreport and Wellington City Council. If this was to be classified as a state highway, NZTA would also be required.</p> <p>Would need to consider elevating above track (25,000m2 of elevated road) and putting piles between tracks to reduce impact on marshalling yards.</p> <p>This option is feasible, however there is significant risk associated and it would require the cease of use of a number of sidings during different periods of construction.</p>
<p>Risks:</p>	<p>May require moving the Loco depot and reorganising the yards – not seen as a massive risk as additional land is available.</p> <p>Ownership of the stadium and the walkway – by putting a road under the walkway through the carpark it will affect the circulation of the entire carpark.</p> <p>Attaining agreement and consents of all parties involved is a significant risk.</p> <p>Working around overhead lines and operating railway and piling will be high-risk activities that will increase construction costs and the period of construction works. Achieving works and blocks of line on a critical part of the network serving Wellington Station and the port will be significant risk.</p> <p>Geotechnical risks with piling in close proximity to rail lines and programme risks associated with working in a live rail environment.</p>



Interdependencies:

Will require a new on/off-ramp structure from SH1 and will require rationalisation of the marshalling yard as a number of rail lines may be affected.

Access to the Ferry terminal will have to be maintained – this may be through access from Hutt Road or on and off-ramps directly into the terminal itself.

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NEW (JOINT) FERRY TERMINAL

Option description:	<p>Construction of an additional set of wharves in the vicinity of the Interislander wharves and construction of a new joint ferry terminal building. Improvements to the storage areas is required to provide stacking capacity for two ferry operators and upgraded, larger ferries.</p> <p>Improvements to the customer interface in terms of legibility and internal circulation within the ferry terminal area will also be required, including a connection to Hutt Road.</p> <p>This option is intended to reflect Project Phoenix</p>	
Estimated cost:	Capital cost (\$m):	\$75m - \$150m
	Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

Performance against investment objective:	<p>Measure: Freight throughput by rail</p> <p>No effect.</p> <p>Measure: Travel time delay</p> <p>On it's own, only a minor effect through enhancements to ferry traffic within the site. Note that this intervention is considered as part of a programme of supporting interventions.</p>	
<p>Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.</p>		
Performance against investment objective:	<p>Measure: Travel time delay</p> <p>No effect.</p> <p>Measure: Travel time reliability</p> <p>On it's own, only a minor effect through enhancements to ferry traffic within the site. Note that this intervention is considered as part of a programme of supporting interventions.</p>	
<p>Delay and journey time variability for travel to, from and through the port area will be no worse than today.</p>		
Performance against investment objective:	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>Significant contribution. This is considered to have the potential to meet all needs in legibility and reliability. A redesign and upgrade of the ferry terminal has the potential to provide a re-organised, modern and legible ferry terminal.</p> <p>Potential for a significant contribution through provision of footpaths and a reduction in the number of conflict points for pedestrians through the provision of footpaths, grade separated access and/or improved way-finding. The 6 conflict points for pedestrians within immediate vicinity of the terminal could be reduced to 1-2 points of conflict.</p> <p>The potential</p> <p>Measure: Network capacity to accept and deliver ferry transport needs for all modes</p> <p>Potentially significant contribution – should be designed to allow faster loading, unloading and storage capacity to meet the requirements of ferry operators.</p> <p>Its effectiveness will be dependent on improved access to the main transport network through supporting interventions.</p>	
<p>Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.</p>		
Performance against investment objective:	<p>Measure: Access to the Port in an HILP event</p> <p>Potential positive effect.</p>	
<p>The adjacent transport infrastructure enables the port to</p>		

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<p>deliver its required function as a key enabler of recovery in a HILP event.</p>	<p>New facilities will be constructed to standard and designed to withstand an HILP event.</p>
<p>Rationale for selection or rejection of alternative:</p>	<p>This option is the subject of a separate business case being run by KiwiRail and CentrePort (Project Phoenix).</p> <p>Its inclusion in this business case is in recognition of the option's potential contribution to the investment objectives, but also in acknowledgment of its requirement for supporting transport network improvements.</p> <p>This option forms the basis of a programme of interventions based around providing effective, legible transport access to the ferry terminal.</p>

IMPLEMENTABILITY APPRAISAL

<p>Feasibility:</p>	<p>Feasibility is being establish by Project Phoenix.</p> <p>Could require further reclamation of land between the main wharf and Kaiwharawhara Point. The rail access to the Burma Road sidings through the ferry terminal egress is important and it is infeasible to move, therefore this option would need to consider customer access to the terminal with the tracks remaining as is.</p> <p>Although in future roll-on-roll off rail wagons will stop being used on ferries, the back shunt siding that extends onto Kaiwharawhara point will need to be maintained if use of the Burma Road sidings is to continue.</p>
<p>Risks:</p>	<p>Operational: Additional traffic generation may increase journey times and reduce reliability for traffic using the Quay to access the port and CBD. Commercial risk – ownership of terminal.</p> <p>Implementation: Would require multi-party agreement and investment, including commercial operators which are competitors.</p> <p>Environmental: Potential for reclamation being required. This has recently been contentious with local iwi/environmental groups.</p>
<p>Interdependencies:</p>	<p>Will require a significant modification to the road network access. Improved legibility and wayfinding of the SH network and along Aotea Quay will be required to support this intervention.</p> <p>Is logically connected to a direct off-ramp from SH1 and potentially an on-ramp onto SH1.</p> <p>The back shunt siding that extends onto Kaiwharawhara point would need to be maintained if use of the Burma Road sidings is to continue. This will restrict the circulation area and storage area for waiting ferry vehicles.</p>

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FOURTH LANE SOUTHBOUND ON SH1 BETWEEN NGAURANGA AND THE QUAY (Smart Motorway Stage 2)

Option description:	Provide a fourth southbound lane between Ngauranga and Aotea Quay approximately 2.5km in length. This will require widening of the Thorndon overbridge and potential reclamation to provide an extra lane on the harbour side. The additional lane will drop at the existing Aotea Quay off-ramp.	
	This is an intervention that essentially reflects the Smart Motorway Stage 2 project as detailed in the Ngauranga to Aotea Quay SAR (Beca, September 2012)	
Estimated cost:	Capital cost (\$m):	\$45m-\$75m
	Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

Performance against investment objective:

Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.

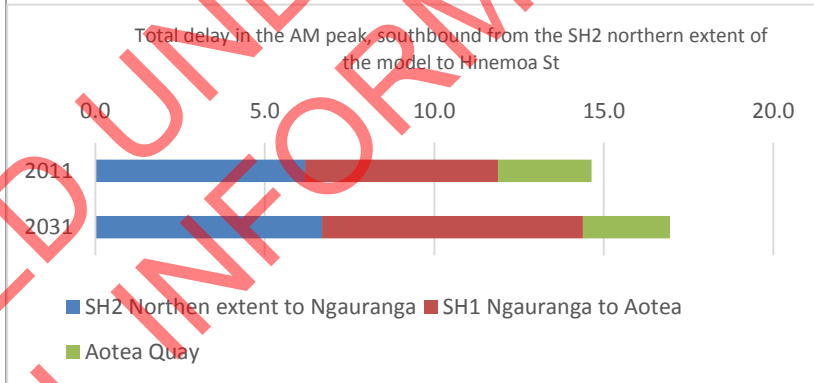
Measure: Freight throughput by rail

No effect.

Measure: Travel time delay

This intervention is likely to have a significant positive effect on reducing travel time delay TO and THROUGH the port area.

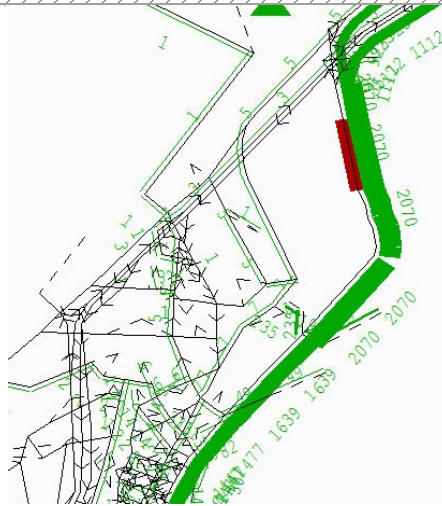
The majority of delay experienced by port bound traffic occurs on SH1 with only a small proportion occurring on the Quay itself. Providing a fourth lane between Ngauranga and the Aotea Quay off-ramp will remove port area bound traffic from the congested southbound flow and decrease the delay experienced in the AM peak



for traffic heading to and through the port.

In the AM peak this will reduce delay for approximately 200 HCV trips and 1110 car trips as shown in the 2031 select link plot, as well as for the main flow towards the Terrace Tunnel.

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2031 AM Select Link Plot on Aotea Quay (excludes HCVs) showing the approximately 50% of trips to and through the port area that originate on SH1

The time travel saving is likely to be approximately 6- 10 minutes in the AM peak, which is a significant saving for trips to through and from the port area in the am peak. This coincides with the time that most trucks are attempting to access the port as a destination.

Given the added capacity on SH1, more drivers are likely to use this route to access the CBD and the volume of traffic along Aotea Quay could increase, reducing the travel time saving and experienced by each vehicle and potentially creating risks with queues from the level crossing.

Does not reduce delay in the PM peak or assist trips FROM the port to the SH1 network.

Performance against investment objective:

Delay and journey time variability for travel to, from and through the port area will be no worse than today.

Measure: Travel time delay

See above.

Measure: Travel time reliability

Reliability of the journey between Ngauranga and the port as well as the CBD is likely to be significantly improved as a result of reduced delay in the AM peak. When combined with an off ramp into the ferry terminal, the travel time reliability and delay benefits of the forth lane may be better realised.

Does not reduce delay in the PM peak or assist trips FROM the port or CBD to the SH1 network.

Performance against investment objective:

Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.

Measure: Legibility of access to ferry terminals by all modes from key destinations

No effect in its own right – unless combined with an off-ramp directly into the ferry terminal.

Measure: Network capacity to accept and deliver Ferry transport needs for all modes

See above.

Performance against investment objective:

The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP

Measure: Access to the Port in an HILP event

Minor positive impact by way of widening the road away from the hills and potentially have more sealed road space for vehicles to manoeuvre around any rocks and material should it fall onto the road during an HILP event.

event.

Rationale for selection or rejection of alternative: This intervention improves delay and reliability for access to and through the port area in the section where a major proportion of the delay is shown to occur. Decisions around the timing and scope of the ferry terminal upgrade (Project Phoenix) and the N2A project are likely triggers for further investigations into the provision of additional capacity through this section.

IMPLEMENTABILITY APPRAISAL

Feasibility: This option may require further reclamation of harbour side land to provide space required for the fourth lane, which could be undertaken in conjunction with the proposed reclamation as part of the Great Harbour Cycleway.
There will be significant elevated structure required over the NIMT and the Interislander ferry terminal area.

Risks:
Operational: Additional traffic generation as a result of improved travel times may reduce the extent of the delay savings and limit improved reliability for traffic using the Quay to access the port and CBD. Also may increase the risk identified in the 2012 Ngauranga to Aotea Quay SAR of queues from the rail crossing reaching SH1.
Implementation: Would need to be considered prior to implementation of the Great Harbour Cycleway as if this is constructed prior to the fourth lane being built it will be unnecessarily difficult to undertake a second reclamation.
Construction and programme risks associated with building above a live rail line and working within the requirements of existing stakeholders will drive both the construction methodology and the design process. Geotechnical risks building on reclaimed land. This will also reduce the effective useable area on Kaiwharawhara Point which may be required by the Port for storage or for holding capacity for the ferry terminal.
The SMART Motorways SAR identified risk associated with needing to designate land for works or temporary works and access requirements proposed as part of the future development of the Port prevent or interfere with the Project. KiwiRail objections to this will result in revisions to Port access plans.
Environmental: Potential for reclamation being required. This has recently been contentious with local iwi and environmental groups.

Interdependencies: This option will benefit from or, potentially combine with an additional ferry terminal off-ramp option and replacement off-ramp onto Aotea Quay.
This option will need to be undertaken with reconfiguration of the ferry terminal access and of the Aotea Quay on- and off-ramps and the ferry terminal upgrade proposal.
This intervention should be considered in conjunction with decisions on N2A and in particular the duplication of the terrace Tunnel and the relative priorities of SH1 and Aotea Quay in CBD access.



Medium Scale Supply Options

HUTT ROAD CONNECTION TO INTERISLANDER TERMINAL		
Option description:	<p>Provide a pedestrian connection between Hutt Road and the existing ferry terminal – likely in the form of a bridge (or underpass) with a drop off/pick up facility on Hutt Road included.</p> <p>Options include a bridge over the NIMT and then bringing people to ground level and onto a path under SH1. Alternatively constructing a single footbridge over both the rail and highway further east where the highway comes back down to grade.</p> <p>While a connection to Hutt Road from the Interislander terminal is inherent in the Large Scale Ferry Terminal Upgrade intervention, this considers it as a stand alone intervention.</p>	
Estimated cost:	Capital cost (\$m):	\$20-30m for a bridge and lifts to ground level or a larger raised span bridge.
	Opex/Maintenance (\$m/30yr):	
INVESTMENT OBJECTIVES		
Performance against investment objective:	Measure: Freight throughput by rail	
<p>Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.</p>	No effect.	
	Measure: Travel time delay	
		No effect.
Performance against investment objective:	Measure: Travel time delay	
<p>Delay and journey time variability for travel to, from and through the port area will be no worse than today.</p>	See above.	
	Measure: Travel time reliability	
		<p>This will provide some advantage to pedestrians and cyclists moving from the Interislander terminal to the city centre or other parts of Wellington. It will enable a link to Hutt with no conflicts. Hutt Road is a major public transport route connecting the city centre and a major cycle priority route.</p>
Performance against investment objective:	Measure: Legibility of access to ferry terminals by all modes from key destinations	
<p>Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.</p>	<p>Significantly increases the legibility of pedestrian, cycle and bus passenger access to and from Hutt Road to the Interislander terminal. This option will reduce conflicts and potentially reduce the distance and convoluted route from the bus stop from 500m to a direct access.</p>	
	<p>It will also provide a more efficient and drop-off/pick up facility for vehicles.</p>	
		Measure: Network capacity to accept and deliver Ferry transport needs for all modes
		<p>Separating PT passengers, pedestrians and pick/up drop off vehicles will enable the Interislander terminal to discharge vehicular trips in greater numbers and at a greater rate as there is less conflict between modes.</p>
		<p>The option may slightly enhance discharge rates and capacity to ferries by reducing conflict points with buses and pedestrians.</p>
Performance against investment objective:	Measure: Access to the Port in an HILP event	
<p>The adjacent transport</p>		

<p>infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.</p>	<p>Minor positive effect.</p> <p>Provides an alternative pedestrian and cyclist access route to the ferry terminal that may increase resilience. However, it is unlikely to affect the port's ability to be a key enabler to recovery in an HILP event.</p>
<p>Rationale for selection or rejection of alternative:</p>	<p>This option is the subject of a separate business case being run by KiwiRail and CentrePort (Project Phoenix).</p> <p>Its inclusion in this business case is in recognition of its potential contribution to the investment objectives, but also in acknowledgment of its likely requirement for supporting transport network improvements.</p> <p>This option forms part of a programme of potential interventions based around providing effective, legible transport access to the ferry terminal.</p>

IMPLEMENTABILITY APPRAISAL

<p>Feasibility:</p>	<p>A footbridge option is the most feasible – as there is limited opportunity to tunnel under the main rail lines which would require a major block of line in a critical part of the rail network.</p>
<p>Risks:</p>	<p>Pedestrian bridges have a higher clearance above motorway – would essentially have to go up two levels to get over the NIMT and motorway before coming back down.</p> <p>Tunnelling is better for the alignment and connection with the terminal. Below sea level so will require pumping.</p> <p>Considerable risk associated with tunnelling under the mainline – would require shutting the NIMT for an extended period of time.</p> <p>Bridging over is less risky and cheaper. A lot of structure would be involved. May be less risky building another off-ramp.</p>
<p>Interdependencies:</p>	<p>This option would be dependent on some modification of the ferry terminal – this would preferably be at the eastern end of the site to reduce the distance for passengers to walk from the Hutt Road connection entrance if a single foot bridge was constructed.</p>

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GRADE SEPARATED PEDESTRIAN LINK FROM THE PORT OFFICE PARK TO THE CITY CENTRE.

Option description:	Construction of/or continuation of a raised pedestrian link between the Port office park and the CBD. The existing Fran Wilde Walkway (FWW) ends at the Wellington Rail Station. A protected facility is required to improve pedestrian safety and amenity by reducing conflict with other modes between the Port and the CBD.	
Estimated cost:	Capital cost (\$m):	\$15-20m (assuming 400-500m in length)
	Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

Performance against investment objective: Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.	<p>Measure: Freight throughput by rail</p> <p>No effect.</p> <p>Measure: Travel time delay</p> <p>No significant effect. Allowing pedestrians to cross Waterloo Quay on an elevated structure will in theory, allow more freight access from the south although this is unlikely to be significant.</p>
Performance against investment objective: Delay and journey time variability for travel to, from and through the port area will be no worse than today.	<p>Measure: Travel time delay</p> <p>See above.</p> <p>Measure: Travel time reliability</p> <p>Minor positive effect for pedestrians as it reduces the need to wait at traffic signals and level crossings therefore improving the reliability of the walk journey time between the city centre and the port.</p> <p>Has almost no effect on the reliability of traffic and freight journeys, other than a minor reduction in pedestrians requiring a crossing phase at Hinemoa Street traffic signals.</p>
Performance against investment objective: Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>No effect.</p> <p>Measure: Network capacity to accept and deliver Ferry transport needs for all modes</p> <p>No effect.</p>
Performance against investment objective: The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.	<p>Measure: Access to the Port in an HILP event</p> <p>No effect.</p>
Rationale for selection or rejection of alternative:	<p>This meets the investment objectives in respect of for pedestrian reliability to and from the port area.</p> <p>It removes some conflicts between freight and pedestrians which when combined with other interventions will have a positive effect on port access and hence the option has been included in the possible programmes for further analysis.</p>

IMPLEMENTABILITY APPRAISAL

Feasibility:	Careful consideration would need to be given to the location and connection to the FWW. Significant space will be needed to provide ramp access at standard grades that can be used by all persons. This will likely require CentrePort's land to accommodate.
Risks:	Consenting risk: impact on people's views and shading may impact the resource consent application. There is also a significant stakeholder risk associated with the various land holders whose land this will impact or be required.
Interdependencies:	Benefits would be increased if a connection to the Cruise terminal were constructed to provide a single level facility for cruise passengers to access the central city.

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INTERNAL PORT FREIGHT ROAD

Option description:	Freight road inside the port, alongside cruise terminal sheds and rail sidings connecting to Aotea Quay close to SH1 ramps. Re-surfacing and potential realignment of sidings along with required signage and traffic signals.	
Estimated cost:	Capital cost (\$m):	\$5-10million
	Opex/Maintenance (\$m/30yr):	This will remove port bound freight from the general traffic along Aotea Quay improving the travel time and reliability for port-bound traffic by creating a separate road to avoid conflicts with general traffic.

INVESTMENT OBJECTIVES

Performance against investment objective:

Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.

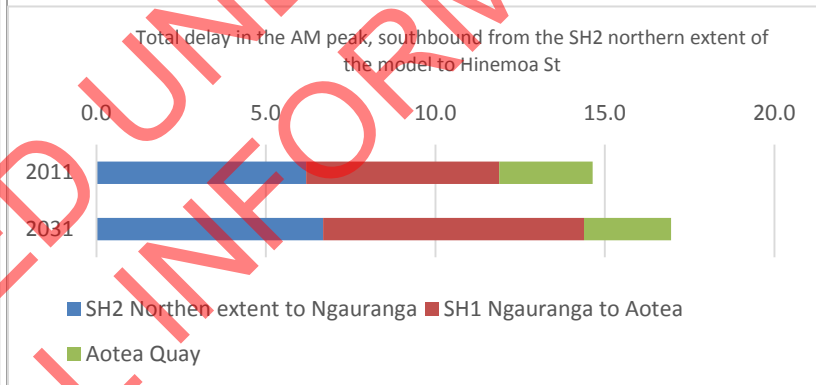
Measure: Freight throughput by rail

No effect as the internal road would be next to the rail sidings.

Measure: Travel time delay

A reduction in travel time delay may occur, as a result of trucks leaving the port joining the network closer to the state highway and therefore travelling along in uncongested conditions before joining the northbound traffic in the PM peak and being able to exit the congested traffic stream on Aotea Quay in the AM peak.

Aotea Quay provides a relatively small proportion of the total journey delay in travel for trucks to the port. In that respect, this intervention is considered moderately effective.



This option would involve effectively moving the port gate north to a location close to SH1. The existing port gate is not at capacity and is not considered an inhibitor to port growth, in particular if office park traffic uses an alternate access to Waterloo Quay.

Performance against investment objective:

Delay and journey time variability

Measure: Travel time delay

See above.

<p>for travel to, from and through the port area will be no worse than today.</p>	<p>Measure: Travel time reliability</p> <p>This option is likely to have a minor positive impact on travel time reliability as a result of taking trucks off Aotea Quay which experiences congestion associated with the SH1 on-ramp in the PM peak and delays associated with shunting movements across Aotea Quay.</p> <p>The proportion of the traffic that it will impact is low and given the potential conflicts with port operational movements the positive effects associated with reduced congestion along Aotea Quay are likely to be minor. It will however have a significant improvements to the access at Hinemoa Street which is currently constrained and will remove freight traffic from general traffic associated with the business park.</p>
<p>Performance against investment objective:</p> <p>Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.</p>	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>No effect.</p> <p>Measure: Network capacity to accept and deliver ferry transport needs for all modes</p> <p>No effect.</p>
<p>Performance against investment objective:</p> <p>The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.</p>	<p>Measure: Access to the Port in an HILP event</p> <p>No effect.</p>
<p>Rationale for selection or rejection of alternative:</p>	<p>This option is the subject to agreement between KiwiRail and CentrePort.</p> <p>The option is not included in any programme owing to safety and operational impacts on the port and only minor benefits.</p>
<p>IMPLEMENTABILITY APPRAISAL</p>	
<p>Feasibility:</p>	<p>There is restricted space and little clearance from the sheds and rail sidings.</p> <p>The ability to design an effective and secure port gate in the space available is considered difficult, if not infeasible on advice from Centreport.</p> <p>The operational consequences of a freight road in the narrow strip of port land on the eastern side of Aotea Quay are considered significant.</p>
<p>Risks:</p>	<p>Movement of utilities and potential removal of the cement silos may be required (not included in cost estimate).</p> <p>Traffic risks: interactions with other junctions – doesn't cause queuing back onto the motorway.</p> <p>Safety and operational risks with port operations.</p>
<p>Interdependencies:</p>	<p>Access directly into the port from a southbound off-ramp will improve the traffic interactions at the northern end of Aotea Quay.</p> <p>If the use of the Burma Road sidings increases, the conflict between rail and trucks having to cross the lines may become too unsafe and make this infeasible.</p>

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RECONFIGURE AOTEA OFF- RAMPS AND FERRY ACCESS

Option description:	Reshaping the Aotea Quay/Hutt Road junction and providing traffic signals to improve egress to and from the ferry area. This is likely to involve new kerb lines, significant changes to drainage and to the existing Ferry terminal circulation. Installation of traffic signals, services realignment and minor structural changes to improve the intersection layout and provide access from the terminal to the SH1 northbound onramp.	
Estimated cost:	Capital cost (\$m):	\$5-10m
	Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

<p>Performance against investment objective:</p> <p>Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.</p>	<p>Measure: Freight throughput by rail</p> <p>No effect.</p> <p>Measure: Travel time delay</p> <p>Little effect as the aim is safer, more legible and more controlled traffic movement. The intervention may generate a marginally worse outcome from a delay perspective in the interests of safety and legibility.</p>
<p>Performance against investment objective:</p> <p>Delay and journey time variability for travel to, from and through the port area will be no worse than today.</p>	<p>Measure: Travel time delay</p> <p>See above.</p> <p>Measure: Travel time reliability</p> <p>There will be a minimal improvement in travel time reliability in the evening peak as a result of ferry traffic leaving the terminal being able to access Aotea Quay and join the northbound traffic stream more efficiently and safely.</p> <p>While signalisation may create small delay off peak, reliability through this junction will likely be maintained.</p> <p>Minor improvements associated with pedestrian access reliability through the installation of pedestrian crossing facilities.</p>
<p>Performance against investment objective:</p> <p>Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.</p>	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>A redesign and upgrade of the ferry terminal access will provide a re-organised and more legible entrance for general traffic, pedestrians and cyclists.</p> <p>Potential for a significant contribution through provision of footpaths and a reduction in the number of conflict points for pedestrians from three uncontrolled pedestrian crossing conflict points to a single specific pedestrian crossing facility.</p> <p>Measure: Network capacity to accept and deliver ferry transport needs for all modes</p> <p>Moderate contribution – could be designed to allow faster access or egress to surrounding network through traffic signals timing and will provide increased storage capacity for vehicles waiting to leave the ferry terminal/access the SH1 on-ramp.</p>
<p>Performance against investment objective:</p> <p>The adjacent transport infrastructure enables the port to deliver its required function as a</p>	<p>Measure: Access to the Port in an HILP event</p> <p>No effect.</p>

key enabler of recovery in a HILP event.	
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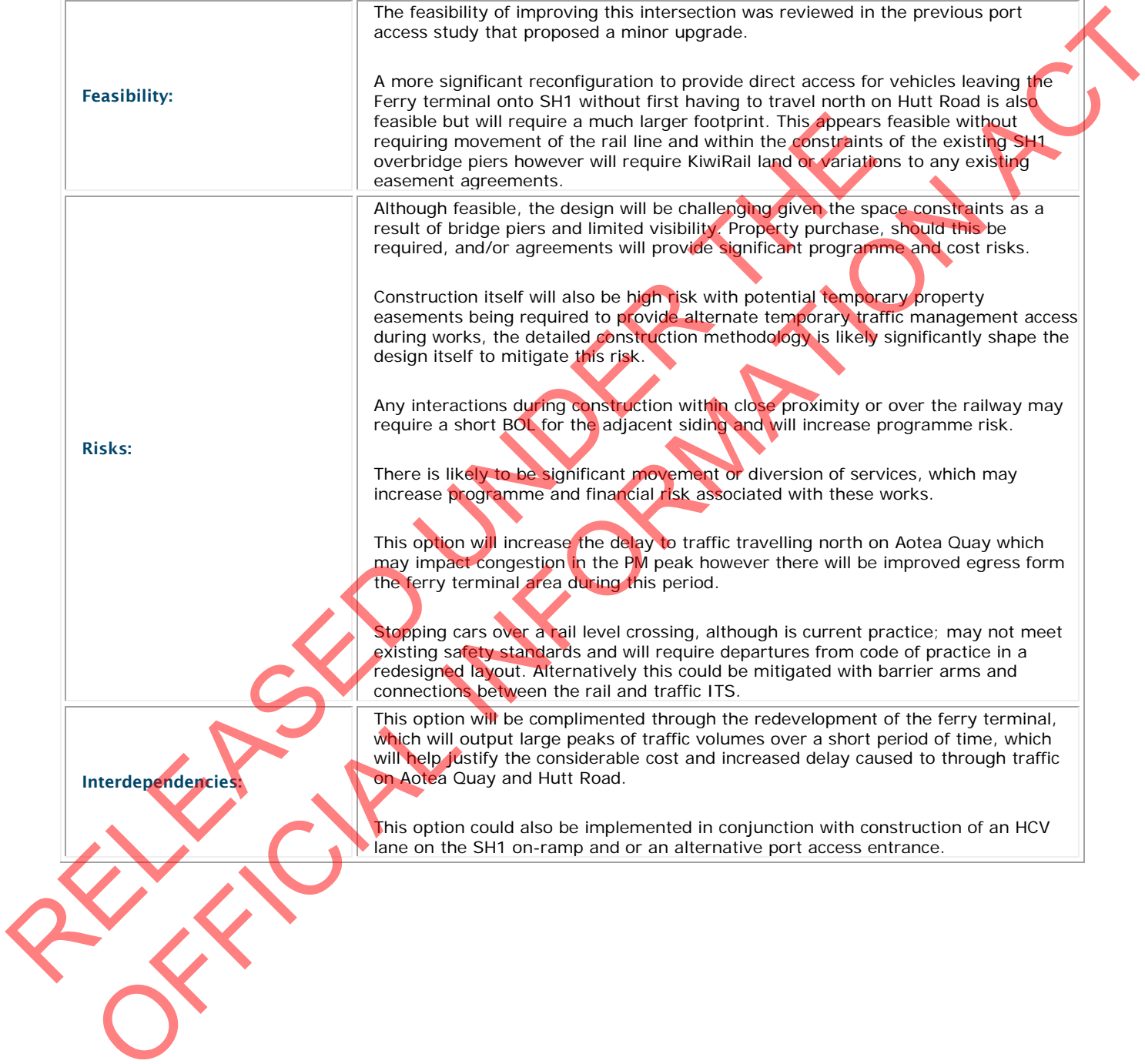
Rationale for selection or rejection of alternative:	If the ferry terminal is significantly upgraded and capacity enhanced, there may be a requirement to improve throughput, legibility and reliability of access. This option is likely to be required as part of a major terminal upgrade, however given the relatively poor state of the current access, this is retained in a medium scale programme to be investigated even without a major terminal upgrade.
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IMPLEMENTABILITY APPRAISAL

Feasibility:	<p>The feasibility of improving this intersection was reviewed in the previous port access study that proposed a minor upgrade.</p> <p>A more significant reconfiguration to provide direct access for vehicles leaving the Ferry terminal onto SH1 without first having to travel north on Hutt Road is also feasible but will require a much larger footprint. This appears feasible without requiring movement of the rail line and within the constraints of the existing SH1 overbridge piers however will require KiwiRail land or variations to any existing easement agreements.</p>
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Risks:	<p>Although feasible, the design will be challenging given the space constraints as a result of bridge piers and limited visibility. Property purchase, should this be required, and/or agreements will provide significant programme and cost risks.</p> <p>Construction itself will also be high risk with potential temporary property easements being required to provide alternate temporary traffic management access during works, the detailed construction methodology is likely significantly shape the design itself to mitigate this risk.</p> <p>Any interactions during construction within close proximity or over the railway may require a short BOL for the adjacent siding and will increase programme risk.</p> <p>There is likely to be significant movement or diversion of services, which may increase programme and financial risk associated with these works.</p> <p>This option will increase the delay to traffic travelling north on Aotea Quay which may impact congestion in the PM peak however there will be improved egress form the ferry terminal area during this period.</p> <p>Stopping cars over a rail level crossing, although is current practice; may not meet existing safety standards and will require departures from code of practice in a redesigned layout. Alternatively this could be mitigated with barrier arms and connections between the rail and traffic ITS.</p>
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Interdependencies:	<p>This option will be complimented through the redevelopment of the ferry terminal, which will output large peaks of traffic volumes over a short period of time, which will help justify the considerable cost and increased delay caused to through traffic on Aotea Quay and Hutt Road.</p> <p>This option could also be implemented in conjunction with construction of an HCV lane on the SH1 on-ramp and or an alternative port access entrance.</p>
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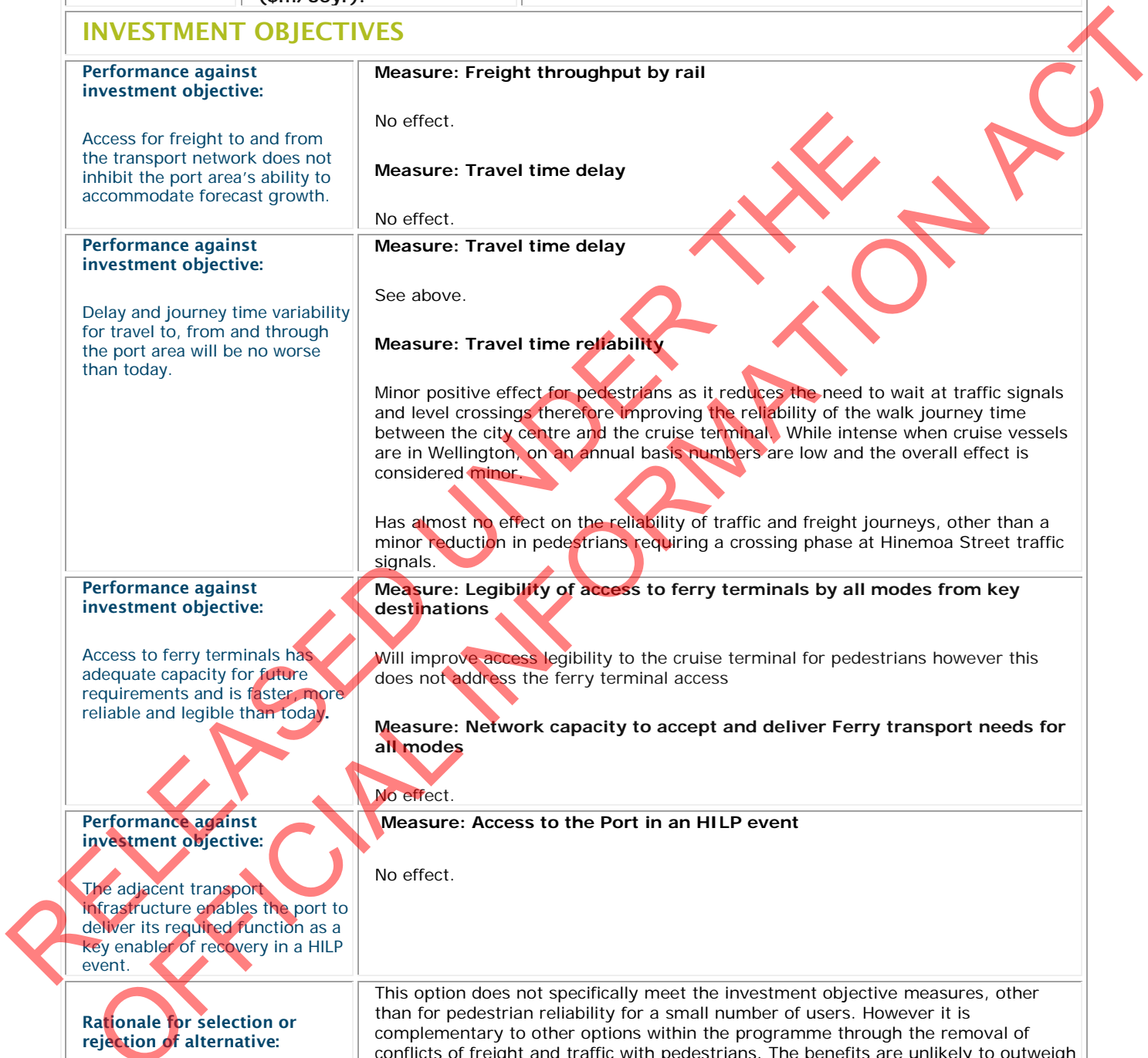


STRUCTURAL CONNECTION BETWEEN THE FRAN WILDE WALKWAY AND THE CRUISE TERMINAL

Option description:	Redirect pedestrians from the cruise terminal onto Fran Wilde Walkway (FWW) via an extension of walkway to the cruise terminal via a bridge structure. Construction of a lift and stairs up to a platform that has wind protection and rain shelter and connects into the existing FWW. Provision of a continuous shelter along the FWW.	
Estimated cost:	Capital cost (\$m):	\$10-15m
	Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

Performance against investment objective: Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.	<p>Measure: Freight throughput by rail</p> <p>No effect.</p> <p>Measure: Travel time delay</p> <p>No effect.</p>
Performance against investment objective: Delay and journey time variability for travel to, from and through the port area will be no worse than today.	<p>Measure: Travel time delay</p> <p>See above.</p> <p>Measure: Travel time reliability</p> <p>Minor positive effect for pedestrians as it reduces the need to wait at traffic signals and level crossings therefore improving the reliability of the walk journey time between the city centre and the cruise terminal. While intense when cruise vessels are in Wellington, on an annual basis numbers are low and the overall effect is considered minor.</p> <p>Has almost no effect on the reliability of traffic and freight journeys, other than a minor reduction in pedestrians requiring a crossing phase at Hinemoa Street traffic signals.</p>
Performance against investment objective: Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>Will improve access legibility to the cruise terminal for pedestrians however this does not address the ferry terminal access</p> <p>Measure: Network capacity to accept and deliver Ferry transport needs for all modes</p> <p>No effect.</p>
Performance against investment objective: The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.	<p>Measure: Access to the Port in an HILP event</p> <p>No effect.</p>
Rationale for selection or rejection of alternative:	This option does not specifically meet the investment objective measures, other than for pedestrian reliability for a small number of users. However it is complementary to other options within the programme through the removal of conflicts of freight and traffic with pedestrians. The benefits are unlikely to outweigh the costs.



IMPLEMENTABILITY APPRAISAL

Feasibility:	Would require a tower at cruise terminal and may have to take structure along southern side of Aotea Quay and cross connecting into FWW where stadium ends. Alignment is restricted by stadium and the road corridor being tight up against the eastern side.
Risks:	May require removal of the walkway along the northbound side of Aotea Quay around the station – to make way for pile structures. Therefore a pedestrian crossing facility may be required to take pedestrians across to the other side of the road. This will impact traffic flows.
Interdependencies:	Dependent on the cruise terminal remaining in its existing location within the port and not moving to the Bluebridge or proposed upgraded ferry facility.

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Small scale supply options

RE- DIRECT CYCLISTS/PROVIDE QUALITY LINK ALONG THORNDON QUAY

Option description:	Construction of the Hutt Road cycleway and installation of signage to direct active transport users away from Aotea Quay and encourage use of the Thorndon Quay connection into the CBD. This will include a signage strategy and potentially marketing of the facility.	
Estimated cost:	Capital cost (\$m):	\$7m (\$6.8m for Hutt Road cycleway and \$200k for additional signage/marketing and minor changes to design to discourage Aotea Quay use).
	Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

Performance against investment objective: Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.	Measure: Freight throughput by rail No effect. Measure: Travel time delay No effect.
Performance against investment objective: Delay and journey time variability for travel to, from and through the port area will be no worse than today.	Measure: Travel time delay See above. Measure: Travel time reliability No effect on vehicular traffic. Some positive effects on active mods through creating a reliable, prioritised route that avoids the freight and traffic dominated waterfront route.
Performance against investment objective: Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.	Measure: Legibility of access to ferry terminals by all modes from key destinations Minor positive effect through provision of a clearly prioritised route for cyclists. Measure: Network capacity to accept and deliver Ferry transport needs for all modes No effect.
Performance against investment objective: The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.	Measure: Access to the Port in an HILP event No effect.
Rationale for selection or rejection of alternative:	A WCC plan that has identified this connection in the Hutt Road Sustainable Transport Study undertaken in 2015. It reduces conflicts between cyclists and other road users – potentially allow any improvements to capacity to be focussed on CBD and port traffic. Its inclusion in this business case is in recognition of its potential contribution to the investment objectives, but also in acknowledgment of its possible requirement for supporting transport network improvements.

IMPLEMENTABILITY APPRAISAL

Feasibility:	A concept design/Sustainable Transport Study has already been undertaken (late 2015) that outlines the alignment and geometry of options along Hutt Road.
Risks:	<p>That cyclists will stay on Aotea Quay owing to the geometry of an apparent long straight run into the CBD.</p> <p>Numerous commercial and retail premises, associated parking and pedestrian movements and accessways providing resistance pre-implementation and safety risks post implementation.</p>
Interdependencies:	This option is dependent on the outcomes of various active transport plans.

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RE- CONFIGURE HINEMOA STREET

Option description:	Provide two right turn lanes on Hinemoa Street to improve access out of the port. Remove parallel parking and trees from left hand kerb to provide new left hand turn lane.	
Estimated cost:	Capital cost (\$m):	\$1m
	Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

<p>Performance against investment objective:</p> <p>Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.</p>	<p>Measure: Freight throughput by rail</p> <p>No effect.</p> <p>Measure: Travel time delay</p> <p>The reconfiguration of Hinemoa Street intersection to provide additional right turning capacity will have a positive effect on reducing travel time delay. This will be achieved by allowing more vehicles through each cycle and hence reducing the number of cycles HCVs are required to wait to turn right, especially in the evening peak.</p> <p>There is however a risk that drivers may not use the additional right turn lane as they will have to merge across into the left hand lane if they wish to access the SH1 on-ramp. This will be better understood following the outcomes of the SMART motorways project and monitoring the queue on Aotea Quay.</p>
<p>Performance against investment objective:</p> <p>Delay and journey time variability for travel to, from and through the port area will be no worse than today.</p>	<p>Measure: Travel time delay</p> <p>See above.</p> <p>Measure: Travel time reliability</p> <p>Minor positive effect on travel time reliability as a result of a longer green signal phase and further storage capacity meaning more vehicles get through the intersection with each green phase.</p>
<p>Performance against investment objective:</p> <p>Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.</p>	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>No effect.</p> <p>Measure: Network capacity to accept and deliver ferry transport needs for all modes</p> <p>This will provide additional capacity for vehicles to leave the port which will particularly benefit freight and general traffic arriving on the evening peak Bluebridge ferry. It does not improve access for freight or general traffic travelling TO the Bluebridge ferry terminal.</p>
<p>Performance against investment objective:</p> <p>The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.</p>	<p>Measure: Access to the Port in an HILP event</p> <p>No effect.</p>
<p>Rationale for selection or rejection of alternative:</p>	<p>This option improves egress from the port to the transport network and therefore will be included in further analysis. The SMART motorways project is reducing the queuing along Aotea Quay in the evening peak, therefore this option will provide more usable capacity for freight vehicles to leave the port and access the state</p>

highway network.

IMPLEMENTABILITY APPRAISAL

Feasibility:

Very feasible – short design timeframe. One kerb line and potentially a few street trees will require moving to accommodate a second right hand turn and separate left hand turn lane.

Risks:

Removal of six car parks may be objected to by office park tenants, which can be mitigated by a supportive and early community engagement strategy.

The option will increase the width of the intersection for pedestrians/cruise passengers to cross.

Interdependencies:

This option may not need to be undertaken if access to the port from Hinemoa Street is freight only. However it will still increase the flow of HCVs on to the road network.

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RE- CONFIGURE RAIL SIDINGS ON THE PORT TO INCREASE CAPACITY

Option description:	Design and implementation of an optimised network of sidings with adequate lengths to reduce the number of shunts per day. This option is likely to consist of an optimisation study and construction of any recommendations as funding allows.	
Estimated cost:	Capital cost (\$m):	\$200-300k for short term optimisation of existing sidings. Up to \$10m for 5km of track - 4 train lengths (\$6m), 10 turn outs (\$3m) and new signals (\$1m)
	Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

Performance against investment objective: Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.	<p>Measure: Freight throughput by rail</p> <p>This option will allow for more shunt movements to occur throughout the day, or for more wagons to be shunted with each movement if the storage capacity is increased.</p> <p>Measure: Travel time delay</p> <p>The enabling of greater rail movements may have a moderately positive effect on the port's ability to growth by enabling greater delivery of freight TO and FROM Centreport by rail.</p> <p>There is the risk that this may have a minor negative effect on travel THROUGH the port area and trips to and from the Bluebridge ferry operation caused by greater use of the at-grade rail crossings.</p>
Performance against investment objective: Delay and journey time variability for travel to, from and through the port area will be no worse than today.	<p>Measure: Travel time delay</p> <p>See above.</p> <p>Measure: Travel time reliability</p> <p>Minor effect. A reduction in the number of shunts may improve travel time reliability, albeit with a minor increase in the duration of each shunt.</p>
Performance against investment objective: Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>No effect.</p> <p>Measure: Network capacity to accept and deliver Ferry transport needs for all modes</p> <p>A very minor effect on the ability of the Bluebridge operation through more rail crossings.</p>
Performance against investment objective: The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.	<p>Measure: Access to the Port in an HILP event</p> <p>No effect.</p>
Rationale for selection or rejection of alternative:	<p>This option improves the port's capacity to receive rail freight from the marshalling area.</p> <p>It is noted that recent investigations have been undertaken to consider the feasibility of improving the capacity of the port to receive logs through the proposed</p>

connection of the Log Siding to the adjacent No. 2 Container Siding.

Although outside the ability of public agencies to implement, this option has been included in recognition of its effectiveness against the freight access investment objective.

IMPLEMENTABILITY APPRAISAL

Feasibility:

The reconfiguration of sidings is feasible under current operations and port layout. CentrePort can load/unload additional wagons using existing cranes and are unlikely to require additional lifting plant – operating costs will be less as idle costs are reduced and efficiency is improved.

Risks:

Track geometric risks may limit the extent of track and curves.

There is a risk that the volume of freight transported by rail will not increase, making any siding improvements less viable.

Interdependencies:

This option has higher justification if the volume of freight moved by rail increases, which is a stated aim of Centreport. This option would be complemented by grade separation of Aotea Quay or the realignment of Aotea Quay and a port masterplan to optimise infrastructure and land use.

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SEPARATE ACCESS TO OFFICE PARK FROM FREIGHT ACCESS TO THE PORT ON TO QUAY

Option description:	Restricting Hinemoa Street to operational port traffic only and using an alternative access south of Hinemoa St for office park access. Provision of cameras or an identification system may be required to enforce the 'freight only' access at Hinemoa Street.	
	This option will require changes to internal circulation, line-marking and the existing Bluebridge storage area which currently impedes flows FROM the ferry out of the port area.	
Estimated cost:	Capital cost (\$m):	\$1m (for signage and signal design and implementation with minor resurfacing works)
	Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

<p>Performance against investment objective:</p> <p>Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.</p>	<p>Measure: Freight throughput by rail</p> <p>No effect.</p>								
	<p>Measure: Travel time delay</p> <p>Minor to moderate positive effect resulting from separating office park commuter vehicles and cars from the Bluebridge ferry, from freight vehicles leaving the port at Hinemoa Street. This will reduce delay associated with freight vehicles turning right out of the port.</p> <p>In the peak periods, Hinemoa St is dominated by private vehicles, most of which are expected to have originated in or are terminating in the office park. While overall, the Centreport access via Hinemoa St has spare capacity for growth, northbound exit capacity is more constrained and with the office park using the exit, capacity has been reached in peaks. Removal of the private vehicle volumes will allow access to the transport network to accommodate forecast growth.</p> <table border="1"> <caption>PM peak hour capacity at the intersection of Hinemoa Street and Waterloo Quay</caption> <thead> <tr> <th>Direction</th> <th>Existing demand</th> <th>Theoretical capacity</th> </tr> </thead> <tbody> <tr> <td>Hinemoa St entry (both directions)</td> <td>~180</td> <td>500</td> </tr> <tr> <td>Hinemoa St exit (northbound)</td> <td>~150</td> <td>150</td> </tr> </tbody> </table> <p>Port office traffic will be redirected to enter and exit the port through the existing Waterloo Quay intersection providing access to the Bluebridge ferry. This may increase journey time slightly for office park traffic travelling south from SH1 in the AM peak due to the need to back-track from the Waterloo Quay entrance to the office park.</p>	Direction	Existing demand	Theoretical capacity	Hinemoa St entry (both directions)	~180	500	Hinemoa St exit (northbound)	~150
Direction	Existing demand	Theoretical capacity							
Hinemoa St entry (both directions)	~180	500							
Hinemoa St exit (northbound)	~150	150							
<p>Performance against investment objective:</p> <p>Delay and journey time variability for travel to, from and through the port area will be no worse than today.</p>	<p>Measure: Travel time delay</p> <p>See above.</p> <p>Measure: Travel time reliability</p> <p>Minor positive effect associated with the improved access from the port to the transport network for freight vehicles. Unlikely to have any significant effect on travel time reliability for vehicles travelling to the Port.</p>								

<p>Performance against investment objective:</p> <p>Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.</p>	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>This intervention may have a minor positive impact on Bluebridge Ferry terminal access for cars and freight vehicles, assuming provided the internal access changes do not have consequential issues and assuming additional signage is installed to provide clear way-finding for ferry traffic.</p> <p>Measure: Network capacity to accept and deliver ferry transport needs for all modes</p> <p>Unlikely to have a significant effect.</p>
<p>Performance against investment objective:</p> <p>The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.</p>	<p>Measure: Access to the Port in an HILP event</p> <p>No effect.</p>
<p>Rationale for selection or rejection of alternative:</p>	<p>This option improves capacity and reliability for freight, to and from the port to the transport network and will be included in further analysis. It has the potential to extend the capacity of the Hinemoa St intersection for freight.</p> <p>It is likely to improve egress for general traffic, because HCVs, which accelerate at a slower rate, are removed from the queue at traffic signals therefore allowing more cars through the intersection during a green phase.</p>

IMPLEMENTABILITY APPRAISAL

<p>Feasibility:</p>	<p>This option is feasible but with some complexity in in relation to the resolution of internal access arrangements.</p>
<p>Risks:</p>	<p>Internal access arrangements, in particular finding a satisfactory alignment with rail sidings and Bluebridge ferry operations.</p>
<p>Interdependencies:</p>	<p>This option is more feasible if the Bluebridge ferry moves away from its existing location.</p> <p>This option may be required if grade separation of the rail crossings on Hinemoa Street was undertaken.</p>

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NEW ROUNDABOUT ON AOTEA QUAY

Option description:

Install a new roundabout on Aotea Quay to allow a more legible access to the Interislander terminal. Remove right turn facilities out of the ferry terminal. Traffic accessing the Interislander ferry from SH1 and the Hutt Road would be able to undertake a U-turn at the roundabout and enter the terminal area using the current access.

This option was detailed in the Port of Wellington Access Strategy (Beca, 2011)



Indicative location from the 2011 report. The location could be moved further south to avoid some constraints.

The roundabout would include a by-pass lane for southbound through movements.

Estimated cost:

Capital cost (\$m):

\$5-10m for construction and associated services, \$100k for coordinated signals with level crossing + construction /design costs

Opex/Maintenance (\$m/30yr):

INVESTMENT OBJECTIVES

Performance against investment objective:

Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.

Measure: Freight throughput by rail

No effect.

Measure: Travel time delay

Possible minor negative effect as a result of northbound traffic having to stop for southbound or ferry traffic undertaking a U-turn following the conversion from a signalised intersection to a roundabout.

Traffic travelling southbound to the ferry terminal, will no longer be required to exit at Ngauranga and will be able to stay on SH1 and use the Aotea Quay off-ramp. This will only provide small travel time savings in the PM and inter peak periods. During the AM peak, the journey time on Hutt Road is currently shorter than remaining on SH1.

Performance against investment objective:

Delay and journey time variability for travel to, from and through the port area will be no worse than today.

Measure: Travel time delay

See above.

Measure: Travel time reliability

Currently trucks double back to the old signalised intersection which is not in-line with the Mainfreight entrance. Moving the intersection directly adjacent the egress provides faster and more reliable access to freight company yards.

Performance against investment objective:

Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.

Measure: Legibility of access to ferry terminals by all modes from key destinations

Signage will be installed to provide clear way-finding to the Interislander terminal for ferry traffic. The route to the ferry terminal will be less direct than if using SH1, however the number of conflict point for vehicles is reduced.

There is a need to travel in the opposite direction to desire lines for most Interislander traffic. Balancing this, the access path is less conflicted and safer than the current arrangement.

This intervention provides little benefit for pedestrian and cycle movements.

The roundabout will provide an obvious location for access for the Interislander terminal, however does not enhance access to the Bluebridge terminal. The intervention may reduce legibility by creating some confusion between the Interislander and Bluebridge terminals.

Measure: Network capacity to accept and deliver Ferry transport needs for all modes

A roundabout will improve access to the ferry terminal through providing the ability for vehicles and freight traffic to make a left hand turn out of the ferry area and turn around at the roundabout to access SH1 and Hutt Road – the existing access is narrow and inefficient.

The intervention will not increase the capacity of the Interislander terminal.

Performance against investment objective:

The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.

Measure: Access to the Port in an HILP event

No effect.

Rationale for selection or rejection of alternative:

This option is included in possible programmes for further analysis as it is a low infrastructure intensive option to improve access to the ferry terminal.

IMPLEMENTABILITY APPRAISAL

Feasibility:

To improve the operations at Mainfreight the roundabout would be in a better position slightly north in line with the Mainfreight building access road. It would be required to be approximately 30-40m across to provide sufficient tracking for larger freight vehicles.

It may be possible to install temporary signals to prioritise movements in certain directions in the peaks.

Risks:

To manage risks of cars stacking back at the roundabout a prioritised access onto the roundabout at the Aotea Quay northbound approach will allow trucks to exit the crossing area when the barrier arms are activated.

Additional land from KiwiRail would be required from both sides of the road – KiwiRail have previously indicated that land would not be available, however this was for a previous roundabout concept location.



	<p>Relocation of some services.</p> <p>Roundabout will take up more space than signalling the junction at the Ferry entrance or haul road entrance.</p>
Interdependencies:	<p>This option is feasible if signalisation of the ferry access/Hutt Road/Aotea Quay intersection is not undertaken. A clear signage strategy would need to be implemented to demonstrate to drivers how to access SH1 and avoid confusing and dangerous manoeuvres.</p>

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Productivity / demand management

REALLOCATE STADIUM CAR PARK FOR OFFICE PARK

Option description:	Reallocate some of the parking within the stadium car park to Port Office Park users and re-use the existing car parking land on the Port area for other purposes that do not generate a significant transport demand.	
Estimated cost:	Capital cost (\$m):	n/a
	Opex/Maintenance (\$m/30yr):	Annual rental of car parking is on a per organisation basis

INVESTMENT OBJECTIVES

Performance against investment objective: Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.	<p>Measure: Freight throughput by rail</p> <p>No effect.</p> <p>Measure: Travel time delay</p> <p>There will be minor travel time savings in the PM peak associated with the reduction in office park commuter vehicles, from freight vehicles leaving the port at Hinemoa Street. This will reduce delay associated with freight vehicles turning right out of the port.</p>
Performance against investment objective: Delay and journey time variability for travel to, from and through the port area will be no worse than today.	<p>Measure: Travel time delay</p> <p>See above.</p> <p>Measure: Travel time reliability</p> <p>Small increase in reliability for commuter traffic as vehicles leaving the carpark in the afternoon peak will not have to share the egress with freight vehicles and are therefore more likely to get through the traffic signals on the green phase.</p>
Performance against investment objective: Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>No effect.</p> <p>Measure: Network capacity to accept and deliver Ferry transport needs for all modes</p> <p>Removing commuter traffic from the mix at Hinemoa Street will improve the capacity of the internal port road network to receive vehicles from the Bluebridge ferry. This option will have no impact on the capacity to accept and receive vehicles at the Interislander terminal.</p>
Performance against investment objective: The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.	<p>Measure: Access to the Port in an HILP event</p> <p>No effect.</p>
Rationale for selection or rejection of alternative:	This option will be included in the productivity programme for further analysis as a result of its performance against the investment objectives and improvements to egress from Hinemoa Street onto the transport network.

IMPLEMENTABILITY APPRAISAL

Feasibility:	A review of the existing use and occupancy of the car parks during the workday will be required to determine capacity. Coordination with the stadium to provide long-term rental of carparks by the port or office park tenants. This may encourage tenants to re-evaluate the number of carparks they provide their staff.
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Risks:	<p>Without the land currently being used for car parking being used for any other purpose in the immediate future, office workers may attempt to park back on-site closer to their office.</p> <p>The business park site on the port area has been developed to approximately 50% of its allowed office space. The stadium carpark may not have capacity to accommodate the additional parking required by this development.</p> <p>Stakeholder buy-in and coordination with the port, WCC and the Westpac Stadium's Board will need to be undertaken and an agreement reached.</p>
Interdependencies:	<p>This option could be supported by a covered and grade-separated crossing to the FWW and west into the city centre.</p>

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FREIGHT BOOKING SYSTEM

Option description:	A freight booking system for trucks means that a driver must book an allocated delivery and pick up time – this encourages coordination of truck movements and reduces the number of empty container movements.	
Estimated cost:	Capital cost (\$m):	unknown
	Opex/Maintenance (\$m/30yr):	unknown

INVESTMENT OBJECTIVES

Performance against investment objective: Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.	<p>Measure: Freight throughput by rail</p> <p>No effect.</p> <p>Measure: Travel time delay</p> <p>This option will have a minor positive effect on reducing travel time delay inside the port gate with the processing of freight delivery and pick-up documentation as it can be combined into an online, automatic booking.</p>
Performance against investment objective: Delay and journey time variability for travel to, from and through the port area will be no worse than today.	<p>Measure: Travel time delay</p> <p>See above.</p> <p>Measure: Travel time reliability</p> <p>Reducing number of empty truck movements and delays at the port gate due to peaks in truck movements by allocating time slots to trucks. Prioritise back loading, e.g. drop-off of one container followed by collection of another, can save two truck movements.</p>
Performance against investment objective: Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>No effect.</p> <p>Measure: Network capacity to accept and deliver Ferry transport needs for all modes</p> <p>No effect.</p>
Performance against investment objective: The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.	<p>Measure: Access to the Port in an HILP event</p> <p>No effect.</p>
Rationale for selection or rejection of alternative:	<p>This option has been included in programmes as it could reduce delay and improve reliability within the port itself. Existing dwell times at the port are not high but may increase with higher throughput.</p> <p>CentrePort has advised that the Hinemoa St gate does not exhibit the queuing and delays that would warrant implementation of a freight booking system. This remains an option in the future should conditions change.</p>

IMPLEMENTABILITY APPRAISAL

Feasibility:	A number of New Zealand ports now operate using a booking system, transport providers and freight forwards are experienced in using them at other ports so it should be relatively easy to implement at CentrePort.
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Risks:	There is a cost associated with the ICT technology and maintenance of the booking system. This cost may not outweigh the operational benefits of staggering truck arrivals.
Interdependencies:	

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CBD PARKING STRATEGY

Option description:	Develop a car parking strategy to manage parking in proximity to the port. This will encourage parking in other areas that do not require access via Aotea Quay through increasing pricing, discouraging all day parking, and restricting the number of carparks provided as part of any future port development	
Estimated cost:	Capital cost (\$m):	\$200k for study (implementation costs unknown)
	Opex/Maintenance (\$m/30yr):	nil

INVESTMENT OBJECTIVES

Performance against investment objective: Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.	<p>Measure: Freight throughput by rail</p> <p>No effect.</p> <p>Measure: Travel time delay</p> <p>Minor improvements in travel time may occur associated with parking charges being used to shift the peak and improving restrictions on parking within the vicinity of the port area.</p>
Performance against investment objective: Delay and journey time variability for travel to, from and through the port area will be no worse than today.	<p>Measure: Travel time delay</p> <p>See above.</p> <p>Measure: Travel time reliability</p> <p>See above.</p>
Performance against investment objective: Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>No effect.</p> <p>Measure: Network capacity to accept and deliver Ferry transport needs for all modes</p> <p>No effect.</p>
Performance against investment objective: The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.	<p>Measure: Access to the Port in an HILP event</p> <p>No effect.</p>
Rationale for selection or rejection of alternative:	This option has been included in any programmes as it is good practice although it doesn't specifically address the investment objectives, and is outside the scope of the business case.

IMPLEMENTABILITY APPRAISAL

Feasibility:	Undertaking a CBD parking strategy is a feasible intervention for WCC to progress if justified for wider reasons. It will likely involve occupancy surveys of existing facilities and workshops with stakeholders to brainstorm potential interventions.
Risks:	<p>This strategy will only relate to the provision of public car parking. May require consultation with the public which may reject any changes to parking charges.</p> <p>Removal of car parking in the vicinity of Aotea Quay may displace the load elsewhere and is dependent on the outcomes of N2A.</p>



	<p>Privately owned car parks may lower their prices to increase their occupancy in the peak period to provide increased competition. This may reduce the number of people using council owned car parks and hence the revenue stream associated with parking charges.</p>
<p>Interdependencies:</p>	

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TRAVEL PLAN FOR OFFICE PARK

Option description: Commission a travel plan in partnership with all commercial workplaces within the office park to encourage mode change, active transport, car-pooling, travel outside peaks etc.

This could be achieved through the creation of a Travel Management Association (TMA), voluntarily or via a plan change requiring it as part of resource consents.

Estimated cost:	Capital cost (\$m):	\$50k for coordination and management of stakeholders
	Opex/Maintenance (\$m/30yr):	n/a

INVESTMENT OBJECTIVES

Performance against investment objective:

Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.

Measure: Freight throughput by rail

No effect.

Measure: Travel time delay

Minor positive impact if the outcomes result in fewer Port Business Park commuters travelling in the AM and PM peaks, and/or using fewer private vehicles which will reduce the demand on Hinemoa Street intersection and improve travel time reliability and reduce delay.

Performance against investment objective:

Delay and journey time variability for travel to, from and through the port area will be no worse than today.

Measure: Travel time delay

See above.

Measure: Travel time reliability

See above.

Performance against investment objective:

Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.

Measure: Legibility of access to ferry terminals by all modes from key destinations

No effect.

Measure: Network capacity to accept and deliver Ferry transport needs for all modes

No effect.

Performance against investment objective:

The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.

Measure: Access to the Port in an HILP event

No effect.

Rationale for selection or rejection of alternative:

Although this option does not specifically meet the investment objectives, it could help to reduce the peak demands on Aotea Quay at peak times and complements demand management interventions providing a non-infrastructure based option to address the congestion.

IMPLEMENTABILITY APPRAISAL

Feasibility:

This is a feasible minor intervention that requires coordination between all organisations on the port. The port could include participation and active management of the travel plan as part of any future office space rental agreement. Improving the reliability and travel times on the Quay by using travel plans to encourage off-peak travel, other modes, ride sharing or alternative means of travel. This may reduce the volume of cars using the Quay and the internal port road.

	network however it is difficult to discourage behaviour without imposing a cost to the user.
Risks:	The main risk exists that once the travel plan is undertaken and the recommendations are provided, that organisations don't take these on board and workers continue to commute as usual. This risk is associated with stakeholder buy-in.
Interdependencies:	n/a

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REALLOCATE LANES FOR FREIGHT ON AOTEA QUAY

Option description:	Reallocate one lane in each direction to freight vehicles. This could be the centre lanes or the outside lanes. Adequate signage and a surface treatment is likely to be provided. Monitoring and enforcement by way of cameras or police will also be required to discourage general traffic users from using these lanes.	
Estimated cost:	Capital cost (\$m):	Up to \$2m for entire length (assuming no kerb-line movements)
	Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

<p>Performance against investment objective:</p> <p>Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.</p>	<p>Measure: Freight throughput by rail</p> <p>No effect.</p> <p>Measure: Travel time delay</p> <p>With relatively little growth in general traffic on the Quay over the next 20 years, HCVs are projected to make up 13% of traffic by 2033 and 15% by 2043. The provision of freight only lanes will reduce travel time along Aotea Quay in the peak periods by approximately 2 minutes.</p> <p>The majority of delay to freight occurs on the state highway network. As a result of decreased capacity for general traffic, travel time and delay along the Quay is likely to increase significantly for general traffic travelling through the port area to and from SH1 while addressing a minor part of the delay to trucks.</p> <p>This is considered as significant negative effect on travel to, from and in particular through the port area.</p>
<p>Performance against investment objective:</p> <p>Delay and journey time variability for travel to, from and through the port area will be no worse than today.</p>	<p>Measure: Travel time delay</p> <p>See above.</p> <p>Measure: Travel time reliability</p> <p>A possible moderate positive impact on freight reliability, however this is accompanied by a significant negative impact on general traffic reliability.</p>
<p>Performance against investment objective:</p> <p>Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.</p>	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>No effect.</p> <p>Measure: Network capacity to accept and deliver Ferry transport needs for all modes</p> <p>No direct effect.</p>
<p>Performance against investment objective:</p> <p>The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.</p>	<p>Measure: Access to the Port in an HILP event</p> <p>No effect.</p>
<p>Rationale for selection or rejection of alternative:</p>	<p>This option provides a moderate travel time saving and improved reliability for a small proportion of the traffic flows on Aotea Quay. This occurs at the expense of a potentially large disbenefit to a largest proportion of road users. This option will not be considered further in programme analysis.</p>

IMPLEMENTABILITY APPRAISAL

Feasibility:	<p>Would require resurfacing, painting and signage assuming no additional lanes or kerb width added.</p> <p>Would require cameras for enforcement and police buy-in to enforce the HCV restriction.</p>
Risks:	<p>Police buy-in and agreement to monitor and enforce violations should they occur is a risk to the effectiveness of freight lanes implementation.</p> <p>Other drivers may get frustrated at having to wait in congestion while HCVs can bypass it and use the lane anyway reducing its effectiveness at improving freight journey reliability.</p>
Interdependencies:	<p>This effectiveness of this intervention would be reduced if an internal port road was installed adjacent to the Burma Road siding, as this would reduce the HCV volume along Aotea Quay, rendering the HCV lane less viable.</p>

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IMPROVE INFORMATION AND LEGIBILITY

Option description:

Provide improved wayfinding and access for general traffic, freight and active modes.

This is likely to include undertaking a way finding study and installation of more signage in appropriate locations along the Quay and also along SH1, Hutt Road and in the CBD.

This could also include notice via a traffic app or website of shunt movements and allowing travellers to make decisions prior to incurring delay.

Estimated cost:

Capital cost (\$m):

\$0.5m - \$1m (design and signage)

Opex/Maintenance (\$m/30yr):

n/a

INVESTMENT OBJECTIVES

Performance against investment objective:

Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.

Measure: Freight throughput by rail

No effect.

Measure: Travel time delay

No significant effect. This may be a mitigation for enabling greater priority for trucks to the port at signals or rail movements to the port.

Performance against investment objective:

Delay and journey time variability for travel to, from and through the port area will be no worse than today.

Measure: Travel time delay

May have a minor positive effect, though enabling people to make route choice or travel timing choices to avoid times of serious congestion, ferry unloading or rail shunts.

Measure: Travel time reliability

As above.

Performance against investment objective:

Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.

Measure: Legibility of access to ferry terminals by all modes from key destinations

A positive effect through the provision of accurate and more legible way finding and signage for the ferry terminal, cruise terminal and general port area.

Neither the number of conflict points nor the routes themselves will change as a result of this intervention.

Measure: Network capacity to accept and deliver Ferry transport needs for all modes

No effect.

Performance against investment objective:

The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.

Measure: Access to the Port in an HILP event

No effect.

Rationale for selection or rejection of alternative:

This option provides a useful improvement to the legibility of ferry terminal access for both vehicle and pedestrian traffic.

The option may also mitigate against increased use of rail to access the port and may provide a mitigation more relevant to the scale of the "transport" problem

caused by shunts on Aotea Quay than a grade separation.

This option will be considered further in programme analysis. Its performance against the investment objectives are likely to be complemented when undertaken in conjunction with improvements to the ferry terminal access and egress layout.

IMPLEMENTABILITY APPRAISAL

Feasibility:

This option is very feasible. It requires a signage strategy to be undertaken and implemented. From the Customer Insights surveys improved way-finding will be a valued intervention.

Risks:

The main risk associated with the implementation of the signage strategy is future changes that may occur in the near future to the layout of the ferry terminal access and hence require re-work. However the signs themselves can be reused in many instances.

Interdependencies:

n/a.

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TIDAL FLOW ON AOTEA QUAY

Option description:	Tidal flow will increase the number of lanes in one direction during the peak which will revert to the opposite direction in the counter peak. This is likely to require an additional lane to create a 5 lane road with two lanes in each direction and a fifth lane that can operate in both directions.	
Estimated cost:	Capital cost (\$m):	\$3m
	Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

<p>Performance against investment objective:</p> <p>Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.</p>	<p>Measure: Freight throughput by rail</p> <p>No effect.</p> <p>Measure: Travel time delay</p> <p>A third lane may increase capacity in the peak direction which will provide time travel savings along the majority of its length, with the exception of where the third lane merges back into the inside lane which may generate some delay associated with merging.</p> <p>The possible time saving is likely to be in the range of 1-2 minutes in the AM peak on Aotea Quay, but there may not be overall savings owing to the capacity of Waterloo Quay and its signalised intersections. The theoretical saving is greater in the PM peak, however the constraint in the PM peak is not a result of Aotea Quay itself but rather the on-ramp to SH1. Therefore, unless significantly more capacity is provided to access SH 1 the additional capacity on Aotea Quay will likely not provide any significant travel time savings.</p>
<p>Performance against investment objective:</p> <p>Delay and journey time variability for travel to, from and through the port area will be no worse than today.</p>	<p>Measure: Travel time delay</p> <p>See above.</p> <p>Measure: Travel time reliability</p> <p>The effect of a third lane is likely to be minimal owing to the restricted capacity down stream of where a third lane would end.</p>
<p>Performance against investment objective:</p> <p>Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.</p>	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>Minor negative effect as a result of potential legibility issues with vehicles leaving the ferry terminal and accessing Aotea Quay. Tidal flow will complicate the already difficult access to and from the Interislander. Terminal.</p> <p>Measure: Network capacity to accept and deliver ferry transport needs for all modes</p> <p>No direct effect.</p>
<p>Performance against investment objective:</p> <p>The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.</p>	<p>Measure: Access to the Port in an HILP event</p> <p>No effect.</p>
<p>Rationale for selection or rejection of alternative:</p>	<p>This option has been included in further analysis in recognition of its potential to improve capacity on Aotea Quay should it become the limiting factor in travel time delay and reliability in the future. Its benefits are only realised in conjunction with the implementation of a separate SH1 HCV-only on-ramp bypass or widened on-ramp, which will provide the additional capacity needed at the throat of the tidal</p>

lane.

The potential cost and complexity of this intervention may not match the relatively minor effect it is likely to have on journey time reliability and delay.

IMPLEMENTABILITY APPRAISAL

Feasibility:

The route is highly tidal at peak times. An additional tidal lane could be used for freight only or for all traffic.

This option, although feasible, would require considerable investment in gantry structures, advance warning signage and intersection treatments in addition to carriageway widening in places.

Risks:

Increased safety risk associated with drivers who don't understand which lanes are open.

Complicated design at the intersections may create confusion, especially for tourist drivers who have just come off the ferry.

Interdependencies:

Tidal flow may not be feasible if Aotea Quay were grade separated, or with the construction of a roundabout on Aotea Quay.

This option is complemented by an additional northbound on-ramp lane or HCV on-ramp bypass that reduces the impact of the merge back into two lanes at the throat.

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PROVIDE PRIORITY TO PORT TRAFFIC AT TRAFFIC SIGNALS

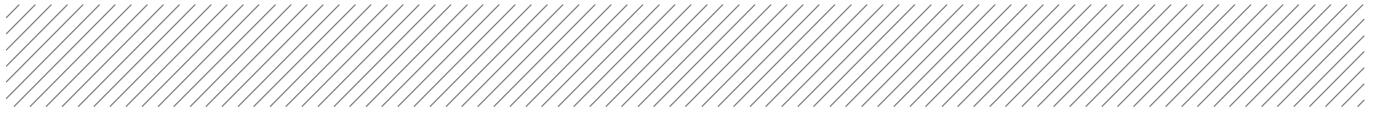
Option description:	Reconfigure the signals at Hinemoa Street to provide an improved level of service through increased green time for traffic turning right out of the Port.	
Estimated cost:	Capital cost (\$m):	\$50-100k
	Opex/Maintenance (\$m/30yr):	nil

INVESTMENT OBJECTIVES

Performance against investment objective: Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.	<p>Measure: Freight throughput by rail</p> <p>No effect.</p> <p>Measure: Travel time delay</p> <p>Minor positive impact on vehicles leaving the port as a result of more green time to access the road network.</p>
Performance against investment objective: Delay and journey time variability for travel to, from and through the port area will be no worse than today.	<p>Measure: Travel time delay</p> <p>See above.</p> <p>Measure: Travel time reliability</p> <p>No direct effect.</p>
Performance against investment objective: Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>No effect.</p> <p>Measure: Network capacity to accept and deliver Ferry transport needs for all modes</p> <p>No effect.</p>
Performance against investment objective: The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.	<p>Measure: Access to the Port in an HILP event</p> <p>No effect.</p>
Rationale for selection or rejection of alternative:	This option has been considered for future analysis as it represents an "easy-win" with reasonable benefits for a low cost associated with re-coordinating the signal timings.

IMPLEMENTABILITY APPRAISAL

Feasibility:	This is feasible and can occur relatively quickly following approval of the new signal timings.
Risks:	Prioritising port access by simply allocating greater time to the port gate at the expense of CBD bound/originating traffic may exacerbate congestion for through traffic.
Interdependencies:	<p>This option may occur in conjunction with the separation of port access for general traffic and freight traffic.</p> <p>This option is not viable if grade separation of the rail level crossings is undertaken.</p>



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PORT GATE OPERATION: HOURS OF OPENING

Option description:	Increase the Port's hours of operation to receive freight to open earlier and close later. (Potentially 24 hour operation)	
Estimated cost:	Capital cost (\$m):	nil
	Opex/Maintenance (\$m/30yr):	There will be a cost to CentrePort to remain open longer hours – this depends on the level of operation and the number of staff required on site outside of normal working hours.

INVESTMENT OBJECTIVES

<p>Performance against investment objective:</p> <p>Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.</p>	<p>Measure: Freight throughput by rail</p> <p>No effect.</p> <p>Measure: Travel time delay</p> <p>No direct impact on travel time delay – as the port would receive freight at any time, transport providers may choose to reduce the delay experienced by their vehicles and change the arrival time to arrive during the night.</p>
<p>Performance against investment objective:</p> <p>Delay and journey time variability for travel to, from and through the port area will be no worse than today.</p>	<p>Measure: Travel time delay</p> <p>See above.</p> <p>Measure: Travel time reliability</p> <p>No effect – as with travel time delay.</p>
<p>Performance against investment objective:</p> <p>Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.</p>	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>No effect.</p> <p>Measure: Network capacity to accept and deliver Ferry transport needs for all modes</p> <p>No effect.</p>
<p>Performance against investment objective:</p> <p>The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.</p>	<p>Measure: Access to the Port in an HILP event</p> <p>No effect.</p>
<p>Rationale for selection or rejection of alternative:</p>	<p>Improving travel times and reliability for freight by allowing deliveries outside of business hours when the Quay is busy with peak through traffic. Allows freight to make an economic decision for journey and arrival times. Although this option does not meet the investment objectives, it provides transport operators with the choice of how much delay or variance in reliability they are willing to accept and change their delivery behaviour accordingly, if the port is open 24/7.</p>

IMPLEMENTABILITY APPRAISAL

<p>Feasibility:</p>	<p>This is an operational decision for Centreport and faces no technical feasibility issues.</p> <p>The barrier to this at present is the lack of demand. Centreport advises that the nature of their current business means that a daytime pattern is required by their customers and that entries are provided for outside of the advertised hours as demand requires.</p>
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Risks:	<p>Risks lie with the provision of staff to operate the port between these periods, the union may not support this structure.</p> <p>An additional risk is that changing the hours of operation does not actually change supply chain behaviour and freight continues to be delivered during peak periods.</p> <p>It can be difficult to maintain the security associated with an international port if it is operational 24/7.</p>
Interdependencies:	<p>No specific dependencies, other than customer demand.</p>

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PORT GATE IMPROVEMENTS: WEIGH BRIDGE OPERATION

Option description:	Installation of a weigh in motion scale for trucks entering and leaving the port.	
Estimated cost:	Capital cost (\$m):	\$250k for a single weigh facility
	Opex/Maintenance (\$m/30yr):	\$15k/year for calibration and maintenance

INVESTMENT OBJECTIVES

Performance against investment objective: Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.	<p>Measure: Freight throughput by rail</p> <p>No effect.</p> <p>Measure: Travel time delay</p> <p>In theory will allow for a greater throughput of trucks.</p>
Performance against investment objective: Delay and journey time variability for travel to, from and through the port area will be no worse than today.	<p>Measure: Travel time delay</p> <p>See above.</p> <p>Measure: Travel time reliability</p> <p>Will have no effect of traffic through the port area and trips to and from the port area other than Centreport. May enhance reliability of these trips to a minor extent. Centreport advises that its port gate an turn around performance is acceptable.</p>
Performance against investment objective: Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>No effect.</p> <p>Measure: Network capacity to accept and deliver Ferry transport needs for all modes</p> <p>No effect.</p>
Performance against investment objective: The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.	<p>Measure: Access to the Port in an HILP event</p> <p>No effect.</p>
Rationale for selection or rejection of alternative:	

IMPLEMENTABILITY APPRAISAL

Feasibility:	This option is considered feasible to eliminate stacking of trucks along Hinemoa Street whilst waiting for access to the existing scales.
Risks:	Weigh in motion scales may not be accurate enough for the purposes of international shipping. Parallel weighbridges with faster readings may be more feasible if this issue exists.
Interdependencies:	This system is dependent on technological operations improvements such as automatic reporting and tracking of freight vehicles within the port. Benefits would also be realised in conjunction with a vehicle booking system.

INCREASE FREIGHT MOVEMENTS BY RAIL

Option description:	Increase the volume of freight moved onto the port by rail. This requires consolidation from trucks onto rail wagons at an inland port (existing or new).	
Estimated cost:	Capital cost (\$m):	n/a
	Opex/Maintenance (\$m/30yr):	Costs associated with labour and maintenance of plant to transfer freight between road and rail wagons – this may be within existing operational costs.

INVESTMENT OBJECTIVES

Performance against investment objective: Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.	<p>Measure: Freight throughput by rail</p> <p>Will provide a significant impact assuming the ports ability to receive the freight is also increased in conjunction with this option. In its own right increasing freight transported by rail will have a limited impact on the throughput given the port's capacity to receive it is restricted by the existing siding lengths.</p> <p>Measure: Travel time delay</p> <p>Minor increase in delay associated with more shunts occurring across the quay – assuming the ports capacity to receive rail freight is increased. It is possible that more freight movements by rail may relieve congestion on the road network to some degree as a result of fewer truck movements.</p>
Performance against investment objective: Delay and journey time variability for travel to, from and through the port area will be no worse than today.	<p>Measure: Travel time delay</p> <p>See above.</p> <p>Measure: Travel time reliability</p> <p>See above in travel time delay.</p>
Performance against investment objective: Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>No effect.</p> <p>Measure: Network capacity to accept and deliver Ferry transport needs for all modes</p> <p>No effect.</p>
Performance against investment objective: The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.	<p>Measure: Access to the Port in an HILP event</p> <p>No effect.</p>
Rationale for selection or rejection of alternative:	This option has been included in further analysis as a result of its positive performance against the 'access for freight' investment objective. However in its own right, this option does not addressing the limiting factors which are the ability of the port to receive freight by rail and the availability of locomotives and wagons are the limiting factor. Its benefits are better realised

IMPLEMENTABILITY APPRAISAL

Feasibility:	Theoretically there is capacity in terms of existing scheduled shunt times and operationally to increase the volume of freight that is moved onto the port via rail.
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Risks:	An increased frequency of level crossing closures and the apparent affect these have on the Quay may exacerbate congestion on the road network – this could be addressed with undertaking rail movements across the Quay at night.
Interdependencies:	<p>This may require an increase in the number of shunt slots across Aotea Quay to increase rail wagon movements onto and off of the port. Undertaking these rail movements at night and increasing the hours of port operations will reduce the risk of traffic congestion related to more level crossing closures.</p> <p>Increasing the siding lengths or providing a turnout may be required if rail capacity continues to increase.</p>

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PROVIDE A CYCLE LANE ALONG AOTEA QUAY

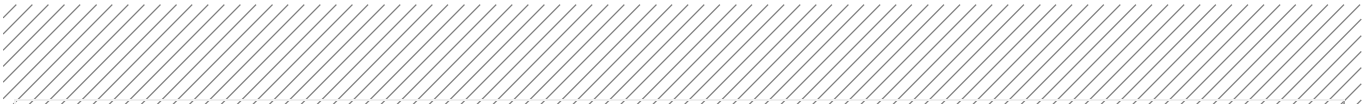
Option description:	Provide separated cycle lanes along Aotea Quay either two way or one on each side of the road.	
Estimated cost:	Capital cost (\$m):	Up to \$3m for entire length (with kerb movements assuming no land take required)
	Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

Performance against investment objective: Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.	Measure: Freight throughput by rail No effect. Measure: Travel time delay .
Performance against investment objective: Delay and journey time variability for travel to, from and through the port area will be no worse than today.	Measure: Travel time delay See above. Measure: Travel time reliability .
Performance against investment objective: Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.	Measure: Legibility of access to ferry terminals by all modes from key destinations No effect. Measure: Network capacity to accept and deliver Ferry transport needs for all modes No effect.
Performance against investment objective: The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.	Measure: Access to the Port in an HILP event No effect.
Rationale for selection or rejection of alternative:	Not to be undertaken in conjunction with providing a cycleway along Thorndon Quay – need to implement one or the other.

IMPLEMENTABILITY APPRAISAL

Feasibility:	This option is feasible but would likely require the removal of the central flush median and turning bays to reallocate road space to cyclists.
Risks:	Safety risk associated with high speed heavy vehicles travelling in close proximity to cyclists and undertaking turning movements across cycle lanes. Property risk: unwilling land sellers where additional road with is required (potentially KiwiRail land required). The effects of providing cyclist priority and restricting turning movements may exacerbate congestion issues on the network- in particular if the flush median and



	turning pockets were removed.
Interdependencies:	Would require significant work to create adequate segregation.

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MAKE MORE USE OF BURMA ROAD SIDING

Option description:	More use of the Burma Road siding to unload and reload wagons to reduce crossings of Aotea Quay.	
Estimated cost:	Capital cost (\$m):	nil
	Opex/Maintenance (\$m/30yr):	

INVESTMENT OBJECTIVES

Performance against investment objective: Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.	<p>Measure: Freight throughput by rail</p> <p>Minor positive effect though more rail options.</p> <p>Measure: Travel time delay</p> <p>Minor positive effect through providing greater rail access.</p>
Performance against investment objective: Delay and journey time variability for travel to, from and through the port area will be no worse than today.	<p>Measure: Travel time delay</p> <p>See above.</p> <p>Measure: Travel time reliability</p> <p>A minor, insignificant effect through potentially using the level crossings on Aotea Quay less.</p>
Performance against investment objective: Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>Moderate negative effect as the Burma Road siding traverses the Interislander passenger and freight access. This may cause additional conflicts.</p> <p>Measure: Network capacity to accept and deliver Ferry transport needs for all modes</p> <p>No effect.</p>
Performance against investment objective: The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.	<p>Measure: Access to the Port in an HILP event</p> <p>No effect.</p>
Rationale for selection or rejection of alternative:	Burma Road does not cross the Quay and as a result increased use would reduce the growth in trucks and not affect reliability of access to the Quay. However, Burma Road does conflict heavily with the Interislander terminal operation. This has not been included in the assessment.

IMPLEMENTABILITY APPRAISAL

Feasibility:	Using the Burma Road siding will generate more crossings of the NIMT line. It will also increase the amount of shunt movements through the Ferry terminal access area.
Risks:	More crossings of NIMT, and safety and operational risks for the Interislander terminal

Interdependencies:	<p>The increased utilisation of these sidings would benefit from consolidation of wagons being undertaken at an inland port prior to arriving at CentrePort. Additionally, trains can load freight on to wagons direct from the container terminal and head out to inland port for distribution, bypassing the marshalling yard.</p> <p>Need to optimise the Container siding to get the benefit – they overlap and constrain each other's movements.</p>
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Resilience options

ALL NEW STRUCTURES BUILT TO APPROPRIATE STRENGTH

Option description:	Any new infrastructure is to be constructed within the vicinity of the port will be constructed in accordance with the NZ Building Code.	
Estimated cost:	Capital cost (\$m):	n/a
	Opex/Maintenance (\$m/30yr):	n/a

INVESTMENT OBJECTIVES

Performance against investment objective: Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.	<p>Measure: Freight throughput by rail</p> <p>No effect.</p> <p>Measure: Travel time delay</p> <p>No effect.</p>
Performance against investment objective: Delay and journey time variability for travel to, from and through the port area will be no worse than today.	<p>Measure: Travel time delay</p> <p>See above.</p> <p>Measure: Travel time reliability</p> <p>No effect.</p>
Performance against investment objective: Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.	<p>Measure: Legibility of access to ferry terminals by all modes from key destinations</p> <p>No effect.</p> <p>Measure: Network capacity to accept and deliver Ferry transport needs for all modes</p> <p>No effect.</p>
Performance against investment objective: The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.	<p>Measure: Access to the Port in an HILP event</p> <p>Significant positive effect.</p>
Rationale for selection or rejection of alternative:	This directly ensures that any new infrastructure is not the limiting factor to access and deliver the port's required function as a key enabler of recovery in a HILP event

IMPLEMENTABILITY APPRAISAL

Feasibility:	High feasibility as these requirements are included within New Zealand legislation.
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Risks:	The main risk is that if a larger earthquake was to occur than those designed for in the Building Code, there is still a possibility that the structure could fail.
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Interdependencies:	n/a
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STRENGTHEN IDENTIFIED WEAK STRUCTURES

Option description:	Any new infrastructure is to be constructed within the vicinity of the port will be constructed in accordance with the NZ Building Code.
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Estimated cost:	Capital cost (\$m):	
	Opex/Maintenance (\$m/30yr):	n/a

INVESTMENT OBJECTIVES

Performance against investment objective: Access for freight to and from the transport network does not inhibit the port area's ability to accommodate forecast growth.	Measure: Freight throughput by rail No effect. Measure: Travel time delay No effect.
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Performance against investment objective: Delay and journey time variability for travel to, from and through the port area will be no worse than today.	Measure: Travel time delay See above. Measure: Travel time reliability No effect.
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Performance against investment objective: Access to ferry terminals has adequate capacity for future requirements and is faster, more reliable and legible than today.	Measure: Legibility of access to ferry terminals by all modes from key destinations No effect. Measure: Network capacity to accept and deliver Ferry transport needs for all modes No effect.
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Performance against investment objective: The adjacent transport infrastructure enables the port to deliver its required function as a key enabler of recovery in a HILP event.	Measure: Access to the Port in an HILP event Significant positive effect.
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Rationale for selection or rejection of alternative:	This directly ensures that any new infrastructure is not the limiting factor to access and deliver the port's required function as a key enabler of recovery in a HILP event
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IMPLEMENTABILITY APPRAISAL

Feasibility:	High feasibility as these requirements are included within New Zealand legislation.
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Risks:	The main risk is that if a larger earthquake was to occur than those designed for in the Building Code, there is still a possibility that the structure could fail.
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Interdependencies:

n/a

RELEASED UNDER THE
OFFICIAL INFORMATION ACT

15	Re-configure rail sidings on port to increase capacity			•	•	•	•	•	
16	Separate access to office park from freight access to the port onto Quay			•	•	•	•	•	
17	Upgraded Ferry access (eg roundabout)			•		•	•	•	
18	Reallocate stadium carpark for office park and reduce parking on port land		•						
19	Freight booking system for trucks		•	•	•	•	•	•	
20	CBD Parking strategy - move parking away from the Quay and use parking charges to influence time of day		•	•	•	•	•	•	
21	Travel plan for office park - travel outside peaks, mode share etc.		•	•	•	•	•	•	
22	Reallocate lanes for freight on the Quay			•			•	•	
23	Improve information and legibility	•	•	•	•	•	•	•	•
24	Tidal flow on Aotea Quay for all traffic		•						
25	Provide priority to port traffic at traffic signals at times of high port demand (more cycle time only)	•	•	•	•	•	•	•	
26	Port gate operation improvements: Hours of opening	•	•	•	•	•	•	•	
27	Port gate improvements faster operation		•	•	•	•	•	•	
28	Increase freight movements at night	•	•	•	•	•	•	•	
29	Increase freight movements by rail		•	•	•	•	•	•	
30	Strengthen identified weak structures e.g. Hutt Road overbridge and Thorndon Quay overbridge								•
31	Provide a connection between Aotea and Thorndon Quays (all modes) - east- west connection								•
32	All new structures built to appropriate strength				•	•	•	•	•