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SOFOS LTD

WHANGANUI TO MOTUEKA FERRY SERVICE

Feasibility Study

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A report prepared by Warwick Walbran of Walbran Transport Analysis Limited and Nik Zangouropoulos of Sofos Ltd

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1 Executive Summary

1.1 The Proposal

The proposal is to establish an inter-island ferry service between Whanganui and Motueka. There have been at least four previous proposals to establish a route between Whanganui and the upper South Island. None of these proposals have proceeded to implementation, despite some sound reasoning. We suspect that the primary stumbling block has been that most of them required substantial government (central, regional and/or local) investment for port development before the first ferry sailing. That approach puts all the capital risk on government.

This proposal is different. It proposes that the ferry operator meets all the port development costs in return for no berthage charges. This approach puts all the capital risk associated with the expensive port development, as well as all the risk associated with ship acquisition and operation, on the ferry operator.

1.2 Ships

The financial analysis has revealed that the optimum ferry size is about 180m overall length and drawing about 6m. This size is similar to the recently introduced vessels on the Wellington - Picton ferry route (*Strait Feronia* and *Kaiarahi*), and a little larger than their predecessors. Initially a single ship operation is proposed, with the addition of a second ship in about the fifth year of operation being anticipated.

Whether the initial vessel offers a passenger capability, or is freight only (with the possibility of a second vessel adding passenger capability at a later date) is not conclusive at this stage. It appears that there are advantages to the ferry operator if the initial vessel is a freight only operation, including lower ship costs (capital and operating), a simple regulatory regime and greater timetable flexibility.

Dry docking is likely to be undertaken offshore (either in Australia or Asia).

1.3 Port Development

To accommodate a vessel of this size, substantial development of both the Whanganui and Motueka ports will be required. Dredging of the approach channel (including the bars), berthing area and manoeuvring basin will be required at both ports. Maritime New Zealand (MNZ) requires 1m under keel clearance, so dredging to 7m is anticipated. Reclamation to create suitable areas for vehicle marshalling and office space will also be required. Using the dredged material for the reclamation is anticipated.

This initial investigation indicates that purchasing a new build dredger at a cost of $20 to $25 million (NZD) may be the most advantageous option; however, purchase or lease of an existing dredger is possible.

There are several options for suitable berthing at Whanganui Port including initial berthing at Wharf 2 or Wharf 3 with a subsequent reclaimed development in the harbour at a future stage. Utilising Wharf 2 or Wharf 3 for initial berthing has the advantage of reducing the upfront requirement for capital investment, but may clash with the relocation of the Q-West boat building facility as shown on the draft Port Redevelopment Master Plan. If there is such a clash, then a modified version of the reclamation option would be required from the outset for the ferry berth. MNZ has indicated that they would not allow the ferry to berth at Wharf 1.

We understand that the proposed relocation of the Q-West facilities is at an advanced stage and that the proposal does to not preclude viable berthing arrangement for the proposed ferry service (however there may be opportunities for optimisation of overall wharf space if minor modifications to the final Q-West proposal are considered).

1.4 Markets

1.4.1 Freight

Determination of the size of the freight market has been undertaken on both a top down basis and a bottom up basis.

1.4.1.1 Top Down

The National Freight Demand Study (NFDS) quantifies the volume of freight moving between New Zealand's regions, broken down by transport mode. The top down approach has utilised the NFDS data to quantify the volume of inter-island freight as 2,070,000 tonnes per year. The proposed ferry service would offer an overwhelming advantage for any freight between Taranaki / Whanganui and Nelson / Tasman / Canterbury. The NFDS reveals that 140,000 tonnes p.a. move across Cook Strait between these provinces which equates to about 24 trucks per day.

The proposed ferry service will also offer advantages to freight to/from anywhere in the north Island above about Palmerston North, and anywhere in the South Island excluding Marlborough and Kaikoura.

1.4.1.2 Bottom Up

Telephone surveys were undertaken identifying 1,024 truck movements per week where interviewees said they would use the proposed ferry service. Interviews with other parties have revealed that a further 46 truck movements per week and 280 camper vans are likely to use the service. This equates to 153 truck movements per day. The proposed ferry has capacity for a maximum of 70 truck units per sailing (two sailings per day) and both the economic analysis and financial analysis assume about 70% utilisation. If the survey results are truly indicative, the potential market is much larger than can be served by a one ship operation.

1.4.2 Passengers

Tourism Resource Consultants were commissioned to estimate the size of the passenger market that could use the proposed service. They concluded that the segment from the existing market is between 24,000 and 60,000 passengers and between 5,500 and 13,750 cars p.a. They also estimate that in addition to that segment, between 5,500 and 11,000 passengers and 3,000 to 6,000 cars p.a. would be new users of an inter-island ferry service.

1.5 Strategic Consistency

The table below summarises the proposal's alignment with the various relevant strategies and policies:

Document	Alignment	Comment
Roads of National Significance	Very Strong	Proposal makes a major contribution to national economic growth and productivity on freight routes.
Government Policy Statement on Land Transport Funding 2015/16	Very Strong	Makes a major contribution to: • Economic growth and productivity • Road safety • Resilience • Value for money.
Land Transport Management Act	Very Strong	Makes a major contribution to four of the five objectives of the Act and makes a minor contribution to the fifth objective.
New Zealand Energy Strategy 2011–2021	Very Strong	
New Zealand Energy Efficiency and Conservation Strategy 2011–2016	Very Strong	
Horizons Regional Land Transport Strategy	Very Strong	Strengthens freight linkages.
Tasman Regional Land Transport Strategy	Not inconsistent	

1.6 Economic Analysis

Section 2.1 below identifies three main problems to be addressed:

- Resilience – the nation is almost entirely dependent on berthing infrastructure at Wellington and Picton for its inter-island ferry service. The recent Kaikoura earthquake has reminded many of us how vulnerable this infrastructure is to the forces of nature. The proposed service would create a second set of ferry infrastructure – immediately usable if the infrastructure at Wellington and/or Picton should become unusable;
- Regional economic decline – this project has the potential to reverse decades of regional economic decline. Examples of how port redevelopment projects have been the catalyst for regional economic revival since about 1950 can be seen at Tauranga, Napier and Gisborne; and
- Transport efficiency – there are considerable transport efficiencies that can be gained from a Whanganui to Motueka ferry service (compared to the existing Wellington to Picton ferry service).

The economic analysis quantifies the benefits (NPV) that can be expected from the proposed ferry service over a 40 year evaluation period at:

Accident benefits	$124 million
Travel Time and Vehicle Operating Cost benefits	$713 million
Road User benefits	$28 million
Carbon Dioxide benefits	-$3 million

Particulate benefits	$12 million
Resilience benefits	$25 million
Total Benefits	**$899 million**

These benefits accrue to the nation, not to the ferry operator. However, the costs that are incurred to produce these benefits accrue to the ferry operator, not to the nation. Costs incurred to the nation (i.e. to government) will be very small in comparison to the expected benefits. Government will be asked to contribute funding for the next stage (Detailed Business Case). The requested government contribution is less than one quarter of one percent of the expected benefits.

A regional impact analysis has not been completed at this stage, but a preliminary assessment of employment opportunities has identified about 120 jobs directly associated with the minimum proposed ferry service.

1.7 Financial Analysis

The financial modelling undertaken as part of this study indicates that very strong commercial outcomes are achievable by the proposed service. The modelling suggests that a freight only service would within three years achieve before tax profit levels (EBIT) of $5m to $10m per annum. On an EBITDA basis, the profit levels are projected to be above to $10m (the precise level is dependent on whether the vessel is leased or purchased).

These profitability levels are achieved by targeting commercial vehicle operators that would derive the greatest road saving benefits from the proposed service. It is assessed that that 23% to 26% of the commercial vehicle market after 2021 would use the service. The biggest component of this is expected to be generated from the Auckland to Canterbury segment (about 60% of total market), with a sizeable secondary component derived from operators moving goods between regional pairings close to the two ports.

The rates charged for the intended service are based on a “sharing” of the road cost savings between the ferry operator and the truck operators. That is, there would be a premium on current inter-island rates but the net savings to the trucking operators would still be substantial.

The analysis currently indicates that the addition of passenger services leads to a reduction in profitability as the incremental revenue is offset by additional passenger costs such as extra capital for a RoPax vessel, hospitality crewing, terminal operations and extra frequency and scale of ship survey costs.

The main sensitivities to the financial forecasts are changes in commercial vehicle rates, port costs and forecasts market shares / volumes. The forecast level of before tax profit is sufficiently robust to withstand significantly adverse outcomes in the above variables – for example if port development costs increased by $25m, before tax profit would still be in a healthy range of $3m to $8m.

1.8 Further Work and Funding

Further work is required before a decision to proceed or not can be made. The remaining stages are:

Stage 3 Detailed Business Case	<u>Stage 3A – Rough Order Cost $350,000</u> • Engineering scoping study – concept design and initial construction cost estimates • Regional economic assessment • Environment scoping study – initial understanding of environmental impacts and possible mitigation measures • Commercial case development

	<u>Stage 3B – Rough Order Cost $1,500,000</u> • Detailed engineering design and construction cost estimates • Scoping of resource consent application • Updated commercial case for presentation to investors
Stage 4 Information Memorandum	• Approach investors for funding the proposal (equity and debt). • Environmental impact assessment • Resource consent application
Stage 5 Implementation	• Port construction • Ferry procurement • Business set up

We have assumed that construction of the port development works would start in mid 2020 and the first sailing would be in mid 2021.

1.9 Summary

This report completes the second stage of the five stage process to implementation. The remaining stages are Detailed Business Case, Information Memorandum and Implementation. One of the purposes of staging the work in this way is to build increasing confidence as we proceed through the staged process, or to give early warning if the project does not appear viable so that initial investment can be limited. This approach allows the investment size to match the level of confidence that is being built in the project through the process.

The outputs of this stage of the process strongly indicate that proceeding to the next stage (Detailed Business Case) is warranted.

2 Background and Context

The Whanganui town wharf was the centre of activity until 1908 when the new port was developed at Castlecliff around the frozen meat trade. For several decades, the port was a bustling entranceway into the central North Island servicing what was, at the time, New Zealand's fifth largest city. Over the last few decades the port has declined and there are now major issues around the state of the infrastructure extending to the available depth of water for vessels using the harbour and river entranceway.

Central government has recognised a need to encourage and support economic revitalisation of regional New Zealand. In August 2016, Economic Development Minister Steven Joyce announced that the Government will invest $500,000 in partnership with the Whanganui District Council to develop a comprehensive plan to revitalise the Whanganui Port Precinct. The plan will form the blueprint for a new marine services centre, an expanded boat building industry, visitor services and recreational area. The government announcement included “Government investment in the project will help the Whanganui District Council develop the plan for the future of the Whanganui Port. Whanganui District Council are working with Iwi, key business leaders, Horizons Regional Council, UCOL and NGOs on the plan”.

Independent of the $500,000 funding from central government, a proposal for a roll-on roll-off (RoRo or RoPax) ferry service catering for freight or freight and passengers between Whanganui and Motueka has been conceived and developed over the last five or so years. This report provides a critical and independent assessment of the ferry proposal at a feasibility level of detail. If the proposal appears feasible, further detailed investigation and analysis will be required before a firm commitment to commencing operations can be made.

This is not the first time that a ferry service between Whanganui and the South Island has been proposed. Previous proposals have not eventuated and one of the key reasons for this is that substantial investment from government (central, regional or local) would have been required to upgrade the physical infrastructure (primarily wharves), and undertake dredging to allow ferries (i.e. ships) to use the harbour. Such an approach places the capital risk of the project on Government.

This proposal is different. It requires the ferry operator to make the investment in upgrading the infrastructure and dredge the harbours and approach channels, placing the capital risk on the ferry operator.

A staged approach is being taken to the investigation of the proposal:

Stage 1 Pre-Feasibility	• Preliminary investigation • Development and promotion of the idea
Stage 2 Feasibility Study	• Proof of concept – technical and commercial viability in principle • Oriented towards local and central government to generate funding for more detailed assessment
Stage 3 Detailed Business Case	<u>Stage 3A – Rough Order Cost $350,000</u> • Engineering scoping study – concept design and initial construction cost estimates • Regional economic assessment • Environment scoping study – initial understanding of environmental impacts and possible mitigation measures • Commercial case development <u>Stage 3B – Rough Order Cost $1,500,000</u> • Detailed engineering design and construction cost estimates • Detailed scoping of resource consent application • Updated commercial case for presentation to investors
Stage 4 Information Memorandum	• Approach investors for funding the proposal (equity and debt) • Environmental impact assessment • Resource consent application
Stage 5 Implementation	• Port construction • Ferry procurement • Business set up

It is envisaged that service to be implemented in Stage 5 would be at the low risk end of the spectrum i.e. a one ship operation initially with phased investment in landside infrastructure. Stage 1 has been completed. This report completes Stage 2.

2.1 Problem/Opportunity Definition

The problem/opportunity is multifaceted.

First, and perhaps most importantly, the nation's primary sea links (KiwiRail trading as InterIslander and Strait Shipping Ltd (SSL) trading as Bluebridge) between the North and South Islands depend entirely on functioning ferry berths at Wellington and Picton. The recent Kaikoura earthquake has both interrupted the primary road route between Picton and Christchurch (Christchurch being the main origin/destination for both freight and passenger movements to/from the South Island), and reminded us all how vulnerable our built infrastructure is to seismic events. Wellington has long been thought of as being likely to be subjected to a major seismic event within planning timeframes, and has been subject to major seismic events in the not too distant past (1848 Marlborough Earthquake, 1855 Wairarapa Earthquake, 1863 Hawke's Bay Earthquake, 1929 Murchison Earthquake, 1931 Hawke's Bay Earthquake, 1968 Inangahua Earthquake, 2016 Kaikoura Earthquake to name but a few). The 2016 Kaikoura Earthquake caused considerable damage to infrastructure at Wellington's Port (CentrePort), and in South Island infrastructure - road (SH1) and rail (Main North Line – MNL).

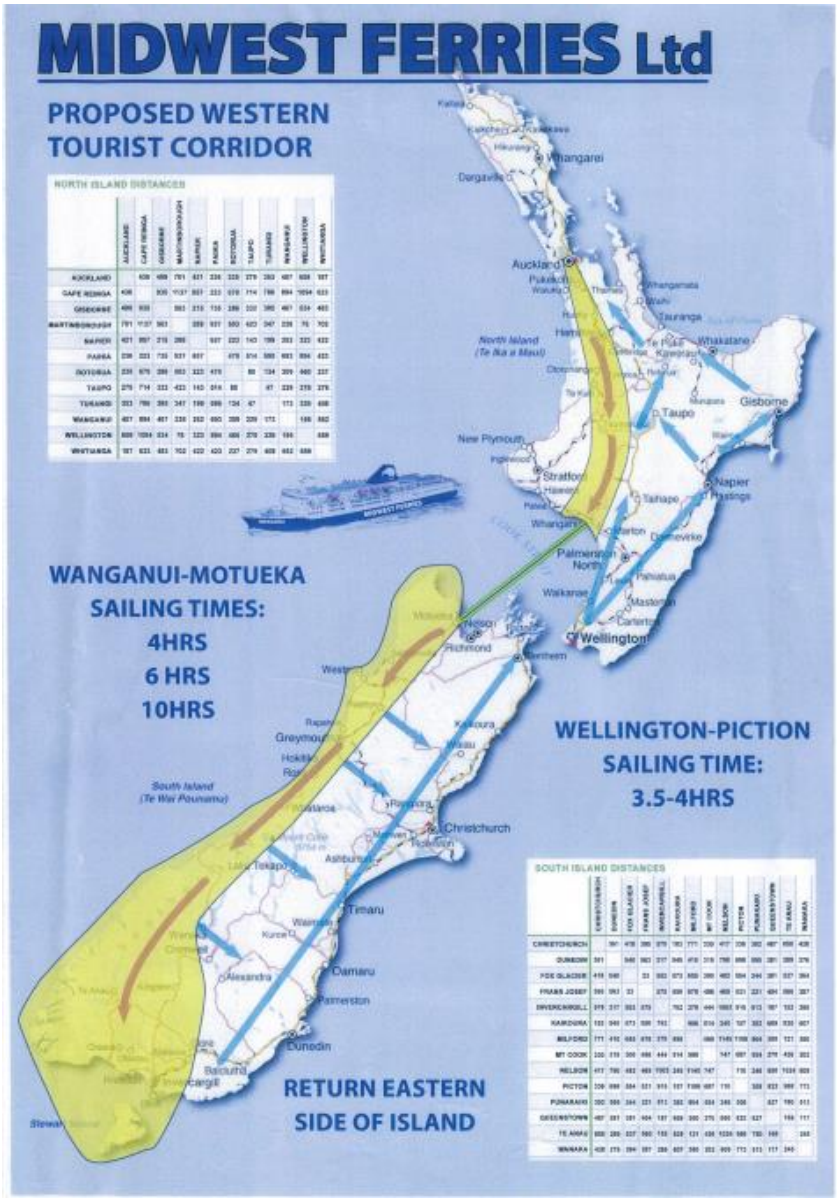
This is an opportunity to establish a scheduled daily ferry service between the North and South Islands that does not rely on berthing facilities at Wellington or Picton, thereby building in a much higher degree of resilience than is present in the current transport network.

Second, there is an opportunity for regional economic development. Over the last few decades New Zealand has benefitted increasingly from tourism, in particular international tourism. These benefits have been concentrated in Auckland, Queenstown and the points between them that lie on or close to SH1, which can be thought of as a transport spine running the length of the country.

Recent discussions with Tourism Industry Aotearoa (TIA) have revealed that international tourism is predicted to continue to grow at well above the general GDP growth rate, and be a key driver of New Zealand's economic performance over the next decade. TIA views Auckland and Queenstown as having reached capacity and has a strategy of spreading tourism beyond the SH1 spine to regions that may not be currently recognized as key tourist destinations.

Establishing a Whanganui to Motueka ferry service would diversify the tourist experience beyond the SH1 spine to incorporate SH3 and SH4 in the north Island and SH6, SH65 and SH7 in the South Island, creating the opportunity for economic renewal in centres along the route. Businesses in these towns can be expected to be quick to respond to the opportunity. An example of this is the recently expanded tourist and traveler serving business in Murchison and Springs Junction. This has been a response to the temporary diversion of SH1 traffic resulting from the closure of the section of SH1 north of Kaikoura since the 2016 Kaikoura Earthquake. Figure 1 below illustrates the potential for regional benefits.

Figure 1 - Regional Benefits



Third, there are transport opportunities / efficiencies. Most of the freight and some of the passengers moving between the North and South Islands by surface transport are moving between Auckland and Christchurch using the SH1 route. The section of SH1 north of Kaikoura is presently closed and road transport has been diverted from Picton along SH1 to Blenheim, and then along SH6 to St Arnaud and on to Murchison, SH65 to Springs Junction and then SH7 to rejoin SH1 north of Rangiora. The Section of SH1 north of Kaikoura is expected to open prior to the commencement of the Whanganui to Motueka ferry service. This report assumes that to be the case.

A Whanganui to Motueka ferry service creates considerable savings in travel time, vehicle operating costs, accident costs, Nitrous Oxide, particulates, other emissions and the deposition of contaminants on the road surface. These savings need to be offset against the longer ferry trip, however there are net savings.

This report quantifies the economic benefits of addressing only the third problem above regarding transport opportunities / efficiencies, which would intuitively seem to be the smallest of the three problems above.

2.2 Purpose Statement

The purpose of this project is to carry out an investigation into the feasibility of the Whanganui to Motueka ferry proposal. The proposal focuses on origin to destination freight transport, possibly combined with a passenger service. Better understanding and definition of the concept, together with the questions to be addressed in the next phase of work, are part of the intended outcomes from this study.

We note that the SH1 route Picton – Kaikoura – Christchurch is currently closed. The proposed ferry service is not expected to be operational until mid 2021. The SH1 route Picton – Kaikoura – Christchurch is expected to be open prior to the commencement of the ferry service and is treated as being open in this study.

The Whanganui to Motueka ferry service proposal is a concept that has considerable potential to address the problem defined in Section 2.1 above, and to contribute to a wide range of national and regional objectives spanning economic development through improvements to New Zealand's competitive position in the international market, environmental sustainability and road safety. However, the proposal remains little more than an idea or concept until such time as the economic evaluation, financial assessment, engineering design and environmental scoping are completed to the detailed level needed to give investors and owners the confidence to make the opportunity a reality. This report is an early stage of the detailed analysis, and provides information as a critical step toward implementation.

If later stages of the investigation confirm viability, the project will provide a compelling proposition to generate increased economic activity through more efficient key transport links and increased tourism in the regions.

2.3 Project Funding, Structure and Consultancy Team

2.3.1 Investigations and Studies

Stage one has been funded from the personal resources of a Whanganui businessman Neville Johnson. Funding for this study to further evaluate the financial viability and economics associated with establishing and operating a ferry service between Whanganui and Motueka has been raised from the public and from businesses, and further funding has been requested from local and regional government.

Walbran Transport Analysis Ltd (Warwick Walbran) and Sofos Ltd (Nik Zangouropoulos) have been commissioned to undertake the study.

2.3.2 Establishment and Operation

During discussions with Sir Peter Talley, he mentioned that Talleys purchased their factory site at Motueka for $1, paid for the wharf construction themselves, and do not pay any berthage charges. That conversation was the trigger for development of the key aspect of the financial operating model for the proposed Whanganui to Motueka ferry service, which is that the ferry company meet all the development costs (including dredging, reclamation, wharf creation and/or strengthening, terminal building and marshalling area) in return for not being charged berthage.

2.4 Previous Work

2.4.1 Previous Studies and Reports

The available previous reports and studies have been reviewed. Below is a summary of the reports and the points of interest taken from them:

Engineering

Whanganui

1. Report on the Wanganui Harbour – J O Riddell for Wanganui Harbour Board – 1967:
   - The report investigates whether Wanganui Port could be developed to serve vessels of 10,000 tons and concludes "*it can be stated quite definitively that such a development is indeed feasible*";
   - The design criteria were for 30 ft (9m) draft below Low Water Spring Tide;
   - As part of the work the Hydraulic Research Station (Wallingford) prepared a report;
   - Littoral drift is estimated at 200,000 yds^3 (152,000 m^3) per year;
   - Proposes to turn 550 foot vessels (167m) and allows twice vessel length for an unwarped turn. Considers diverting the river through South Spit as an alternative option and turning the harbour into a still water harbour (the blue water harbour concept); and
   - Hydraulic Research Station recommends against extending the moles to gain greater depth.

2. Investigations of the Entrance to Wanganui Harbour – R F Mclean and J S Burgess – Geography Department, University of Canterbury – 1969:
   - Changes in volume of sand at the harbour entrance vary between 135,000 yds^3 and 345,000 yds^3 per year.

3. Wanganui Port Development Coastal Engineering Considerations – WBM & Coastal Consultancy International – November 1991:
   - Prevailing Entrance Channel depth is commonly less than 3m (below chart datum);
   - Minimum required depth is 7 to 9m to facilitate increased trade; and
   - Objective was to prepare a programme of investigations and design steps required to determine the best solution and reliable cost estimates.

4. Wanganui Port Development Feasibility Studies – Coastal Engineering Aspects – Coastal Consultancy International & WBM – July 1992:
   - Assumes river diversion;
   - Net drift rate 300,000 m^3/year with a peak rate of 70,000 to 80,000 m^3/fortnight; and
   - Downtime restricted to major storm events about 2% of the time.

5. Wanganui Port Development Feasibility Report – Murray Gilbertson on behalf of Wanganui District Council's Port Project Team – October 1993:
   - Current port asset is deteriorating;
   - Large investment is required;
   - Anticipates logs as the primary potential cargo; and
   - Concludes that port development is feasible and attractive.

6. A Proposal for Immediate Action on New Marina and Port Developments – River City Port Ltd – 23 December 2003:
   - A proposal to take ownership and develop small boat and retail facilities and investigate opportunities for larger boats / barging / shipping.

7. Assessment of Deferred Maintenance of Port of Wanganui – CPG New Zealand Ltd – December 2009:
   - Gives the following breakdown of deferred maintenance:

Wharf 1	$353,648
Wharf 2 including transition 2 to 3	$1,609,888
Wharf 3	$1,902,000
Maintenance Dredging	$2,100,000
South Mole	$2,216,000
Central Training Wall	$1,285,000
North Bank Sea Wall	$50,000
Wharf Sheds	$200,000
Total	**$9,706,536**

8. Harbour Baseline Study: Lower Whanganui River Management Strategy – Coastal Systems Ltd (Dr Roger Shand) – March 2016:
   - Mostly focuses up river of the port, but does contain useful information about the port and bar sedimentation; and
   - Recommends data collection and analysis.

9. Lower Whanganui Training Structure – Council paper by Rowan McGregor – 15 March 2017:
   - $16.5m of deferred maintenance work needed on the moles and South Spit.

Motueka

A. Establishing and Maintaining a New Navigation Channel for Port Motueka – OCEL – May 2011:
   - Geotextile Groyne installed in the mid-1990s, designed by Beca Carter Ferner – overwhelmed by a sand tongue less than 2 months after completion;
   - Littoral drift is an average of 68,000 m³ per year – from Kirk 1990;
   - Kirk proposed a dredged channel;
   - At no time in the past has the combination of tidal flow and training wall been adequate to prevent channel infilling;
   - Proposed channel 50m wide and 3m below chart datum. Estimates dredging volume of 132,500 m³;
   - Maintenance dredging column of 14,250 to 23,750 m³ per year; and
   - Includes on page 7 "the natural occurrences of cobbles in the bed of the existing channel" – may impact the type of dredging required?"

B. Jackett Island Long Term Erosion Management Preliminary Practicable Options Report – Tonkin and Taylor – November 2011

- Notes that the seaward side of Jackett Island is eroding and gives Tasman District Council options to stabilise the situation at costs ranging from about $2m to $12m. The options have varying annual maintenance costs and risks associated with them;
- The "*Reset of channel position*" is similar to the channel modifications required for the ferry proposal; and
- Estimates longshore drift sand transport at 47,500m3/year;

Other

10. Marketing Research Report for a Potential Inter-Island Freight Link Between Wanganui and a South Island Port – Author not identified – October 1989:
    - Good support exists for such a service;
    - Reliability, timetable, cost, reefer points are all important; and
    - Competitive response needs consideration.

11. Whanganui Nelson Roll on Roll off Proposal – Port Development and Viability Issues – A Report – D-186577 – Allan McGibbon – March 2011:
    - Considered operating a freight only service using a small vessel and concluded that a compelling argument to implement the proposed service does not exist – the authors of this report would concur with the conclusion that a small ferry operation is not viable.

3 The Proposal

The project's promoter set himself a number of objectives, including:

- Providing impetus for much increased and sustainable economic vitality in Whanganui and surrounding areas;
- Improving the integration/positioning of Whanganui with the national economy; and
- Creating Whanganui as a destination (the Whanganui River with its associated cultural and historical importance being key elements).

The spearhead for achieving these objectives is:

- Maximising the commercial potential of Whanganui Port.

The key proposal is to establish a scheduled daily ferry service between Whanganui and Motueka to facilitate realisation of the objectives above.

3.1 Services

The proposed ferry operation could be conducted in many ways incorporating numerous variables such as the number and type of vessel, the frequency of sailings, the timetable, and which markets and market segments are served.

The concept underlying this study envisaged two or more vessels operating on the proposed route. This study, however, takes as a starting point a single vessel operation as the lowest risk entry point into the inter-island market i.e. the lowest cost operating regime that requires the lowest market share levels for financial breakeven.

Such a regime would result in a daily return schedule with a timetable to be finalised based on the best mix of targeted traffic.

The proposed operation could service the combined freight and passenger markets, or it could service just the freight market. The combined markets offer a greater revenue pool but require a higher cost base (vessel type and operation, and land based costs), as well as greater complexity and risk. Both options are explored in this study.

The truck freight market includes many segments including various categories of dangerous goods which require restricted passenger numbers.

3.2 Ships

3.2.1 Ship Type

This study has evaluated both a freight only service (RoRo vessels) and a combined freight and passenger service comparable to the services provided by the existing operators on the Cook Strait (RoPax vessels).

The evaluation indicates either option is viable with the freight only option offering higher profit and lower risk at this stage. More detailed work on which option is preferred will be undertaken in the next stage.

The vessel envisaged would be of a type currently deployed by InterIslander and Bluebridge:

- 180m length
- 25m beam
- 6.5m draft (loaded)
- 2,000 lane metres (official specifications)

- 70 truck effective capacity
- 400 passenger capacity (minimum)
- 20 knot speed

The age of the vessel will be a secondary consideration provided it meets modern safety and operating standards. Depending on the condition of the vessel, upgrades may be required for passenger facilities, or other parts of the vessel to ensure efficient operation on the proposed route. It is assumed that the vessel has modern manoeuvring equipment (bow thrusters, active rudders etc.).

The capacity of the above vessel is considered the best trade-off between required breakeven volumes (the bigger capacity the better) and overall costs for ship and port operations (the smaller capacity the better).

Initially a 150m vessel was considered. However, research found that availability of vessels of this size is limited. Notwithstanding the issue of availability, financial analysis subsequently found that the larger sized option is commercially preferable due to the significantly greater lane metre capacity provided relative to the moderate additional capital cost.

3.2.2 Regulatory Regime

3.2.2.1 Flag State
The ship will need to be registered under a domestic regulatory regime which will dictate the standards such as crewing that need to be complied with, and how compliance is inspected. There are significant costs associated with changing flags so it is likely that the flag state of the acquired vessel will be retained. The most likely option is a United Kingdom flagged vessel.

3.2.2.2 Classification Society
All ships operating around the world must be operated “within class” i.e. belong to a Classification Society which stipulates detailed operating procedures and equipment standards for vessel use. The main Classification Societies are Lloyds and DNV.

3.2.2.3 Safety Management Systems
Maritime New Zealand requires ship operators to have a Safety Management System that details safe operating procedure including sea and shore integration.

A RoPax / passenger operation necessitates compliance to many additional safety standards (SOLAS), including lifesaving equipment and minimum crewing to passenger ratios.

3.2.2.4 License to Operate
Maritime New Zealand is ultimately responsible for issuing a “Document of Compliance” which allows a business to operate a vessel in New Zealand. This process incorporates elements of the above regulatory requirements.

3.2.3 Service Reliability

The proposed service should be able to operate as reliably as existing Cook Strait services. Typically, mechanical reliability should be close to 100% especially with a timetable that has a fair degree of redundancy (e.g. a six hour transit time twice per day provides 50% shore versus sea time).

Vessels of the proposed size should be able to operate over 98% of the time based on significant wave height restrictions. Present indications are that the seakeeping conditions on the proposed route are no worse than the existing Wellington to Picton route. There may be a fractional increase in the number of cancelled sailings due to the longer transit time, requiring additional caution compared to the Cook Strait vessels.

3.2.4 Sailings Timetable

It has been initially assessed that the starting point for the proposed ferry service is a single ship operation. While this creates a narrower base against which to spread capital costs, it allows a realistic breakeven level of volume and market share within the first three years of operation.

On this basis, a daily return service would be offered with fixed times for at six days per week to cater for the freight market.

The final timetable will depend on a detailed survey of freight and passenger markets, resulting in an optimisation exercise to capture as much of those markets as possible within the timegates covered. In the meantime, a timetable has been assumed in order to assess market shares and volumes for the proposed service's financial projections.

Consideration would also be given to operating different timetables in the weekends when truck volumes are heavily reduced.

3.2.5 Dry Docking Regime

Previous generations of inter-island ferries (150m length, 20m beam) were able to undertake their periodic out of water surveys at the dry-docking facility in Devonport, New Zealand. The newer vessels deployed by the Cook Strait operators have greater dimensions that cannot be accommodated by Devonport and need to be dry docked offshore, resulting in greater periods out of service and significantly greater overall cost.

The first offshore preference is for an Australian dry dock option as this is the shortest steaming time. The Australian options have narrowed significantly with the closure of the Forgacs shipyard in Brisbane in 2014. The principal Australian option now is Thales shipyard in Sydney. This shipyard has contracts in place with the Royal Australian Navy and reserving dry docking periods to coincide with ideal times for a ferry operator cannot be assured.

If the Australian option is not available, the next best options are in Asian countries such as Singapore. This extends steaming time from three days to about 12 days in each direction thus significantly increasing the total cost of a given dry dock, especially when adding lost revenue opportunities to the explicit costs of the survey.

Freight only vessels require out of water surveys every five years; passenger vessels require surveys every two to three years.

Some work has taken place recently in relation to developing a dry dock facility in New Zealand that can accommodate vessels up to 200m in length, however, to date there are no firm plans in place for such a facility.

3.3 Port Infrastructure and Operations

The proposal is based on the significant upgrade of existing land and sea infrastructure at Whanganui and Motueka ports. The possibility of having Nelson as the South Island Terminus was entertained, but based on feedback from Port Nelson it appears unlikely that they would be able to accommodate the proposed ferry service.

The ferry operation will be based on vessels with length of about 180m.

3.3.1 Wharves and Harbour

The existing physical environment of the Whanganui Port cannot accommodate berthing arrangements for a 180m vessel. Discussions with experienced marine and harbour operators suggest a number of viable options exist to address this without major disruption or risk including:

- *Operation from Wharf 3 (with or without reconfiguration of adjacent boating infrastructure).*
- *Operation from Wharf 2 (with different permutations for berthing/mooring).*
- *Harbour reclamation and new berths.*

In addition to the above options there are considerations of short and long term options. In the longer term a two ship operation is a natural progression of the envisaged start up service. This would require the harbour reclamation option.

The use of either Wharf 2 or Wharf 3 may be constrained or even eliminated by the planned relocation of the current Q-West boat building and servicing operation. Should this occur, a harbour reclamation option will be required (which may involve a modified version of the layout contemplated as the long term wharf solution).

It is understood from the Port Revitalisation Project Team that nothing in the Master Plan currently being developed precludes the eventual operation of a ferry service (i.e. there is flexibility to ensure one of the above options is workable).

Some modifications to existing training wall structures (possibly including reclamation) will be required irrespective of which option eventuates.

Advice received from maritime specialists indicates that the options above require a maximum required turning basin for modern vessels (twin screw, bow thrusters, active rudders and possibly further manoeuvring aids) of 250m. A number of further options could be considered to improve berthing if required, including the use of mooring or anchors in the manoeuvring process.

Similar constraints in Motueka do not apply.

3.3.2 Marshalling Yards

Marshalling yards for heavy vehicle traffic as well as standard vehicle traffic will need to be created at both ports. Naturally, the closer to the loading ramp the better. Initial requirements will be based on a full vehicle (un)load for one vessel plus a partial (un)load for another; the indicative land requirement is about one hectare.

3.3.3 Vehicle Ramps

Vehicle ramps will be required to accommodate stern loading at both ports. In an ideal world, vessels would be drive through (i.e. stern or bow loading), however given the relatively small number of such vessels in the marketplace there is no guarantee such a vessel would be available when procurement commences.

The large tidal range at Motueka means a more advanced ramp structure will be required to that adjusts with the tides rather than a simpler fixed structure.

3.3.4 Buildings

Accommodation will be required for administrative/office staff in addition to passenger terminal processing facilities if required. Such facilities may be integrated with other planned facilities as part of the Port Revitalisation Project at Whanganui Port.

3.3.5 Fuel

Fuel servicing will need to be provided at one of the two ports. The two broad options are tanker operations to a port, or the development of port-side fuel facilities. Within these options further sub-options exist which will need to be explored with fuel companies.

3.3.6 Berthing and Pilotage

The requirement for berthing assistance (or otherwise) will depend on which of the above options is pursued. In particular, the final physical environment will need to be assessed, given changes to protective structures and newly dredged channels. Options exist within New Zealand and Australia for detailed computer and physical simulation modelling to facilitate any such decisions. Maritime New Zealand will be part of the above process and will ultimately make recommendations or determinations regarding any additional berthing requirements.

3.3.7 Dredging

Both Whanganui and Motueka ports have shallow harbours that would require substantial capital dredging to allow a ferry with a likely loaded draft of 6.0m to 6.5m to operate. In both ports, channels and contiguous areas would need to be dredged to a depth of 7 to 7.5m to allow the commencement of the service. Thereafter a year-round maintenance dredging regime would be required to maintain the required below keel clearance of 1.0m.

Based on previous reports and bathymetric surveys referenced elsewhere in this paper, it is estimated that 1 million m^3 of sand and silt would need to be dredged in Whanganui and a further 1 million m^3 in Motueka to allow the service to commence.

Maintenance dredging requirements are estimated at 200,000 m^3 per annum at Whanganui and 50,000 m^3 at Motueka. As mentioned above, it is assumed that these operations are undertaken by a dedicated dredging vessel owned by the ferry service. A programme of dredging will be designed to reflect sand accretion rates at respective ports, ideally with windows for outsourcing to other ports during downtime windows providing opportunities to offset dredging costs.

3.3.8 Terminal Operations

Initially a minimal terminal operation will be required for freight handling operations. If the service is passenger capable, a modest expansion of the terminal will be required to provide facilities for passengers (about 80 passengers per sailing at each end).

The final freight operation will depend on which freight customers are targeted, but it is assumed that most trucks will travel trailer only; however, a portion will travel with tractor unit and driver. Trailer only movements will require a “tug” operation to move the trailers on and off the vehicle deck (i.e. hired or owned mini tractor units designed for this purpose), as well as a trestling operation to tie down the trailers to the vehicle deck.

The terminal equipment and crewing operation will match the desired mix of the traffic with and without the tractor unit.

3.3.9 Berthage Charges

The discussion above indicates that a Whanganui to Motueka ferry service is predicated on a substantial capital outlay from the operators of the service to create port facilities of significant scale. This outlay would ordinarily be undertaken by port companies who would then charge port users berthage fees. In this proposed operation, the ferry operator undertakes the outlays and carries the capital risk of doing so. Accordingly, it would seek an agreement that berthage would not be charged. Port ownership would remain in the hands of the local community but the quid pro quo for the ferry operator’s investment (and the huge regional/community benefits arising from that investment) is guaranteed operating rights without the berthage charges.

3.3.10 Other Port Opportunities

Once the wharf requirements have been completed at both ports, opportunities may be created for other ship operations to use these facilities if suitable timetabling arrangements can be made. This could improve the commercial performance of the service and provide additional opportunities for economic development to Whanganui and Motueka.

3.4 Funding and Ownership

3.4.1 Pre-Feasibility

The pre-feasibility stage has been funded by a Whanganui Businessman Mr Neville Johnson. His motivation for doing so is his strong desire to see Whanganui and the surrounding area become a strong economy, reversing decades of decline. As a comparison, Gisborne was previously on a downward economic trend similar to Whanganui's; the redevelopment of Gisborne's port has been a major factor in its economic revival over the last ten years.

Another useful comparison is Tauranga port, which was in a state of substantial decline many decades ago. The port and city have achieved a dramatic turnaround, due largely to the rejuvenation of the port, which today is New Zealand's largest freight port.

3.4.2 Feasibility

Funds are being raised to fund this feasibility study. At the time of writing in excess of $60,000 has been raised from the public of Whanganui and Rangitikei in a matter of six weeks. The funds received are indicative of the strong public support that exists for the project.

Whanganui District Council has been asked to match the funds raised from the public on a dollar for dollar basis. They are understood to be considering the request and a response is expected in the very near future.

Horizons Regional Council has also been asked to contribute. They advised that they have no funds available, but would be prepared to assist in kind such as providing staff time at no cost. They mentioned that they have some of the best river engineers in the country on staff and could make their time available if requested to do so.

Tasman District Council will be approached for funding shortly, as will Nelson City Council.

Two major industry players have indicated that they will make a donation in the very near future.

3.4.3 Business Case

If support is obtained for the project to progress to Stage 3 (Detailed Business Case) it is envisaged that the first part of this stage is expected to cost about $350,000. The second part of the Detailed Business Case stage is estimated to cost approximately $1 million. Funding at this level is beyond what could be expected to be raised from the public. Funding would need to be provided by government (Central, Regional and Local, or any mix thereof) and/or private enterprise.

We anticipate any significant private sector funding would be conditional on the funders' having a right to be involved in the resulting ferry service.

3.4.4 Information Memorandum

The quantum and source of funding for Stage 4 has not yet been considered.

3.4.5 Implementation

Preliminary indications are that about $75 to $100 million will be required to implement the ferry service – refer Section 11 Financial Analysis.

Discussions with some major road freight operators have revealed strong levels of interest in attaining ownership stakes. Other ownership options including other business interests and iwi will be explored.

Discussions have taken place with a potential fuel supplier, and we have been advised that the fuel supplier would be interested in seeing the Business Case with a view to taking a 10% stake in the operation.

Once the initial figures are available we will move to make the information available to iwi for their consideration.

3.5 Existing and Potential Road and Rail Services

The proposed Whanganui – Motueka RoRo service competes with road freight, primarily for freight with origins/destinations north of Palmerston North and most of the South Island excluding the Marlborough and Kaikoura areas.

3.5.1 Additional Road Infrastructure Required

3.5.1.1 Road Routes

Every sailing of the proposed Whanganui-Motueka RoRo service (daily for six or seven days per week in each direction) could transfer up to 70 truck movements from SH1 Auckland/South Island or from a Taranaki/South Island route to an Auckland or Taranaki/Whanganui and thence South Island route. Southbound trucks from Auckland would depart SH1 at Taupiri onto SH39 and then join SH3 at Otorohanga, joining SH4 and remaining on SH4 to Whanganui. A short section of SH3 would be traversed and then a local road (Heads Road) would be used between SH3 and the port. Heads Road is a "Truck Route" in Whanganui District Council's Urban Transportation Strategy and has a heavy duty pavement designed to accommodate truck traffic. Trucks to/from Taranaki would avoid the Whanganui to Wellington leg of their journey.

The South Island road leg for freight to/from Christchurch could traverse SH60 from Motueka to SH6 at Richmond, and then SH6 from Richmond to Murchison, SH65 between Murchison and Springs Junction, then SH7 from Springs Junction to rejoin SH1 at Waipara. There is an alternative route using local roads from Motueka to access the Motueka Valley Highway and join SH6 at Kohatu. The suitability of these two routes can be further considered in Stage 3 (Detailed Business Case).

The total road travel distance would be reduced from 979 km (SH1 route) to 863 km (Whanganui-Motueka RoRo route); a saving of 116 km in road distance and about 1 hour 30 minutes of driving time – see maps that follow.

3.5.1.2 Capital and Maintenance Costs

The parts of the route most sensitive to additional truck traffic are likely to be SH4 (particularly the Paraparas section) and SH6 between Nelson and Blenheim.

NZTA have been approached for their advice on whether an additional 15 to 20 or so truck and trailer units on the SH4 Parapara route 5 days per week would have any significant effect on maintenance requirements. We are awaiting their response, however we suspect that an additional 15 to 20 trucks per day would not make a significant difference, and that truck traffic on the route could increase by 15 to 20 trucks per day in a small number of years due to natural growth. NZTA reports 169 trucks per day on SH4 at Aberfeldie in 2015, clearly the additional 20 to 25 trucks that are expected as a result of the ferry project will be barely a noticeable increase on existing traffic levels.

Frank Porter of Marlborough Roads has previously been contacted and asked about the impacts of the additional truck movements on South Island roads. He advised that trucks may use either the Nelson Blenheim route (SH6, SH1) or the Lewis Pass route (SH6, SH65, SH7, SH1). He advised that there would be no significant negative impact on either route; and that additional trucks on the Lewis Pass route might be a benefit in terms of helping to manage ice in winter.

We conclude, based upon advice from NZTA staff, that there would be no significant additional road capital or maintenance costs.

3.5.2 Rail

There is a rail branch line into Whanganui port that could be reinstated. However, there is no rail line into Tasman Bay, so the proposed ferry service will not be able to connect with a rail service at Motueka. For this reason, rail freight has not been considered for this evaluation.

4 Identification of the Major Components of the Freight Task – Top Down Approach

Given the volume of research that has been undertaken on shipping (both international and coastal) the consultancy team built upon the available existing information to enhance its understanding of inter-island freight movement. Principal sources of information included available recent national reports, in particular, the National Freight Demand Study (NFDS) updated in 2014.

Two approaches have been taken to identify the major components of the freight task. The first approach utilises a top down methodology, based on the NFDS 2014. This study was undertaken for the Ministry of Transport to update and expand the NFDS 2009. The NFDS 2014 reports, among other things, the total freight moving between and within New Zealand's regions by road, rail and coastal shipping in 2012 (note that the coastal shipping figures exclude freight moved on the Cook Strait ferries, which is included as road or rail freight as appropriate). This study focuses on road freight as there is no rail line at Motueka or Nelson; the only rail service carrying freight between the north and south Islands runs from Picton down the east coast of the South Island. There are existing services moving containerised or bulk freight by coastal shipping, the proposed ferry service is not intended to compete with those services. Table 4.6 of the NFDS 2014 is reproduced below:

Table 4.6

Total Estimated Freight Movements by Road Transport 2012 (million tonnes)

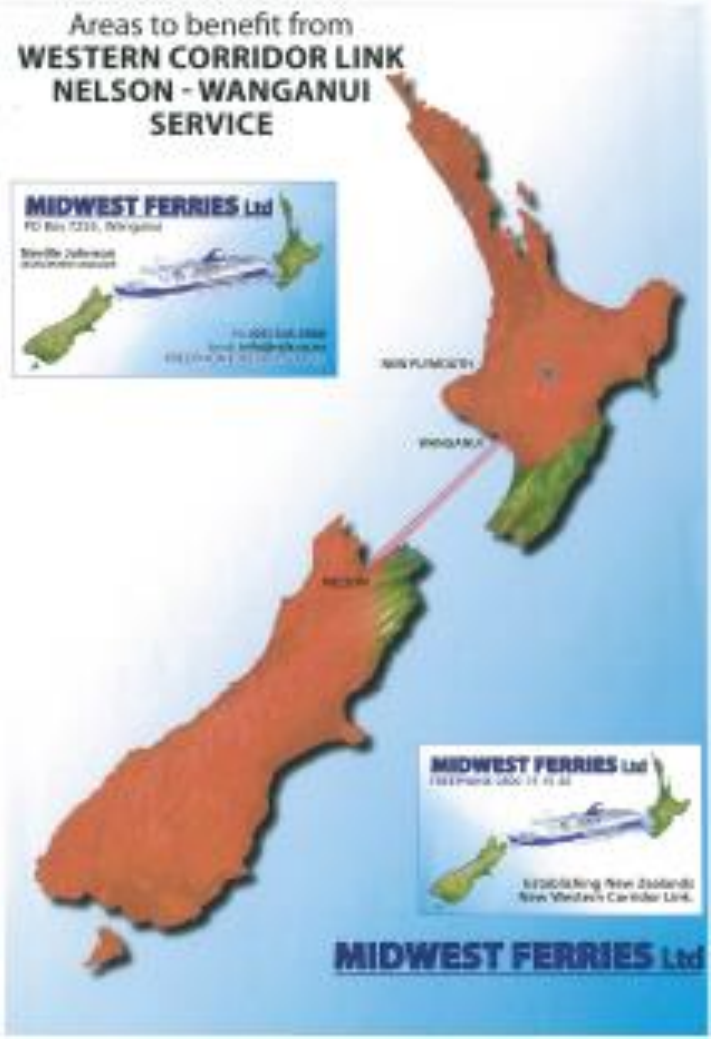
		Destination														
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	TNM	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland	11.85	1.28	0.11	0.15	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.03	0.00	0.01	13.46
	Auckland	0.88	38.04	2.37	1.61	0.14	0.47	0.46	1.14	1.05	0.02	0.01	0.57	0.00	0.02	46.77
	Waikato	0.12	3.38	23.46	1.46	0.02	0.16	0.30	0.11	0.06	0.00	0.00	0.10	0.00	0.01	29.20
	Bay of Plenty	0.17	1.04	1.79	17.81	0.12	0.23	0.12	0.28	0.13	0.00	0.00	0.00	0.00	0.00	21.65
	Gisborne	0.00	0.07	0.08	0.15	3.21	0.16	0.01	0.07	0.01	0.00	0.00	0.02	0.00	0.00	3.78
	Hawkes Bay	0.02	0.23	0.13	0.99	0.54	7.28	0.06	0.63	0.08	0.00	0.00	0.02	0.00	0.00	9.95
	Taranaki	0.09	0.17	0.33	0.12	0.01	0.06	6.06	0.30	0.05	0.01	0.00	0.06	0.01	0.00	7.26
	Manawatu	0.01	0.22	0.09	0.14	0.02	0.68	1.25	5.65	1.18	0.01	0.00	0.03	0.00	0.00	9.29
	Wellington	0.01	0.63	0.07	0.02	0.01	0.11	0.13	0.84	6.23	0.02	0.00	0.06	0.00	0.00	8.12
	TNM	0.00	0.09	0.01	0.05	0.00	0.01	0.01	0.02	0.04	8.03	0.37	0.40	0.02	0.01	9.07
	West Coast	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.59	0.34	0.00	0.00	2.69
	Canterbury	0.00	0.42	0.02	0.00	0.00	0.01	0.04	0.05	0.06	0.83	0.61	30.33	1.14	0.52	34.03
	Otago	0.00	0.08	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.68	8.18	0.61	9.56
	Southland	0.00	0.05	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.28	0.44	10.00	10.79
	Total	13.16	45.58	28.45	22.49	4.07	9.18	8.41	9.10	8.87	8.94	3.59	32.91	9.70	11.18	215.63

Notes: It should be noted that TNM is the combination of the Tasman, Nelson and Marlborough regions.
Where flows are non-existent they are denoted by "-". Where they are small they are denoted by 0.00.

The freight volumes in the above table need to be amended to incorporate changes in the size of the freight task between 2012 and 2021. The NFDS 2014 predicts that the total freight task will grow from 236.02 million tonnes in 2012 to 372.93 million tonnes in 2042; an average compound growth rate of a little over 1.5% pa.

The figure below illustrates the predicted catchment (i.e. areas from which using the proposed Whanganui – Motueka ferry service would produce a lower freight cost) of the proposed ferry service. The regional flows have been increased by just under 15% to allow for growth between 2012 and 2021.

Figure 2 – Catchment



The matrix of freight volumes above (figure 4.6 of the NFDS 2014) has been amended to include only the areas shaded brown above. The resulting matrix is shown below as:

Total Estimated Freight Movements by Road Transport 2021 (million tonnes)															
		Destination													
		Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Manawatu	Wellington	TNM	West Coast	Canterbury	Otago	Southland	Total
Origin	Northland										0.00	0.00	0.03	0.00	0.01	0.05
	Auckland										0.02	0.01	0.65	0.00	0.02	0.71
	Waikato										0.00	0.00	0.11	0.00	0.01	0.13
	Bay of Plenty										0.00	0.00	0.00	0.00	0.00	0.00
	Gisborne										0.00	0.00	0.02	0.00	0.00	0.02
	Hawkes Bay										0.00	0.00	0.02	0.00	0.00	0.02
	Taranaki										0.01	0.00	0.07	0.01	0.00	.09
	Manawatu										0.01	0.00	0.03	0.00	0.00	0.05
	Wellington															
	TNM	0.00	0.10	0.01	0.06	0.00	0.01	0.01	0.02							0.21
	West Coast	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00							0.00
	Canterbury	0.00	0.48	0.02	0.00	0.00	0.01	0.05	0.06							0.61
	Otago	0.00	0.09	0.00	0.01	0.00	0.00	0.00	0.00							0.10
	Southland	0.00	0.06	0.00	0.00	0.00	0.01	0.00	0.00							0.07
	Total	0.00	0.73	0.03	0.07	0.00	0.03	0.06	0.08		0.05	0.01	0.95	0.01	0.05	2.07

Notes: It should be noted that TNM is the combination of the Tasman, Nelson and Marlborough regions.

Table 1 - Potential Freight Volume

Table 1 - Potential Freight Volume above shows that the volume of freight potentially available to the proposed ferry service in 2021 is 2.07 million tonnes p.a. Experience at InterIslander has been that the average truck (including truck and trailer combinations) load is about 16 tonnes. Allowing 16 tonnes per truck equates to 129,582 truck and trailers per annum or 2,541 truck and trailers per week (based on 51 weeks per year).

4.1 Current Freight Transport Mode Choice

Most freight is moved by road transport. The NFDS reveals that road transport accounts for 91% of all the New Zealand freight task in tonnage terms and 70% in tonne-kilometre terms. In comparison, rail was estimated to account for 7% and 16% respectively and coastal shipping 2% and 14% respectively.

4.1.1 Mode Choice Drivers

The drivers of mode choice appear not to have changed significantly in recent years. The drivers and the relative advantage of each mode are:

Drivers of Freight Mode Choice and Potential Modal Impacts			
Attribute	**Impact by Mode**		
	Road	**Rail**	**Coastal Shipping**
Price	1	2	3
Service time, reliability, and flexibility of transport mode	3	2	1
Modal connectivity	3	2	1
Security and potential for damage	3	2	1
Ease of intermodal transfer	3	3	3
Need for specialised handling	2	3	3
Capacity	3	2	3
Value added activities in the supply chain	3	3	1
Environmental and sustainability issues	1	2	3

Source: NFDS 2014 Table 6.1 A higher numerical value denotes a better outcome.

Previous work for the Western Blue Highway study (http://www.nzta.govt.nz/assets/resources/western-blue-highway-transport-study/docs/western-blue-highway-transport-study.pdf) revealed the following mode choice drivers and ranked their relative importance:
"*The 35 cargo generators confidentially surveyed in mid 2009 in the five regions, on which this study is focused, nominated some 79 drivers of modal choice (refer Appendices A & B). All cargo interests interviewed cited at least a couple of drivers, and despite our efforts often did not prioritise them. The NFDS suggested some 9 drivers of transport mode choice. These have been adopted for this report with a couple of modifications – firstly the two modal drivers (connectivity and ease of transfer) used in NFDS have been combined, since it was hard for those interviewed to distinguish between them; secondly "personal and industry relationships" have been omitted since no-one cited them as a driver.*

Table 2 below tabulates in descending order of frequency cited drivers referred to by those interviewed.

Table 2 - Modal Drivers in WBH Field Interviews

Driver	*% of Total*	*WBH Competitive Ability*
Price	*33%*	*Possible*
Service, Reliability & Flexibility	*31%*	*Possible v Rail; v Road*
Modal Connectivity/Transfer	*13%*	*Comparable to Rail; v Road*
Special Handling Needs	*10%*	*Limited unless RoRo*
Value Added in the Supply Chain	*6%*	*Unlikely*
Security of/Lack of Damage to Cargo	*6%*	*Unlikely v Road*
Environmental	*1%*	*Strong*

It is worth noting that intermodal considerations were particularly high among Nelson cargo interests, a number of whom confirmed their dependence on ferry operations on Cook Strait for their domestic supply chain, and their dissatisfaction with the service provided – we believe this arose from the lack of ferry frequency ex Nelson itself and the need to move freight by road to Picton as the alternative"

4.1.2 Ability to Influence Choice of Ferry Service

In the analysis, we have assumed a rational market; meaning that freight consignors will choose the least generalised cost (which accounts for ferry price, truck operating cost, driver time and overall journey cost) ferry service if other factors are the same, but made an allowance for a degree of non-rational behaviour that could be driven by other factors such as existing contracts between ferry service providers and truck operators.

The proposed ferry service can only compete effectively if:

a) It provides frequency of service – fixed daily departure and arrival times will be the most attractive option;
b) It provides reliability of service - delays due to weather or mechanical issues are likely to destroy whatever competitive service position it might hold – a pervious harbour master has advised that Whanganui – Motueka is likely to be closed due to weather less often than Wellington - Picton;
c) It provides overall transit time comparable to or better than the existing services; and
d) Pricing reflects any inferiority/superiority of frequency or transit.

The other areas where it may have the ability to establish competitive advantage over other operators include where:

- It directly services areas that are remote from a rival service (e.g. the hinterlands of Nelson and Whanganui and the Taranaki regions) thus creating a significant cost advantage; and
- It reduces cost in long haul trucking by providing RoRo services that reduce the time, cost and/or driver constraints of trucking (e.g. by providing a logistics link between two trucking sectors that are sustainable within the current maximum 13 hour driver limit for the round trip within each trucking sector). A ferry service between Whanganui and Motueka for freight on the key sector between Auckland and Christchurch would be a good example of this.

4.2 Future Freight Tasks Scenarios

NFDS estimated the NZ domestic freight task would grow from 236 million tonnes p.a. to 373 million tonnes p.a. over the thirty years between 2012 and 2042. There appears to be no reason to disagree with this. If the NFDS forecast growth rate is achieved on a long term basis, and growth in inter-island freight reflects the overall freight task growth, the potential cargo task directly available to the proposed ferry service over the next 40 years would increase by 58%.

In 2014 KiwiRail retired the rail ferry *Arahura* and replaced her with a leased RoPax vessel since renamed *Kaiarahi*. This replacement necessitated the creation of a permanent "road bridging" operation whereby traffic previously moved on wagons across the Cook Strait is now transferred onto trailers and transported on the road deck of the new vessel. The driver behind this decision was the relative economics of RoPax vessels, typically 5 to 20 years old versus new build rail vessels (there being no second hand market in rail vessels). The latter option costing three times or more the former option on a capital or lease equivalent basis for each vessel. The modification to existing rail linkspan infrastructure also requires significantly greater capital costs than the simpler road ramp alternatives.

This phenomenon is due to be repeated when the remaining rail vessel *Aratere* is due for replacement at or before 2025. There is a reasonable likelihood that when this occurs, KiwiRail will move to a two (large) ship fleet. Such a fleet will result in various changes to KiwiRail's operation – on the one hand it will generate cost savings, but this will be at the expense of a major reduction in the number of sailings and timegate coverage. The change in capacity and timegate coverage will also offer opportunities to other operators in the marketplace at that time.

From the NFDS we learn that in 2014, 940,000 tonnes was transported across Cook Strait by rail and 1,980,000 was transported across the Strait by road transport. If *Aratere* is replaced with a RoPax vessel as expected, the impact on both Cook Strait capacity and mode shift is uncertain due to considerations such as the size of the replacement vessel (likely to be larger than current vessels) and the number of sailings per day (likely to be lower due to greater turnaround times) among other factors. A further consideration is that if two comparable vessels are eventually acquired a mirror timetable could be run producing five return trips per day providing higher available capacity.

The lack of an inter-island rail ferry could be expected to result in a degree of freight mode shift away from rail to road transport. The alternative would be for the rail freight for all the Cook Strait crossings being transferred from rail to road at the commencement of the inter-island crossing and then transferred from road to rail at completion of the inter-island crossing. There would be costs associated with this double transfer from rail to road and back again. Rail freight is often low value commodities and their ability to absorb the additional handling is questionable.

4.3 General Transport Arrangements

The three available freight transport modes (road, rail, coastal shipping) have different characteristics which make some modes better suited to particular freight tasks than others. This section outlines in broad terms the characteristics of each freight mode.

4.3.1 Road

The key characteristics of road freight include:

- Door to door coverage – road freight can pick up from and deliver to any origin/destination served by a trafficable surface. All freight origins/destinations are served by a trafficable surface, effectively giving road freight door to door coverage within and between the North and South Islands (noting the need for a RoRo link between the islands);
- Time flexibility – road freight can pick up and deliver at any time to suit the customer, giving 24/7 service times;
- Small loads – road freight can transport comparatively small freight volumes efficiently. A fully loaded truck and trailer rig carries about 27 tonnes;

- Freight consolidation – many freight forwarding operations exist that consolidate LTL or less than truck loads efficiently;
- Market competition – a large number of road freight operators compete in the marketplace, the barriers to entry for a new operator are minimal, and consignors have a wide choice of road freight transport providers. The market can be viewed as being mature;
- Subsidy – the road freight industry claims that it is unsubsidised. However, the 2005 *Surface Transport Costs and Charges* study revealed that the road freight industry falls well short of meeting its full cost and receives substantial indirect subsidy. The study states that:
  - "Current charges total some $2.63 billion p.a. or $2.34 billion if roading rates are excluded as not being a user charge'.
  - 'The best estimate of total provider/external costs is $5.59 billion p.a., i.e. just over double the current charges"; and
  - "The "social cost recovery" (charges: external costs ratio) is significantly greater for cars than for trucks"
- Minimum transit time – road freight can, and usually does, achieve door to door delivery in a transit time that cannot be matched by the other modes.

4.3.2 Rail

The key characteristics of rail freight include:

- Terminal to terminal coverage – usually requires road transport to collect freight from origin and transport to rail terminal, and to deliver freight from rail terminal to destination (with the exception of major industries and freight forwarders, which have their own sidings);
- Time inflexibility – rail freight generally runs to a timetable (road freight also runs to timetable but can be more flexible);
- Medium loads – rail freight usually requires the aggregation of freight from more than one origin;
- Market competition – there is only one rail provider in terms of trains. The market is a sole supplier situation. However, there are numerous companies that aggregate cargo for carriage by rail, which also use road and coastal shipping;
- Intermediate transit time – rail freight door to door delivery times are usually intermediate between those of road freight and coastal shipping.

4.3.3 Coastal Shipping

The key characteristics of coastal shipping within New Zealand (other than specialist bulk services) include:

- Port to Port coverage – similar to rail freight, usually requires road transport to collect freight from origin and transport to port, and to deliver freight from port to destination;
- Time inflexibility – coastal shipping generally runs to a timetable (often a weekly timetable), resulting in cut-off times for receipt of freight at the port, or inland terminal, and set times for freight availability at the delivery port or inland terminal;
- Large loads – coastal shipping almost always requires the aggregation of freight from more than one origin;
- Market competition – there is limited competition. There is one general coastal shipping operation (Pacifica), plus two Cook Strait ferry services (KiwiRail's Inter-island operation and Strait Shipping's Bluebridge operation). Other freight movement by coastal ship is by international vessels, or by enterprise operated specialist vessels such as Holcim and Golden Bay cement and Silver Fern (bulk fuel);
- Longest transit time – coastal shipping door to door delivery times are usually longer than those of road freight and rail freight.

5 Freight Cargo Volumes – Bottom Up Approach

In order to obtain a counterpoint to the top down estimation of freight volumes reported above, freight surveys were conducted by telephone interview with a number of the key truck operators. The surveys were conducted a few years ago and will need to be refreshed as a part of the stage 3.

Since the surveys were undertaken there has been an important change to the road freight operating environment – the government has introduced legislation allowing both 50MAX and High Productivity Motor Vehicle (HPMV).

50MAX vehicles have an additional axle and an allowable maximum gross combination weight of 50 tonnes. 50MAX vehicles can operate on SH4 (The Paraparas). HPMVs cannot operate on SH4.

HPMV vehicles have an allowable maximum gross combination weight of 54 tonnes and can only operate on routes designated for HPMVs. SH1 between Auckland and Christchurch is a designated HPMV route. Parts of the road route between Motueka and Christchurch are not a designated HPMV route.

5.1 Freight Surveys

Freight surveys (telephone interviews) were undertaken with 68 road transport operators. These telephone interviews identified 1,024 truck and trailer movements per week where the interviewees said they would use the proposed ferry service.

Thirteen other relevant parties were surveyed and revealed a further 46 truck and trailer movements per week are likely to use the service.

Thirteen camper van rental companies were surveyed and identified that 280 movements per week currently use the Cook Strait service, and some of these could be expected to transfer to the proposed ferry service.

5.2 Freight Transfer

The ferry services between the North and South Island are currently operated by InterIslander and Bluebridge. Bluebridge is a passenger and vehicle service, they do not offer a rail ferry service and are not thought likely to at any stage in the future.

KiwiRail own and operate the InterIslander road and rail service across Cook Strait between Wellington and Picton. Currently they operate three ferries, one of which (*Aratere*) is a rail, road vehicle and passenger ferry. We understand that *Aratere* is likely to be retired in the 2020-2025 period and that any replacement ferry is unlikely to have rail capability.

When *Aratere* is retired the inter-island rail freight can be expected to be moved by road freight or by coastal shipping.

The NFDS records that 0.47 million tonnes p.a. are moved by rail between Auckland and Canterbury. The NFDS also records that 0.99 million tonnes p.a. are moved by road between Auckland and Canterbury. Hence the volume of rail fright across Cook Straight is about half the volume of road freight. When *Aratere* is retired a substantial increase in the volume of inter-island road freight is possible.

5.3 Freight Generation

From various people interviewed there is an expectation that the proposed ferry service will result in the creation of new businesses that rely on the inter-island ferry service between Whanganui and Motueka. At this stage, we have not attempted to quantify the generation of new freight and have not taken account of it in our analysis. Our expectation is that the volume of new freight generated will not be large, less than 3% of the total inter-island freight market.

5.4 Comparison with Top Down Estimate of Freight Volumes

The Top Down estimate of total freight volumes that could use the service identified 1,584 truck and trailers per week. The Bottom Up approach identified 1,070 truck and trailers per week plus 280 campervan movements that are likely to use the proposed ferry service.

6 Passenger Volumes

6.1 Market Size

6.1.1 Current

Current passenger volumes on the existing Wellington to Picton inter-island route are estimated at about 1.1 million p.a. Historically this route enjoyed high annual growth in passenger numbers, but in the past decade strong airline competition has had a depressive impact on the foot passenger component of the market, restricting overall growth to more modest levels around the level of GDP growth. In the past two years, however, strong tourism growth has resulted in a renewed burst of growth.

Vehicle movement growth has outperformed the growth in passenger numbers due to the lesser impact of airline competition (despite some impact at the margins from better fly and car rental options). Current vehicle numbers are estimated at about 330,000 per annum. The impact of airline competition has resulted in a higher share of total passengers now travelling with cars (over 60% compared to historical levels of about 50%).

6.1.2 Future

Generally speaking, future economic growth on the existing route is expected to be a function of growth in tourist numbers as well as domestic economic activity. With domestic economic activity estimated to average around 3% in the next five years and international holiday numbers growing at 10% pa (holiday and visiting friends or relatives (VFR) segments), it is expected that overall growth of 4% per annum in passenger and vehicle markets is probable.

6.2 Market Shares

KiwiRail's InterIslander ferry operation has historically held a dominant position in the inter-island passenger market. A number of inter-island ferry operators have come and gone over the years, however, SSL's Bluebridge operation has remained and is now a fully-fledged passenger operator competing on near equal footing.

SSL starting out as a small freight operator in 1992 and has, over the past two plus decades, incrementally added to its capacity and scope. It now operates two large RoPax vessels with comparable capacities in direct competition to InterIslander. InterIslander operates three vessels, but a significant component of overall capacity is dedicated to its rail operation on *Aratere*. Further, in some cases rail traffic is "road bridged" on the RoPax vessels (i.e. traffic is transferred from rail onto trailers that use the vehicle decks of the RoPax vessels).

InterIslander retains a market share that is still ahead of its sailing / capacity share due to its greater spend on marketing and more sophisticated pricing and related systems. This incumbency premium is, however, reducing and it is now thought that SSL has about 35% passenger and vehicle market share.

6.3 Market Segments

6.3.1 Travel Type

The overwhelming proportion of the inter-island passenger market is in the VFR segment or tourism/leisure related rather than business related. This is as would be expected when considering the relative travel times of ferries versus aircraft. Typically transit times are not therefore critical, but departure and arrival times are very important considerations in which service/sailing is chosen.

6.3.2 Geographic

The historical split of domestic vs international passengers in the inter-island ferry market was 70/30. Recent growth in the tourism market is likely to have tipped this ratio in favour of the international market by 5%+ i.e. to at least 65/35. This ratio compares with the overall ratio of about 50/50 for tourism travel in New Zealand more generally.

Recent surveys have not been sighted, but historically the lion's share of domestic users of the inter-island service come from the bottom half of the North Island and the top part of the South Island (Christchurch and

north). The Auckland based domestic component has never featured prominently in the users of these services e.g. only about 15% of southbound traffic originates from New Zealand's biggest population base.

6.3.3 Passenger and Vehicle Types

As referenced above, passengers may travel with or without vehicles – typically a vehicle will have an average of 2 to 2.5 passengers associated with it. Passengers travelling without vehicles are referred to as "foot" passengers and generally have significantly more travel options as the passenger capacities on existing vessels are high in relation to vehicle deck capacities (a significant subset of this market is the backpacker market). It is rare for vessels to approach passenger limits for the larger vessels with 1,000 or higher passenger capacities. Passengers can be divided into any number of other segments such as groups, seniors, children etc. but that is beyond the scope of this paper.

There are a large number of "vehicle" types – cars, campervans, caravans, buses, boats, motorcycles etc. (even in the car category there are a various specifications / dimensions to be considered). For the purposes of this paper (and the financial modelling that underpins it), vehicle types are treated homogeneously.

6.4 New Route

6.4.1 Market Growth

The route being proposed in this paper is an alternative link between the North and South Islands thus providing an opportunity to grow the overall volumes in inter-island passenger/tourism traffic. In particular, there would be an opportunity for travellers to undertake an entirely new trans-national tourist route by travelling down the north western side of the North Island and returning on the other coast after a South Island loop, or vice-versa.

It is inherently difficult at this early stage to assess the prospects of such a tourism route / package as it will depend on many factors such as sailing timetables, marketing and the development of attractions at key points on the loop route.

For the purposes of this paper, conservative new business growth rates of between 1% and 2% in inter-island traffic have been assumed. As new destination marketing and attraction development is undertaken it is expected that there would be additional market growth upside.

7 Tourism and Regional Development

Implementation of a passenger ferry service between Whanganui and Motueka has significant tourism and regional development potential. Currently the main international tourist flows are down SH1 from Auckland with some side trips (such as Rotorua and the Tongariro National Park). Tourists generally continue down the eastern side of the South Island to Christchurch and/or Queenstown and then depart the country.

The proposed ferry service offers the potential to change this one way top to bottom and then depart pattern into a loop that would spread the benefits of tourism over a wider geographical area.

There is an abundance of natural attractions that could be developed (or further developed) along the western side of both islands that would support such a loop. To name but a few from north to south - Waitomo Caves, Tongariro National Park, Whanganui River (jet boating, kayaking, bridge to Nowhere, history of the area (Pipiriki, London, Jerusalem), Abel Tasman National Park (Kaiteriteri, Tonga Island Marine Reserve, Te Waikoropupu Springs, Rewaka Resurgence, Heaphy Track, Kawatire Railway Station and bridge, gold prospecting at Glenhope Scenic Reserve, Denniston Plateau, Punakaiki Marine Reserve, Paparoa National Park, Hanmer Springs – and many other attractions not listed.

To see a current example of how a regional community can respond to increased tourist opportunities we need look no further than Springs Junction and Murchison. These towns are temporarily on the most direct route between Picton and Christchurch and are experiencing a large lift in the tourist and other traffic through the town. The lift in traffic volumes is expected to be temporary; NZTA's website advises in relation to SH1 north pf Kaikoura that "*The road is closed to through traffic. It is not expected to re-open until the end of 2017*"; Clearly there is an expectation SH1 north of Kaikoura will reopen in the not too distant future. Despite the temporary nature of the increase in traffic volumes, both towns have responded to the increased traffic volumes and are reaping the economic rewards of having done so.

7.1 Current Tourism Volumes and Patterns

Tourism Resource Consultants have been commissioned to undertake a desktop study of the potential tourism market for the new ferry service.

They estimate that the new ferry service will attract between 24,000 and 60,000 passengers and between 5,500 and 13,750 cars p.a. from the existing market. They also estimate that in addition to passengers and cars attracted from the existing market, between 5,500 and 11,000 passengers and 3,000 to 6,000 cars p.a. from new users would be attracted to the service. These projected volumes equate to about 5% of forecast volumes in the Cook Strait market.

They note the potential for development of a "tourist loop" and advise that a long term marketing strategy and tourism product development would be required. TRC's review is attached in Appendix A.

8 Potential Coastal Shipping Services

8.1 Service Options

Various inter-island shipping service options were examined in the Western Blue Highway report, (available at http://www.nzta.govt.nz/assets/resources/western-blue-highway-transport-study/docs/western-blue-highway-transport-study.pdf). The service options examined included:

Option 1 – Round New Zealand Service
Option 2 – West Coast Shallow Water Service
Option 3 – Enhanced Western Service
Option 4 – New Plymouth – Nelson RoRo Service
Option 5 – West Coast RoRo Service

Option 4 – New Plymouth – Nelson RoRo Service was found to be potentially viable and was taken forward for further analysis. The service has not been established.

The service options investigated in this study are based on RoRo and RoPax operations only.

The Western Blue Highway report did not consider an option utilising Whanganui as the North Island terminus. Whanganui has the following advantages relative to New Plymouth:

- Shorter sea distance (115 nautical miles versus 148 nautical miles), with a consequential shorter travel time;
- A single ship operation is able to offer 6 return sailings per week from Whanganui (versus 3 return sailings per week from New Plymouth);
- It has a greater catchment area for inter-island traffic;
- Sea conditions off Cape Egmont can be more extreme than off Whanganui.

On the other hand, only minimal new infrastructure would be required at New Plymouth and the entry to New Plymouth is not constrained by a river bar. Additionally, use of a smaller vessel could be feasible.

8.2 Regional Impact Assessment

A regional iimpact analysis has not been completed at this stage but a preliminary assessment of employment opportunities has identified over 100 jobs directly associated with the minimum proposed ferry service. Most of these jobs would be ship crew, with additional jobs in terminal operations and head office.

8.3 Inter-Island Capacity

There are currently five ferries operating on Cook Strait (three InterIslander ships and two Bluebridge ships). Given the potential sailings available and the size of these vessels there is possibly a degree of overcapacity in the market.

In the medium term however, it is believed that KiwiRail is unlikely to retain a three ship operation rather, moving to a two large ship fleet. If this eventuates then a Whanganui to Motueka vessel would provide an appropriate level of capacity without creating the conditions for undue competitive price pressure.

9 Strategic Fit

9.1 Roads of National Significance

Central Government has identified seven Roads of National Significance (RoNS). These are:

- Puhoi to Wellsford – SH1
- Completion of the Auckland Western Ring Route – SH20/16/18
- Auckland Victoria Park bottleneck – SH1
- Waikato Expressway – SH1
- Tauranga Eastern Corridor – SH2
- Wellington Northern Corridor (Levin to Wellington) – SH1
- Christchurch motorway projects

The Whanganui to Motueka Ferry Service would reduce traffic (and in particular heavy traffic) on a section of the Waikato Expressway – SH1, and on Wellington Northern Corridor (Levin to Wellington) – SH1.

The proposed service is an excellent strategic fit with the RoNS.

NZTA's criteria for Strategic Fit include:

Table 3 - Strategic Fit

Activity Class	HIGH
New and improved infrastructure for State highways and local roads	Potential for a major contribution to national economic growth and productivity on Freight routes

The economic analysis described in section 10 clearly demonstrates that the proposed service(s) would make a **major contribution** to national economic growth and productivity on **Freight routes**. Total national economic benefits are calculated as $899 million (NPV) discounted over the forty year evaluation period. The proposed services are rated HIGH for Strategic Fit.

9.2 Relationship to Government Policy Statement on Land Transport Funding 2015/16

The Government Policy Statement on Land Transport Funding 2009/10 – 2018/19 (GPS) sets out what central government wishes to achieve from its investment in land transport.

9.2.1 GPS Introduction

The GPS includes:
"*The national strategic direction for land transport is as follows:*
To drive improved performance from the land transport system by focussing on:

- *Economic growth and productivity*
- *Road safety*
- *Value for money*"

The economic analysis in section 10 demonstrates that the proposed Whanganui to Motueka ferry service will contribute to all three bullet points above.

The GPS goes on to state that:
"*This strategic direction has been informed by the Government's national policy priorities. These are:*

- *Building a more competitive and productive economy"*

Section 10 also demonstrates that the proposed Whanganui to Motueka ferry service will contribute to building a more competitive and productive economy.

The GPS includes "*Improving the performance of the land transport system in order to improve the productivity of the wider economy is a particular focus of GPS 2015*". The proposed Whanganui to Motueka ferry service

will contribute to improving the performance of the land transport system by providing a more efficient and effective transport connection between the North and South Islands for both freight and passenger movements. The proposed ferry service will also result in a reassignment of heavy traffic from the heavily congested SH1 route between Hamilton and Christchurch to the relatively uncongested SH3 / 4 / 60 / 6 /69 / 7 route to rejoin SH1 at Waipara. Critically, it will also make a substantial contribution to improving the resilience of the land transport system by providing an alternative link between New Zealand's two main islands that is likely to still be operational should the Wellington to Picton link not be available due to natural disaster or other event.

The GPS also states "*New Zealand is still in the process of addressing some critical constraints on the network, particularly, but not exclusively, in the upper North Island.*
Significant steps are being taken to improve critical parts of New Zealand's land transport system. Continued investment is needed through the Roads of National Significance (the RoNS) programme, providing additional capacity through more transport choice (for example public transport), the Auckland Transport Package, improvements in Christchurch, and measures to increase the amount of the road network available to heavier freight vehicles."
The proposed Whanganui to Motueka ferry service will address the potential critical constraint of the Wellington to Picton ferry service which could be unavailable or available at severely reduced capacity after a natural disaster.

Paragraph 13 of the GPS states "*Effective and efficient freight movement is critical to the economic health of an exporting nation. Reducing the internal transport costs experienced by producers, processors and exporters of primary produce is one way to improve our international competitiveness. Gains that can be made in this area flow into the rest of the economy*". The proposed Whanganui to Motueka ferry service will reduce the cost of transport between the North and South Islands, making a significant contribution to improving the efficiency and effectiveness of freight transport within New Zealand.

Paragraph 14 of the GPS recognizes that "*Auckland and Canterbury predicted to experience the greatest increases in freight, followed by the Waikato" and paragraph 15 includes 'Considerable investment has been made to improve freight productivity".* One of the key focuses of the proposed ferry service is to reduce the cost and improve the efficiency of moving freight between Auckland/Waikato and Canterbury.

Paragraphs 38 to 41 of the GPS set out road safety as a key transport priority. Section 10.2.1 of this report quantifies the contribution to road safety that the proposed ferry service will make.

The GPS has a focus on achieving value for money from public expenditure. The proposed ferry service will achieve many of the outcomes sought by the GPS with only minimal public expenditure, which must be the ultimate value for money for the public purse.

9.2.2 GPS Strategic Direction

The GPS states that:
"*The overall strategic direction for land transport is:*
To drive improved performance from the land transport system by focussing on:

- *Economic growth and productivity*
- *Road safety*
- *Value for money*"

Section 10 of this report quantifies the contribution that the proposed ferry service will make to "*economic growth and productivity*" and to "*road safety".* As these contributions to GPS objectives will be achieved with only minimal expenditure of public money (in fact a reduction in total expenditure from the public purse is expected), it is the ultimate in value for money.

Paragraph 89 of the GPS states "*We need to find ways to improve the productivity of every part of the system*". The analysis in section 10 of this report demonstrates that the proposed ferry service is a way of making a substantial improvement to the productivity of the transport link between the nation's two major islands.

The proposed ferry service will also make a significant and quantified contribution to the GPS Strategic Priority of Road Safety – refer Section 10 of this report.

The third and final Strategic Priority in the GPS is "*Value for Money*". As the proposed ferry service delivers on the GPS objectives without any expenditure from the public purse, it is the ultimate in value for money.

"*The national land transport objectives for GPS 2015 are for a land transport system that:*

- *Addresses current and future demand for access to economic and social opportunities*
- *Provides appropriate transport choices*
- *Is resilient*
- *Is a safe system, increasingly free of death and serious injury*
- *Mitigates the effects of land transport on the environment*
- *Delivers the right infrastructure and services to the right level at the best cost*"

In transport terms, providing access to economic and social opportunities is usually thought of in terms of getting people to and from their place of residence to the location of the economic and/or social opportunity. The proposed ferry service turns this concept on its head by bringing the economic and/or social opportunity to where the people are. Currently many small regional centres or rural towns are in economic decline and have been so for many years, and appear likely to decline further without intervention. The proposed ferry service will significantly increase the flow of tourist traffic through many smaller centres including Te Awamutu, Otorohanga, Te Kuiti, Taumaranui, Raetahi, Motueka, Murchison, Springs Junction, Maruia Springs, Lewis Pass and Culverden. These centres (along with some smaller centres) are expected to experience an economic renaissance as a result of the additional tourist traffic.

A good example of this effect is the current economic mini boom being experienced in Murchison as a result of the temporary closure of SH1 following the Kaikoura earthquake. This mini boom is expected to be temporary, once SH1 is reopened it is probable that most of the tourist traffic will reassign to the SH1 route. The proposed ferry service will make the increase in tourist traffic through Murchison permanent, giving local businesses the confidence to invest in developing longer term opportunities; refer section 7 Tourism and Regional Development.

The proposed ferry service provides transport choice, currently Wellington-Picton is the only inter-island surface transport option.

The proposed ferry service will provide resilience. The recent damage to port facilities at Wellington as a result of the Kaikoura earthquake has highlighted the vulnerability of the inter-island ferry link to short/medium term disruption as a result of natural disaster. It is unlikely that a natural event would result in significant disruption to both the Wellington-Picton and the Whanganui-Motueka ferry services.

The proposed ferry service will contribute to making the transport system increasingly free of death and serious injury. This contribution is quantified in section 10.

This report demonstrates that the redevelopment of the ports at Whanganui and Motueka is the right infrastructure and it will be delivered at the best cost by private enterprise.

The table below sets out the "*Primary long term results*" sought by central government as set out the GPS and whether or not the proposed ferry service makes a contribution to achieving those results.

Primary long term result sought	Proposed ferry service contribution
Support economic growth and productivity through the provision of better access to markets, employment and business areas	Major contribution at no cost to the public purse
Support economic growth of regional New Zealand through provision of better access to markets	Major contribution at no cost to the public purse
Provide appropriate travel choices, particularly for people with limited access to a private vehicle	Additional travel Choice provided, no contribution to mobility for those with limited access to a motor vehicle
Increased safe cycling through improvement of cycle networks	No contribution
Improved network resilience at the most critical points	Major contribution at no cost to the public purse
Reduction in deaths and serious injuries	Contribution
Mitigation of adverse environmental effects	Contribution
Delivery of the right infrastructure and services to the right level	Major contribution at no cost to the public purse
Improved returns from road maintenance	No contribution

Improved returns from public transport	No contribution

Paragraph 118 of the GPS includes "*A resilient land transport system meets future needs and endures shocks. It needs to deal with the impact of hard-to-predict shocks (for example, major earthquakes or extreme weather events) on the most critical points in the network*". It would seem to be self-evident that the ferry service between the North and South Islands is a "*critical point in the network*". Disruption to the service would be a major interruption to the land transport network which would impose very high economic and social costs. Currently two operators provide ferry services, however both operators use the Wellington port as their North Island terminus and the Picton port as their South Island terminus. Both operators could easily be impacted by the same natural disaster (such as significant Wellington fault movement). Having a third operator providing ferry services between the North and South Islands using termini other than Wellington or Picton will provide a major increase in the resilience of the critical ferry link between the nation's two major islands.

9.2.3 Conclusion

The alignment between the proposed ferry service and the GPS is unusually strong.

9.3 Relationship to the Land Transport Management Act

9.3.1 Objective – Assisting Economic Development

Efficient and effective transport of containerised products is an essential component of an efficient economy. The proposed Whanganui to Motueka ferry service will assist economic development by:

- Removing traffic from congested sections of SH1 in the Wellington urban area. The project has substantial positive net benefit on other road users (i.e. traffic remaining on the road network), the national travel time, reliability and vehicle operating cost benefits in the Wellington region alone are calculated as $28 million (NPV); and;
- Reducing overall transport costs. The proposed ferry service will result in significant reductions in internal freight transport costs (a freight transport cost reduction on the key trade routes considered ranging between $100s to in excess of $1,000 per truck movement is potentially available;
- Removing structural loading from some existing pavement infrastructure and thereby extending its useful life; and
- Increasing the resilience of New Zealand's inter-island transport network by providing an alternative inter-island ferry connection that is completely independent of current infrastructure located at Wellington and Picton.

Transporting containerised products efficiently is, in itself, a contribution to economic development. Work on previous commissions using input-output models has demonstrated that this activity will have a useful multiplier effect that will add not only to the economic performance of transport and port activities, but will also flow on to other areas of the economy. These benefits have not been included in the economic evaluation.

Additionally, the proposed ferry service will have a major beneficial impact on many of the regional towns such as Te Awamutu, Otorohanga, Te Kuiti, Taumaranui, Raetahi, Motueka, Murchison, Springs Junction, Maruia Springs, Lewis Pass and Culverden. These centres (along with some smaller centres) have been on a downward economic trend for many years. The increase in road traffic (including tourist traffic) through these areas will rejuvenate local economic activity, providing the conditions required for investment in long term businesses focusing on providing the needs and desires of travelers.

9.3.2 Objective – Assisting Safety and Personal Security

Route reassignment of freight and non-freight traffic will reduce the total distance travelled by 120 kilometres with a corresponding reduction in both the real and the perceived safety risk. In particular, transport of general cargo products by the proposed ferry service will improve safety by reducing the length of road traversed by loaded truck and trailer units.

The project will contribute to the NZTS targets of reducing road deaths to no more than 200 per annum by 2040 and reducing serious injuries on roads to no more than 1,500 per annum by 2040. Transfer of the freight transport task from road to coastal shipping is predicted to reduce the cost of road accidents by more than $8 million annually. The national accident cost benefits are calculated as $124 million NPV.

9.3.3 Objective – Ensuring Environmental Sustainability

The proposed service will:

- Increase coastal shipping's share of the freight task;
- Reduce the noise impact of the transport operation;
- Reduce the emission of particulates. National net benefits of particulate emission reduction have been quantified at $12 million NPV; and
- Reduce the deposition of other contaminants on the road surface attributable to the transport.

9.3.4 Objective – Improving Access and Mobility

The proposed ferry service will make a minor contribution to promoting cycling and walking. The rural state highway routes generally experience minor use by touring cyclists. Reducing the length of road traversed by loaded truck and trailer units will improve cyclists' perception of the routes.

Additionally, the removal of trucks from sections of State Highways with relatively heavy pedestrian usage can be expected to improve pedestrians' perception of the walking environment.

9.3.5 Objective – Protecting and Promoting Public Health

The ferry operation is expected to contribute to:

- Reducing the number of people exposed to health endangering noise levels from transport; and
- Reducing the number of people exposed to health endangering concentrations of air pollution in locations where the impact of transport emissions is significant.

The national benefits associated with reduced exposure to particulate emissions are calculated as $12 million NPV.

9.3.6 Conclusion

The alignment between the proposed ferry service and the Land Transport Management Act is Strong.

9.4 New Zealand Energy Strategy 2011–2021

This initial evaluation is showing that the ferry service will burn more fossil than the current transport arrangements. This is a most unexpected and counterintuitive result. More detailed evaluation of comparative fuel burn will be undertaken in the next stage.

9.4.1 Conclusion

The alignment between the proposed ferry service and the New Zealand Energy Strategy is questionable and needs further investigation.

9.5 New Zealand Energy Efficiency and Conservation Strategy 2011–2016

The New Zealand Energy Efficiency and Conservation Strategy 2011–2016 notes that:
"*Making improvements in energy efficiency, energy conservation and renewable energy is an important priority for the Government.*
The use of energy efficient technology and practices, energy conservation, and renewable sources of energy can:

- *Enhance economic growth through increased productivity.*

The proposed ferry service will make an important contribution to this government desire.

The strategy also states:
"*The Government has identified opportunities for better integration of road freight with rail, shipping, and air freight networks, and ports and airports serving both local and international markets.*
and
The Government considers improving the efficiency and reliability of key freight corridors and the metro passenger networks to be a priority, as well as achieving better integration of regional freight movement across road, rail, sea, and air".
The ferry service will result in transport being better integrated between road and sea, more efficient and more resilient.

9.5.1 Conclusion

The proposal is aligned with the Energy Efficiency and Conservation Strategy.

9.6 Relationship to Regional Land Transport Strategies

9.6.1 Horizons Regional Land Transport Strategy

The Horizons Regional Land Transport Strategy includes:
"*Transport is a key enabler of growth*
Improved linkages to other Regions of importance, links to the south of the Region and to the north of the regional border between the Desert Road Summit and Taupo"

The proposed ferry service will strengthen transport's position as a key enabler of growth in the region, and enhance the transport linkages to neighbouring regions to the south by providing a new and significant transport link from the region to the South Island. It will strengthen and reinforce transport links to the north by spreading the load over parallel routes, increasing resilience.

The strategy also includes:
"*Contaminants such as those from vehicle tyres, brake pads, oil and grease and the wear of bitumen from road surfaces can all end up in the Region's air, water and land*"

The reduction in road travel distance of 116 km will reduce the deposition of contaminants on the road.

The strategy lists its strategic priorities, which include:
"*Strategic Priority 6: An appropriate network of tourism routes*
This is a priority as it encourages visitors to visit the Region, and therefore provides economic development opportunities, and encourages their movement through a network of clearly defined and visible tourist routes. International tourism is particularly important for the Wanganui and Ruapehu Districts"

The proposed ferry service will divert a portion of the tourist traffic away from SH1, spreading tourism more broadly across the region, creating the opportunity for the development of tourism focused industries away from SH1, and it may generate additional tourism.

The strategy also includes:
"*Supporting the integration of modes, where possible, to encourage the most efficient and effective inter-and intra-regional movement of freight*" and
"*Supporting the provision of facilities for the transfer of freight between transport modes, as appropriate*"

Sea transport is widely recognised as being more efficient (but slower) than road transport. The ferry service gives effect to being the "*most efficient and effective inter-and intra-regional movement of freight*" and integrates the road and sea modes.

The strategy goes on to include:
"Ensuring that freight corridors are resilient to disruption from adverse weather and other hazards, and that there are available alternatives of appropriate standard to minimise disruption of freight flows"

The ferry service will provide an alternative to the current Wellington-Picton inter-island link, making a substantial contribution to improving transport resilience and minimising any interruption that would occur as a resulting of an interruption to the Wellington-Picton service.

Overall there is strong alignment with the Horizons Regional Land Transport Strategy.

Horizons Regional Council have indicated that they support the proposed ferry service and that it is consistent with their RLTS – refer Appendix D.

9.6.2 Tasman Regional Land Transport Strategy

The applicable Regional Land Transport Strategy for Tasman District includes:
"*It is the desire of the Top of the South councils to have a resilient network. For Marlborough and Tasman in particular, the majority of the network is rural. The need for a robust current route or a viable alternative is imperative*" and
"*State Highway 6 is an important route through Nelson for both Marlborough and Tasman. It provides the link to and from Marlborough and is Nelson and Tasman's link south to the West Coast and Christchurch. If something happened to this network due to an unplanned event, the majority of the region would be isolated in terms of land transport*"

The proposed ferry service is not inconsistent with the applicable Regional Land Transport Strategy.

10 Economic Analysis – Methodology & Results

The economic analysis that follows is consistent with the New Zealand Transport Agency's (NZTA's) Economic Evaluation Manual (EEM). It is of a type that Central, Regional and Local government will be familiar with. It quantifies national benefits and costs; it does not evaluate regional benefits or costs.

The economic analyse addresses the third of the three problems identified in section 2.1 Problem/Opportunity Definition above. It does not address Regional Economic Development at all, although the ferry service can be expected to make a significant contribution to Regional Economic Development. It touches on Resilience in the most minimalist of ways.

For economic evaluation purposes, we need to analyse freight between defined origin/destination pairs. In order to choose representative origin/destination pairs we have considered which pairs would be advantaged by use of the proposed ferry service. This is illustrated in The freight volumes in the above table need to be amended to incorporate changes in the size of the freight task between 2012 and 2021. The NFDS 2014 predicts that the total freight task will grow from 236.02 million tonnes in 2012 to 372.93 million tonnes in 2042; an average compound growth rate of a little over 1.5% pa.

The figure below illustrates the predicted catchment (i.e. areas from which using the proposed Whanganui – Motueka ferry service would produce a lower freight cost) of the proposed ferry service. The regional flows have been increased by just under 15% to allow for growth between 2012 and 2021.

Figure 2 – CatchmentThe NFDS reveals that 2 million tonnes of freight flows between the North and South Islands by road each year. 56% of the inter-island road freight flows between Auckland and Canterbury. Figure 2 in Section 4 shows that it would be advantageous for this freight to use the proposed ferry service. Clearly Auckland/Canterbury needs to be heavily represented in the economic analysis.

The freight origin/destination pairs that would be most advantaged by the proposed ferry service are freight between Taranaki/Whanganui with destinations in Nelson/Tasman/West Coast/Canterbury and vice versa. The NFDS does not separately identify Whanganui as an origin/destination of freight, it includes it in Manawatu. The total volume of inter-island freight originating in Taranaki with a Nelson/Tasman/Canterbury destination and vice versa is 80,000 tonnes per year. There are a further 60,000 tonnes originating in Nelson/Tasman/Canterbury bound for Taranaki. This includes freight to/from Marlborough; however, this over counting is offset by excluding freight to/from the West Coast.

Records available from the current ferry operators show that the typical load is about 16 tonnes per truck unit. This equates to 24 truck movements per day going to or from Taranaki.

For economic evaluation purposes, we have assumed that:

1. The ferry has capacity for 70 truck and trailer units;
2. The utilisation rate is 70%, i.e. an average of 50 truck and trailer units per sailing (based on a six day timetable);
3. The average payload of the truck and trailer units is 16 tonnes;
4. Half the truck units are moving freight between Auckland and Canterbury; and
5. The other half of the truck and trailer units are moving freight between Nelson and New Plymouth.

The economic analysis assumes that construction starts on 1 July 2020 and the first ferry service sailing is on 1 July 2021. It also assumes that operations are commenced with a single ship operation and that a second ship (i.e. two ship operation) starts service on 1 July 2026.

10.1 Base Date and Time Zero

The Base Date is the common base that all costs and benefits are set to. The Base Date for this project is 1 July 2016.

Time Zero is when the significant project costs or benefits start. Time Zero for this analysis is the commencement of construction work which has been assumed to be 1 July 2020.

10.2 Benefits

10.2.1 Accident Costs

The New Zealand Transport Agency has developed a model for predicting truck accidents. This model is in Appendix 6 of the Agency's Economic Evaluation Manual Volume 1, and is supplemented by information in the NZTA's Crash Estimation Compendium.

NZTA's method has been used to calculate the accident reduction benefits of transferring the freight from the current Wellington – Picton ferry service to the proposed Whanganui – Motueka ferry service. The modelling reveals accident savings (i.e. accidents avoided) of $365 million undiscounted which equates to $124 million discounted.

10.2.2 Travel Time and Vehicle Operating Cost

For trucks on the dominant Auckland / Canterbury route using the proposed Whanganui / Motueka ferry service would result in a road distance saving of 116 km (a saving of 198 km in the North Island, offset against an additional 82 km in the South Island). These figures assume that the SH1 route from Picton to Christchurch via Kaikoura is open and operating without delays.

NZTA's EEM gives a combined Travel Time and Vehicle Operating Cost rate of $3.03 per km (EMM SP2) and this rate has been used to calculate the Travel Time and Vehicle Operating Cost savings.

A number of truck operators (McCarthy Transport, Talleys Transport, Big Chill, Halls Transport, Toll Holdings, KPH Transport, KAM Transport and NZ Courier Post) were surveyed concerning truck travel times. As would be expected, there was variation in the answers given and these are thought to reflect variations in loads, horsepower and company requirements. For economic analysis purposes two outlying travel times were excluded and the remaining travel times averaged. The averaged road travel time saving on the Auckland / Christchurch run that would arise from using the proposed Whanganui to Motueka Ferry Service is two hours and 25 minutes.

In terms of travel time a key factor here is the drivers log book hours. Drivers are required to have a 30 minute break every 5.5 hours of work and to have a 10 hour break after 13 hours of work. For the Auckland / Whanganui run some operators were expecting their driver to have the 30 minute break on route and gave the travel time as 6.5 hours. Other operators were arranging for the truck to be met by a 2nd driver when the 1st driver completes his 5.5 hours, and the 2nd driver driving the last 30 minutes of the trip and reporting the travel time as 6 hours. In either case the Auckland / Whanganui / Auckland round trip within driving hours appears possible.

The travel time and vehicle operating cost savings are calculated as $2.1 billion undiscounted and $713 million discounted.

10.2.3 Road User Benefits

Greater Wellington modelled travel time, congested travel time, vehicle operating and congestion costs associated with a heavy truck and trailer units within the Wellington region using the Wellington Transport Strategic Model and reported this work in their report titled "Road User Benefits from Road to Rail Transfer of Logs and Wood Products - Marton, Masterton and Wanganui" dated June 2004. This modelling used benefit unit values with a base date of 2002, and produced the unit road user cost per VKT for trips within Wellington region. The modelling accounted for the effects of the addition or removal of truck units on other road users, and found that the costs increased over time (as would be expected). We have asked with Greater Wellington that we could discuss the merits of updating that work if this ferry proposal proceeds to the next stage. In the meantime, the values from the 2004 report have been used.

The calculated travel time, vehicle operating and congestion benefits (which might be better described as an improvement of travel conditions from a reduced number of heavy vehicles on the road) have been calculated within the Wellington Region only. The calculated benefits are $321 million undiscounted and $28 million discounted.

10.2.4 Carbon Dioxide

This initial evaluation is showing that the ferry service will burn more fossil fuels than the current transport arrangements. This is a most unexpected and counterintuitive result. More detailed evaluation of comparative fuel burn will be undertaken in the next stage.

10.2.5 Particulate Impacts

The exhaust emissions from diesel engines include fine particulates that are detrimental to health. EEM clause A9.4 includes "*Mortality costs have been estimated as a 0.101% increase in daily death rates for a 1 microgram per m^3 increase in PM10*"; PM10 being a measure of the fine particulates. EEM values the health cost of these fine particulates at $0.20 per vehicle kilometre in urban areas. Google Earth has been used to measure the length of the road routes through urban areas for the following routes:

1. Auckland to Christchurch via Wellington and Kaikoura;
2. Auckland to Christchurch via Whanganui and Motueka;
3. New Plymouth to Nelson via Wellington and Picton; and
4. New Plymouth to Nelson via Whanganui and Motueka.

The changes in route distance through urban areas have been summed and the net benefit associated with reductions in exposure to fine particulates calculated as $35 million undiscounted and $12 million discounted.

10.2.6 Resilience

In this context, Resilience refers to the ability of the road transport network to withstand large shocks, such as a major seismic event.

The New Whanganui / Motueka RoRo service will provide increased robustness/connectivity of the transport network. The networks with a greater number of interconnections are more robust than networks with a fewer number of interconnections is well known. New Zealand's road network is reasonably interconnected and robust within each island, with some limitations which relate to the linear nature of the country and its topography.

However, the picture is somewhat different when we consider connectivity between the two main islands. The only rail link and the only substantive RoRo link both rely on Wellington, with no alternative North Island RoRo berth point available outside of Wellington (other than disused RoRo berths in Auckland). This lack of interconnection raises questions regarding how robust the land transport network connections are.

The robustness of lifelines is a subset of this interconnectedness. There are a great many lifelines type events that could, and almost certainly will at some point in time, disrupt the nation's transport system. To illustrate the point, consider a scenario involving a major seismic event in Wellington (which the experts tells us is a question of when, not if). It is likely that Wellington's wharves (including its RoRo berthing facilities) could be inoperable for many months, or possibly years. If the seismic event resulted in a significant rising of the seabed (as has occurred in previous events, including the 1855 event) the present wharf site might never be a usable wharf again. Such an event would result in a very substantive reduction in inter island freight transport capacity, with an extremely serious medium term negative effect on the national economy.

The Magnitude 7.8 November 2016 Kaikoura Earthquake has highlighted the importance of resilience. SH1 in the vicinity of Kaikoura has been shown to lack resilience. North of Kaikoura the highway remains impassable five months after the earthquake and the NZTA website advises that it is not expected to reopen until the end of 2017. The earthquake also caused substantial damage to CentrePort's Wellington port facilities, including liquefaction and damage to container cranes making the cranes inoperable for months.

The seismologists tell us that the occurrence of another large earthquake centred near Wellington is a certainty – only the timing is unknown. Many large earthquakes affecting Wellington have resulted in an uplift of the sea floor. Wellington experienced considerable damage in the 1848 Marlborough Earthquake and was further damaged in the 1855 Wairarapa fault earthquake. The 1855 earthquake caused significant uplift of the harbour floor; much of the current CBD is built on land that was below sea level prior to the 1855 earthquake.

Seismologists advise that future seismic induced movements of the harbour floor are expected to be upwards.

That Wellington's port could be severely damaged by a large seismic event to the extent of being inoperable for a long period of time is well within the bounds of credibility.

The probability of such an event occurring in any given year has been assumed to be 1%. The impact of such an event on the inter-island ferry service has been valued at the approximate annual ferry revenue. This may undervalue the impact by an order of magnitude or more. Should such an event occur and make the current Wellington and / or Picton ferry terminal unusable by damaging the existing infrastructure and/or raising the seabed to an extent that the present ferry berth might never be usable again; the economic impact could be billions of dollars.

Provision of substantive appropriately configured RoRo facilities at Whanganui and Motueka would largely avoid the substantive reduction on North Island / South Island transport capacity, and substantially mitigate the consequential extremely serious medium term negative effect on the national economy.

Techniques for quantifying these effects are only now emerging and are not yet widely accepted. However, it is interesting to note that Greater Wellington (Wellington Regional Council), with some involvement/guidance from the Wellington Lifelines Group, recently obtained an economic assessment of a proposal to reduce the restoration period for bulk water supply following a major seismic event in Wellington. That assessment quantified the present value of the benefits as between $200m and $600m. Intuitively, it would appear that the benefits of maintaining a high capacity freight link between our two main islands could be much greater than those of reducing the water supply restoration period.

We have attempted to quantify the resilience benefit by assuming a 1% annual probability of the event occurring and valuing the impact at the ferry revenue of the existing operators (which is likely to be a massive underestimate of the impact). The resulting benefit values are $61,240,225 undiscounted or $24,709,686 discounted. We believe that these values are a massive under estimation of the resilience benefits.

10.2.7 Other Impacts

Other positive impacts exist, but have not been quantified as there is no generally accepted methodology for doing so. These include reduced deposition of heavy metals to the road surface from truck operations, and consequently less suspended heavy metals entering the water borne ecosystem.

10.3 State Highway Extension

NZTA's website includes:
"*What's the difference between a state highway and a local road?*
State highways are those roads in New Zealand that form a nationally strategic purpose in moving people and goods nationwide. For example, State Highway 1 runs the entire length of New Zealand. State highways are a Crown asset that we manage on behalf of central government.
Local roads are those roads that form a regionally strategic purpose in moving people and goods within regions. These roads are managed by local government"

Heads Road is currently a local road and clearly fits within the NZTA's definition of a local road as "*moving people and goods within regions*". Once the Whanganui to Motueka ferry service is operational Heads Road will be serving "*a nationally strategic purpose in moving people and goods nationwide*". There is a clear case for Heads Road to be reclassified as a State Highway when the ferry service is operational.

10.4 Benefit Cost Ratio

The calculated benefit cost ratio is 1.6 for the RoRo (freight only) operation.

The calculated benefit cost ratio is 1.1 for the RoPax (freight and passenger) operation.

10.5 Sensitivity

The calculations are not at all sensitive to the freight market growth rate as the constraining factor is ship capacity.

The calculations are moderately sensitive to the utilisation rate. However, we note that the market appears to be more than adequate to support a one ship operation.

The calculations are also moderately sensitive to the truck travel time. We interviewed a number of truck operators on the subject of travel time. A range of answers were received. We took the average of the answers (after discarding two outliers). The estimates of truck travel time used in the calculations appear robust.

There are assumptions about typical carriageway and shoulder widths required for the accident benefit calculation. The calculated BCR has a small degree of sensitivity to these assumptions.

11 Financial Analysis

11.1 Costs

11.1.1 Port Development

The ports that are contemplated as the North and South Island terminals for this ferry proposal would require substantial capital works to create facilities to a standard capable of allowing such a service to operate safely and efficiently. The table below provides a summary with further commentary on individual items following.

Port Development Costs - Whanganui and Motueka (NZD-m)	
Dredger Vessel	20 - 25
Capital Dredging	4 - 5
Reclamation	8 - 12
Wharves	10 - 15
Vehicle Ramps	4 - 6
Marshalling Yard	2 - 3
Buildings	2 - 3
Other	2 - 4
Contingency	23 - 27
Total Costs	75 - 100

11.1.2 Dredging Costs

At this stage of the evaluation it is difficult to be precise as to the dredging arrangements that would best meet the operating requirements in a cost-efficient manner. Initial assessments indicate that the best approach would involve the acquisition of a new build dredger with appropriate capacity and functionality. On current market rates this would cost approximately $22m (NZD) plus delivery costs. The upfront capital cost would be significantly defrayed by substantial savings (possibly as much as $10m) in operating the dredger in the capital dredging phase, as well as substantial reductions for maintenance dredging (possibly $1m per annum). Further gains could be made by outsourcing the dredger to other ports as windows in the dredging programme allow. It is envisaged that the dredging operation would be run by a subsidiary business to encourage best commercial performance.

Modern dredgers are able to provide reclamation functionality which is likely to beneficial for other aspects of required port development ahead of launching the service.

Maintenance dredging will be required for a combined total of about 250,000 m^3 of material per annum. The annual dredging cost will be driven by the operating costs of the vessel plus depreciation of the dredger. These costs could be defrayed by outsourcing the dredger to other ports as windows in the maintenance dredging programme allow.

11.1.3 Reclamation

11.1.3.1 Whanganui

There are a number of berthing scenarios that could be deployed in Whanganui, refer section 3 above. All scenarios will require a degree of reshaping/restructuring of the existing training wall structures and may involve varying degrees of reclamation.

Modifications of this type will result in some degree of redirection of the flow of the main river which is likely to impact on the southern river banks and mole, and may require reinforcement or modification. There is currently substantial deferred maintenance in relation to various river structures as identified by a recent Tonkin and

Taylor Report, and any final proposals will need to be integrated with evolving plans to upgrade/modify river structures.

Redirection of the river flow could also have an impact on river hydraulics/flood performance upstream of the diversion. Horizons Regional Council has offered to assist the study by provision of services in kind. They have been made aware of the reshaping / restructuring proposed for the existing training walls. They have responded by indicating a willingness to work collaboratively with us to quantify the effect of the proposed works and to identify what treatments might be appropriate.

11.1.3.2 Motueka

At Motueka it is intended that reclamation of the inner harbour basin is completed to provide wharf and berthing facilities. There are no apparent issues concerning adequacy of the turning basin. The Motueka harbour is not at the outlet of a river as in Whanganui, but rather a tidal estuary with a minor creek flow. There is a minor wooden training wall running off Jackett Island which may need to be replaced or removed depending on marine advice.

11.1.4 Wharves, Berths and Mooring

11.1.4.1 Whanganui

The different berthing scenarios arise from different wharf options (Wharf 2 or Wharf 3) or even the possibility of a new wharf on reclaimed land. It is envisaged that the most likely scenario involves a solution based on an existing wharf being rebuilt to accommodate vessels of the size and weight contemplated, with appropriate additional structures if required (e.g. fendering, dolphins, mooring points etc.).

In the longer term, it is envisaged that a second vessel will be added to the operation, and as such, optionality should be retained for a second berth (this is a safety requirement for emergencies as typically each vessel will be at one or other port).

New wharves may also allow the opportunity of other vessel operators berthing in them in windows where the service is at sea or at the other port. Further, the newly developed port will offer opportunities for an expanded scope of commercial operations e.g. partially or fully loaded logging vessels, larger coastal bulk carriers as well as other commercial or recreation maritime operations.

11.1.4.2 Motueka

The wharf and berth at Motueka will be built from scratch.

11.1.5 Ship

Historically the vessel type envisaged (180m RoRo or RoPax) has not provided procurement difficulties, however, in the past 15 years there has been a relative dearth of RoPax shipbuilding which has created a tighter market for these vessels.

Initial investigations indicate that there are suitable vessels available today e.g. *Liverpool Seaways* which is the sister ship of *Strait Feronia* currently being operated by Bluebridge. Further there are a number of RoPax vessels currently being chartered e.g. by StenaRoRo that may enter the marketplace in the timeframe relevant to this proposal (indicatively from 2020).

At the point of vessel procurement, negotiations with vessel owners may entail lease versus buy considerations. The relative value of the two options to the ferry operator will depend on the value gain from avoiding ongoing leasor margins and return delivery costs compared to the optionality and flexibility offered by the lease (or lease to buy) option.

The cost of purchase or lease can only be estimated indicatively as it depends on market conditions in several years' time. As an indicator, it is believed the *Strait Feronia's* purchase price was EUR23 million in 2014 (approx. $32 million NZD). Current market conditions would suggest a higher outlay would be required to acquire such a vessel due to under supply.

11.1.6 Crewing

The crewing regime is based on a freight only operation or a combined freight and passenger operation as appropriate. The passenger operation necessitates additional crew both for passenger hospitality and for safety requirements. The exact number required depends on forecast passenger numbers.

The crewing regimes of the two Cook Strait ferry operators varies substantially in terms of crewing complements, time on / time off ratios and remuneration rates. The net effect of these variations is a reasonable cost premium for the InterIslander operation relative to the Bluebridge operation. The persistence of this premium relates to historical factors that are complex in nature (dominant market position, state ownership etc.).

For the purposes of this operation a hybrid approach has been taken with an orientation towards the SSL crewing regime.

While final numbers will evolve as timetables and target markets are refined, overall crew numbers for a passenger operation are estimated at about 70-75 maritime and hospitality staff at cost of $6.0m - $6.5m per annum.

11.1.7 Fuel

Typical fuel consumption levels for 180m vessels travelling at 18 knots are about 2,300 litres of light fuel oil (180cst) per hour, resulting in an estimated consumption of 13,800 litres for a six hour sailing (19 knots cruising speed).

11.1.8 Maintenance and Dry Docking

Most routine maintenance would be carried out in the periods when the vessel is in port (most likely 12 hour windows each day). Some maintenance would require short “layby” periods which would be targeted at weekends in winter where possible (passenger off peak across the year and freight off peak across the week).

Engine maintenance is usually a function of equipment hours or elapsed time and can be scheduled well in advance; other maintenance is usually a function of sailing time or elapsed time. A robust asset management plan with an optimised maintenance programme would be a key operational requirement given the lack of back-up options in a one ship fleet.

Dry dock costs will depend on which shipyard is available in five or six years’ time when the first vessel survey would be due, assuming the service commenced in three years’ time. The model assumes total costs of $4m per dry dock. A freight only vessel would require dry docking at five yearly intervals. A passenger vessel would require dry docking at two to three year intervals.

11.1.9 Other Costs

The financial model has estimated other operating costs covering:

- Provedoring
- Insurance
- Port maintenance
- Terminal operations
- Head office personnel
- Corporate overheads
- Other

The indicative total of these costs is over $4m p.a.

The business may explore the option of outsourcing ship management to an existing operator.

11.2 Revenue and Pricing

11.2.1 Freight Volumes

Freight volumes in the commercial vehicle market are typically measured in terms of lane metres as this is usually the limiting factor on RoRo vessels. The estimated volumes for the total inter-island commercial vehicle market for the year ending June 2017 is 2.4 million lane metres. It is expected that this volume will grow by 2% to 3% per annum in the next five years, resulting in a 2.7 million level in the first year of modelled ferry operation. The growth rate is related to a limited extent on KiwiRail's performance in the inter-island rail freight market which has exhibited a long term trend of market share loss to the commercial vehicle market.

11.2.2 Market Shares

11.2.2.1 Top Down
Based on the National Freight Demand Survey of 2014 there is about 10% of total inter-island market that would have a very strong likelihood of using the proposed service. This is based on traffic moving to or from:

- Taranaki
- Northern Manawatu/Whanganui
- Hawkes Bay and Poverty Bay
- Tasman/Nelson
- West Coast

Beyond this segment of direct beneficiaries there is clear cost saving from avoided road travel of about 120km for the approximately 60% of the market that moves goods between Auckland and Canterbury.

On the basis that over 75% of the first group and about 25% of the second group would use the service as well as a small percentage of the remainder, a forecast market share of 23% to 26% of the inter-island commercial vehicle market is obtained. These levels are considered conservative based on the survey data reviewed.

Based on the forecast market volumes noted above, such market shares correspond to about 70% vehicle deck utilisation for the proposed ferry service. While this is about 10% above the industry standard for ferries with round the clock sailings – a service with fewer sailings would expect higher utilisation rates.

11.2.2.2 Bottom Up
Surveys of individual freight operators indicate that demand would be even higher, which in the first instance provides validation for the top down analysis, and second, suggests that there may be a path for a two vessel service in the future.

11.2.2.3 New Markets
Anecdotal evidence suggests the operation of a service from Whanganui to Motueka would also open up transport opportunities that are not currently viable. It is very difficult to assess the size of this, but even a small overall increase in market size offers a significant opportunity as all the volume would go to the proposed service (e.g. a 1% to 2% increase in market size equates to a volume increase of 5% to 10% for the proposed service). The evaluation has not assumed any value attributed to this.

11.2.3 Market Segments

The commercial vehicle market can be broken down in to a number of market segments each with different service requirements and characteristics. Various categories can be used including:

- Scheduled general goods services
- Couriers
- Bulk freight
- Furniture
- Tankers
- Dangerous Goods

The relevance of these segments lies in the service offering provided to them – particularly the timetable which allows key pick up and drop off timegates to be achieved. The final timetable will be designed to optimise the

offering to as many segments / transport operators as possible in order to meet the market shares noted above.

11.2.4 Freight Rates

After a long period of decline in freight rates on the Cook Strait over the past two decades, a degree of stability has been experienced in the past 3 to 4 years. Rates are averaging around $45 per lane metre or about $800 to $850 per truck.

This average, however, hides a wide range of prices that are offered to road transport operators. Commercial vehicle pricing incorporates many factors including:

- Competitor offer
- Customer size and volumes
- Service offering
- Market segment
- Strategic value of customer

The financial analysis assumes average rates of $55 for the proposed service i.e. a premium of about $10 or 20% (about $150 per truck). This premium is justified on the basis of the significant reduction in road distance that will be offered to road transport operators by this service (120km to 290km for most users).

11.2.5 Freight Revenue

Based on the range of forecast volumes and the forecast average rate, the freight revenue expectation for the proposed service is $30m to $35m per annum.

11.2.6 Passenger Volumes and Market Shares

The passenger market would initially operate as a secondary market as this route requires marketing / destination development. The desktop exercise undertaken as part of this study indicates volumes of 50,000 passengers and 20,000 cars in the initial stage of the operation. These volumes correspond to about 5% of the projected market size in 2021.

11.2.7 Passenger Revenue

The passenger market has significantly greater seasonality than the freight market. Accordingly, operators typically charge a variety of rates to reflect different demand patterns across the year. Based on forecast volumes but using existing rates without any premium the initial revenue is $5m per annum.

11.3 Profitability

The freight only scenario shows robust levels of profit before tax of between $5m and $10m after a two year build up period. The initial assessment is that the combined freight and passenger operation is less profitable due to additional costs associated with passenger operations outweighing incremental revenue opportunities.

11.4 Sensitivities

The key sensitivities identified in the financial analysis are changes in:

- [redacted] *[Commercially sensitive – competitor could gain advantage]*
- [redacted] *[Commercially sensitive – competitor could gain advantage]*
- Port Development Costs – a 10% change in port costs changes before tax (EBIT) profitability by $0.7m. This proposal is not sensitive to the normal range of variation on port development costs.

12 Risks and Issues

As this study is looking at feasibility only, rather than a detailed business case, a full risk and issues analysis has not been undertaken, however, some key risks and issues have been identified at this stage for evaluation at the Detailed Business Case stage.

Whanganui District Council have commissioned consultants to prepare a Port Redevelopment Master Plan for Whanganui Port. At this stage, an important consideration for the project is the integration of the ferry facility at Whanganui into this Master Plan. This will be pivotal in gathering support from Whanganui District Council as part of the wider revitalisation activity that is the objective of Master Plan.

Other risks identified at this stage include:

- Competitive response from incumbent operators on the Cook Strait. KiwiRail has experienced a number of ferry competitors in the past, and all of them except SSL have not survived. KiwiRail will, in all probability, take a proactive approach to responding to a new inter-island competitor. It is believed, however, that a low risk approach, modelled on SSL's slow and steady operation would prevail as the competitive advantages of the service are robust.
- Actual take up rate by freight operators. There is a risk that taking preliminary surveys of freight operators at face value could overstate the final take up rate of the service. Prior to the commencement to the Information Memorandum stage, there will be a comprehensive freight user analysis to validate the preliminary conclusion to a very high level of confidence.
- Outages (scheduled and unscheduled) – impact on customers. In the case of a one ship operation that is envisaged as the initial phase of the proposed service, there is a risk of unscheduled outage with no credible back up plan. Any extended outage may have serious ramifications for customers who move their freight from other operators. With a passenger operation, this risk extends to scheduled survey outages every two to three years (five years for a freight only operation). The above risk could be mitigated by contractual arrangements with existing operators for back up services.

13 Timeline

The graphic below illustrates the proposed timeline for this project with additional information on key drivers, funding and key components of each stage.

WHANGANUI TO MOTUEKA TIMELINE						
Stage	**1. Pre Feasibility**	**2. Feasibility**	**3. Detailed Business Case**	**4. Information Memorandum**	**5. Implementation**	**6. Go Live**
Start Date	Jan-10	Mar-17	Jul-17	Jul-18	Jul-20	Jul-21
Key Drivers	Neville Johnson	WTAL and Sofos Consultancies	Establishment Board	Investors	Midwest Ferries Ltd	Midwest Ferries Ltd
Funding	Neville Johnson	Public / Interested Parties	Central and Local Govt / Investors	Midwest Ferries Ltd	Midwest Ferries Ltd	Midwest Ferries Ltd
Key Activities	Review of Previous Proposals Private Investigation Freight surveys	National Economic Benefits Study Financial Model Market Assessments Business Model Preliminary Maritime Scoping	Memorandum of Understanding Engineering Scoping Study Engineering Design & Estimates Environmental Scoping Study Commercial Model	Environmental Field Work Resource Consentiing Port Owner Negotiations Investment Structure Financing	Port Construction Vessel Procurement Business Systems Set Up Recruitment	Service Commencement

APPENDICES

Appendix A: Potential Tourism Market for Passengers and Vehicles

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Wanganui to Motueka Ferry Service and the Potential Tourism Market for Passengers and Vehicles

Introduction

This report is commissioned by Midwest Ferries to identify and establish the likely and potential passenger and vehicle uptake by a proposed ferry service between Wanganui and Motueka. The analysis comprises a desktop exploration of current visitor flows and the current use of the Wellington ferries and what percentage might be attracted to a new route and crossing. In addition, advice is provided about the long-term potential for increased tourism and visitation to the two ports and which might establish long term demand for the service.

Context

A new interisland ferry service is proposed that would provide an alternative link between the South Island and the North Island. The two ports would be Motueka and Wanganui. The tourism benefits of this proposed service would be a new route between the two islands and also a significantly enhanced opportunity to tour around the South Island without duplication of route. In the North Island, there would be new opportunities to depart from Wanganui which would create a greater incentive for visitors to travel down the western regions of the island.

This report assumes:

1. The proposed ferry would be in the order of 150 metres or more in length and over 15,000 gross tonnes and with a cruise speed of 15- 20 knots
2. The frequency of sailings would be no less than 1 return crossing daily
3. The interior of the ship would be of a high standard with the emphasis on passenger safety, comfort and service. If an overnight service was established suitable accommodation would be available on board.
4. The trip duration would be either a proposed 6 hour crossing or a 10 hour overnight crossing.
5. The infrastructure and facilities for berthing and boarding at both ports would be of a high standard befitting to tourist requirements.
6. The cost of passage for vehicles and foot passengers would be competitive with existing Wellington options

We understand that this service would be looking to attract both the domestic travel market for business, tourism and general travel, and also capitalise on the international tourist market. This demand would be in addition to any freight component that the ferry would service

To therefore identify the potential of this new market it is necessary to consider:

- The existing total annual passenger and vehicle movements across Cook Strait
- Total international tourist numbers to New Zealand and their existing travel patterns especially to the regions in questions
- The population of the existing regions surrounding both ports.
- The domestic tourism and travel market and especially to the regions in question.

We have then applied some further assumptions to these numbers and considered other factors which may influence patronage on the introduction of such a service ie regional events and conferences, new tourist itineraries, together with existing road and regional air flows. An estimate of demand for this proposed service from visitors can then be derived.

The Current Cook Strait Market

Two companies presently provide passenger and vehicle transport across Cook Strait between Wellington and Picton. In the year to June 2015 the Interislander carried over 1,000,000 passengers and 217,000 vehicles (Annual report 2015). This represented 70% of the market and by extrapolation Bluebridge carried approximately 430,000 passengers and 93,000 cars.

By comparison in the year to June 2016 the Interislander passenger traffic decreased to approximately 800,000 (Annual Report 2016) with consequential equivalent decrease in vehicle traffic to approximately 174,000 cars. The decrease can be attributed to a number of factors including breakdowns and less capacity across the Strait. The larger capacity vessel Kaiarahi was introduced to the service in September 2015 and by assumption this would allow the Interislander service to increase market share after a settling in period of approximately 6 months.

Assuming the Bluebridge service continued its growth at 5% per annum from 2015 levels and the Interislander traffic renewed growth from 2016 reported levels with a 10% recovery with the additional capacity and 5% assumed national market growth, this would equate in present 2017 market share figures to approximately 200,000 Interislander vehicles and 103,000 Bluebridge vehicles carried. This indicates a total current market of 302,000 vehicles per annum crossing Cook Strait.

It can also be assumed this market is now increasing with the rising international tourism trend but this market will have been affected to some extent by the 2016 Kaikoura earthquakes.

In summary, the total annual passenger and car movement across Cook Strait is conservatively estimated at over 1,200,000 passengers and 302,000 cars. Over time with the increased domestic population growth and the international tourism trend of significant increases in visitor numbers in the next couple of years and annual patronage could be expected to be up to 1,400,000 passengers and over 330,000 cars.

The ratio of cars to passengers is approximately 1:4 for the Wellington ferries. The passenger numbers are at this level because of the significant population centre of Wellington, the significant accommodation options and the backpacker market that passes through Wellington. We consider a car: passenger ratio for the proposed ferry route is likely to be more consistent with the passenger ratio for rental vans at around 2 – 2.2:1. If the ferry route could attract the backpacker market to Wanganui and Motueka and the destinations could be established on the backpacker circuit as must visit destinations and the ferry crossing as a must do, then the number of passengers could rise considerably.

International Tourism Numbers to New Zealand and Current Trends

International visitor arrivals to New Zealand have now passed 3.5 million per year (Latest Tourism Satellite Account Feb 2017). Of this number of 50% were traveling specifically for holiday. This year's total arrivals are up 11 % for the year ending 2017. The bulk of this increase was from holiday arrivals, up 15% on the previous year. Further, MBIE is forecasting these numbers to increase by 5.4% per year and reaching 4.5 million visitors in 2022. Most of this forecast growth is expected to come from holidaymakers and those visiting friends and relatives.

In relation to ferry usage, care needs to be taken in interpreting gross arrivals data. As can be seen in the table below, those international markets that do tour New Zealand and travel widely are the traditional markets of Europe and America. These visitors stay longer and travel more extensively including both islands. The Australia market is expected to remain constant in its travel patterns, with much of the travel being VFR travel and short breaks, such as 7 day ski holidays to Queenstown. The China market is evolving rapidly and currently around 30% are free independent travellers. There is also a significant proportion that are short stay (3-4 days) and visit a very limited number of destinations. In addition, there is a significant group of China visitors that are long stay education visitors and this combination influences the average length of stay detailed below.

Source Market (Total Arrivals)	2016 arrivals (millions)	2022 forecast arrivals (millions)	Forecast average length of stay in 2022 (days)	CAGR 2016 - 2022
Australia	1.442	1.653	10	3.2%
China	0.440	0.921	17[1]	14.5%
USA	0.295	0.401	19	7.4%
UK	0.215	0.252	28	3.1%
Germany	0.085	0.125	57	5.7%
Total Arrivals	3.475	4.515	20	5.4%

There are approximately 1.1M holiday specific arrivals from the key source markets of America, Europe and Australia in 2016. In addition, there are approximately 800,000 visiting friend and relatives travellers to New Zealand from the same source markets. In the next 5 – 10 years these are the principal source markets for international visitors that are likely to travel widely and have the time to tour. These two groups represent about half of the total arrivals to New Zealand.

In summary, it can be expected that the international visitor market will grow strongly over the next five years. The market most likely to utilise the ferry services and travel widely throughout New Zealand is expected to grow at around the same rate as the overall market and not at the rate of our most rapidly growing international visitor arrival markets. This market comprises around half of the international visitor arrivals to New Zealand.

Visitor numbers to the proposed port locations and neighbouring regions

The Commercial Accommodation Monitor provides accurate statistics of guest nights to the Regional Tourism Organisation (RTO) regions with a breakdown by way of both domestic and international guest nights. The figures below are for the year to January 2017.

RTO Annual Guest Nights and Visitor numbers[2]						
	Year end Jan 2016	Year end Jan 2017	% change	Av length stay(nights)	Est Visitor Nos	Int/Dom Ratio
Wanganui	190,380	187,169	-1.7%	1.76	106,346	22:78
Manawatu	528,035	537,616	1.8%	1.64	327,814	15:85
Taranaki	582,242	620,665	6.6%	2.09	296,969	15:85
Nelson Tasman	1,349,674	1,468,522	8.8%	2.30	638,488	32:68
National Total	36,531,834	38,556,462	5.5			43:57

[1] The China market comprises a significant number of long stay education visitors and the average length of stay for holiday makers is around 9 days.

[2] The commercial accommodation monitor only records nights in commercial accommodation and excludes stays with friends and relatives and bach accommodation. As a result it underestimates total stay and is likely to underestimate domestic stays in particular.

As this table indicates, Wanganui is a comparatively small destination for visitors and the other regions also have comparatively small commercial accommodation markets comprising approximately 7% of the total national bed nights.

Capacity in these regions is limited and in particular, hotel accommodation which will act as a constraint for some markets. Occupancy is also comparatively low compared with major tourism destinations. Combined, these two aspects indicate that the regions do have available accommodation capacity but that the overall volume is constrained.

Seasonality is another factor to take into consideration, with Nelson Tasman in particular, having a strong summer seasonal peak and low winter visitor numbers.

Population of the proposed port locations and neighbouring regions

The total population of the proposed Port and neighbour areas are detailed below as provided by the New Zealand 2013 Census.

Region	2013	%of NZ Pop.
Wanganui/Manawatu	222,672	5.2%
Taranaki	109,608	2.6%
Tasman	47,157	1.1%
Nelson	46,437	1.1%
Total	425,874	10%

With 10% of the New Zealand population in the immediate vicinity of the proposed ports, general travel between these two regions will be facilitated by the introduction of a service that connects the two regions.

Both holiday, visiting friends and relatives and event travel between these regions would be expected to increase as a result of this transport connection. Where there is a need to take a vehicle for an event, such as Horse of the Year in Hawkes Bay, Manfield car racing, or other similar events, then a ferry service will be a preferred option to flying or taking alternative ferry services.

New Regional Interisland Tourist Route to be promoted.

A new ferry service between Motueka and Wanganui would result in additional connections between the ports and the surrounding regions:
The key linkages in the North Island would be:

- SH3 from Hamilton to Awakino to New Plymouth to Wanganui
- SH 4 from Taumaranui to National Park to Wanganui

In addition, the traditional route via SH1 could also be used to travel to Bulls or Marton and the travel SH3 to Wanganui.

In the South Island the principal benefit would be to enable a circuit of the South Island with either a route from Motueka to Murchison along SH6, down the West Coast and further south. To complete the circuit the route north would involve the return journey up the east coast on SH1 to Picton. The attraction of such a route for visitors is that there is no doubling back and also a greater area of the South Island can be experienced in a given time.

The establishment of a new tourism route will require a long-term investment in destination marketing and development of additional tourism experiences, accommodation and upgrading of a number of the roads.

At present traffic flows along SH4 are low and this is partly as a result of the quality of the road and also the nature of the region that the road passes through. At around 1000vpd and an estimate of 20% being tourist traffic there is a very limited flow along this route. Of more significance is SH3 via Taranaki which has around three times the traffic flow and a similar estimated proportion of tourism traffic. From a tourism perspective, there is little by way of attractions or activities in the area and therefore little incentive to travel these routes compared with other ways.

To change this touring route would require a long-term effort over a very long period. Such a change would require the involvement of the RTO's in the vicinity of the two ports and significant awareness raising about the benefits of a circuit approach to both islands. There are already touring routes heavily marketed by Rental vehicle companies and such a new approach would need to be included as an option in this marketing.

In addition, the provision of accommodation options and also attractions and activities at both ports and along the routes to the ports would require significant improvement over the longer term. Much of this activity would require investment by private investors who would be expected to respond to any increase in demand.

Previous analysis of campervan use in New Zealand indicates that international visitors (predominantly American, UK and European) travel extensively with around 45% visiting both islands during their travels. Around 20% of New Zealand campervan hires cover both islands. In general, international visitors cover most regions of New Zealand, with Taranaki being the least visited with only 15% travelling in that region. Consultation with a major campervan company indicates that around 35% of their fleet is estimated to travel between the two islands in any one year. In addition, there are a number of one way hires and relocation trips for each vehicle. The current commercial fleet is around 4500 campervans and it is estimated that there are around 2000 campervan ferry trips per annum.

The privately owned New Zealand campervan market is in a resurgence at the moment and it is estimated that there are around 35,000 privately owned vehicles. The "away days" have been quite consistent amongst MZ Motor Caravan Assn members at around 70 days per year.

Anecdotally there is also considered to be an increase in travel by these members around both islands. Using the data from commercial hires at 20% touring both islands for domestic rentals, this would give a population of around 7000 ferry crossings per annum from private vehicles.

With the right facilities and a competitive ferry off we would expect that this would be an attractive crossing option for this market.

The New Zealand rental car fleet comprises around 40,000 vehicles. The major companies do not allow their vehicles to cross the Cook Strait and hence the fleet that can cross is significantly reduced. We estimate that the second-tier rental companies comprise around 10,000 vehicles and this is the key market that tours both islands. Of this fleet, it is estimated that 30 – 40% would make one crossing per annum. This gives a rental car population of around 3000 to 4000 rental cars crossing Cook Strait. However, there are increasing numbers of international visitors renting vehicles for their travels and we would expect this use to result in an increasing number of crossings over time.

Tourist coaches also cross between the two islands both on touring routes with passengers and also relocate between the islands to meet the different seasonal requirements. At this time, no information is available on this demand.

Highway vehicle counts on State highways.

Assumptions about the potential for visitor traffic to utilise a new ferry service between Wanganui and Motueka.

The potential for a new ferry service to attract custom from existing services will depend on its price and the comparative advantages a new service has over current offers.

The biggest attractor from a visitor perspective will be the opportunity to do a “circuit” of one or both islands. Given that visitors are often time poor and want to see as much as possible in a given time, this potential is expected to be attractive to international visitors in particular. Specific market research would be required to develop a firm estimate of the attractiveness of this option.

Our estimate for this potential market is that with a current market of 1.2M passengers and 300,000 vehicles a new service that offered an equivalent cost, quality and convenience of service could expect to attract between 2 and 5% of current traffic. We consider that the lower end estimate is realistic in the first instance depending on the quality and timing of the service.

A 2% share represents a potential of around 24,000 passengers and 6000 cars per annum. At 5% 60,000 passengers and 15,000 cars.

Local Domestic Population usage

As outlined above there is a regional population that would be expected to use this ferry option as a preferred travel mode between the islands for holidays, events and visiting friends and relatives.

Assuming 0.5 – 1% utilise such a new ferry service, the regional demand based on the local population would be estimated at 2000 to 8500 passengers and 1000 to 4000 cars per annum.

Development and Marketing of New Regional Interisland Tourist Route

As outlined above there are about 1.1M international holiday makers from the target countries that are likely to tour New Zealand for an extended period and therefore are likely to travel between the North and South Island. Of this number, there are around 500,000 European and American visitors that have a long length of stay (over 20 days) and are most likely travel between the two islands. Given the options of drive and fly, the option of talking a ferry, touring by car or campervan is only one option. Therefore, our estimate of the potential cohort that will take up a new route by land and sea is a comparatively small proportion of the total potential travellers.

We have therefore assumed that between 0.5% and 1% may use a new route and take a ferry between the two islands. This comprises between 5500 and 11000 passengers. In addition, this would attract 3000 to 6000 vehicles.

Conclusion

The opportunity for visitors, both domestic and international to take advantage of a new ferry service between Wanganui and Motueka will depend largely on the quality, price and timetabling of the service. To achieve maximum benefit from such a service considerable marketing and development of the feeder routes and tourism product and accommodation would need to take place. The existing routes and ferry service are well entrenched as a product and route. While a new “circuit” route would be highly attractive to international visitors it would take some time to develop and be understood as a travel option.

Our estimates are based on existing usage and a desktop assessment of the potential of various segments of the travelling population that already use Cook strait services. We have undertaken no direct surveys of these potential ferry service users to ascertain their likelihood to use the service at this stage. We estimate that the initial range will be between:Low Visitor Estimate

Source	Passengers	Vehicles
From Wellington ferry	24,000	6000
International travellers	5500	3000

Regional travellers	2000	1000
Total	30,000	10,000

High Visitor Estimate

Source	Passengers	Vehicles
From Wellington ferry	60,000	15000
International travellers	11000	6000
Regional travellers	8500	4000
Total	80,000	25,000

With a long-term marketing strategy successfully implemented, as well as complementary tourism product development and increases in accommodation supply there is significant upside to what is possible in attracting visitors to a new ferry service. This scenario is, however, a long term one and would take some time to implement.

Should you require any further information to support the business case development please contact me.

Ray Salter, TRC

Appendix B: Layout Plan - Whanganui

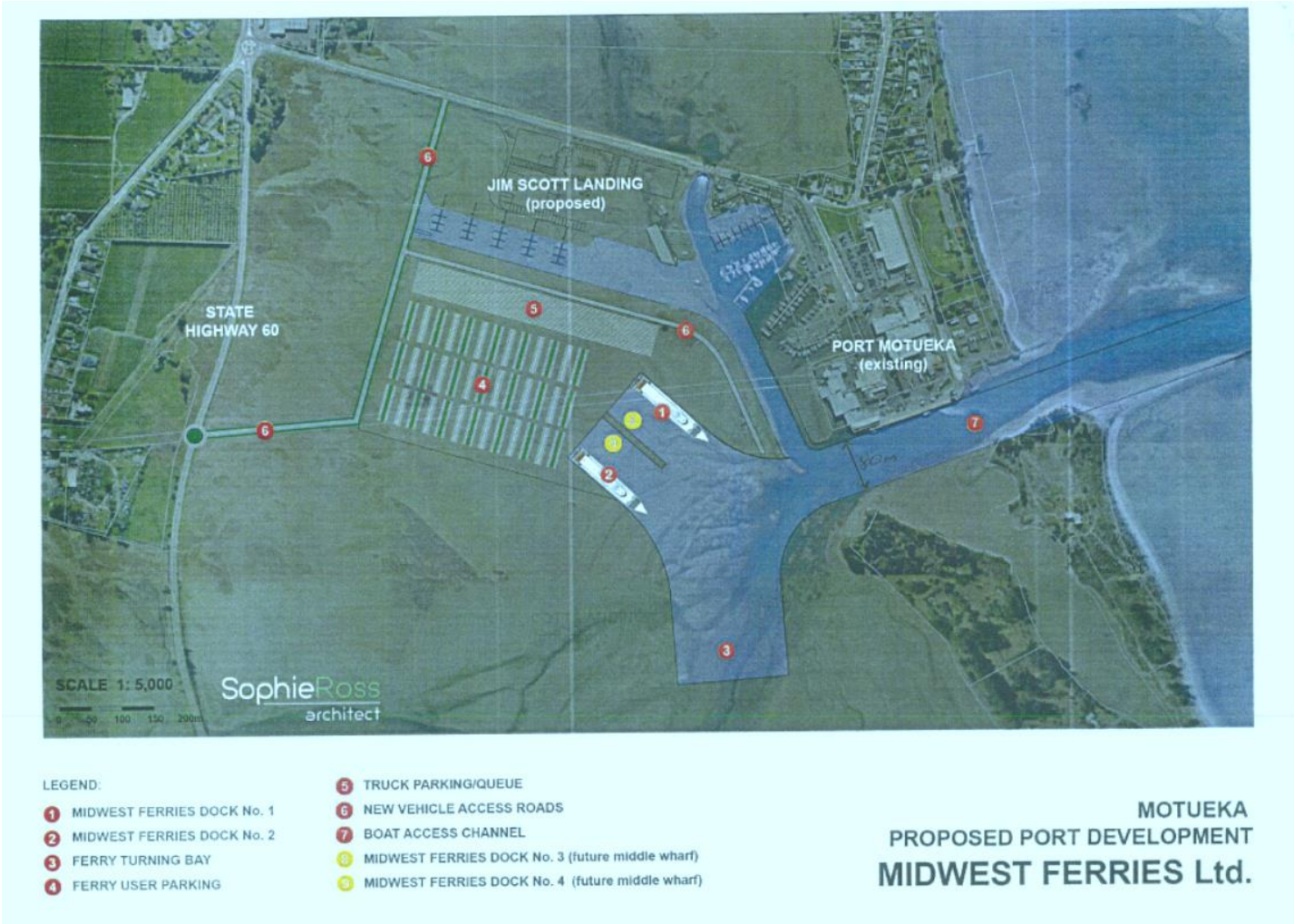
LEGEND:

1. MIDWEST FERRIES DOCK No. 1
2. MIDWEST FERRIES DOCK No. 2
3. MIDWEST FERRIES DOCK No. 3 (if required)
4. DEFLECTOR WALL
5. FERRY USER PARKING / STAGE 1 RECLAMATION
6. RECREATIONAL INNER HARBOUR
7. PUBLIC PARKING
8. VICTORY SHED - community destination, mixed public use (WL11)
9. EXISTING SMALL BOAT SLIPWAY - width increased x3 (WL8)
10. MARINA - 366m length, 122 berth potential (WL10)
11. PORT TO CITY CENTRE FERRY SERVICE (WL28)
12. JUMP/DIVE PLATFORM (WL29)
13. RECREATIONAL AREA - water sport, swimming, waka ama, paddle board etc. (WL7)
14. RECREATIONAL BOAT RAMP (WL22)
15. LAWN ZONE - community events & recreation (WL21)
16. PEDESTRIAN / FISHING WHARF (WL20)

STAGE 2:

17. ACCESS CHANNEL INTO Q-WEST (current site)
18. WHARF SPACE - Q-WEST CLIENT VESSELS
19. POSSIBLE VEHICLE ENTRY OFF HEADS ROAD
20. POSSIBLE VEHICLE EXIT TO HEADS ROAD
21. SOUTH BEACH DREDGING (if required)

Appendix C: Layout Plan – Motueka



Appendix D: Support from Regional Council

horizons
regional council

12 April 2017

Private Bag 11025
Manawatu Mail Centre
Palmerston North 4442
P 06 952 2800
F 06 952 2929
www.horizons.govt.nz

Walbran Transport Analysis Ltd
41 Albany Road
Nikau Valley
PARAPARAUMU 5032

File ref: TPP 02 01
LS:PH

Attention Warwick Walbran

Dear Warwick

WHANGANUI TO MOTUEKA FERRY SERVICE

Thank you for meeting with Michael and I on Monday 3 April 2017 to discuss the proposal to establish a ferry service between Whanganui and Motueka.

This letter is in response to your request for written confirmation that Horizons Regional Council is aware and supports the proposal and that it is consistent with the Regional Land Transport Plan (RLTP). Please note that the RLTS was replaced by the current RLTP, 2015-2025 which was made operative in 2015.

I can confirm that Horizons Regional Council supports the ferry proposal. In our view, this aligns with Central Government's GPS for Land Transport which is currently being reviewed. The draft GPS places greater emphasis on multi-modal transport options and is promoting a 'one transport system' approach which encourages the best solutions across transport modes (road, rail, sea, air) with seamless connections between them. This proposal aligns with these themes expressed in the draft GPS.

Horizons operative RLTP gives effect to the GPS. Within the RLTP are objectives, strategic priorities and policies. The ones we consider relevant to this proposal are listed in the table on the following page. The proposed ferry service will provide improved connectivity, resilience and multi-modal options for the region. It is therefore consistent with Horizons RLTP and adequately supported by the current objectives, strategic priorities and policy framework.

With regards to your request for the RLTP to be amended to include specific reference to the port, we don't believe this necessary as it is already provided for by the current provisions, particularly Policies 2.1.5 and 2.3.2.

Kairanga
Marton
Palmerston North
Taihape
Taumarunui
Wanganui
Woodville

24hr Freephone 0508 800 800

horizons regional council

Table: Relevant Objectives, Strategic Priorities and Policies from the RLTP 2015-2025

Objectives	Strategic Priority	Policy
A resilient and multi modal transport system Enhanced freight efficiency across the region	2.Improved connectivity	2.1.5 – encouraging the integration of rail and other transport modes, where possible to ensure the most efficient and effective inter- and intra-regional movement of freight and people
		2.3.2 – supporting the integration of modes, where possible, to encourage the most efficient and effective intra- and inter-regional movement of freight
		2.3.4 supporting the provision of facilities for the transfer of freight between transport modes, as appropriate
	5. efficient, accessible and affordable public transport	5.1.1 – providing frequent, reliable, cost effective public transport services where appropriate in urban areas and between centres.
		5.1.2 – promoting public transport in urban centres as the mode of choice for current car users, particularly for commuters.
	6. appropriate network of tourism routes	6.1 – ensuring that existing transport links in rural areas are maintained and where necessary improved to facilitate tourism growth.

I trust this letter satisfies your request. If you wish to discuss this further, please let me know.

Yours sincerely

Bruce Gordon
CHAIRMAN

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Appendix E: Economic Analysis – Freight Only

Summary

BCR

	Over 40 Years
	National
Benefits (NPV)	
Accidents	$124,373,969
Travel Time & Vehicle Operating Costs	$712,577,005
Road User Benefits	$28,419,164
CO_2	-$1,091,711
Particulates	$11,970,331
Resilience	$24,709,686
TOTAL	**$900,958,445**
Costs (NPV)	
Implementation and Operational Costs	$560,625,305
TOTAL	**$560,625,305**
BCR	**1.6**

Data Inputs

Discount Rate	6%	
Evaluation Period	40	Years
Freight Growth Rate	1.5%	
Sailings Per Annum	600	Allows 1 week per year for reliability and 6 weeks dry dock every fifth year
Ferry Utilisation	73%	
Ferry Capacity	70	Truck units per sailing
Truck Units	30,660	Truck units per year
Construction Start date	July 1, 2020	
Service Start Date	July 1, 2021	
Second Ferry Start Date	July 1, 2026	

Route	Distance (klm)
Auckland to Wellington	643
Picton to Christchurch	336
Total	979
Auckland to Whanganui	445
Motueka to Christchurch	418
Total	863
Saving	**116**

Route	Distance (klm)
New Plymouth to Wellington	349
Picton to Nelson	133
Total	482
New Plymouth to Whanganui	160
Motueka to Nelson	46
Total	206
Saving	**276**

Probablity of Inter-island wharves be unavailable due to natural disaster	1%

Travel Times

	McCarthy Transport	Talleys Transport	Big Chill	Halls Transport	Toll	KPH Transport	KAM Transport	NZ Courier Post	
Auckland - Wellington	11	11	9	10	9		9	9.1	9.72
Auckland - Whanganui			*7*	6	6.5		6	6.4	6.23
Picton - Christchurch		4.5	5	4.5		4.5	4.5	4.5	4.58
Motueka - Christchurch		5.5	5.5			5.5	*7.5*	6.1	5.64

Figures in *italics* are outliers and have been excluded from the calculation of average travel times

Cook Strait Ferry	14.30
Whanganui to Motueka Ferry	11.88
Road Travel time saving	2.43
2 hours 25 minutes	

Accident Savings

The EEM Vol 2, clause A7.4 includes "In transport service proposals analysts should use accident rate analysis". EEM Vol 1 A6.5 includes a crash prediction model for heavy vehicles on rural two lane roads (Model (12)). This analysis has been used for this evaluation.

This accident analysis assumes that all the route is rural. While not strictly correct, the assumption is conservative as accident rates on urban routes can be expected be higher.

The typical Crash rate is calculated as:

$A_{T.opt} = b_0 * exposure * CMF$ EEM A6.7

For Freight between Auckland and Canterbury

For trucks using existing ferry service and SH1 between Auckland and Christchurch

The ONRC for SH1 from Auckland to Christchurch via Wellington and Picton is a mix of High Volume and National. For calculation purposes a National classification and a curved alignment has been used.

B_0 = 19 From Crash Estimation Compendium (CEC) Table 2

Ferry capacity is 70 trucks per sailing and one sailing per day

Mileage = 979 kilometres

Trucks in each direction with each sailing - 50 trucks per sailing

Exposure = 0.3001614

CMF = 1.67 From CMF Table 5, National, 3.25m lane width and 0.5m shoulder

$A_{T.opt}$ = 9.5 Crashes per year

For trucks using the new ferry service

The ONRC for SHs from North of Hamilton to Waipara via Whanganui and Motueka is a mix of High Volume, National, Regional, Arterial and Primary Collector. For calculation purposes a Primary Collector clasification and a Curved alignment has been used.

B_0 = 29 From Crash Estimation Compendium (CEC) Table 2

Mileage = 863 kilometres

Trucks in each direction with each sailing - 50 trucks per sailing

Exposure = 0.2645958

CMF = 1.12 From CMF Table 5 - Primary Collector, 3.25m lane width and 0.5m shoulder

$A_{T.opt}$ = 2.8 Crashes per year

Savings in truck crashes	6.7	
Heavy vehicle crash costs	$760,000	EEM Table A6.(c) 100km/hr near rural
	$1,155,000	EEM Table A6.(c) 100km/hr remote rural
	$957,500	
Crash Cost Saving	$6,416,853	pa

For Freight between Taranaki and Nelson/Tasman

For trucks using SH3 and SH6 betweenNew Plymouth and Nelson

The ONRC for SH3 and SH6 from New Plymouth to Nelson via Wellington and Picton is a mix of High Volume, National and Regional. For calculation purposes a National classification and a curved alignment has been used.

B_0 = 19 From Crash Estimation Compendium (CEC) Table 2

Ferry capacity is 70 trucks per sailing and one sailing per day

Mileage = 482 kilometres

One truck in each direction with each sailing

Exposure = 0.1477812

CMF = 1.67 From CMF Table 5 - National, 3.25m lane width and 0.5m shoulder

$A_{T.opt}$ = 4.7 Crashes per year

For trucks using the new ferry service

The ONRC for SH1 from New Plymouth to Nelson via Whanganui and Motueka is mostly Regional. For calculation purposes a Regional clasification and a curved alignment has been used.

B_0 = 29 From Crash Estimation Compendium (CEC) Table 2

Mileage = 206 kilometres

One truck in each direction with each sailing

Exposure = 0.0631596

CMF = 1.67 From CMF Table 5 - Regional, 3.25m lane width and 0.5m shoulder

$A_{T.opt}$ = 0.5 Crashes per year

Savings in truck crashes	4.2	
Heavy vehicle crash costs	$760,000	EEM Table A6.(c) 100km/hr near rural
	$1,155,000	EEM Table A6.(c) 100km/hr remote rural
	$957,500	
Crash Cost Saving	$4,016,241	

Load split between Auckland-Canterbury Freight and New Plymouth -Nelson/Tasman Freight 50/50

Annual Crash Cost Saving $5,216,547

Road Accident Costs				
Year		Annual Accident Cost Saving	SPPWF	NPV
2020	0	$4,665,779	1	$0
2021	1	$4,665,779	0.943396226	$4,401,678
2022	2	$4,665,779	0.88999644	$4,152,526
2023	3	$4,665,779	0.839619283	$3,917,478
2024	4	$4,665,779	0.792093663	$3,695,734
2025	5	$4,665,779	0.747258173	$3,486,541
2026	6	$9,331,557.43	0.70496054	$6,578,380
2027	7	$9,331,557.43	0.665057114	$6,206,019
2028	8	$9,331,557.43	0.627412371	$5,854,735
2029	9	$9,331,557.43	0.591898464	$5,523,335
2030	10	$9,331,557.43	0.558394777	$5,210,693
2031	11	$9,331,557.43	0.526787525	$4,915,748
2032	12	$9,331,557.43	0.496969364	$4,637,498
2033	13	$9,331,557.43	0.468839022	$4,374,998
2034	14	$9,331,557.43	0.442300964	$4,127,357
2035	15	$9,331,557.43	0.417265061	$3,893,733
2036	16	$9,331,557.43	0.393646284	$3,673,333
2037	17	$9,331,557.43	0.371364419	$3,465,408
2038	18	$9,331,557.43	0.350343791	$3,269,253
2039	19	$9,331,557.43	0.33051301	$3,084,201
2040	20	$9,331,557.43	0.311804727	$2,909,624
2041	21	$9,331,557.43	0.294155403	$2,744,928
2042	22	$9,331,557.43	0.277505097	$2,589,555
2043	23	$9,331,557.43	0.261797261	$2,442,976
2044	24	$9,331,557.43	0.246978548	$2,304,695
2045	25	$9,331,557.43	0.232998631	$2,174,240
2046	26	$9,331,557.43	0.219810029	$2,051,170
2047	27	$9,331,557.43	0.207367952	$1,935,066
2048	28	$9,331,557.43	0.195630143	$1,825,534
2049	29	$9,331,557.43	0.184556739	$1,722,202
2050	30	$9,331,557.43	0.174110131	$1,624,719
2051	31	$9,331,557.43	0.16425484	$1,532,753
2052	32	$9,331,557.43	0.154957397	$1,445,994
2053	33	$9,331,557.43	0.146186223	$1,364,145
2054	34	$9,331,557.43	0.137911531	$1,286,929
2055	35	$9,331,557.43	0.130105218	$1,214,084
2056	36	$9,331,557.43	0.122740772	$1,145,363
2057	37	$9,331,557.43	0.115793181	$1,080,531
2058	38	$9,331,557.43	0.10923885	$1,019,369
2059	39	$9,331,557.43	0.103055519	$961,668
2060	40	$9,331,557.43	0.097222188	$907,234
Totals (Prior to Update)		**$354,599,182**		**$120,751,426**
Update Factor - 1.03 - From EEM Vol 1 Table A12.2				
Totals (Updated)		**$365,237,158**		**$124,373,969**

Travel Time and Vehicle Operating Costs

Road Transport

HCVII Cost	$3.03	per km, from EEM SP2	
Distance avoided	Auckland to Christchurch		116
	Taranaki to Wellington		276
		Average	196

Year		Vehicle kms removed	Travel Time & VOC	SPPWF	VOC PV
0	2020	6,266,904	$18,988,719	1.0000	$0
1	2021	6,266,904	$18,988,719	0.9434	$17,913,886
2	2022	6,266,904	$18,988,719	0.8900	$16,899,892
3	2023	6,266,904	$18,988,719	0.8396	$15,943,295
4	2024	6,266,904	$18,988,719	0.7921	$15,040,844
5	2025	6,266,904	$18,988,719	0.7473	$14,189,476
6	2026	12,533,808	$37,977,438	0.7050	$26,772,595
7	2027	12,533,808	$37,977,438	0.6651	$25,257,165
8	2028	12,533,808	$37,977,438	0.6274	$23,827,515
9	2029	12,533,808	$37,977,438	0.5919	$22,478,787
10	2030	12,533,808	$37,977,438	0.5584	$21,206,403
11	2031	12,533,808	$37,977,438	0.5268	$20,006,041
12	2032	12,533,808	$37,977,438	0.4970	$18,873,623
13	2033	12,533,808	$37,977,438	0.4688	$17,805,305
14	2034	12,533,808	$37,977,438	0.4423	$16,797,458
15	2035	12,533,808	$37,977,438	0.4173	$15,846,658
16	2036	12,533,808	$37,977,438	0.3936	$14,949,677
17	2037	12,533,808	$37,977,438	0.3714	$14,103,469
18	2038	12,533,808	$37,977,438	0.3503	$13,305,160
19	2039	12,533,808	$37,977,438	0.3305	$12,552,037
20	2040	12,533,808	$37,977,438	0.3118	$11,841,545
21	2041	12,533,808	$37,977,438	0.2942	$11,171,269
22	2042	12,533,808	$37,977,438	0.2775	$10,538,933
23	2043	12,533,808	$37,977,438	0.2618	$9,942,389
24	2044	12,533,808	$37,977,438	0.2470	$9,379,613
25	2045	12,533,808	$37,977,438	0.2330	$8,848,691
26	2046	12,533,808	$37,977,438	0.2198	$8,347,822
27	2047	12,533,808	$37,977,438	0.2074	$7,875,304
28	2048	12,533,808	$37,977,438	0.1956	$7,429,532
29	2049	12,533,808	$37,977,438	0.1846	$7,008,992
30	2050	12,533,808	$37,977,438	0.1741	$6,612,257
31	2051	12,533,808	$37,977,438	0.1643	$6,237,978
32	2052	12,533,808	$37,977,438	0.1550	$5,884,885
33	2053	12,533,808	$37,977,438	0.1462	$5,551,778
34	2054	12,533,808	$37,977,438	0.1379	$5,237,527
35	2055	12,533,808	$37,977,438	0.1301	$4,941,063
36	2056	12,533,808	$37,977,438	0.1227	$4,661,380
37	2057	12,533,808	$37,977,438	0.1158	$4,397,528
38	2058	12,533,808	$37,977,438	0.1092	$4,148,612
39	2059	12,533,808	$37,977,438	0.1031	$3,913,785
40	2060	12,533,808	$37,977,438	0.0972	$3,692,250
		Total	**$1,443,142,653**		**$491,432,417**
		Update Factor - 1.45 - From EEM Vol 1 Table A12.2			
		Totals (Updated)	**$2,092,556,847**		**$712,577,005**

Road User Benefits

Greater Wellington modelled travel time, congested travel time and vehicle operating costs associated with a heavy truck unit using the Wellington Transport Strategic Model and reported this work in their report titled "*Road User Benefits from Road to Rail Transfer of Logs and Wood Products - Marton, Masterton and Wanganui*" dated June 2004. This modelling used benefit unit values with a base date of 2002, and produced the unit road user cost per vehicle kilometre for trips within Wellington region. The modelling accounted for the effects of the addition or removal of truck units on other road users, and found that the costs increased as over time (as would be expected). The combined cost in 2020 was $0.80/km in 2020, rising to $1.15/km in 2030. The tabulation below uses the costs per truck kilometre from this report, updates them to 1 July 2016 values using the update factors in the EEM Vol 1 Appendix 12 and applies them to the truck movements that will be removed from the roading network.

Congestion cost 2020	$0.80	per kilometre in 2002 dollars
Kilometres per truck	80	kms
Update factors	1.45	Travel Time
	1.0486	VOC
Travel Time in GW report (2016)	$624,881	
VOC in GW report (2016)	$387,988	
Weighted update factor	1.30	
Congestion cost 2020	$1.04	per kilometre in 2016 dollars

Congestion cost 2030	$1.15	per kilometre in 2002 dollars
Kilometres per truck	80	kms
Update factors	1.45	Travel Time
	1.0486	VOC
Travel Time in GW report (2016)	$624,881	
VOC in GW report (2016)	$387,988	
Weighted update factor	1.30	
Congestion cost 2030	$1.49	per kilometre in 2016 dollars

Annual growth in congestion cost		$0.0453684	$/km
Ferry load factor		73%	
Length on Wellington Road network		80	klm

Road User Benefits						
Year		Trucks pa	Road User Benefit per km (from GW Report)	Road User Benefit	SPPWF	NPV
0	2020	26,280	$1.04	$2,180,173	1.0000	$0
1	2021	26,280	$1.08	$2,275,555	0.9434	$823,124
2	2022	26,280	$1.13	$2,370,938	0.8900	$843,329
3	2023	26,280	$1.17	$2,466,320	0.8396	$859,108
4	2024	26,280	$1.22	$2,561,703	0.7921	$856,596
5	2025	26,280	$1.26	$2,657,085	0.7473	$865,479
6	2026	52,560	$1.31	$5,504,936	0.7050	$871,038
7	2027	52,560	$1.35	$5,695,701	0.6651	$873,600
8	2028	52,560	$1.40	$5,886,466	0.6274	$861,973
9	2029	52,560	$1.45	$6,077,231	0.5919	$860,025
10	2030	52,560	$1.49	$6,267,996	0.5584	$855,882
11	2031	52,560	$1.54	$6,458,761	0.5268	$840,014
12	2032	52,560	$1.58	$6,649,526	0.4970	$832,688
13	2033	52,560	$1.63	$6,840,291	0.4688	$823,796
14	2034	52,560	$1.67	$7,031,057	0.4423	$813,522
15	2035	52,560	$1.72	$7,221,822	0.4173	$794,176
16	2036	52,560	$1.76	$7,412,587	0.3936	$782,054
17	2037	52,560	$1.81	$7,603,352	0.3714	$768,999
18	2038	52,560	$1.85	$7,794,117	0.3503	$748,461
19	2039	52,560	$1.90	$7,984,882	0.3305	$734,279
20	2040	52,560	$1.94	$8,175,647	0.3118	$719,509
21	2041	52,560	$1.99	$8,366,412	0.2942	$698,573
22	2042	52,560	$2.04	$8,557,177	0.2775	$683,223
23	2043	52,560	$2.08	$8,747,942	0.2618	$667,547
24	2044	52,560	$2.13	$8,938,708	0.2470	$651,622
25	2045	52,560	$2.17	$9,129,473	0.2330	$635,520
26	2046	52,560	$2.22	$9,320,238	0.2198	$619,301
27	2047	52,560	$2.26	$9,511,003	0.2074	$603,025
28	2048	52,560	$2.31	$9,701,768	0.1956	$586,741
29	2049	52,560	$2.35	$9,892,533	0.1846	$570,497
30	2050	52,560	$2.40	$10,083,298	0.1741	$570,497
31	2051	52,560	$2.44	$10,274,063	0.1643	$570,497
32	2052	52,560	$2.49	$10,464,828	0.1550	$570,497
33	2053	52,560	$2.53	$10,655,593	0.1462	$570,497
34	2054	52,560	$2.58	$10,846,359	0.1379	$570,497
35	2055	52,560	$2.62	$11,037,124	0.1301	$570,497
36	2056	52,560	$2.67	$11,227,889	0.1227	$570,497
37	2057	52,560	$2.72	$11,418,654	0.1158	$570,497
38	2058	52,560	$2.76	$11,609,419	0.1092	$570,497
39	2059	52,560	$2.81	$11,800,184	0.1031	$570,497
40	2060	52,560	$2.85	$11,990,949	0.0972	$570,497
			Totals	**$320,689,759**		**$28,419,164**

Carbon Dioxide - Benefit - Roads - Auckland / Christchurch Freight						
Year		**Truck km avoided p.a.**	**Litres Saved**	**CO2 Cost**	**SPPWF**	**NPV**
0	2020	3,556,560	1,693,600	$203,232	1.0000	$0
1	2021	3,556,560	1,693,600	$203,232	0.9434	$191,728
2	2022	3,556,560	1,693,600	$203,232	0.8900	$180,876
3	2023	3,556,560	1,693,600	$203,232	0.8396	$170,638
4	2024	3,556,560	1,693,600	$203,232	0.7921	$160,979
5	2025	3,556,560	1,693,600	$203,232	0.7473	$151,867
6	2026	7,113,120	3,387,200	$406,464	0.7050	$286,541
7	2027	7,113,120	3,387,200	$406,464	0.6651	$270,322
8	2028	7,113,120	3,387,200	$406,464	0.6274	$255,021
9	2029	7,113,120	3,387,200	$406,464	0.5919	$240,585
10	2030	7,113,120	3,387,200	$406,464	0.5584	$226,967
11	2031	7,113,120	3,387,200	$406,464	0.5268	$214,120
12	2032	7,113,120	3,387,200	$406,464	0.4970	$202,000
13	2033	7,113,120	3,387,200	$406,464	0.4688	$190,566
14	2034	7,113,120	3,387,200	$406,464	0.4423	$179,779
15	2035	7,113,120	3,387,200	$406,464	0.4173	$169,603
16	2036	7,113,120	3,387,200	$406,464	0.3936	$160,003
17	2037	7,113,120	3,387,200	$406,464	0.3714	$150,946
18	2038	7,113,120	3,387,200	$406,464	0.3503	$142,402
19	2039	7,113,120	3,387,200	$406,464	0.3305	$134,342
20	2040	7,113,120	3,387,200	$406,464	0.3118	$126,737
21	2041	7,113,120	3,387,200	$406,464	0.2942	$119,564
22	2042	7,113,120	3,387,200	$406,464	0.2775	$112,796
23	2043	7,113,120	3,387,200	$406,464	0.2618	$106,411
24	2044	7,113,120	3,387,200	$406,464	0.2470	$100,388
25	2045	7,113,120	3,387,200	$406,464	0.2330	$94,706
26	2046	7,113,120	3,387,200	$406,464	0.2198	$89,345
27	2047	7,113,120	3,387,200	$406,464	0.2074	$84,288
28	2048	7,113,120	3,387,200	$406,464	0.1956	$79,517
29	2049	7,113,120	3,387,200	$406,464	0.1846	$75,016
30	2050	7,113,120	3,387,200	$406,464	0.1741	$70,770
31	2051	7,113,120	3,387,200	$406,464	0.1643	$66,764
32	2052	7,113,120	3,387,200	$406,464	0.1550	$62,985
33	2053	7,113,120	3,387,200	$406,464	0.1462	$59,419
34	2054	7,113,120	3,387,200	$406,464	0.1379	$56,056
35	2055	7,113,120	3,387,200	$406,464	0.1301	$52,883
36	2056	7,113,120	3,387,200	$406,464	0.1227	$49,890
37	2057	7,113,120	3,387,200	$406,464	0.1158	$47,066
38	2058	7,113,120	3,387,200	$406,464	0.1092	$44,402
39	2059	7,113,120	3,387,200	$406,464	0.1031	$41,888
40	2060	7,113,120	3,387,200	$406,464	0.0972	$39,517
Totals			**128,713,600**	**$15,445,632**		**$5,259,691**

Carbon Dioxide - Benefit - Roads - Taranaki / Canterbury, Nelson, Tasman Freight						
Year		**Truck & tailer kms avoided per year**	**Litres Saved**	**CO2 Cost**	**SPPWF**	**NPV**
0	2010	8,462,160	4,029,600	$483,552	1.0000	$0
1	2011	8,462,160	4,029,600	$483,552	0.9434	$456,181
2	2012	8,462,160	4,029,600	$483,552	0.8900	$430,360
3	2013	8,462,160	4,029,600	$483,552	0.8396	$406,000
4	2014	8,462,160	4,029,600	$483,552	0.7921	$383,018
5	2015	8,462,160	4,029,600	$483,552	0.7473	$361,338
6	2016	16,924,320	8,059,200	$967,104	0.7050	$681,770
7	2017	16,924,320	8,059,200	$967,104	0.6651	$643,179
8	2018	16,924,320	8,059,200	$967,104	0.6274	$606,773
9	2019	16,924,320	8,059,200	$967,104	0.5919	$572,427
10	2020	16,924,320	8,059,200	$967,104	0.5584	$540,026
11	2021	16,924,320	8,059,200	$967,104	0.5268	$509,458
12	2022	16,924,320	8,059,200	$967,104	0.4970	$480,621
13	2023	16,924,320	8,059,200	$967,104	0.4688	$453,416
14	2024	16,924,320	8,059,200	$967,104	0.4423	$427,751
15	2025	16,924,320	8,059,200	$967,104	0.4173	$403,539
16	2026	16,924,320	8,059,200	$967,104	0.3936	$380,697
17	2027	16,924,320	8,059,200	$967,104	0.3714	$359,148
18	2028	16,924,320	8,059,200	$967,104	0.3503	$338,819
19	2029	16,924,320	8,059,200	$967,104	0.3305	$319,640
20	2030	16,924,320	8,059,200	$967,104	0.3118	$301,548
21	2031	16,924,320	8,059,200	$967,104	0.2942	$284,479
22	2032	16,924,320	8,059,200	$967,104	0.2775	$268,376
23	2033	16,924,320	8,059,200	$967,104	0.2618	$253,185
24	2034	16,924,320	8,059,200	$967,104	0.2470	$238,854
25	2035	16,924,320	8,059,200	$967,104	0.2330	$225,334
26	2036	16,924,320	8,059,200	$967,104	0.2198	$212,579
27	2037	16,924,320	8,059,200	$967,104	0.2074	$200,546
28	2038	16,924,320	8,059,200	$967,104	0.1956	$189,195
29	2039	16,924,320	8,059,200	$967,104	0.1846	$178,486
30	2040	16,924,320	8,059,200	$967,104	0.1741	$168,383
31	2041	16,924,320	8,059,200	$967,104	0.1643	$158,852
32	2042	16,924,320	8,059,200	$967,104	0.1550	$149,860
33	2043	16,924,320	8,059,200	$967,104	0.1462	$141,377
34	2044	16,924,320	8,059,200	$967,104	0.1379	$133,375
35	2045	16,924,320	8,059,200	$967,104	0.1301	$125,825
36	2046	16,924,320	8,059,200	$967,104	0.1227	$118,703
37	2047	16,924,320	8,059,200	$967,104	0.1158	$111,984
38	2048	16,924,320	8,059,200	$967,104	0.1092	$105,645
39	2049	16,924,320	8,059,200	$967,104	0.1031	$99,665
40	2050	16,924,320	8,059,200	$967,104	0.0972	$94,024
Totals			**306,249,600**	**$36,749,952**		**$12,514,437**

Coastal Shipping CO2

Ferry Fuel Burn	2250 litres per hour
The Whanganui - Motueka ferry will burn	13,500 litres per one way trip
The Wellington - Picton ferry will burn	9,000
Marginal Fuel burn	4,500

Benefit - Coastal Shipping

Year		Marginal fuel used by ferry (litres)	CO2 Cost	SPPWF	NPV
0	2020	2,700,000	$324,000	1.0000	$324,000
1	2021	2,700,000	$324,000	0.9434	$305,660
2	2022	2,700,000	$324,000	0.8900	$288,359
3	2023	2,700,000	$324,000	0.8396	$272,037
4	2024	2,700,000	$324,000	0.7921	$256,638
5	2025	2,700,000	$324,000	0.7473	$242,112
6	2026	5,400,000	$648,000	0.7050	$456,814
7	2027	5,400,000	$648,000	0.6651	$430,957
8	2028	5,400,000	$648,000	0.6274	$406,563
9	2029	5,400,000	$648,000	0.5919	$383,550
10	2030	5,400,000	$648,000	0.5584	$361,840
11	2031	5,400,000	$648,000	0.5268	$341,358
12	2032	5,400,000	$648,000	0.4970	$322,036
13	2033	5,400,000	$648,000	0.4688	$303,808
14	2034	5,400,000	$648,000	0.4423	$286,611
15	2035	5,400,000	$648,000	0.4173	$270,388
16	2036	5,400,000	$648,000	0.3936	$255,083
17	2037	5,400,000	$648,000	0.3714	$240,644
18	2038	5,400,000	$648,000	0.3503	$227,023
19	2039	5,400,000	$648,000	0.3305	$214,172
20	2040	5,400,000	$648,000	0.3118	$202,049
21	2041	5,400,000	$648,000	0.2942	$190,613
22	2042	5,400,000	$648,000	0.2775	$179,823
23	2043	5,400,000	$648,000	0.2618	$169,645
24	2044	5,400,000	$648,000	0.2470	$160,042
25	2045	5,400,000	$648,000	0.2330	$150,983
26	2046	5,400,000	$648,000	0.2198	$142,437
27	2047	5,400,000	$648,000	0.2074	$134,374
28	2048	5,400,000	$648,000	0.1956	$126,768
29	2049	5,400,000	$648,000	0.1846	$119,593
30	2050	5,400,000	$648,000	0.1741	$112,823
31	2051	5,400,000	$648,000	0.1643	$106,437
32	2052	5,400,000	$648,000	0.1550	$100,412
33	2053	5,400,000	$648,000	0.1462	$94,729
34	2054	5,400,000	$648,000	0.1379	$89,367
35	2055	5,400,000	$648,000	0.1301	$84,308
36	2056	5,400,000	$648,000	0.1227	$79,536
37	2057	5,400,000	$648,000	0.1158	$75,034
38	2058	5,400,000	$648,000	0.1092	$70,787
39	2059	5,400,000	$648,000	0.1031	$66,780
40	2060	5,400,000	$648,000	0.0972	$63,000
Totals		**205,200,000**	**$24,624,000**		**$8,709,195**

CO2 Benefit $177,869

Litres Saved 12,281,600

Particulates

The EEM Vol 1 clause A9.4 advises that the cost of particulates is $0.20 per heavy diesel vehicle km in urban areas.

Location	Urban Distance
Auckland	35
Mercer	2
Meremere	2
Huntly	4
Taupiri	2
Ngaruawahia	4
Hamilton	12
Cambridge	3
Tirau	2
Putaruru	2
Tokoroa	4
Taupo	5
Turangi	2
Waiouru	1.5
Taihape	4
Mangweka	1
Hunterville	1.5
Bulls	2.5
Otorohanga	2
Te Kuiti	3
Taumaranui	4
National Park	1
Raetihi	1
Whanganui - Castlecli	10
Whanganui	8
Waverly	3
Patea	3
Hawera	4
Eltham	3
Stratford	3
Inglewood	3
New Plymouth	6
Sanson	1
Foxton	3
Levin	6
Otaki	1.5
Waikanae	1.5
Paraparaumu	3
Paekakariki	1
Pukerua Bay	2
Plimerton	2
Mana	3
Motorway	25
North Island total	**92.5**
Picton	3
Blenheim	3
Havelock	2
Nelson Port	13
Nelson	12
Kaikoura	4
Cheviot	2
Amberly	2
Woodend	2
Christchurch	12
South Island Total	**42**

Particulate Cost

$0.20 per HCV km in urban areas

Route	Urban Distance	Particulate Costs	Particulate Costs for Route
Auckland - Wellington	138.5	$27.70	$33.30
Picton - Christchurch	28	$5.60	
New Plym - Wellington	105.5	$21.10	$27.70
Picton - Nelson	33	$6.60	
Auckland - Whanganui	70	$14.00	$16.60
Motueka - Nelson	13	$2.60	
New Plym - Whanganui	33	$6.60	$9.20
Motueka - Nelson	13	$2.60	

Particulate Costs						
Year		Existing Ferry	Proposed Ferry	Net Cost	SPPWF	NPV
0	2020	$801,540	$339,012	$462,528	1	$0
1	2021	$801,540	$339,012	$462,528	0.943396226	$436,347
2	2022	$801,540	$339,012	$462,528	0.88999644	$411,648
3	2023	$801,540	$339,012	$462,528	0.839619283	$388,347
4	2024	$801,540	$339,012	$462,528	0.792093663	$366,365
5	2025	$801,540	$339,012	$462,528	0.747258173	$345,628
6	2026	$1,603,080	$678,024	$925,056	0.70496054	$652,128
7	2027	$1,603,080	$678,024	$925,056	0.665057114	$615,215
8	2028	$1,603,080	$678,024	$925,056	0.627412371	$580,392
9	2029	$1,603,080	$678,024	$925,056	0.591898464	$547,539
10	2030	$1,603,080	$678,024	$925,056	0.558394777	$516,546
11	2031	$1,603,080	$678,024	$925,056	0.526787525	$487,308
12	2032	$1,603,080	$678,024	$925,056	0.496969364	$459,724
13	2033	$1,603,080	$678,024	$925,056	0.468839022	$433,702
14	2034	$1,603,080	$678,024	$925,056	0.442300964	$409,153
15	2035	$1,603,080	$678,024	$925,056	0.417265061	$385,994
16	2036	$1,603,080	$678,024	$925,056	0.393646284	$364,145
17	2037	$1,603,080	$678,024	$925,056	0.371364419	$343,533
18	2038	$1,603,080	$678,024	$925,056	0.350343791	$324,088
19	2039	$1,603,080	$678,024	$925,056	0.33051301	$305,743
20	2040	$1,603,080	$678,024	$925,056	0.311804727	$288,437
21	2041	$1,603,080	$678,024	$925,056	0.294155403	$272,110
22	2042	$1,603,080	$678,024	$925,056	0.277505097	$256,708
23	2043	$1,603,080	$678,024	$925,056	0.261797261	$242,177
24	2044	$1,603,080	$678,024	$925,056	0.246978548	$228,469
25	2045	$1,603,080	$678,024	$925,056	0.232998631	$215,537
26	2046	$1,603,080	$678,024	$925,056	0.219810029	$203,337
27	2047	$1,603,080	$678,024	$925,056	0.207367952	$191,827
28	2048	$1,603,080	$678,024	$925,056	0.195630143	$180,969
29	2049	$1,603,080	$678,024	$925,056	0.184556739	$170,725
30	2050	$1,603,080	$678,024	$925,056	0.174110131	$161,062
31	2051	$1,603,080	$678,024	$925,056	0.16425484	$151,945
32	2052	$1,603,080	$678,024	$925,056	0.154957397	$143,344
33	2053	$1,603,080	$678,024	$925,056	0.146186223	$135,230
34	2054	$1,603,080	$678,024	$925,056	0.137911531	$127,576
35	2055	$1,603,080	$678,024	$925,056	0.130105218	$120,355
36	2056	$1,603,080	$678,024	$925,056	0.122740772	$113,542
37	2057	$1,603,080	$678,024	$925,056	0.115793181	$107,115
38	2058	$1,603,080	$678,024	$925,056	0.10923885	$101,052
39	2059	$1,603,080	$678,024	$925,056	0.103055519	$95,332
40	2060	$1,603,080	$678,024	$925,056	0.097222188	$89,936
	Totals	**$60,917,040**	**$25,764,912**	**$35,152,128**		**$11,970,331**

Resilience

This worksheet calculates the Resilience benefit of he proposed ferry service. It is possible the the current Wellington - Piction interisland ferry service could be disrupted by a natural disaster suchas an earthquake. The recent Kaikoura earthquiake has demonstrated the impact that such an event can have on the nation's transport infrastructure. EEM section 4.10 details how to analyse events involving risk and uncertantintity. EEM section A10.7 includes "providing for security of access and improved resilience" as specific examples of National Strategic Factors that can be quntified and included in an evaluation. EEM A10.8 includes "Security of access is an important consideration where there are few (or no) reasonable alternatives to a particular route", the cook strait ferry would be an example a route haveing few or no reasonable alternative. EEM A13.12 provides an example of the evaluation methodology.

The cost of the existing interisland service being unavailable is quantified based on willingness to pay (ie the fares being paid by users)

Current fares	$185,000,000 pa
Probably of unavailability	1%

Resilience Benefit						
Year		Cost of event	Probability	Cost	SPPWF	Benefit
0	2020				1	$0
1	2021	$185,000,000	1.0000%	$1,850,000	0.94340	$1,745,283
2	2022	$185,000,000	0.9900%	$1,831,500	0.89000	$1,630,028
3	2023	$185,000,000	0.9801%	$1,813,185	0.83962	$1,522,385
4	2024	$185,000,000	0.9703%	$1,795,053	0.79209	$1,421,850
5	2025	$185,000,000	0.9606%	$1,777,103	0.74726	$1,327,954
6	2026	$185,000,000	0.9510%	$1,759,332	0.70496	$1,240,259
7	2027	$185,000,000	0.9415%	$1,741,738	0.66506	$1,158,355
8	2028	$185,000,000	0.9321%	$1,724,321	0.62741	$1,081,860
9	2029	$185,000,000	0.9227%	$1,707,078	0.59190	$1,010,417
10	2030	$185,000,000	0.9135%	$1,690,007	0.55839	$943,691
11	2031	$185,000,000	0.9044%	$1,673,107	0.52679	$881,372
12	2032	$185,000,000	0.8953%	$1,656,376	0.49697	$823,168
13	2033	$185,000,000	0.8864%	$1,639,812	0.46884	$768,808
14	2034	$185,000,000	0.8775%	$1,623,414	0.44230	$718,038
15	2035	$185,000,000	0.8687%	$1,607,180	0.41727	$670,620
16	2036	$185,000,000	0.8601%	$1,591,108	0.39365	$626,334
17	2037	$185,000,000	0.8515%	$1,575,197	0.37136	$584,972
18	2038	$185,000,000	0.8429%	$1,559,445	0.35034	$546,342
19	2039	$185,000,000	0.8345%	$1,543,850	0.33051	$510,263
20	2040	$185,000,000	0.8262%	$1,528,412	0.31180	$476,566
21	2041	$185,000,000	0.8179%	$1,513,128	0.29416	$445,095
22	2042	$185,000,000	0.8097%	$1,497,997	0.27751	$415,702
23	2043	$185,000,000	0.8016%	$1,483,017	0.26180	$388,250
24	2044	$185,000,000	0.7936%	$1,468,186	0.24698	$362,611
25	2045	$185,000,000	0.7857%	$1,453,505	0.23300	$338,665
26	2046	$185,000,000	0.7778%	$1,438,970	0.21981	$316,300
27	2047	$185,000,000	0.7700%	$1,424,580	0.20737	$295,412
28	2048	$185,000,000	0.7623%	$1,410,334	0.19563	$275,904
29	2049	$185,000,000	0.7547%	$1,396,231	0.18456	$257,684
30	2050	$185,000,000	0.7472%	$1,382,268	0.17411	$240,667
31	2051	$185,000,000	0.7397%	$1,368,446	0.16425	$224,774
32	2052	$185,000,000	0.7323%	$1,354,761	0.15496	$209,930
33	2053	$185,000,000	0.7250%	$1,341,214	0.14619	$196,067
34	2054	$185,000,000	0.7177%	$1,327,801	0.13791	$183,119
35	2055	$185,000,000	0.7106%	$1,314,523	0.13011	$171,026
36	2056	$185,000,000	0.7034%	$1,301,378	0.12274	$159,732
37	2057	$185,000,000	0.6964%	$1,288,364	0.11579	$149,184
38	2058	$185,000,000	0.6894%	$1,275,481	0.10924	$139,332
39	2059	$185,000,000	0.6826%	$1,262,726	0.10306	$130,131
40	2060	$185,000,000	0.6757%	$1,250,099	0.09722	$121,537
			Totals	**$61,240,225**		**$24,709,686**

Costs

Conversion of total cost to economic cost 90%
Annual Operating Cost freight only ferry **$23,904,000** from financial model
Annual Operating Cost 2nd ferry **$18,549,000**

Year		Cost	SPPWF	PV
0	2020	0	1.0000	$0
1	2021	23,904,000	0.9434	$22,550,943
2	2022	23,904,000	0.8900	$21,274,475
3	2023	23,904,000	0.8396	$20,070,259
4	2024	23,904,000	0.7921	$18,934,207
5	2025	23,904,000	0.7473	$17,862,459
6	2026	42,453,000	0.7050	$29,927,690
7	2027	42,453,000	0.6651	$28,233,670
8	2028	42,453,000	0.6274	$26,635,537
9	2029	42,453,000	0.5919	$25,127,865
10	2030	42,453,000	0.5584	$23,705,533
11	2031	42,453,000	0.5268	$22,363,711
12	2032	42,453,000	0.4970	$21,097,840
13	2033	42,453,000	0.4688	$19,903,623
14	2034	42,453,000	0.4423	$18,777,003
15	2035	42,453,000	0.4173	$17,714,154
16	2036	42,453,000	0.3936	$16,711,466
17	2037	42,453,000	0.3714	$15,765,534
18	2038	42,453,000	0.3503	$14,873,145
19	2039	42,453,000	0.3305	$14,031,269
20	2040	42,453,000	0.3118	$13,237,046
21	2041	42,453,000	0.2942	$12,487,779
22	2042	42,453,000	0.2775	$11,780,924
23	2043	42,453,000	0.2618	$11,114,079
24	2044	42,453,000	0.2470	$10,484,980
25	2045	42,453,000	0.2330	$9,891,491
26	2046	42,453,000	0.2198	$9,331,595
27	2047	42,453,000	0.2074	$8,803,392
28	2048	42,453,000	0.1956	$8,305,086
29	2049	42,453,000	0.1846	$7,834,987
30	2050	42,453,000	0.1741	$7,391,497
31	2051	42,453,000	0.1643	$6,973,111
32	2052	42,453,000	0.1550	$6,578,406
33	2053	42,453,000	0.1462	$6,206,044
34	2054	42,453,000	0.1379	$5,854,758
35	2055	42,453,000	0.1301	$5,523,357
36	2056	42,453,000	0.1227	$5,210,714
37	2057	42,453,000	0.1158	$4,915,768
38	2058	42,453,000	0.1092	$4,637,517
39	2059	42,453,000	0.1031	$4,375,016
40	2060	42,453,000	0.0972	$4,127,374
		Total		**$560,625,305**