Northland Rail
North Auckland Line and Marsden Point Rail Link

Kua whakahoutia te rerewhenua o Te Tai Tokerau

Single Stage Business Case

For the Ministry of Transport

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Executive Summary

Purpose of the Business Case

This Single Stage Business Case examines the merits and costs of investing in renewing and upgrading the North Auckland Line (NAL) and constructing the proposed Marsden Point Rail Link (Marsden Link). The business case was commissioned in September 2018 by the Ministry of Transport at the request of the Minister of Transport, Hon Phil Twyford and the Minister for Regional Economic Development, Hon Shane Jones, and is funded by the Provincial Growth Fund.

The business case was developed under the direction of the Ministry of Transport and prepared to conform with the NZ Treasury's Better Business Case guidelines for strategic and programme phases. This approach was adopted due to the compressed timeframe in which the business case was developed and noting that other significant processes are underway looking at the future of rail and freight logistics in the upper North Island. The outcomes of these processes, either draft or in full, are not yet known but would likely impact on some of the conclusions of this business case. The information on potential utilisation of the railway in Northland, which this business case relies on, was collated from September to November 2018.

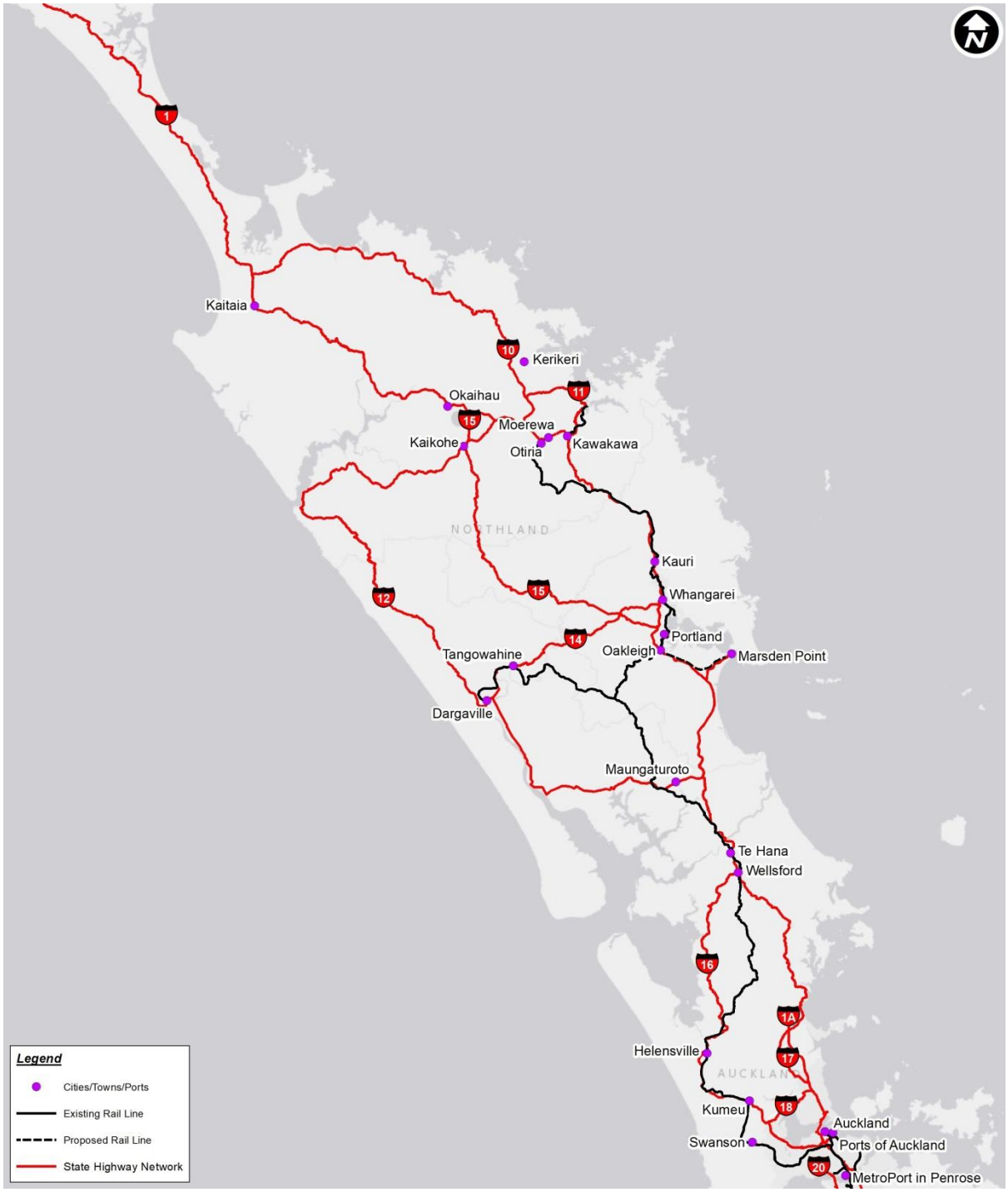
The NAL is currently defined as the rail line from Westfield in Auckland north to Whāngārei, the line north of that to Kauri, and on to Otiria, and the Dargaville Branch line. This business case has looked at the options for Northland's rail, noting that the consideration of other transport infrastructure options is out-of-scope. Potential benefits for other regions, notably Auckland, have been explored. This business case has relied on indicative costings from KiwiRail, which has assessed the potential upgrade of the NAL and the construction of the Marsden Link.

Introduction

Northland sits at the apex of the fastest growing area of New Zealand, yet it has so far failed to fully capitalise on this growth. The upper North Island accounts for over half of the country's population, over half the freight moved and over half the country's Gross Domestic Product (GDP). Despite its proximity to our largest economic centre, Northland continues to lag behind other regions in employment, wealth, and wellbeing more generally. This is despite the region's wealth in people, culture, history, land, natural resources, coastline and waterways.

A contributing factor to this economic underperformance and unrealised potential is Northland's physical isolation from Auckland and the rest of New Zealand. While other regions are also challenged by New Zealand's geography, Northland is unique in that it is in close proximity to New Zealand's largest economic centre, yet practically isolated from it. The region's current State Highway 1 connection to Auckland is long and winding, has areas of medium to high crash risk and is increasingly affected by growing congestion in urban Auckland. Northland also has transport challenges within the region, growing traffic volumes within Whāngārei at peak times and areas of high crash risk. This geographical isolation also means that Auckland-based people and businesses find it harder to access Northland. This in turn means that Northland may not be considered for travel or new investments, when other areas adjacent to Auckland are more accessible.

While the region does have a rail network it is no longer fit-for-purpose to meet today's requirements for moving people or freight. With restricted tunnel heights Northland's exporters cannot use rail to move modern high-cube containers to and from Auckland, leaving road transport as the only choice to move high-value goods to international markets. The network is no longer port-connected since the old port was decommissioned and operations moved to Marsden Point. As one of the few New Zealand ports without a rail connection, rail volumes in Northland fell substantially with over a million tonnes of freight moving to road transport. Compounding the decline in volumes, the line was under-maintained and saw no substantial investment for over fifty years. As structures and tracks aged, train speeds were slowed and older, less reliable trains and equipment were used due to weight restrictions on the line. This 'managed decline' meant that businesses no longer saw rail as a feasible way of moving freight to, from or within Northland. Given its condition, it is likely that rail service within Northland will cease all together without a substantial investment commitment within the next five years.



Key Findings

Strategic option value

There is a strong strategic case for the renewal and upgrade of the NAL and the construction of the Marsden Link based on the potential for substantial changes to freight flows within the upper North Island. This strategic benefit is based on the significant medium to long-term option value of providing a second high-quality land transport connection linking Northport (a natural deep-water port) to Auckland, our largest economic centre. Due to the growth of New Zealand's international trade, much of which is managed within Auckland, it is conceivable that Northport has the medium-term potential to function not just as Northland's main regional port, but also as a port that supports a portion of the trade to and from Auckland. A rail connection would be required to manage this substantial movement of containers. The development of a rail connection to Northport, and the potential development of substantial container handling capability at the port will also provide significant resilience value for this important trade.

The future shape of freight logistics in the Upper North Island is currently being examined by a Government working group. Until this work is completed and its recommendations are known, a full assessment of this option value cannot be determined. However a high quality rail connection from Marsden Point to Auckland would be a critical pre-condition of Northport becoming an inter-regional container port. In the event of such a significant supply-chain decision, investment in a modern rail connection would drive economic development, or act as 'lead infrastructure' that enables a change in freight movements to and from Northport. Current economic evaluation procedures cannot quantify the value of this strategic option value. To highlight its potential this business case includes a sensitivity test for a substantial movement of containerised freight between Northport and Auckland by rail. The sensitivity test demonstrates that should the assumed container volume shift occur the line would provide value-for-money, providing an indicative BCRn of 1.19.

Regional development potential

A rail connection that meets the needs of existing and future users will also enable improved economic integration between Auckland and Northland, in the same way highway and rail investments have better integrated our largest economic centre with the Waikato and the Bay of Plenty. While rail will only be able to service some freight types, investment in the NAL and the Marsden Link would signal to the private sector that Northport and the Marsden Point area have the potential to accommodate large-scale industrial and freight logistics activities that suit rail. Significantly improved land transport connectivity could, when delivered alongside a range of other outcomes, deliver enhanced economic growth for the region. To illustrate this point, if Whāngārei economic growth accelerated to match that achieved by Hamilton in 2018 (0.4% higher job growth than Whāngārei in 2018), or potentially even Tauranga (1.8% higher job growth in 2018), this could see Whāngārei employment grow by an additional 2,000 jobs to as much as 9,400 jobs over 12 years. This assessment has not been included in the benefit cost ratio.

Estimated employment increase in Whāngārei (over 12 years) with comparable regional growth to Hamilton and Tauranga

	Marginal increase of 0.4%	*Marginal increase of 1.8%*
Job growth in Whāngārei	1,937	9,424

Source: Deloitte Analysis

A rail connection, as part of ongoing improvements to land transport connectivity more generally, would help position Northland more completely in the upper North Island growth triangle. The key 'push' factor for this potential movement of freight and industrial activity to Northland is the ongoing growth of Auckland. Over the last ten years Auckland's population has grown faster than previously forecast and is now expected to grow to 2.4 million people by 2043, with around half this future population living north of the Waitematā Harbour. This growth is placing constraints on the transport system within the city and the land available for industrial and freight activities.

The critical 'pull' factors that would attract commercial interest are, once connected by rail, the available industrial land and proximity of the Marsden Point area to Auckland. This will be complemented by the 'push' factors within Auckland as land area and road space become more contested, increasing the cost of doing business for some high volume industrial and freight logistics activities.

A rail connection linking Auckland and the Marsden Point area will provide private sector decision-makers the level of service certainty they require to consider locating their operations there, where rail suits their requirements. Such a response from the private sector will create significant employment uplift for the Marsden Point-Ruakākā area. While some of this employment will be displaced from Auckland, much of it will be focused around new industries taking advantage of the new transport connection and the ongoing growth in Auckland. Although there is insufficient information, such as confirmation from potential business interests, to adequately estimate what the level of employment uplift might be. This business case has identified specific employment questions around:

- Intermodal terminals that would be developed to service the rail network, which would generate modest employment uplift in strategic points around the NAL such as Otiria-Moerewa, Maungaturoto, Wellsford, Kumeū and as freight volumes grow in Dargaville. This business case outlines how a significant amount of export freight is sent currently by road to Auckland, to be

loaded onto rail, for shipment through Tauranga. The current task of packing and unpacking containers, transferring to rail for passage to export ports could be undertaken at inter-modal terminals at key locations. On current freight volumes, and with the potential for Northland's freight volumes to grow significantly due to increasing production of high value dairy products, processed wood products, containerised kiwifruit and avocado, these intermodal terminals could provide commercial efficiencies through better truck utilisation and local employment benefits.

- Renewal of the NAL and the construction of the Marsden Link will provide an initial benefit of increased local economic activity, as well as the potential to train Northlanders in infrastructure construction and maintenance. Due to the high levels of young Northlanders not in work or training, a large-scale infrastructure programme over several years could provide training and employment opportunities. This workforce could then be employed in future infrastructure projects across Northland and Auckland.
- Road transport industry may have some initial loss of employment if volume is shifted to rail. Given the increasing shortage of suitable heavy vehicle drivers in Northland, the net loss of employment in the road transport industry is likely to be minimal with work quickly being available for moving freight by road that is not suited to being moved by rail.
- Reducing the cost of doing business in Northland. The movement of some road freight to rail will help reduce some of the road related costs and externalities within Northland, such as improving travel time for other road users, reducing the crash risk (and delays for other road users), reducing pollution and road maintenance costs. This business case estimates that from the preferred option of a rail-connected port moving some freight to rail will provide direct economic benefits, from reduced externalities of around $236,000,000 over 40 years (PV).

Mode shift and Government's land transport objectives

The Government Policy Statement on Land Transport 2018-2021 (GPS 2018) sets out key policy objectives of improving transport access (particularly for regions), improved modal choice and reduced negative effects of land transport – notably reducing carbon dioxide (CO_2) emissions and improving road safety. Northland currently has no modal choice for moving freight within the region and very limited choice for freight going to and from other regions. As the railway is not currently fit-for-purpose, it is not considered as a transport option for moving freight. As such the region is completely dependent on road transport for moving freight. The result of this has been an increase in heavy truck movements on the main State highway corridors within Northland, and to/from Auckland.

This business case has identified potential rail freight demand of between 1.8 to 2.5 million tonnes, conditional on the price of cartage, with appropriate and reliable service levels. Of all the options the inter-operable, port connected option would carry the most volume both between Northland and Auckland, and within Northland itself. This business case has used the current transport economic evaluation procedures to assess the anticipated transfer of freight to rail. This has identified that an investment in the NAL and the Marsden Link (the Rail Connected Port Option + Tourism) would generate substantial benefits in reducing some of the negative effects of road transport, which include:

- Congestion reduction – using estimated freight volumes up to 75,000 heavy truck trips could be avoided each year, estimated to save $158 million over 40 years (PV). This would equate to around 10,000,000 kilometres of avoided heavy truck travel annually, of which around 3,000,000 kilometres would be within Auckland.
- Crash risk reduction – reduced heavy truck travel would result in a marginal reduction in the crash risk, for crashes involving heavy vehicles and regardless as to who was at fault. Using the NZ Transport Agency's evaluation procedures this crash risk reduction is calculated as $19,651,900 (PV).
- Greenhouse gas emission reductions - this reduction in heavy truck travel is estimated to avoid around 10,072 tonnes of CO_2 emissions each year, which equates to around 3,744,000 litres of diesel saved. This equates to around $16 million over 40 years (PV).
- Road maintenance – with a reduction in heavy vehicle travel there will be a measurable reduction in wear and tear on the State highway routes of around $3.8 million annually.

If the rail network is redeveloped and becomes more reliable and responsive to industry needs, it can be included in regional and national land transport planning and investment. This will allow regional decision-

makers the ability to consider a broader set of transport investment options for Northland than just roads, depending on the merits of proposed investments. Re-establishing the rail line will also help shape future land use planning for local government and industry, with new freight and industrial developments able to be located at points around the rail network, State highways and the port.

However, these identified benefits, including those that cannot be monetised using existing procedures, are insufficient to cover the substantial capital and ongoing operational cost of an investment in the NAL and the Marsden Link.

Despite this, given the significant volume of freight that could be moved by rail to, from and within Northland and North Auckland this business case determines that investing in the railway will measurably contribute to the Government's land transport policy objectives.

While the case for investment on the basis of regional development or achieving the government's transport agenda are not compelling on their own (either commercially or from a public value assessment), the strategic option value of the Rail Connected Port + Tourism option provides the most compelling case.

Problem Definition

In identifying the above conclusions this business case used the Investment Logic Mapping (ILM) approach to identify the main problems, opportunities, benefits, and key performance indicators for Northland (set out below). The following four problems have been identified as the foundation for potential investment into the NAL and Marsden Link:

- Problem statement 1: Limited Northland connectivity.
- Problem statement 2: Poorly integrated Northland transport system.
- Problem statement 3: Current rail network impractical for users.
- Problem statement 4: Under-investment impacting network viability.

These problem statements were then tested and further developed with the Northland Rail Stakeholder Group. There was a broad agreement in that forum with the problem statements, the benefits and the measures proposed.

Benefit	Measured by
Northland is more connected into the domestic economy and international trade.	Reduction in cost of moving freight (including increased productivity) Employment and jobs Northport throughput Business growth and number of new businesses
Improved quality of service & choice for customers.	Customer growth (for rail) Northport activity On time performance
Lower cost and impacts of transport, including externality costs to environment and society in general.	Total cost of travel (including costs to other users) Emissions Safety
Modal shift from road to rail, better use of existing infrastructure.	KiwiRail operating costs Proportion of Northland freight moved by rail Truck movements on constrained parts of the State highway system reduced

Options Considered

A long list of eleven options were identified and evaluated against critical success factors and a total of four options subsequently shortlisted for further analysis.

Status quo (base case): Managed decline

The Status Quo is the comparator case which other options are assessed against. Without significant investment, the condition of the NAL will continue to decline leading to probable closure in around five

years when it can no longer be maintained in a safe condition. Major maintenance required includes sleeper and bridge replacements. Additionally, the light axle loads, constrained tunnels and slow operating speeds of the current NAL both limit its usefulness for freight customers and results in poor operational productivity for KiwiRail.

Rail Connected Port

This option renews and upgrades the rail line between Auckland to Kauri together with constructing a branch line to Marsden Point and reopening the line between Kauri and Otiria.

Upgraded North Auckland Line ("Upgrade NAL")

Under this option (only) the existing NAL from Auckland to the Fonterra plant at Kauri north of Whāngārei would be upgraded to an equivalent standard as other parts of the KiwiRail North Island network (referred to as a 'Modern NZ Freight Standard' – this being that sleepers and a number of bridges would be replaced to allow 18 tonne axles loadings for KiwiRail's new locomotive fleet to operate. Track speed restrictions would be lifted to reduce travel time from around seven hours to four-and-a-half between Whāngārei and Auckland. Tunnels that are too small for high-cube shipping containers would be enlarged.

Rail Connected Port with tourism services ("Rail Connected Port + Tourism")

This option provides optionality for passenger services to be added if commercially viable. Although the circuitous nature of the NAL route between Auckland and Whāngārei compared to SH1 means that there is little potential for regular commuter passenger rail services, there is potential for tourist focused passenger trains to be operated in Northland.

Option analysis

To assess these options the Business Case has estimated the potential utilisation of the options by both freight and passenger. This analysis compared this potential use against the reviewed infrastructure cost estimates provided by KiwiRail (both capital and operational investment over forty years). This assessment included the use of the standardised and accepted economic evaluation procedures for land transport investment, developed and maintained by the NZ Transport Agency and other economic analysis where appropriate for the information that was available. The information that was available was limited due to the fact that the NAL is no-longer fit-for-purpose, and the Marsden Link is not yet built. As a result current use is minimal or non-existent, meaning the assessment was based on potential freight and passenger volumes. This business case has therefore had to identify assumed potential use based on the empirical evidence available as well as the considered views of potential rail customers.

Passenger Rail

Currently Auckland's metro services terminate at Swanson in the north west of the city, with services to Waitākere being withdrawn in July 2015 due to the high costs of running a passenger rail service and the cost of electrifying the network through the Waitākere tunnel. The area north of Swanson following the railway through Kumeū, Huapai and on to Waimauku is currently lower density outer residential, with the area beyond that to Helensville rural. Beyond Helensville, rail travel times of over an hour (even with improvements to the line to lift train speeds) will likely make daily commuting to Auckland unattractive for enough commuters in the foreseeable future precluding net benefits. As such, extending metro passenger services beyond Swanson at this time is not considered likely to provide economic benefits beyond the substantial costs. The line up to Helensville should be protected for future potential urban growth to the North of Swanson, for which metro rail services could facilitate and service. Within Northland the potential for regular commuter rail services is also unlikely to be economically viable due to the high costs of providing rail passenger services, the low population density and that the existing publicly-funded bus services within Northland have not yet reached service capacity.

There is an opportunity to operate a tourist rail operation on a renewed NAL and potentially on the Marsden Link. Due to the growing success of rail tourism in other places across Australasia, the NAL presents an opportunity to provide an integrated tourism offering that uses rail to bring domestic and international visitors to and from Auckland and Northland. This offering would be a travel experience, rather than just a means of transport with the much cheaper bus services and more flexible rental cars and vans continuing to take most visitors to Northland. Such a service would depend on the development of connecting transport and accommodation options within Northland and North Auckland, as well as creating additional tourist attractions in Northland to attract visitors north. As seen elsewhere, boutique rail tourism

operations can also be successful in attracting large numbers of cruise ship passengers. There is potential for operations of this sort to be established taking advantage of future cruise ship berthing at Northport. A scenario for commercial operations for around 60,000 passengers a year has been considered potentially viable, at minimal additional cost, and included in the economic analysis.

Freight

Potential freight demand has been assessed against current and likely freight volumes and commodity types in Northland. The total freight task generated in the Northland region in 2012 was estimated at 16,900,000 tonnes by the National Freight Demand Study (2014). Since then, this has grown between 1.1% annual average growth to bring the 2018 freight task generated by Northland to approximately 18,000,000 tonnes per annum. By 2042 the region's freight is forecast to grow to 23.23 million tonnes, with indications it could grow faster than that.

Northland's freight include a number of commodities such as processed dairy, export meat, logs, processed wood products and other containerised freight that are moved substantially by rail currently around the country. Today just over 110,000 tonnes of freight is moved on the NAL, with the majority of this being processed dairy volumes from Northland, along with logs from northern Auckland. Around New Zealand rail moves around 7% of New Zealand's freight by volume (16% by volume and distance), in Northland this is 1.4%.

Potential Freight Volumes

To determine the potential utilisation of each of the four options around thirty supply-chain decision-makers, such as cargo owners and freight transport businesses, were approached during September through to November 2018 to discuss the potential greater use of the rail network in Northland (including the Marsden Link). Those approached for discussions were from businesses that currently use rail elsewhere in New Zealand or previously within Northland. These in-confidence discussions were used to determine their potential interest in using an upgraded and extended rail network in Northland, and the potential volume that could be transferred to rail. These potential freight volumes were confirmed with the businesses contacted, noting that this did not represent a formal commitment from them, in any way, to use rail in Northland in the future.

The information gathered during the data collection phase of the business case development was then validated against information in the National Freight Demand Study (2014). The Study provides comprehensive information on what commodities are moving on rail and over what distances, compared to the road alternative. These comparable distances were then considered for the movement of freight within Northland and to/from other regions, notably Auckland. To determine which commodities in Northland have the potential to move to rail, the following criteria were applied that the commodity was:

- Currently produced, rather than planned or proposed
- Indicated by a supply-chain decision-maker as potentially moved on rail
- Consistent with the movement of these commodities by rail elsewhere within New Zealand based on the National Freight Demand Study (2014)

As a result, commodities such as processed dairy, raw milk, export meat, export wood products, export clay, fertiliser, logs, and some general freight were included in the Central Scenario. Commodities such as aggregates, petroleum products, imported cars, kiwifruit, avocados, cement products and fast moving consumer goods (FMCG), were not included in the Central Scenario estimates as there was no indication at this time that moving these goods by rail was a likely preferred option in the short to medium-term. Although these commodities could be practically moved by rail, they did not meet the criteria set out above. Some supply-chain decision-makers indicated that rail could become more attractive in time if there were significant changes in their operating environment, such as increases in:

- workforce shortages for heavy truck drivers
- containerisation of growing export commodities like kiwifruit and avocado (which is undergoing substantial growth around the mid-North),
- travel time and travel unreliability on State highways within Northland, and to and from Auckland.

To anticipate the potential impact on supply chains for these potential disruptive forces a High Growth Scenario was developed, as a sensitivity test, assuming 4% annual freight growth compared to the central growth assumption of 2% per annum. There is also the potential for some freight volume reduction in Northland, particularly if value-add industries are developed that process more of the region's raw materials such as milk and logs into higher value products.

Scenario	Total freight task (tonnes)	Status Quo (rail)	Upgraded NAL (rail)	Rail connected port (rail)	Rail connected Port + tourism (rail)
Scenarios derived from freight user discussion					
Central scenario	18,000,000	116,000	181,000	2,202,000	2,202,000
% of Northland freight task		0.7%	1%	12%	12%

Economic Analysis

Based on the potential utilisation of each option, this business case includes economic analysis of the likely impacts against the cost of the investment. This value-for-money analysis covers those benefits that can be identified, and for which a defined monetary value exists. This analysis makes substantive use of the land transport economic evaluation procedures, developed by the NZ Transport Agency.

All costs and benefits (PV), additional to the status quo

	Rail Connected Port (the preferred way forward)	*Upgrade NAL*	*Rail Connected Port + Tourism*
Decongestion	$158 m	$30 m	$158 m
Net user benefit	$41 m	$7 m	$41 m
Crash cost savings	$20 m	$3 m	$20 m
CO_2 cost savings	$16 m	$2 m	$16 m
Tourism expenditure			$123 m
Total benefits	**$236 m**	**$42 m**	**$359 m**
Total Rail costs	$1,259 m	$451 m	$1,381 m
Total avoided road operating and maintenance costs	$530 m	$62 m	$530 m
Net costs (rail costs - avoided road costs)	**$729 m**	**$389 m**	**$851 m**
Benefit Cost Ratio (BCRn) National	**0.32**	**0.11**	**0.42**

Source: Deloitte and AECOM analysis

In undertaking this value-for-money assessment it should be noted that identified values of the benefits could change substantially depending on the outcomes of separate work currently underway, notably the Government's review of land transport economic evaluation procedures. That review is designed to ensure that these procedures better reflect the economic value of alternate modes – including rail. Additionally the policy work being led by the Ministry of Transport around the future role of rail may also change the policy context in which rail investments like the NAL and Marsden Link are assessed. Until these important contextual processes are completed, the value-for-money assessment in this business case is conditional.

The resulting Benefit Cost Analysis is an important part of understanding the relative merits of a proposed investment. However in certain circumstances, such as in the case of lead infrastructure, built to stimulate and direct demand, it is difficult to determine what the benefits would be in advance of the activity being enabled by the investment. In accordance with the guidelines, different benefit/cost ratios were developed against the options and scenarios within the options. The BCRn represents value for money from a national economic perspective, being all costs and all benefits (which can be monetarised). This presents the value

(PV) of the net benefits divided by the present value (PV) of costs to the nation as a whole, including government, private sector and third parties. The BCRg represents the value for money from a central government perspective only. BCRg uses net costs to the Government which is the value (NPV) of the investment required. Any potential revenue for the rail activity is included in the BCRg, but not for the BCRn.

The BCRg is 0.58 and 0.63 for the Rail Connected Port and Rail Connected Port Option + Tourism, respectively, and 0.10 for the Upgrade NAL option. The additional operating costs of the network are expected to be fully recovered in the Rail Connected Port Option, so the funding assistance is smaller than the net economic cost. However, this is not true for the Upgrade NAL option, where revenue does not cover operating costs. An additional cost is the service rate of return discount factor which is treated as a cost to government in the BCRg calculations.

Marginal quantifiable costs and benefits and BCRg (PV, discounted at 6%)

	Rail Connected Port	*Upgrade NAL*	*Rail Connected Port + Tourism*
Decongestion	$158 m	$30 m	$158 m
Net user benefit	$41 m	$7 m	$41 m
Crash cost savings	$20 m	$3 m	$20 m
CO_2 cost savings	$16 m	$2 m	$16 m
Tourism expenditure	$0 m	$0 m	$123 m
Total benefits	**$236 m**	**$42 m**	**$359 m**
Operating costs	$389 m	$47 m	$506 m
Capital costs	$870 m	$404 m	$875 m
Service rate of return	$70 m	$23 m	$74 m
Revenue	($618 m)	($27 m)	($735 m)
Savings to government	($153 m)	($21 m)	($153 m)
Funding assistance required	**$558 m**	**$425 m**	**$567 m**
Benefit Cost Ratio (BCRg) Government	**0.58**	**0.10**	**0.63**

Source: Deloitte and AECOM analysis

Significant shift in freight through Northport

Estimating the desirability or likelihood of a significant shift in freight movements between Northport and Auckland is outside the scope of this business case. However, a possible future scenario was developed and tested to provide an indicative value-for-money assessment of the potential strategic option value of the port connected rail option. This scenario assumes that a significant volume of freight is shifted between Auckland to Northport. Many costs of significantly increasing freight volumes through Northport have not been quantified and there are a number of limitations of this analysis. Therefore, the BCR and associated costs and benefits should be interpreted as a rough indication only. Further detailed analysis is recommended if more information becomes available that better shapes this scenario.

With its planned and proposed developments (including investing in cranes), Northport estimates it could potentially have the capacity to handle up to 400,000 (TEUs) containers a year, about the same as the Port of Lyttelton. The key question would be whether the port could attract this volume, from within Northland and further afield. The Marsden Link and an upgraded NAL would be essential to enabling such a development and would be required ahead of demand, to allow transport. Assuming 100,000 containers were moving within Northland, 300,000 containers would otherwise need up to 1000 heavy truck trips (500 each way) moving between Northport and Auckland each working day. Alternatively, the task could be handled by 12 trains a day (six each way) carrying up to 80 containers (TEUs) each trip.

To test this, the following scenario estimates the benefits expected with an additional 300,000 TEUs moving between Auckland and Northland by rail each year, rather than road. The BCR is just over 1 in this scenario, indicating there could be value for money in this option. However, costs of increasing volumes though Northport have not been quantified. Costs that are quantified include the above rail operational expenses, including fuel, labour, rail terminal operation, locomotive and wagon repair and maintenance, and other freight costs and overheads.

Summary of results of the significant shift of freight through Northport scenario (PV), additional to the status quo

	Significant shift through Northport
Decongestion	$192 m
Net user benefit	$41 m
Crash cost savings	$76 m
CO_2 cost savings	$59 m
Tourism expenditure	
Total benefits	**$369 m**
Total Rail costs	$2,861 m
Total avoided road operating and maintenance costs	$2,552 m
Net costs (rail costs - avoided road costs)	**$309 m**
Benefit Cost Ratio (BCRn) National	**1.19**

Over half of benefits in this scenario arise from decongesting Auckland's roads. It is assumed that congestion is present for 50% of road freight trips made. Varying this assumption has a significant effect on the BCR. The effect on the BCR of varying the congestion assumption is shown in the Table below.

Congestion assumption	BCRn
50%	1.19
75%	1.5
25%	0.88

Uncertainty Log

The following uncertainties have been noted when undertaking this business case.

1.	Future freight volume growth is an unknown.
2.	Potential rail freight volumes are indicative only.
3.	No formal risk analysis was undertaken. Contingency is qualitatively applied to only those risks identified by estimators.
4.	Cost of transfer of freight from road to rail at railhead not included and unknown.
5.	Risk that revenue is less than forecast and the funding gap is higher than assumed leading to a lower BCRg.
6.	Upgrade work may disrupt rail freight volumes.
7	Whether the upgrade work undertaken during extended block of line is realistic.
8	Assumptions associated with Beca 2009 estimate of quantities (which were used by the estimators) are unknown.
9	The outcomes of other work streams currently underway that are unknown could materially change outcomes presented, in particular the Government's review of land transport evaluation procedures, the Ministry of Transport led work around the future of rail, and the Upper North Island logistics study.

[redacted]

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1. Introduction

Purpose of business case

1.1 This Single Stage Business Case examines the merits and costs of investing in renewing and upgrading the North Auckland Line (NAL) and constructing the proposed Marsden Point Rail Link (Marsden Link). The business case was commissioned in September 2018 by the Ministry of Transport at the request of the Minister of Transport, Hon Phil Twyford and the Minister for Regional Economic Development, the Hon Shane Jones Minister, and is funded by the Provincial Growth Fund.[1]

1.2 Northland is widely acknowledged as a region that requires regional development assistance to reach its full social and economic potential. For this reason, Northland has been identified as a surge region for prioritised investment from the Provincial Growth Fund (the Fund). This business case was commissioned in September 2018 by the Ministry of Transport with an allocation from the Fund. At the same time the Fund also invested in complementary work by KiwiRail Ltd to investigate the condition of the NAL, likely renewal costs and the cost of building the Marsden Link.

1.3 As substantial investment is required to provide a reliable and modernised rail system in Northland that also connects to the port at Marsden Point, the Coalition Government has asked for an analysis of the costs and benefits of any potential public investment. This business case provides analysis of these costs and benefits, as well as the strategic considerations that have been identified.

Scope

1.4 The Terms of Reference sets out the task of developing a business case that considers the costs and benefits of:

- Bringing all the NAL up to a modern freight standard (being comparable to the rest of the rail network) and allow passenger services south of Whāngārei.
- Construction of a branch line to the port at Marsden Point.

1.5 The NAL is currently defined as the rail line from Westfield in Auckland north to Whāngārei, the line to Kauri and Otiria, and the Dargaville Branch lines. It should be noted that the line from Westfield to Swanson is part of the Auckland metropolitan passenger network. The full Terms of Reference are attached as Appendix I.

1.6 The Terms of Reference focuses this business case on analysing the options for Northland's rail infrastructure only. Potential options for investing in other transport infrastructure are out of scope. This includes the respective priority of any potential investment in the North Auckland Line against other investments. In this regard it is worth noting the merits of investing in State highways in Northland have been considered in a separate business case.[2] While some of this previous work has informed this business case, there lacks a detailed understanding of the merits of investing in rail in Northland. This business case seeks to fill that gap to allow better decision-making.

1.7 The business case has considered benefits to other regions, especially Auckland, from investing in Northland's rail infrastructure. While considering the potential wider economic benefits is an inherent aspect of the business case process, this business case does not extend to undertaking a wider detailed examination of the benefits of rail or the need for infrastructure investment in regions beyond Northland.

Figure 1. Northland Rail

[1] See Ministers' statement: https://www.beehive.govt.nz/release/plan-unlock-rail%E2%80%99s-potential-northland
[2] For example, the Auckland to Whangarei – Connecting Northland Programme Business Case

1.8 To determine the infrastructure cost of any potential options this business case has reviewed the indicative costings provided by KiwiRail for their assessment of a potential upgrade of the NAL and the construction of the Marsden Link. Detailed engineering site investigations (such as geotechnical, topographical or asset condition) are also excluded from the Terms of Reference.

Our approach

1.9 This business case has been developed according to NZ Treasury business case guidelines, which are based on internationally recognised best practice standards.[3] This business case was developed by asking five critical questions:

- What is the compelling case for change?
- Does the preferred option represent best value for money?
- What is the commercial viability of the proposal?
- Is the investment proposal affordable?
- What is the best way to successfully deliver the proposal?

1.10 To advance this inquiry the project team has considered the potential of the rail network as an enabler from Northland's regional economic and social development. This has included looking at the current state of freight and passenger demand to, from and within the region. Substantive opportunities, challenges or problems potentially affecting the current state have been identified and explored in future scenarios over the next 40 years.

Figure 2. Proposed Marsden Link

1.11 In considering the costs and benefits this business case investigates a range of investment options, including the do minimum (maintain the status quo of managed decline) to inform decision making about investing in Northland's rail infrastructure. The current state and the possible future scenarios have then been used to test the options. Where possible economic values that can be monetarised have been identified and calculated. This includes applying, where appropriate, some of the evaluation procedures within the NZ Transport Agency's Economic Evaluation Manual. It is noted that many of these evaluation procedures have not yet been reviewed or updated as proposed by the Government to reflect the strategic priorities for transport.[4]

1.12 This business case has been prepared as a standalone case for investment for reinvestment in the NAL and investment in constructing the Marsden Link. The business case has been developed in advance and strictly at 'arms-length' of other inter-related work currently underway but not yet completed. While this work is of direct relevance to some of the key questions and assumptions in this business case, they will be brought together in advice at a later date by the Ministry of Transport. This work includes:

- The Future of Rail policy development work, led by the Ministry of Transport.
- The Upper North Island (UNI) Supply Chain Strategy, led by an independent working group.[5]
- Development of the Second Stage of the Government Policy Statement on Land Transport by the Ministry of Transport.[6]

[3] treasury.govt.nz/information-and-services/state-sector-leadership/investment-management/better-business-cases-bbc
[4] *Government Policy Statement on Land Transport*, p.23
[5] Led by an Independent Working Group, see https://www.transport.govt.nz/multi-modal/keystrategiesandplans/upper-north-island-supply-chain-strategy/

- Review of land transport investment assessment procedures (to reflect the Government's mode neutral investment policy objectives), by the NZ Transport Agency.[7]
- Geotechnical investigations for the Marsden Point Rail Link commissioned by KiwiRail, which have been included in the project cost estimates.

1.13 To ensure the integrity of these processes the Ministry of Transport has ensured that each process has not influenced or been affected by another. This business case was developed on the basis of the current state, using only currently accepted land transport policy and evaluation procedures.

Report structure

1.14 This report is structured at a high level into several chapters. Each chapter contains sections providing a summary of the key findings. In accordance with the Ministry of Transport's requirements, detailed analysis and data is provided in the appendices. The chapters are as follows:

- Chapter 1 (Introduction) – introduces the purpose of this report, our approach, and stakeholder engagement and background to Northland rail.
- Chapter 2 (Strategic Case) – outlines the existing state, future state, analyses the evidence, outlines the strategic policy context, details the Investment Logic Mapping (ILM) process undertaken, an assessment of likely freight and passenger demand, and provides a preliminary view that there is a case for change and investment.
- Chapter 3 (Economic Case) – considers the options and options assessment process. Presents the costs and benefits of each shortlisted option, along with risks and uncertainty.
- Chapters 4, 5, & 6 – will overview the Commercial, Financial and Management Cases, respectively, for the preferred option identified in the Economic Case.
- Chapter 7 – will present conclusions and recommendations.
- Appendices (which includes detailed analysis and data).

Stakeholder engagement

Northland Rail Stakeholder Group

1.15 The Ministry of Transport convened and chaired a Northland Rail Stakeholder Group during the project, which met monthly during the development of the Business Case in late 2018 and into early 2019. The reference group provided a valuable opportunity to gain insight and information, test our problem definition, potential options and scenarios and develop a broad level of agreement following the Investment Logic Mapping (ILM) process. Membership of the Northland Rail Stakeholder Group is listed in Appendix J. Presentations and discussions were held with the Northland Rail Stakeholder Group on 27 July, 21 August, 18 September and 16 November 2018.

Key stakeholders

1.16 A number of interested parties were involved in the development of this business case. They are acknowledged in Appendix J. These interested parties were approached on the basis of one or more of the following criteria:

- they could directly influence rail use (such as moving freight or passengers by rail),
- they had a stated interest in the future of rail in Northland (in that they had spoken publicly on the question or had approached the Ministry of Transport on the matter),
- investment in the rail network would have an impact on their work (notably regional and local government).

[6] As indicated by the *GPS* 2018-21, p.5. The Ministry of Transport has advised that this Second State GPS will not be issued.
[7] This may include changes to the Economic Evaluation Manual (EEM) as it relates to rail freight activities

1.17 A limited engagement process from September through to November 2018 was undertaken with current or potential rail users, including passenger rail providers, cargo owners and freight transport operators. These discussions were conducted on a commercial in-confidence basis to protect their business information. These discussions were also undertaken on the basis that the views expressed did not commit the participants, in any way, to any future undertakings or commitments. Therefore, some of the insights and information provided is not contained in the business case, or directly attributed, to respect these confidences and commercial sensitivity. See 116 and 126 for detailed information on potential freight and passenger utilisation.

1.18 The project team also had significant assistance from KiwiRail, Northland Inc, and also input from the Northland Regional Council, the Far North, Whāngārei and Kaipara District Councils.

1.19 The Ministry of Transport took responsibility for engagement with Iwi Māori and organised and undertook three hui at:

- Otiria Marae, Moerewa - 6 March 2019
- Whāngārei Te Renga Paraoa Marae, Whāngārei – 7 March 2019
- Te Hana Te Ao Marama Marae, Te Hana – 8 March 2019

Background

1.20 To better understand the question of rail in Northland, particularly its current state, it is worth reviewing the development, growth and decline of the region's rail infrastructure and services (see detailed historical background in Appendix A). Today less than 1% of Northland's freight is moved by rail (by tonne-kilometres), compared with around 16% nationally.[8] Historically the proportion of rail freight was much higher, although this has been declining since Northland rail's golden age in the 1920s to 1950s. The region's rail infrastructure and services were once a critical part of Northland's economy, particularly as the NAL once provided strategic connectivity to Auckland and the main regional port at Port Whāngārei. The region's connectivity to Auckland by land was vital for the prosperity of the region.

1.21 Local Māori remember that while the railway provided access it was achieved at the expense of significant amounts of their land. Using the broad powers under the Public Works Act whānau, hapū and iwi were negatively impacted during construction of the line, including having land taken without compensation. Decisions around the development of the line was often undertaken without their involvement or consent, with resulting negative effects on their property, way of life and responsibilities as kaitiaki/guardians of the land and waterways. Going forward, Māori want to be included directly in decision-making about the future of the line generally across Northland and where it might affect their specific interests. In advancing their own social, cultural and economic development aspirations they would like to be treated as partners by the Crown in its future infrastructure and development plans. They also want to be approached according to their specific interests in their own rohe/area whether that is as property owners, whānau, hapū or iwi.

1.22 With improvements to road transport, rail declined in popularity as people and freight made use of the flexibility, point-to-point journeys and improved travel times that road transport offered. A milestone in the decline of Northland's rail freight was the 66% drop in rail freight, triggered by the relocation of the port. While the port at Whāngārei had rail access, the new port at Marsden Point did not. The impact of the port relocation in April 2007 without rail access, coupled with declining service reliability, tunnels restricting high-cube container access to Auckland, effectively switched the rail network 'off' with annual rail freight volumes falling from almost 1,000,000 tonnes before 2000 to less than 300,000 tonnes by 2008.[9] Today the rail network in no longer regarded by seen as fit-for-purpose by the businesses moving freight, including Northland-based exporters. As such even those businesses that use rail elsewhere in New Zealand simply do not see rail as an option in Northland.

[8] *National Freight Demand Study*, 2014, p.186
[9] Kelvin Taylor, Turning Northland Rail into a Self-Sustaining Business, 2012, p.4

The Case for Northland

1.23 Considering its potential, the Northland Region underperforms the rest of New Zealand on a number of social and economic measures. This is despite Northland being rich in natural resources, with a good climate, rich cultural traditions, world class beaches and scenery, a long and engaging history – all the while being in close proximity to Auckland - New Zealand's largest city and economic region. This underperformance suggests that there is significant untapped economic potential, in terms of both people and business.

1.24 Northland contributes 2.6% of New Zealand's Gross Domestic Product (GDP), despite making up 3.6% of the national population. This means that Northland has lower GDP per person, being 26% below the national average. This below average economic performance is reflected in Northland's median income, which is 17.9% less than the national median income and in 2017 was lowest in the country at just $40,269 (compared to the national average of $57,002). Income growth for the past 15 years in the Northland region has been slow, widening the gap between Northland and New Zealand's median income. This economic underperformance tends to disproportionately affect Māori who make up over 30% of the population. The unemployment rate for Northland in the year ending December 2018 sat at 5.2%. While this is down on the December 2017 figure of 6.8%, it is still above the national average of 4.3%.[10]

[10] Infometrics, Northland Region Quarterly Economic Monitor – December 2018

2. Strategic case

2.1 This section outlines the strategic context for investment and whether there is a compelling case for change. This includes understanding the problem, what options are available to address this and the likely benefits of these interventions. To do this an Investment Logic Mapping (ILM) process was undertaken to identify and agree on the key problem statements that this business case is assessing. These problem statements were then assessed in the context of potential freight and passenger demand for rail services, including possible future disruptive trends and/or developments.

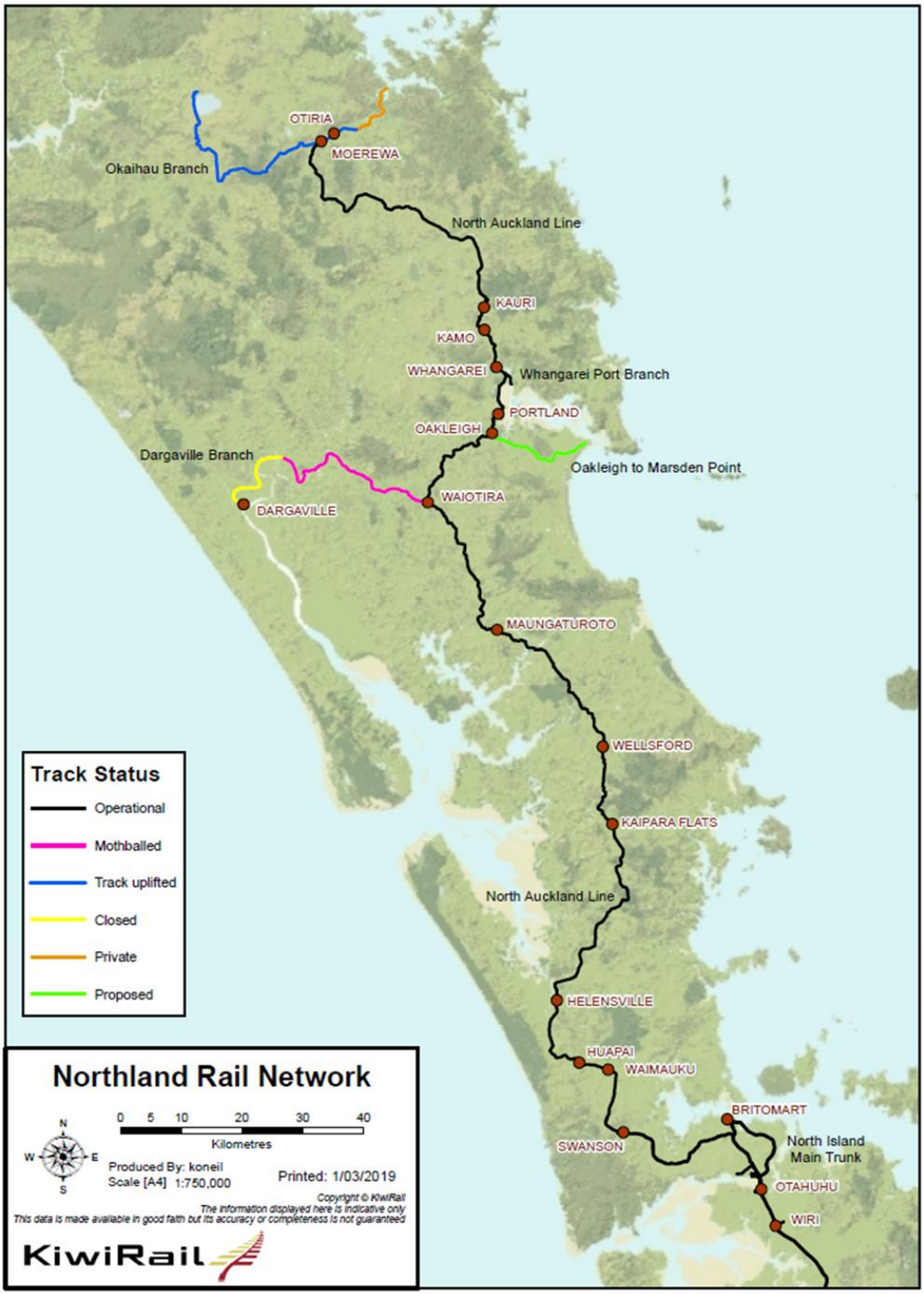


Figure 3. The North Auckland Line today

Image: KiwiRail

Case for Change

2.2 The following four problems were identified as the foundation for potential investment into the NAL and Marsden Link:

- Problem statement 1: Limited Northland connectivity.
- Problem statement 2: Poorly integrated Northland transport system.
- Problem statement 3: Current rail network impractical for users.
- Problem statement 4: Under-investment impacting network viability.

Problem definition (ILM)

2.3 An Investment Logic Mapping (ILM) workshop was held on 3 October 2018 to identify the key problems and opportunities of rail in Northland, set out above. Participants included representatives from the Ministry of Transport and KiwiRail.[11]

2.4 ILM outputs were then presented to and tested with the Northland Rail Stakeholder Group in November. There was a broad level of agreement in that forum with the problem definition. The primary outputs of this workshop were a series of problem statements, benefits, and key performance indicators for Northland, which follow. A more detailed version of the ILM (completed to date) is attached in Appendix M.

Problem 1: Limited Northland connectivity

2.5 This problem identifies that despite its proximity, Northland is poorly connected into Auckland, and the upper North Island. Northland's key connections are lengthy, have higher safety risks and provide less reliable journey times. These poor connections include the condition of the strategic intra-regional and inter-regional highway and rail connections, as well as the ability of passenger and freight vehicles to move through the increasingly congested Auckland network. This poor and worsening connectivity is having a negative impact on access for Northland goods to international markets as the two major export ports available for much of Northland's containerised exports are in Auckland. These under-performing, strategic transport connections are factors in Northland not being able to fulfil its potential as a place to invest in or to visit. These connections are also getting less reliable, more time consuming and more expensive to use as Auckland grows.

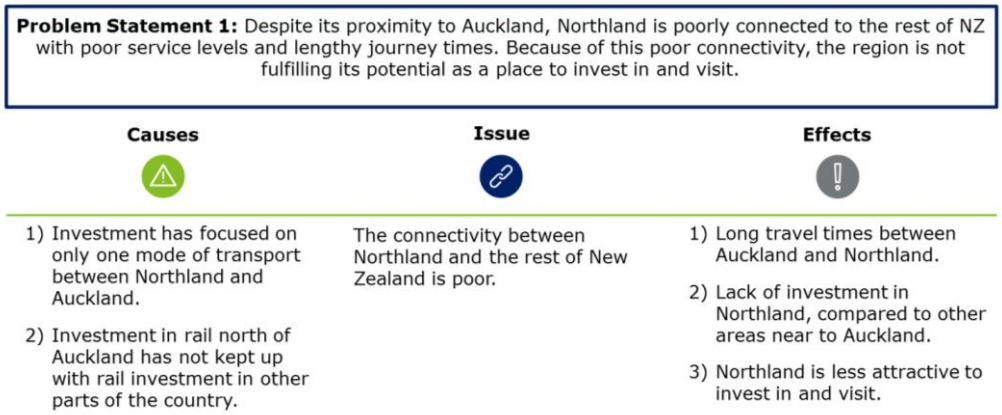


Figure 4. ILM Problem 1

2.6 The evidence:

- The Northland region has a challenging topography (particularly between Whāngārei and Auckland), problematic geology, and high impact seasonal rainfall. This has meant that it has a challenging State highway network that is susceptible to natural events that can cut parts of the region off.

[11] The NZ Transport Agency was invited, but declined to participate in the ILM workshop.

- Increasing congestion in an expanding urban Auckland and the development of northern residential subdivisions is reducing travel time and travel reliability between Auckland and Northland on SH1.
- Business investment is significantly below other regions in relative proximity to Auckland, such as the development underway in the northern Waikato.
- To address this poor connectivity and safety concerns, significant planning and investment in recent years has focused on road and highway investment, for example:
    - 2015–18 National Land Transport Programme Northland forecast $460 million investment for Northland roads, walking and cycling; including some $311 million for road maintenance and operations (compared to KiwiRail's annual operating costs of around $8-9 million for the NAL).
    - Investment has been focused on better connecting Auckland metropolitan area to the high-growth areas immediately to the north. The Pūhoi to Warkworth four-lane 18.5 km highway is under construction with a net present contract price of $709.5 million (this is the 'whole of life' cost for the Northern Express Group to build the motorway over the next five years, and then operate the road for 25 years).[12] This significant investment is located in the Auckland Region, although some benefits will extend to improving travel between Auckland and Northland.
    - The NZ Transport Agency has re-evaluated its investment programme and potential completion of four-laning the State highway between Whāngārei and Te Hana is unlikely to occur before 2030 (the focus instead is on resilience and safety improvements to the existing highway corridor).
- Nationally and in Northland a shortage of heavy vehicle drivers (notably Class 5), while freight demand grows, is increasing freight costs. The impact of this is expected to be pronounced in Northland because of the region's high reliance on road transport (approximately 98.6% of Northland freight volume travels by road).[13]
- Also refer to Problems 3 and 4.

Problem 2: Poorly integrated Northland transport system

2.7 The second problem concerns the existing rail network being poorly integrated into the wider transport system. This lack of functional integration means that use of the network is limited as freight and passenger connections cannot be practically made. This limits the potential contribution of rail to meeting customer needs, including Northport connectivity. As the rail network does not provide adequate connections within Northland, or to Auckland and is unconnected to the regional port, the private sector within Northland and the wider upper North Island are unable to develop freight supply chains that include rail or makes full use of potential strategic connections. This includes connecting the deep-water port at Marsden Point with a rail connection to Auckland. This could potentially provide the option of managing the upper North Island containerised import/export task across the three deep-water ports.

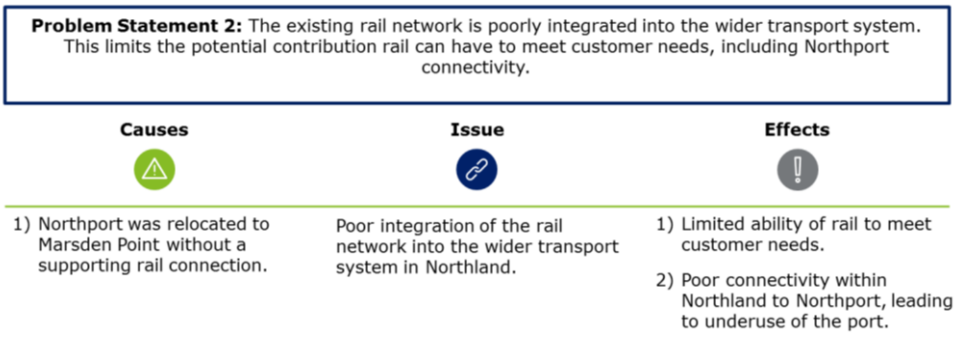


Figure 5. ILM Problem 2

[12] https://www.nzta.govt.nz/projects/ara-tuhono-puhoi-to-warkworth/faqs/, accessed 5/12/18.
[13] This excludes petroleum products moved by the Refinery to Auckland Pipeline and coastal shipping services of fuel and cement between Northland and other regions.

2.8 The evidence:

- Freight movements to Northport are 100% reliant on road freight transport, as there is no rail link from the NAL to Marsden Point.
- Poor track condition has resulted in very low travel speeds, lack of access to modern high-cube containers between Auckland and Northland mean the line is not functionally connected for significant types of high-value freight, lower axle loadings meaning only older and less reliable locomotives can be used. This significantly reduces service reliability.
- All other substantive import/export container ports in New Zealand are serviced by rail (except for Nelson).
- Designation (DNZRC 2) for the Oakleigh to Marsden Point Line was approved following the relocation of the port, but has not been progressed with substantial land acquisition and construction required.
- Northport has established and is growing its container services. Without a rail link, the port will be largely limited to managing containers that are exported from or imported to the Northland region.
- Several Northland-based export companies do use rail to get their higher-value freight to international markets. However, they cannot use rail within Northland, instead having to road transport their freight to Auckland from where it is then loaded onto rail.

Problem 3: Current rail network impractical for users

2.9 The third problem considers the current rail network characteristics that make it impractical and non-viable to use for many purposes. This means most people and goods travel by road, even where that is less commercially efficient. Feedback from cargo owners and freight transport operators is that while road transport provides highly responsive and reliable services door to door, there are situations in which the use of rail would be preferable (See Appendix D – Detailed Commodity Analysis). This is particularly true for movements of freight over much longer distances, particularly to and through Auckland. Despite this rail is not considered an option for businesses moving freight due to the limitations of the NAL – notably the poor service offering, unreliability, tunnel height restrictions limiting high-cube containers and the carrying weight restrictions on the line.

Problem Statement 3: The state of the current rail network in Northland makes it impractical and non-viable to use for most purposes. This means most freight travels by road, even where less economically efficient.

Causes	Issue	Effects
1) Rail infrastructure has not kept up with today's requirements for moving freight.	The North Auckland Line is not fit-for-purpose for most uses, even when rail might be more economically efficient.	1) Reliance on road as main freight and passenger transport mode, leads to higher road safety risks, higher CO^2 emissions, additional road maintenance cost, and additional road congestion. 2) Rail is not considered as an option for moving freight in Northland, reducing the region's connectivity and transport resilience.

Figure 6. ILM Problem 3

2.10 The evidence:

- Less than 1% of Northland's freight is moved by rail (being 110,000 tonnes), compared with 7% nationally. Before the port was relocated to Marsden Point, rail volumes in Northland were around 500,000 tonnes a year and had been growing.[14]
- Locomotives and rolling stock are not inter-operable north and south of Auckland as Northland's rail network has not kept pace with the rest of the rail network's upgrades. This has meant that KiwiRail is operating increasingly 'obsolete but still operating' equipment on the line, which adds

[14] PCIE, Financial and Economic Evaluation of Northland Rail, March 2002, p.38 Unpublished.

cost and reduces responsiveness as the rolling stock and locomotives that can run on the line are old and going out of service.

- Speed restrictions and other factors make the line impractical for (commuter) passenger travel and less attractive for some types of freight, for example, travel from Whāngārei to Westfield is about 215 kilometres compared with 185 kilometres by road, and travel times on rail are now much longer taking around 7 hours (4.5 hours previously) compared with road at around 3 hours.
- The NAL is unreliable with regular service disruptions, including there being minimal and highly variability of space available on the remaining daily service. This means that from day-to-day those companies trying to use rail in Northland may not, in any given day, get their goods on rail.
- As a result of infrastructure and rolling stock conditions, KiwiRail has reduced services down to one return train per day every weekday between Whāngārei and Auckland, with one main customer. This has meant that other customers have been unable to obtain space on that service, and therefore must use a road transport solution.

Problem 4: Under-investment impacting network viability

2.11 The fourth problem relates to years of under-investment leading to deteriorating asset conditions and service levels, high operating costs and lower resilience, threatening the medium-term viability of Northland's rail network. The poor condition of infrastructure, locomotives and rolling stock has led to declining freight volumes, leading to a corresponding cycle of reducing infrastructure investment and renewals.

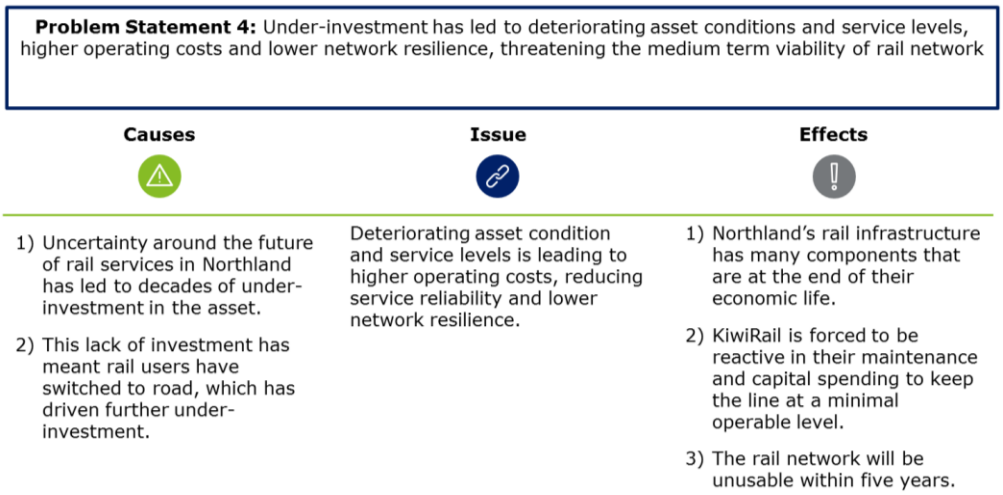


Figure 7. ILM Problem 4

2.12 The evidence:

- Portions of the track are either past or coming up to the end of their useful life. Older infrastructure places pressure on operating expenditure and higher asset related costs for maintenance, reduced levels of service and greater service unreliability.
- The level of service is poor demonstrated by aging assets and capacity issues including:
  - A large number of original wooden bridges on the line that limit modern locomotive access (due to weight restrictions), are at risk of failure and need to be renewed to ensure the line can continue to operate
  - Many tunnels on the line are not high enough for high-cube containers which are increasingly used for imports and exports
  - Overall poor and obsolete condition of rolling stock and locomotives, with newer (and heavier) equipment not able to be used on the Northland line.
- KiwiRail made a commercial decision in 2014 not to invest in upgrading the NAL to accommodate industry standard high-cube containers, while the rest of New Zealand (excluding the Gisborne Line) was upgraded.

- Annual operating costs of the NAL according to KiwiRail are similar to revenue at $8-9 million (break-even).[15]

Investment objectives

2.13 The investment objectives reflect the priorities identified through the development of this business case, including problem identification and subsequent engagement with stakeholders to further test and refine those problems. Achievement of these investment objectives are expected to see the transformation of the utility of rail in Northland to provide better and additional connectivity within Northland and into Auckland and the upper North Island. This change in form and function will require significant capital investment but will also deliver a number of benefits directly to a number of Northland-based businesses moving freight, other land transport system users and as a result the Northland, and also the Auckland regions.

2.14 These investment objectives are:

- To better connect Northland into Auckland and the rest of the upper North Island
- To improve the quality of service and choice for customers and enable better transport mode integration
- To reduce the cost and impact of transport for Northland-based businesses and New Zealand more generally
- To encourage better use of existing infrastructure.

Benefits of investment (ILM)

2.15 Table 1 outlines the key benefits expected to flow from addressing the problems identified with rail in Northland. High level themes for key performance indicators (KPIs) are also identified and will be refined into SMART KPIs as part of the Programme of Work (this is returned to later in this chapter).

Table 1. Benefits expected

Benefit	Measured by
Northland is more connected into the domestic economy and international trade.	Reduction in cost of moving freight (including increased productivity) Employment and jobs Northport throughput Business growth and number of new businesses
Improved quality of service & choice for customers.	Customer growth Northport activity On time performance
Lower cost and impacts of transport, including externality costs to environment and society in general.	Total cost of travel (including costs to other users) Emissions Safety
Modal shift from road to rail, better use of existing infrastructure.	KiwiRail operating costs Proportion of Northland freight moved by rail Truck movements on constrained parts of the State highway system reduced

Enhancing Northland's ability to compete and support Auckland growth

2.16 As Auckland grows to achieve its potential as a successful international city of scale, it will need to have high-performing land transport connections into its economic hinterland – south and north. Although on its own rail is not a 'silver bullet' for addressing the connectivity challenge in Northland, improving access and providing greater modal choice could provide a material catalyst for additional commercial activity and employment that stimulates the Northland economy. Where there are strong forces of potential supply and demand new land transport infrastructure can stimulate new economic activity. New or improved highway and/or rail infrastructure can equally stimulate increased economic activity where there is strong demand,

[15] The Northland Lines Review, KiwiRail, 2011, www.parliament.nz/resource/0000166353

and for rail attract potential users for the type of transport task rail is efficient at undertaking.[16] This demand and supply response to the Government's highway and rail investment to the south of Auckland can be seen in the increasing industrial and freight and logistics developments in the Waikato and the Bay of Plenty, designed in part to support Auckland's future growth.

2.17 Such a connection would also increase system resilience in the event of a natural disaster or significant breaks in the supply chain. A freight system that is impaired by shocks is less able to provide lifeline functions, such as the supply of food, medical supplies and other basic community activity. It is also less able to perform the movement of goods required for economic activity. Considering the Canterbury and Kaikōura Earthquakes, along with the closure of the Manawatū Gorge, New Zealanders better appreciate the fragility of our transport system and the value of additional resilience and redundancy to cope with system shocks. There is a growing consensus that our economic success depends on strategic parts of the national freight system being able to quickly respond and recover in the event of shocks and emergency events. As an example the economic losses from the Kaikōura earthquake, including tourism losses, excluding infrastructure reinstatement costs, have been estimated at $465m over two years.[17] The loss of the key South Island coastal routes placed great strain on the national supply chain, through the loss of the main strategic highway and rail connections, and demonstrated the importance of New Zealand coastal shipping services in providing short-term service resilience.

2.18 The ability to move goods efficiently, effectively and reliably is essential for a successful modern economy. Auckland has experienced significant growth over the last decade, with the boom set to continue. Auckland's population is projected to reach 2.4 million by 2043, according to the Auckland Plan 2050. This increased population will significantly impact on the ability to move freight through and within the city. Increasing traffic congestion within Auckland means some businesses may look to relocate their activities further out of the city, where feasible. Current high-quality road and rail connections into the Waikato are allowing businesses to considering moving there. In contract Northland is less attractive as a relocation proposition for businesses. With a poor rail link and falling levels of service on an already problematic highway connection to Auckland, preventing Northland from taking advantage of its proximity to Auckland.

Problem and benefits matrix (ILM)

2.19 Figure 8 shows the outputs of the ILM process. Each benefit is expected to correspond with more than one problem statement.

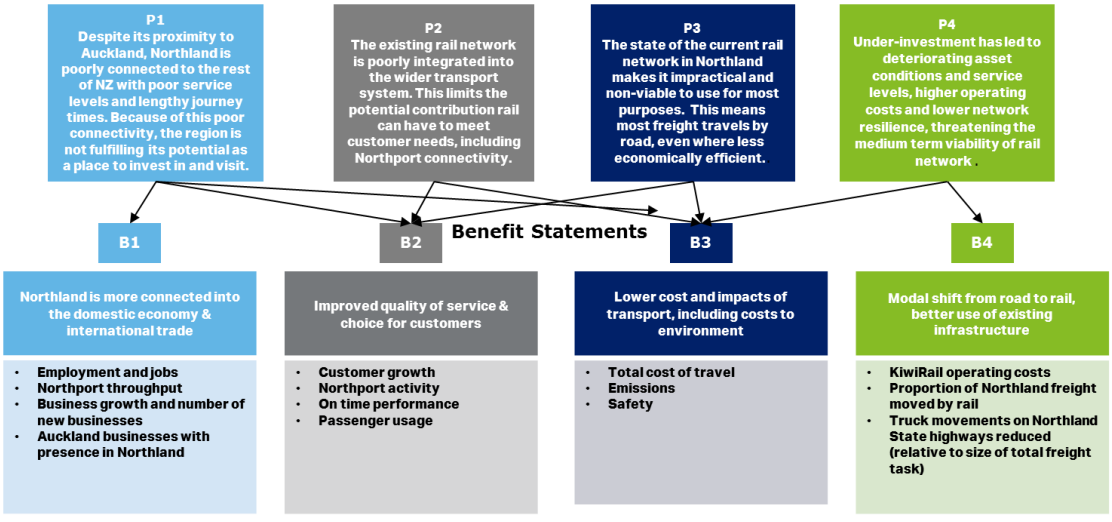


Figure 8. ILM outputs

[16] For example one influential study estimated that a 5 percent reduction in travel time for all business road travel in Great Britain could generate costs savings of around £2.5 billion per annum. See for example the findings of *The Eddington Transport Study, Transport's role in sustaining the UK's productivity and competitiveness*, 2006, p.24
[17] Market Economics Ltd, Economic Impact of the 2016 Kaikoura Earthquake, 2017 (for the Ministry of Transport)

High quality transport connections an economic enabler for Northland

2.20 The problem statements defined in the ILM process were tested with stakeholders in Northland, and Auckland, during the development of the business case. The feedback provided included consistent themes about Northland's isolation from Auckland and the rest of the country. It was widely agreed that one of the contributing factors to Northland's poor economic performance is its location. Despite being geographically next to the strong performing Auckland economy, the difficult terrain between the regions make them more isolated from each other than a map would suggest. Northland is also long at 340 kilometres in length with at least five hours needed to drive from Cape Reinga to Te Hana. It has low population density with poor land transport connections within the region and connections to Auckland and the rest of New Zealand. Given its location Northland has a specific emerging opportunity in developing industries that provide goods and services for Auckland.

2.21 Northland's poor transport connectivity within the region, to Auckland and on to international connections is consistently raised as a problem when Northlanders discuss their regional development needs and aspirations. It is a key problem to be addressed in its Regional land Transport Plan.[18] Travel in Northland is typified as having:

- Longer travel times due to both the length of Northland as well as the winding and undulating nature of the region's main roads
- Greater fuel consumption costs (due to the topography and road condition)
- Higher vehicle operating costs (due to the poor physical condition of the roads)
- Poor road safety outcomes (due to the poor road condition being less forgiving of human error)
- Reducing resilience and travel delays (due to serious crashes, extreme weather events and road maintenance work on lifeline routes)
- Increasing difficulty getting through Auckland due to increasing congestion during day-time hours on the critical lifeline routes of State Highway 1 (SH1) and State Highway 20 (SH20).

2.22 The high cost of transport to, from and within Northland is a critical constraint on Northland's economic performance. Northland's poor, and decreasing, land transport linkage into Auckland is a key concern due to the city's rapid growth. As travel times through Auckland become longer and less reliable, Northland businesses face the prospect of being more isolated. Not being able to efficiently access Auckland means Northland is also at a competitive disadvantage when accessing internal and international markets, notably New Zealand's three main export ports of Auckland, Tauranga (MetroPort located at Penrose) and Auckland International Airport.

2.23 With travel becoming longer, particularly when traffic enters the newly residential area of north Auckland, it is becoming increasingly difficult for trucks to make daytime return journeys from Northland to Auckland within the maximum 13-hour work-time window for a truck driver (see detailed freight analysis). Additionally, the national shortage of Class 5 heavy vehicle drivers is expected to place increasing pressure on road transport companies. These factors are constraints on forecast future growth in the freight task and business productivity in Northland and Auckland. Rail can help elevate some of these constraints by providing a more resource efficient alternative to road and reducing road congestion, particularly for Northland freight being moved through Auckland.

2.24 Because of this poor strategic connectivity, logistics and transport infrastructure improvement were identified as an enabler in the Tai Tokerau Northland Economic Action Plan.[19] The Action Plan brought together projects that together aim to unlock the natural resources and opportunities that Northland has, to achieve its growth potential. One role of local and central government in the Action Plan is to ensure that logistics and transport infrastructure is in place to support private sector investment. The 2016 Action Plan however did not include any actions around rail, with road connections being the sole focus.

2.25 Feedback provided during the development of this business case, particularly from industry, was generally in favour of looking more broadly at what transport connections are required in Northland to include rail, as

[18] Northland Regional Council, *Regional Land Transport Plan 2015-2021*, Three Year Review, April 2018
[19] *Tai Tokerau Northland Economic Action Plan*, February 2016. Potential updates to this plan were not available for this business case.

well as roads, highways and coastal shipping. Given that most cargo owners already move freight across several modes, there was a view that Northland needed an overall step-change in transport connectivity to qualitatively improve Northland's economic performance.

Alignment to government policy objectives

2.26 The key driver for undertaking this business case for Northland rail comes from the Government's Coalition Agreement with NZ First, including supporting regional growth and investment in regional rail.[20] The Government's Confidence and Supply Agreement with the Green Party, also includes a commitment to "increase investment in rail infrastructure in cities and regions".[21] This commitment is primarily implemented through the Regional Development (Provincial Growth) Fund (commonly known as the Provincial Growth Fund), with funding allocated for this business case to investigate upgrading the NAL and constructing the Marsden Link. Investment decisions, particularly for investments from the National Land Transport Fund, will be guided by the GPS 2018 and the NZ Transport Agency's Investment Proposal. A brief overview of the key policy objectives follows.

2.27 Other relevant central, regional and local government policy drivers include:

- The Government's Business Partnership Agenda and Urban Growth Agenda
- New Zealand's transition to a low carbon economy
- Northland Regional Council's Regional Land Transport Plan
- Regional and District Long Term Planning for Northland
- Whāngārei District Council's objectives in the Marsden Point-Ruakākā Structure Plan, which specifically provides for the Marsden Link.

2.28 Developing and investing in the regions is a priority for the Coalition Government. The government is seeking through its land transport investment improved access and modal choices for people and freight, reduced impacts on the environment and improved safety. A more in-depth overview of the strategic policy direction at both the Government level and regional and district level is included in Appendix L. This business case is consistent with this policy direction and the government's stated objectives.

2.29 As an investment principle the Government has indicated that decisions should be made on a mode neutral basis. As a principle this means considering all transport options for moving people and freight, including multi-modal options, to identify the best solutions to deliver transport outcomes. This will involve understanding and evaluating the wider costs associated with different modes, such as environmental and social costs. This thinking is in its early stages and currently there is no accepted methodology of how to plan for, or evaluate, land transport activities in New Zealand in an integrated way. This business case focuses on rail infrastructure only, in accordance with in the Terms of Reference (discussed earlier in this report). Investigating options for other transport modes such as roads or coastal infrastructure is beyond the scope of this report.

The Government's investment objectives for land transport are to enable regional development, improve safety, protect the environment and allow significantly improved modal choices.

[20] NZ Labour Party and NZ First, *Coalition Agreement*, 24 October 2017, p.2
[21] NZ Labour Party and Green Party of Aotearoa/NZ, *Confidence and Supply Agreement*, 24 October 2017, p.3

Analysis of the evidence

Existing environment of infrastructure supply

2.30 This section of the report sets the scene for what is currently happening in and around Northland and the upper North Island. The focus is on the social and economics of Northland, transport modes, and the rail network.

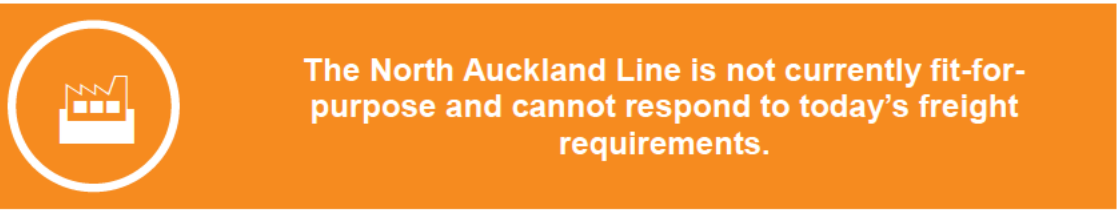
Northland's strategic freight network

2.31 A strategic freight network is made up of the most critical parts of the transport system that moves high volumes or values of freight to significant locations (the detailed network analysis is located in Appendix B). In Northland this critical infrastructure includes:

- The main intra and inter-regional State highway routes (such as SH1 Kawakawa to Whāngārei, Whāngārei to Wellsford, SH15)
- The railway (at least due to its past functionality and option value)
- Coastal shipping services
- The Refinery to Auckland Pipeline
- Northport the main regional port

Northland rail network current extent and condition

2.32 The Northland rail network has not seen any significant investment, other than the minimum maintenance and reinstatement work, for the last fifty years. The NAL remains largely as it was originally constructed, with circuitous alignment that result in lower operating speeds. Most of the original, including wooden bridges are still in place limiting axle loads – limiting the loads that can be carried and restricting access to KiwiRail's modern locomotive fleet. The originally constructed tunnels have not, like others around New Zealand, been enlarged to accommodate for the taller (high-cube) and taller and longer (40-foot equivalent) shipping containers that are becoming increasingly standard.



2.33 Because of the cost these restrictions have on rail operations, KiwiRail's network elsewhere across the country was standardised to allow 18 tonne-tonne axle loads and vertical clearances for 9-foot 6-inch high-cube containers. The heavier axle weights allow access for KiwiRail's modern locomotives that can haul more and are more reliable. In Northland only older locomotives, some dating back to the 1950s can operate. Table 2 outlines high-level features and characteristics for the NAL between Swanson and Otiria and the mothballed Dargaville branch. The key operational constraints on the NAL compared to other parts of the KiwiRail network in the Upper North Island are low maximum allowable axle loads and container height limitations.

2.34 Lack of clearance for high-cube containers means that much of Northland's containerised freight, including the task of bringing containers into Northland to be filled, cannot go on rail. Over time as these higher dimensions become standard, all containers will need to be moved by road to and from Northland. Low-rider wagons (also known as well-deck wagons) could be employed to haul these containers, but they would have to be procured specially at additional and higher cost, have higher operating costs and reduce the ability of KiwiRail to manage its wagon capacity across its network. The cost of doing this was the main reason why KiwiRail opened the rest of their network to high-cube containers around ten years ago. Alternatively, these containers could be delivered by international or coastal shipping services to Northport, and then road transported within Northland. However sufficient services do not currently exist.

2.35 The low operating speeds in Northland increase journey times and contribute to higher operating costs than might otherwise be possible. Current speed restrictions, in place to manage the safety risk from the

declining condition of the track, mean that freight services now take 7 hours, rather than 4.5. This adds additional labour costs and provides a less reliable and timely service for customers. Services are now also limited to one return train each working day. This means that other companies looking to use rail are unable to obtain space on the service for their freight.

2.36 Bringing the NAL to a 'modern freight standard' in the New Zealand context would mean that it is interoperable with the rest of the KiwiRail network with:

- 18 tonne axle loadings
- High-cube container access
- Limited speed restrictions
- Modern locomotives and rolling stock that are inter-operable from across the rail network
- High service reliability, frequency and available capacity.

Figure 9. NAL Track condition - montage

Source: KiwiRail

2.37 KiwiRail has advised that without significant investment to renew life expired assets (including tunnels, bridges, culverts and abutments), the condition of the North Auckland Line will continue to deteriorate. Without significant renewal investment it is unlikely that the rail line will be operating at all within the next five years once operations can no longer be continued safely. The capital costs assumed in the options assessed in the Economic Case reflect the considerable investment required to bring the Northland rail network back to a sustainable and fully operational condition.

Without significant investment it is unlikely that the Northland rail network will be operating within the next five years.

Table 2. Northland Rail Key Statistics

Item	Swanson to Whāngārei	Whāngārei to Otiria	Waiotira to Dargaville
Operational status	Open	No services currently beyond Kauri	Out of service (Tangowahine to Dargaville leased to tourism operator)
Length (km)	181	68	50
Maximum Line Speed for Express Freight trains or equivalent	50	50	40/ 25 (Tangowahine to Dargaville)
Ruling gradient	1 in 34 Northbound 1 in 32 Southbound	1 in 44 Northbound 1 in 50 Southbound	1 in 50 Westbound 1 in 50 Eastbound
Nominal Maximum Axle load for locomotives and wagons (tonnes)	16	16	16
Maximum container height on standard wagons	Standard (8'6")	High-Cube (9 '6")	Standard (8'6")
Bridges	88	64	20
Tunnels	13	0	2
Public Level Crossings (vehicle and pedestrian)	35	29	10
Private Level Crossings	71	38	31

State highway network

2.38 Road transport takes up by far the largest share of freight movements in Northland, at over 95% (by tonne-km), compared to 70% nationally.[22] This share is mainly because of the reliability, efficiency and flexibility of road transport compared to rail for most types of freight. Due to its long, skinny geography Northland the main intra and inter-regional freight connection is State Highway 1 (SH1). The region is also completely dependent on SH1 to move around 35% of its outbound freight down to Auckland.[23] It is by way of this single lifeline highway route to and through Auckland that Northland connects to domestic and international markets for much of its most valuable freight. This main highway is also critical for the flow of inbound freight that Northlanders rely on every day, both imports and domestically produced goods.

Northland's growing freight volumes are dependent on one constrained highway corridor.

Road safety in Northland

2.39 The high volume of road freight on these key corridors has acerbated the poor 2 to 3 star safety rating of the region's main highways. While around 60% of all crashes involving a truck are caused by primary factors other than the truck or its driver, the presence of a heavy vehicle on the road network creates a risk. Due to these combinations of higher crash risks, around 28% of crashes in Northland involve a heavy vehicle. This is above the national average of around 20%.

Increasing truck travel will marginally increase the crash risk, though it may not directly increase the crash rate.

[22] *National Freight Demand Study*, 2014, p.2 (based on 2012 data)
[23] Northland Regional Transport Plan, p.4

Importance of moving freight

2.40 Moving freight safely, effectively and efficiently is vital for a small, exporting country like New Zealand. The upper North Island of New Zealand is particularly critical to New Zealand's long-term economic success. More than 55% of New Zealand's freight travels through the Northland, Auckland, Waikato and Bay of Plenty regions, and collectively these regions generate over 50% of New Zealand's gross domestic product. Freight demand in the upper North Island is likely to grow significantly over the next thirty years.

2.41 Importantly Auckland is the centre for much of this freight activity. The Ports of Auckland handle over 800,000 containers (twenty-foot equivalent units (TEUs)) a year made of mostly imports, but also exports. Most of the import containers are taken to with 30 kilometres of the port to destinations like the freight and logistics belt across Onehunga-Penrose-Ōtāhuhu for distribution around Auckland and New Zealand.

2.42 Port of Tauranga operates an inland port, MetroPort in Penrose, which rails around 200,000 containers a year between Auckland and Tauranga. Currently most of Northland's exporters moving goods in containers, rely on Ports of Auckland and the Port of Tauranga to access international markets. This is because Northport does not yet have enough international container ship services to make them consider moving their goods through these. While they consider coastal shipping an option, it is not preferred due to the cost of handling when transferring to international services and the travel time involved (See Appendix D for detailed freight analysis).

Figure 10. MetroPort

Photo: KiwiRail

Current state - Northland freight demand

2.43 Moving freight effectively and safely is important for the Northland region which produces and moves around 18 million tonnes of freight each year. Most freight (about 14 million tonnes) is moved within the region. Much of the rest is moved by road to Auckland.[24] This generates around 100 million kilometres of truck travel on the region's extensive State highway network alone each year.

2.44 Northland is a significant producer of primary products, notably logs and milk. Northland also produces a smaller volume of higher-value processed products that make a significant contribution to regional employment and economic wellbeing. Northland also consumes round $844 million worth of retail sales in terms of Supermarkets and Food, based on the 2012 data available. Most of Northland's inward goods are warehoused and distributed from south Auckland and are road transported up. Most of the volume moving through Northport is overwhelmingly logs, though the port has recently begun diversifying into containerised freight and other bulk cargos. Other high-value exports are moved through Ports of Auckland and Port of Tauranga.

[24] Updated freight volumes using the National Freight Demand Study (2014), assuming a 1.1% annual increase since 2012

Future freight projections

Introduction – current state forecast

2.45 Northland's future freight task, assuming natural growth from a 'business-as-usual' outlook, is forecast to grow from around 12 million tonnes (in 2012) moved within the region to over 25 million tonnes by 2042. In terms of volume and distance, freight movements would increase from under a billion tonne-kilometres to around 1.19 billion tonnes-kilometres within the region. This business case has assumed medium regional freight growth at 2%, with the growth potential of the main commodities summarised below.

Table 3. Growth potential of main commodities summary

Commodity	Growth potential (BAU)	High-growth Potential	Comments
Mi k	Limited	Medium	Better land utilisation and productivity growth
Processed dairy	Limited	Medium	Depends on mi k availability. Limited processing capacity in Northland
Logs	Decline	Low	Harvest still substantial. Recover in mid-2030s from replanting underway
Wood products	Limited	Medium	Dependent on suitable wood supply
Horticulture	Growing	High	Kiwifruit and avocado increasing rapidly, from low base.
Aquiculture	Limited	Medium	Depends on consenting and investment in new farm capacity
General Freight	Limited	Low	Depends on population growth within Northland

Potential for rail utilisation growth – Freight

Modal-choice decision-drivers

2.46 While central and local government can and do shape modal choices through the provision of infrastructure and regulation, logistics is fundamentally a private sector activity. The companies that produce, transport and consume freight are usually the key decision-makers in both how freight is moved as well as the wider logistics considerations of things like warehousing, distribution and packing. Choices around the modes used to move freight are made by businesses within the context of these broader considerations. These mode choices are based on wider supply chain considerations and customer requirements, see Appendix D for detailed analysis on freight mode choices. Over the last 10 years in New Zealand several businesses have changed the way they operate their supply chains, notably to make more use of rail, to achieve wider supply chain outcomes.

2.47 Modal choice involves either a specific mode or combination of intermodal transportation options across road, rail, air or coastal shipping. The freight task may constitute a number of different legs for which there may be different optimal transport modes. The most important criteria for modal share are:

1. **Reliability** is the most important criteria as the potential impact of a failure to receive or deliver product on time, and as specified, can result in either downtime or cessation of a manufacturing process or the potential loss of a sale. Supply chains are built around the seamless inter-connection of a range of components. Repeated failure due to an inability to rely on a service provider would jeopardise the total supply chain.

2. **Timeliness** is a further but specific dimension of reliability. It is important that not only are the linkages between components of a supply chain reliable but that they connect in a timely manner. Many manufacturers and wholesalers have incorporated timeliness, as an integral part of their value proposition, offering delivery anywhere in New Zealand within 24 hours.

3. **Product care** is critical as products arriving in poor condition will result in a loss of sale or reshipment. This is particularly important for perishable or fragile products.

4. **Safety** is also cited as being important for products where mishandling poses a danger to staff, the transport operator or the wider public. Particular examples include hazardous goods because of the risk involved with the product.

5. **Cost** is important and companies are increasingly focused on minimising cost.

2.48 Different types of freight can be more suitable for particular modes. Rail, for example, is suited to the movement of heavy, larger volume goods that move from point to point, while road can deliver goods to multiple points (for example supermarkets) and offers more flexibility around the timing of movements. The decisions of companies which import or export are also influenced by international shipping companies as they make decisions on which ports they will service and when.

2.49 Coastal shipping offers several advantages relative to road and rail in the market for general freight transportation, which include lower prices, less congestion, fewer accidents and lower emissions. However coastal shipping can be more expensive over shorter distances when goods need to be transferred to/from international shipping.

2.50 For logistics chains to be effective, it is important that there are good connections between road, rail and ports/airports. There are additional handling costs for changing freight from the rail to the road part-way through the end-to-end journey, as opposed to just using road or rail.

2.51 Northland could benefit from more use of coastal shipping with high volumes of bulk goods (cement and petroleum products) already coastally shipped around New Zealand. If the spur line were added to Marsden this could allow freight to be railed to the port and then coastally shipped to Tauranga for example (meat and dairy exports). Over the longer term, it would be a game-changer if international ships were to start visiting Northland, particularly for containerised goods or high value items.

Identifying potential freight demand for upgraded rail services in Northland

2.52 Rail is not currently seriously considered as an option in Northland as without significant investment it cannot be meaningfully used for moving freight. To better understand these requirements and the potential uptake of improved rail services in Northland, in-confidence discussions were held with around 40 cargo owners and freight transport operators. These discussions were undertaken on a ‘without-prejudice’ basis, so that anything disclosed or suggested to the project team would not commit the participants to any actions in anyway.

The information gathered during the data collection phase of the business case development was then validated against information in the National Freight Demand Study (2014). The Study provides comprehensive information on what commodities are best suited to rail and over what distances, compared to the road alternative. These distances were then compared against that for the movement of freight within Northland and to and from other regions – notably Auckland. See the detailed freight analysis in Appendix D. To determine which commodities in Northland had the potential to move to rail, the following criteria were applied, being that the commodity was:

- Currently produced, rather than planned or proposed
- Indicated by a supply-chain decision-maker as potentially moved on rail
- Consistent with the movement of these commodities by rail elsewhere within New Zealand based on National Freight Demand Study (2014)

Stakeholder perceptions on Northland rail - summary

2.53 Stakeholder and the Northland Rail Reference Group provided the following observations on why rail was not fit-for-purpose.

1. Rail does not connect to the port.
2. Rail cannot accommodate high-cube containers.
3. Rail services have been unreliable and unresponsive.

Without significant investment, Northland's rail network cannot be considered a viable option for moving freight.

Commodity analysis

2.54 Following discussions with supply chain decision-makers, the following potential freight volumes were identified as the Central Scenario, subject to substantive rail service and infrastructure improvements. Up to 1.8 to 2.5 million tonnes of freight was identified as potentially being able to be moved by rail to, from or within Northland. This is based on current volumes, unadjusted for freight growth over time.

Table 4. Summary Table - potential freight demand for upgraded NAL and Marsden Rail Link

	Current (p.a.) (2017)	Potential rail freight demand (tonnes)			Percentage of Current volume share for commodity in Northland	Estimated percentage share of potential volume
		Low	*Medium*	*High*		
Logs	20,000	950,000	1,175,000	1,550,000	<1%	35%
Dairy (Export)	75,000	-	130,000			>90%
Milk (factory to factory)	0	-	91,000	-	0%	>90%
Clay	11,000	-	11,000	-	100%	100%
Processed Wood Products	10,000	-	370,000	-	<5%	60%
Meat (export)	0	-	70,000	-	0%	>90%
General freight	<10,000	-	125,000	-	<5%	10%
Fertilisers (inter-regional)	0	-	23,500	-	0%	>90%

2.55 Additionally, a number of freight commodity types were not included in the estimates. These are summarised in Table 5.

Table 5. Summary Table – potential freight excluded from estimates

Commodity	Origin/Destination	Comments
Fast-moving consumer goods (FMCG)	Auckland to Northland	Distance too short, customer time-frame requirements make road preferred.
Cement	Northland to Auckland, rest of New Zealand	Road to Auckland and Coastal shipping preferred. Rail possibility for future.
Petroleum	Northland to Auckland, rest of New Zealand	Pipeline to Auckland preferred, with additional capacity potential. Coastal shipping to rest of NZ preferred. Rail possible in emergency, but coastal ship preferred.
Horticulture	Northland to Northport, Auckland, rest of New Zealand	Road transport preferred due to handling of goods, distance to market at this time. Containerisation may make rail more attractive in the future.
Motor vehicles	Northport to Auckland	Direct shipping services into Auckland preferred, or (with a port change) road transport from Northland due to ability to deliver to sales yards directly. Rail technically possible for smaller motor vehicles if they are protected in specialised equipment.
Mining / aggregates	Within Northland, Northland to Auckland	Due to the distance between quarries and mines to potential rail heads, and the cost of road bridging at either end of the journey, road transport is preferred. Some limited potential for rail may be available at some locations.

Future potential disruptors and opportunities - Freight

2.56 In reviewing the next forty years of transport demand, it can be assumed that freight volumes in the Central Scenario will likely grow at either:

- Low growth at 1.1% p.a. (historic growth)
- Medium growth at 2% p.a. (assumed growth from GDP forecasts)
- High growth at 4% (driven by significant changes in regional freight production and consumption)

2.57 With the context of this potential freight demand, several disruptive forces to the movement of freight to, from and within Northland were considered. These disruptive forces may increase rail's mode share.

Heavy vehicle driver availability

2.58 Northland is facing a growing shortage of heavy truck drivers. This shortage of suitable drivers is affecting the ability of Northland businesses to efficiently operate freight supply chains. With the average age of Northland's heavy truck drivers in the mid to late 50s, and with few younger drivers joining the industry, road transport will be increasingly constrained over the next ten years. While fully automated trucks may someday into the future resolve this problem, rail may provide some mitigation, along with efforts to attract younger and more diverse people to the industry.

Increasing inter-regional travel times

2.59 As Auckland's population grows and the urban area moves north, travel times during day-time are increasing. Increasing travel times, and growing travel time unreliability, both on the main highways in Northland and within Auckland are putting pressure on Northland businesses moving freight on these lifeline corridors. This is increasing the cost of moving freight into Auckland and placing greater pressure on the road transport workforce, which has under the law strict time limits on the hours they can work. While most freight will continue to be moved by road, some volume could be moved by rail to mitigate these connectivity constraints for some of Northland's freight task.

Northport's potential for inter-regional logistics

2.60 As Auckland grows, Northport and the industrial-zoned land around it, have the potential to play a greater role supporting the movement of freight to and from the city. The option value from any substantial investment in the NAL and the Marsden Link needs to be sized in the context of how real this potential freight demand is within the next 40 years. While full analysis of the long-term function of ports in the upper North Island is out of scope for this business case, a comprehensive assessment of the port question is being undertaken by the North Island Supply Chain Strategy Working Group (refer to Appendix K), an assessment of potential future freight demand between Marsden Point and Auckland needs to be considered. Some background context is that:

- New Zealand's high-value containerised trade has grown rapidly over the last twenty years. This growth has been concentrated in the upper North Island with volumes through Auckland and Tauranga increasing by almost 600% since 1995.
- Container ships visiting New Zealand are also growing substantially in size. These larger ships require deeper and longer docking facilities and exchange more containers in a visit than previously experienced.
- This growth has created constraints within Auckland, including the handling and storage of containers and truck access to the port area during daytime. As a result, the Port of Tauranga established a rail-enabled inland port in Penrose, Auckland in 1999. MetroPort now handles over 180,000 containers (around 300,000 in TEU) for the Auckland market import/export market each year. This is despite the fact that Tauranga is 200 km (235 km by rail) from MetroPort in Auckland, compared with the Ports of Auckland which is only 14 kilometres away from Penrose.
- By comparison Northport is 150 km by road (215 km by rail) from Penrose. Northport has a maximum depth of 14.5 meters (chart datum), meaning larger container ships could be accommodated there.[25] The port has around 33 hectares of paved area for cargo storage and

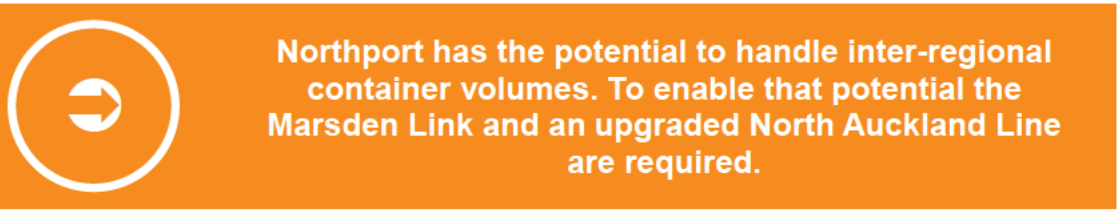
[25] Northport Limited, *Port Information and Operating Criteria for Shipping Operations*, January 2015. Chart datum is the most conservative assessment of depth, being a water level so low that the tide will but seldom fall below it.

handling. The port has a potential footprint of a further 180 hectares of land that could be developed for port-related use. This is part of a wider area of 700 hectares of designated port and commercially-zoned land.

2.61 Given the attributes above and the changes underway in the movement of containers nationally it is conceivable that Northport could develop within the next twenty years as an additional container port to support Auckland's import/export supply chains. A third container port in the fast-growing part of the country would also provide some additional future-proofing and resilience to the national logistics chain, in the event of trade through Auckland or Tauranga being disrupted.

2.62 Critical to attracting a container trade is securing regular, scheduled international shipping services. These shipping services will call to ports with sufficient known and reliable cargo volumes. At present the international shipping services that most importers and exporters rely on, do not call at Northport. Over the next 10 to 20 years this may change, which may make Northport an attractive proposition for some businesses to consider using for imports and exports.

2.63 While some container volume might be road transported from Auckland using SH1, the cost of doing so would make the continued use of Auckland or Tauranga more compelling. Without a rail connection, therefore, Northport is unlikely to be considered as an option for moving significant volumes of containers to and from Auckland and other regions.



Potential for Northland Passenger Rail

2.64 Along with using the line to move more freight, several stakeholders have called for the NAL to be used for passenger rail. This includes commuter and tourist trains. While the focus of any investment would be to manage current and future freight volumes, passenger services could provide some additional utilisation and regional development opportunities. (See detailed Passenger Analysis in Appendix E).

2.65 There appears to be little scope for rail commuter services to be re-instated north of Swanson in West Auckland, or within Northland itself in the short to medium term. This is due to the long commute times for these journeys on the line and low population densities of these areas, which would see low patronage and high subsidy costs.

2.66 There is an opportunity for a medium-sized scenic tourism offering, which is worth further investigation with rail tourism industry participants. This service would not just provide transport, but potentially be part of an integrated tourism offering in Northland. This could provide regional economic benefits to Northland as well as marginally improve the value of the rail investment itself. From a value for money perspective there is a potential for tourist rail to be an additional and a complementary offering alongside the core freight services.

2.67 It is estimated, based on the successful operation of similar scenic services around Australia and New Zealand, that an operation of around 60,000 passengers a year paying around $100+ a ticket (for carriage only), might be feasible. Given the proximity of Auckland to Northland both international and domestic passengers would likely make use of this potential travel experience. More luxury services could also be offered, and have been proposed, but this has not been assessed in the business case as more information would be required from potential providers on their potential. Operation of these services would require a more developed tourism experience, including accommodation, in Northland.

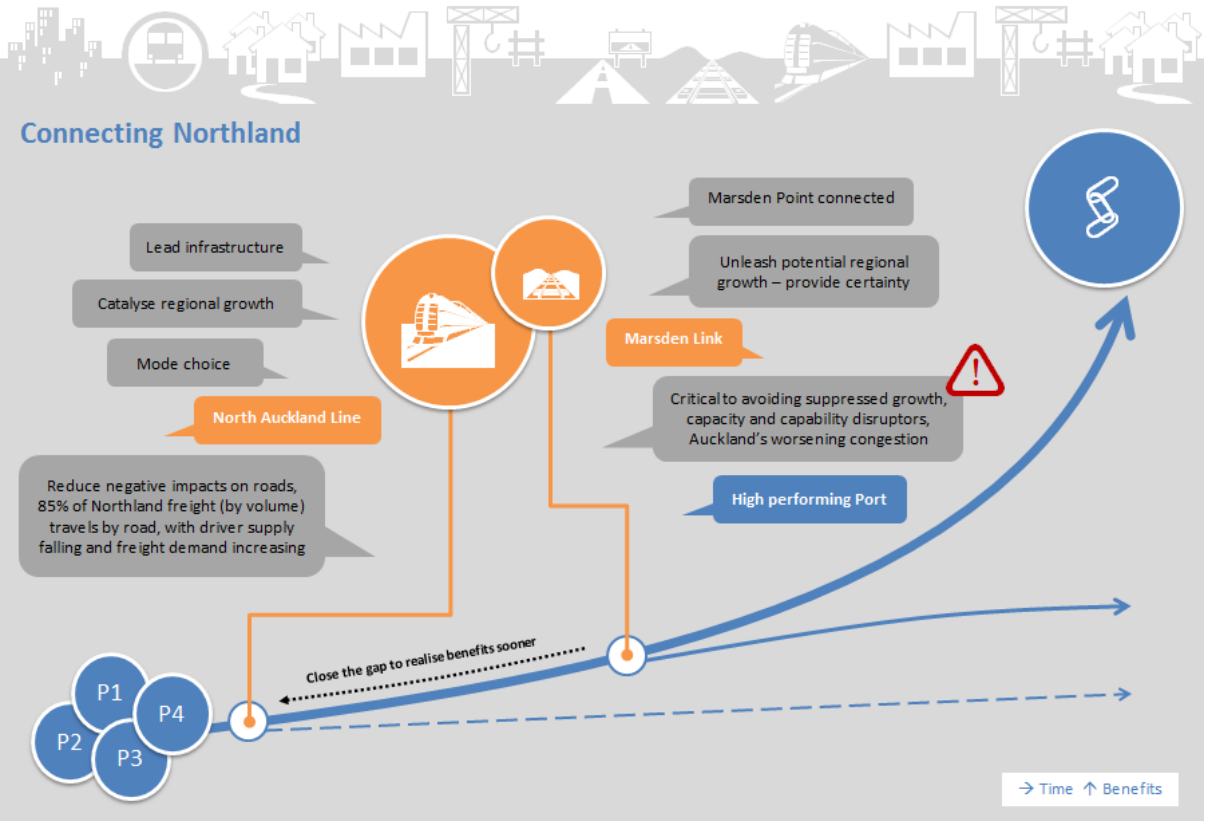


Figure 11. Potential role for rail in Northland's growth

2.68 Northland is currently completely reliant on road transport to move much of its freight. While road transport will continue to be the dominant mode of transport, due to its flexibility and efficiency, rail (if upgraded) has the potential to move around 1.8 to 2.5 million tonnes of the region's freight task. As such the investment in an upgraded rail network in Northland, and building the Marsden Link will provide potential benefits through:

- A new and renewed freight connection that would reduce Northland's geographical isolation from Auckland. This would benefit a significant portion of inter-regional freight movements (but not all)
- Some additional resilience to the strategic connections between Auckland and Northland and within Northland
- Some mode choice within Northland that would reduce a degree of the negative effects of road transport within Northland and Auckland
- Creating the potential for high-value tourism services to, from and within Northland
- Enabling the potential option value of a strategic connection between the industrial and freight-handling potential of Marsden Point with our largest economic centre in Auckland.

2.69 These factors, based on an examination of the evidence available, is illustrated in Figure 11 which considers the options (at a high level) to better connect Northland. The evidence also supports the need to consider rail (and the way that it is used) as one of the options to address, at least in part, the problem statements identified – namely Northland's poor connectivity.

2.70 It is expected that over the medium term (10-20 years) disruptors and opportunities to Northland's freight task will be seen. The information available shows that journey times for freight within Northland and to and from Auckland are under pressure from increasing road traffic volumes. This is creating longer more unpredictable journeys that are placing pressure on the working hours of truck drivers. This has the potential to reduce productivity and increase costs. The heavy road transport workforce is also aging, with fewer younger people joining it. As such suitably qualified truck drivers are now in short supply, with Northland businesses finding road transport more expensive as a result. Northport also has the potential to become a third container port to support Auckland's growth.

2.71 Longer term (20-40 years) could see growth in population, tourism (especially domestic from Auckland) and new industries (generated mainly from Treaty of Waitangi settlements and development of new Māori-owned industries), which will drive increased freight demand. Auckland businesses will look to the hinterlands to locate new industries to support the city's economy, namely the Waikato and/or Northland. Population growth in the north of Auckland may lead to more freight being moved through Northport. Northport has the capability to serve as a third inter-regional container port in the upper North Island. This potential value is predicated on efficient land transport links to enable an efficient connectivity.

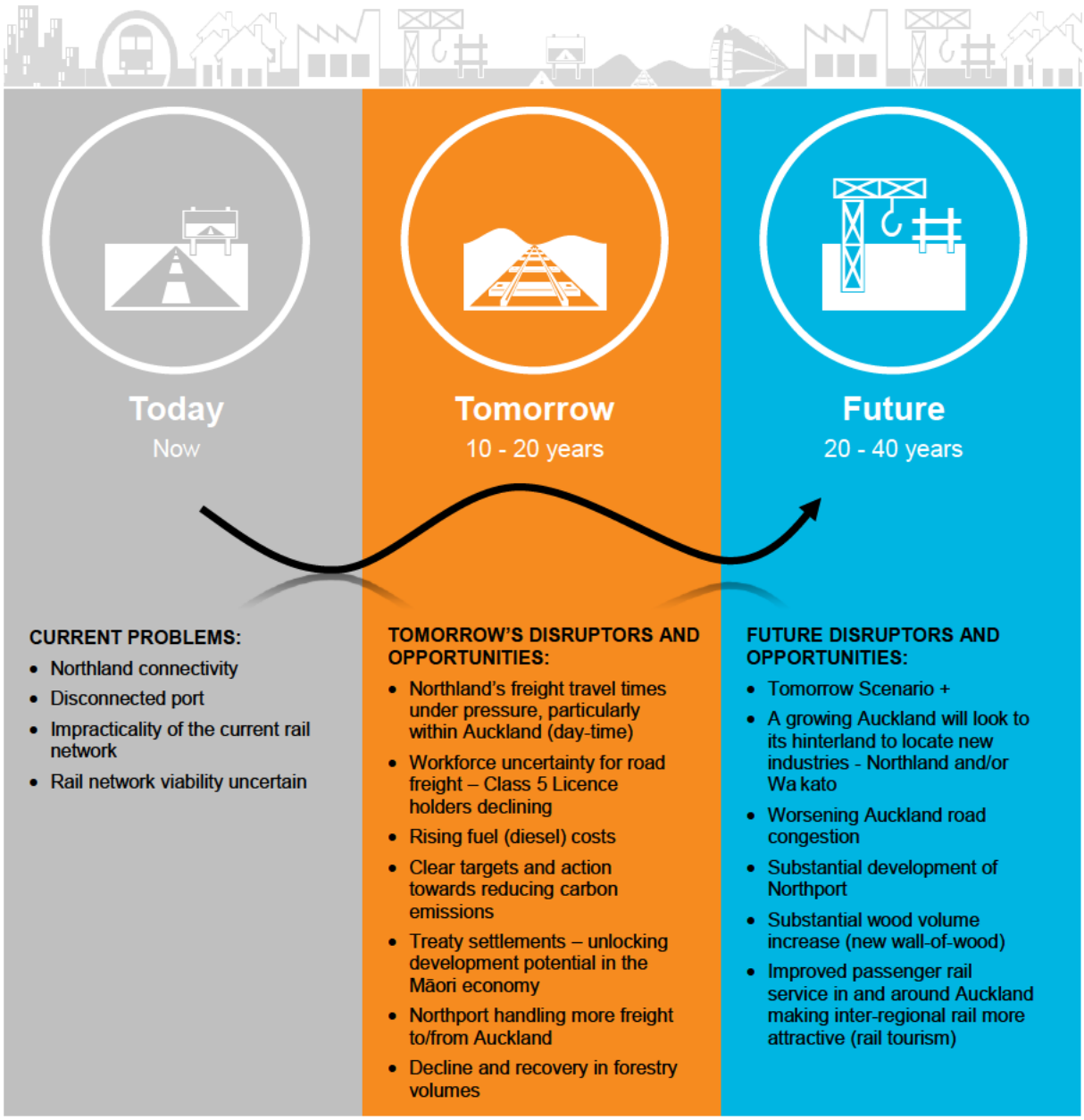


Figure 12. Disruptors and opportunities for Northland

3. Economic case

3.1 Rail has a potential role to play as an enabler of regional growth and prosperity for the people of Northland by supporting the delivery of a range of social, environmental, financial, and human capital outcomes. From a transport sector perspective, promoting a shift from road to rail means that some of the negative effects of transport, whether environmental, safety or congestion related, are lessened.

3.2 Investment in rail in Northland will benefit that region by bringing improved connectivity within the region – particularly to the port – and connectivity to Auckland and beyond. The long-term economic benefits to the region of improved connectivity are hard to quantify, but this does not make them less real. At the present time, it is clear that while Northland presents a range of comparative advantages to potential investors looking to start or expand job-creating commercial ventures in Northland, for example the region's rich volcanic soils, mild climate, natural resources and relatively young population. The region does not have, however, ease of connectivity to current and potential markets.

3.3 This poor connectivity adds cost into the supply chain, limits tourism, and ultimately means that one of Northland's more material potential comparative advantages, proximity to New Zealand's largest economic centre, is constrained from delivering opportunities to the region. The net result is less investment, fewer jobs and lower productivity for regional businesses than would otherwise be the case.

Figure 13. Whāngārei Container Transfer Site

Photo: AECOM 2018

3.4 Under a counterfactual scenario of improved connectivity, and looking at through a rail-connected lens, there are some potential scenarios which could be likely to encourage greater flows of private capital, more jobs and improved productivity. This business case is not an economic development strategy for Northland; however it is noted that these could include:

1. Upgrading port operations with greater container capacity to provide new employment opportunities and accelerate wider revitalisation of the areas around the edge of Whāngārei Harbour including Whāngārei itself.

2. Encouraging specialisation in Northland around industry clusters, and thereby increasing agglomeration benefits. Examples could include aquaculture or horticulture food hubs or even (both for domestic and global consumption), infrastructure and housing pre-fabrication or other "heavier industry" hub concepts.

3. Development of manufacturing, around the rail network, which processes a larger proportion of Northland's raw materials to add export value and create jobs such as high-value dairy goods and proceeded timber products.

4. Exploring new industry supply chain links between emerging energy materials like hydrogen and uses including oil refining, fertiliser production, food processing foods and defence.

5. Developing a nation-leading workforce for Northland's emerging industries, with a focus on those industries which will be of greatest importance to Northland's future prosperity. This may require a plan to prepare for population growth, particularly around Whāngārei, to capture benefits. This will require integrated, collaborative port and urban planning.

3.5 Investment in improved connectivity, alongside broader economic revitalisation activities has the potential to be transformative for Northland's future economic prosperity. Investment in rail alone will not be sufficient, but it could act as an enabler for the movement of certain types of freight, providing a platform for broader investments and changes which might otherwise be stifled. It is impossible to forecast the potential additional investment, jobs and long-run economic growth, but a fit-for-purpose modern railway is required for Northland to become a base for certain types of freight and logistics activities. Even if the railway was only used to transport goods between Northport and Auckland (under a scenario where some goods come into Northport rather than Ports of Auckland) this could be expected to add jobs at Northport.

3.6 The goal must be to change perceptions of Whāngārei from being a small provincial city, with poor transport linkages, to that with a "supporting second city" status more akin to Hamilton or Tauranga. Under this scenario, significant job growth could be anticipated. As a comparison in 2018 job growth in Whāngārei was 3.2% (1,200 jobs, to 39,500) while business growth was only 0.2%, and GDP per job fell by 0.5% (Source: Infometrics). By comparison, Hamilton had job growth of 3.6% (over 3,200 jobs, to 92,700), and new business growth of 2.1% (300 new businesses). These differences may not seem significant but over time they are, over 12 years adding just a marginal 0.4% growth in jobs would add up to around 2,000 additional people employed.

3.7 Material economic benefits would be likely to be generated for other regions as well – notably Auckland, and for New Zealand as a whole. As identified in the Strategic Case, rail could help address future disrupters to the freight transport industry in the short and longer term, and be an important enabler of a re-design of strategic port options for the upper North Island. It would also add some resilience to New Zealand's international trade.

Figure 14. Bridge on the NAL

Source: KiwiRail

3.8 Under the Status Quo option it is probable, without increased and ongoing investment, that rail services on the NAL will cease altogether within the next five years. Given the current low volumes of freight on the network now, this closure will directly contribute only a small marginal increase in freight volumes on the State highway network.

3.9 Although it is not the purpose of this business case to examine alternative options to rail, and to evaluate the potential costs and benefits of those options, some key points should be noted. The State highway network is increasingly constrained through other factors and has high safety risks for users. This means that Do Nothing is a suboptimal option and if rail ceases, then more significant investment in SH1 will be

necessary if Northland is not to experience a decline in economic prosperity and overall wellbeing from reduced connectivity.

3.10 This Economic Case considers several potential options for investment in rail in Northland, assessing the options based on criteria developed in the Strategic Case, and comparing a short list of options in terms of their quantities and qualitative attributes against the Status Quo. All options for investment have costs attached. The challenge for this Economic Case is to provide a sufficiently robust analysis given the data available of both the costs and benefits of the short-listed options to provide a recommendation on the preferred way forward. Therefore the Economic Case:

- establishes evaluation criteria through which all options are assessed;
- develops a long list of possible options to deliver business case objectives;
- refines the long list of options down to the short list of options considered in more detail; and
- provides thorough analysis of the costs, benefits, risks, and uncertainties recommends a preferred way forward.

Summary of Options

3.11 The section highlights that a number of rail options are feasible in Northland and that these options can help deliver the objectives described in the strategic case. As part of the business case, the Economic Case does this by identifying a wide range of possible options to deliver the business case objectives and identifying evaluation criteria through which these options are assessed.

3.12 To develop the options, a continuum of variables within a number of dimensions should be considered. These dimensions are the ‘building blocks’ that outline the possible attributes for option development. The purpose of looking across dimensions is to ensure a wide range of options are considered and then assessed against agreed Investment Objectives and Critical Success Criteria. The six dimensions considered, as well as a breakdown of the scope dimension, are described in more detail in Appendix N. In summary the dimensions are:

- Extent or scale of investment
- Service level, both below track and above track (in particular, rolling stock)
- Location (scope)
- Service solution and delivery (who and how)
- Implementation timeframes and staging
- Funding

Evaluation criteria

3.13 Investment Objectives and Critical Success Criteria are used as a ‘first-pass’ to evaluate options. These objectives and criteria are expected to drive the desired outcomes specified in the Strategic Case. The criteria also ensure that the investment offers value for money, is achievable, and fits within wider strategic priorities. All shortlisted options are expected to broadly meet these Investment Objectives and Critical Success Criteria. These are set out in more detail below.

3.14 **Investment Objectives** reflect the priorities of this business case and were detailed in the Strategic Case.

3.15 **Critical Success Criteria** are the attributes essential for successful delivery of the project and are used for appraising the options, along with the Investment Objectives. These criteria include dimensions such as capacity, capability, affordability and achievability. These are provided by Treasury and set out below.

Table 6. Critical Success Criteria

Key Critical Success Factors	Broad Description
Strategic fit and business needs	How well the option: • meets the agreed strategic objectives, related business needs and service requirements; and • provides holistic fit and synergy with other strategies, programmes and projects.
Potential value for money	How well the option optimises public value (social, economic and environmental), in terms of the potential costs, benefits and risks.
Supplier capacity and capability	How well the option • matches the ability of potential suppliers to deliver the required services; and • is likely to be attractive to the supply side.
Potential affordability	How well the option: • can be funded from available sources of finance, and • aligns with sourcing constraints.
Potential achievability	How well the option: • is likely to be delivered given the organisation's ability to respond to the changes required, and • matches the level of available skills required for successful delivery.

3.16 See Appendix F for detailed analysis and the long list of options.

Status quo (base case): Managed decline

3.17 The Status Quo is the comparator case which other options are assessed against. Without significant investment, the condition of the NAL will continue to decline leading to probable closure in around five years when it can no longer be operated safely. Major maintenance required includes sleeper and bridge replacements. Additionally, the restricted axle loads, constrained tunnels, reduce services operating and slow operating speeds of the current NAL makes it unable to meet the needs of most freight customers and results in poor operational productivity for KiwiRail.

Upgraded North Auckland Rail line ("Upgrade NAL")

3.18 Under this option (only) the existing NAL from Auckland to the Fonterra plant at Kauri north of Whāngārei would be upgraded to an equivalent standard as other parts of the North Island network (sometimes referred to as a 'modern freight standard'). Sleepers and a number of bridges would be replaced. Tunnels too small for high-cube shipping containers would be enlarged. Figure 15 displays the sleeper age profile.

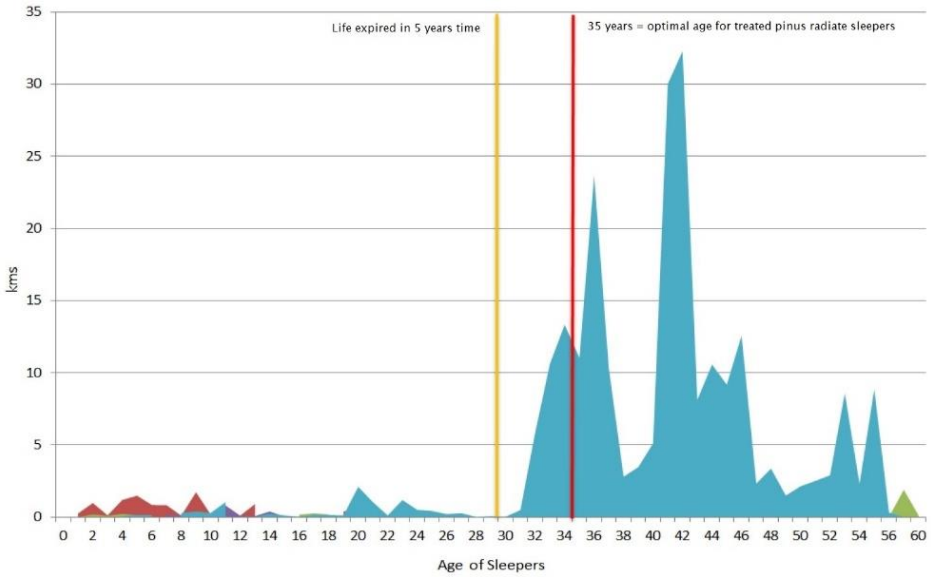


Figure 15. Sleeper Age Profile

Source: KiwiRail

Rail Connected Port: The Preferred Way Forward

3.19 This option renews and upgrades the rail line between Auckland to Kauri together with constructing a branch line to Marsden Point and reopening the line between Kauri and Otiria. It generates the most overall demand and therefore economic benefits (but also costs). For this reason it is the preferred option.

Rail Connected Port with tourism services ("Rail Connected Port + Tourism")

3.20 This option provides optionality for passenger services to be added if commercially viable. Although the circuitous nature of the NAL route between Auckland and Whāngārei compared to SH 1 means that there is little potential for regular passenger rail services, there is potential for tourist focused passenger trains to be operated in Northland. This potential is dependent on a fuller tourism experience being developed.

Summary of results

3.21 The following tables summarise the marginal cost of the short listed options in comparison to the Status Quo comparator. All options, other than the Status Quo comparator, have a significant investment cost requirement which varies from $451 million (Upgrade NAL approach) to $1.4 billion (Rail Connected Port + Tourism) in Net Present Value (discounted to 2018 at 6%) terms. A risk contingency ranging from 30% to 50% for different sections of the track is included in the upgrade cost estimates.

Table 7. Marginal costs of short listed options (NPV, discounted to 6% p.a)

	Rail connected Port	*Upgrade NAL*	*Rail Connected Port + Tourism*	*Status Quo*
Total rail cost	**$1,259 m**	**$451 m**	**$1,381 m**	**$65 m**
Upgrade costs	$679 m	$345 m	$679 m	$20 m
Rolling stock	$140 m	$27 m	$144 m	$7 m
Annual capital cost	$52 m	$32 m	$52 m	$0 m
Above track operating costs	$377 m	$41 m	$495 m	$35 m
Below track operating costs	$12 m	$6 m	$12 m	$3 m
Avoided costs	**$530 m**	**$62 m**	**$530 m**	**$35 m**
Road operating costs	$377 m	$41 m	$377 m	$35 m
Road maintenance cost	$153 m	$21 m	$153 m	$0 m
Net costs (rail costs - avoided road costs)	**$729 m**	**$389 m**	**$851 m**	**$30 m**

Source: Deloitte and AECOM analysis, based on KiwiRail data

3.22 Table 8 presents the quantifiable transport benefits, using existing assessment procedures, expected to be incurred from the investment options. These benefits are marginal to the benefits incurred under the status quo.

3.23 Weighing up the costs and benefits associated with the short listed options can be done from a national or governmental perspective, as informed by the NZ Transport Agency's Economic Evaluation Manual (EEM). Both these assessment perspectives, based on analysis completed to date, show that all of the investment options return a net present cost – in other words the quantifiable benefits are less than the estimated costs. The Status Quo comparator also returns a net present cost, since the closure of parts of the existing rail network in Northland over the next five years (in the absence of investment) will negatively impact transport outcomes. The values presented below are evaluated over 40 years, discounted at a 6% discount rate.

Table 8. Marginal benefits of short listed options, (PV, discounted at 6%)

	Rail Connected Port	*Upgrade NAL*	*Rail Connected Port + Tourism*
Decongestion	$158 m	$30 m	$158 m
Net user benefit	$41 m	$7 m	$41 m
Crash cost savings	$20 m	$3 m	$20 m
CO_2 cost savings	$16 m	$2 m	$16 m
Tourism expenditure			$123 m
Total benefits	**$236 m**	**$42 m**	**$359 m**

Source: Deloitte and AECOM analysis

3.24 The BCRn represents value for money from a national perspective. It is the present value (PV) of net benefits divided by the present PV of net costs. The national economic costs are the net costs of the investment to New Zealand as a whole. The BCRn is therefore the ratio of benefits delivered to society against the costs of delivering the service, net of any cost savings. Revenue is not included as it is assumed to be a transfer payment – in this case most likely a substitution between revenue paid to road operators and revenue paid to the rail operator. The BCRn ranges from 0.11 for the Upgrade NAL option to 0.42 for the Rail Connected Port + Tourism option.

Table 9. Marginal quantifiable costs and benefits and BCRn (NPV, discounted at 6%)

	Rail Connected	*Upgrade NAL*	*Rail Connected Port + Tourism*
Decongestion	$158 m	$30 m	$158 m
Net user benefit	$41 m	$7 m	$41 m
Crash cost savings	$20 m	$3 m	$20 m
CO_2 cost savings	$16 m	$2 m	$16 m
Tourism expenditure			$123 m
Total benefits	**$236 m**	**$42 m**	**$359 m**
Total Rail costs	$1,259 m	$451 m	$1,381 m
Total avoided road operating and maintenance costs	$530 m	$62 m	$530 m
Net costs (rail costs - avoided road costs)	**$729 m**	**$389 m**	**$851 m**
Benefit Cost Ratio (BCRn) National	**0.32**	**0.11**	**0.42**

Source: Deloitte and AECOM analysis

3.25 On the other hand, the BCRg represents value for money from a central government perspective. It allows consideration of whether the government subsidy required to make the service commercially viable, based on the level of revenue to the government, is justifiable based on the benefits the service is expected to deliver. The BCRg considers the costs incurred to the service provider, including operating and capital costs along with an assumed rate of return on capital. The gap between these costs and expected revenue is called the funding gap, which is discounted at 6% p.a. to derive the net present cost, or the funding assistance required. Table 10 presents these costs and the resulting BCRg.

3.26 The BCRg is 0.58 and 0.63 for the Rail Connected Port and Rail Connected Port Option + Tourism, respectively, and 0.10 for the Upgrade NAL option. The additional operating costs of the network are expected to be fully recovered in the Rail Connected Port option, so the funding assistance is smaller than the net economic cost. However, this is not true for the Upgrade NAL option, where revenue does not cover operating costs. An additional cost is the service rate of return discount factor which is treated as a cost to government in the BCRg calculations.

Table 10. Marginal quantifiable costs and benefits and BCRg (PV, discounted at 6%)

	Rail Connected Port	*Upgrade NAL*	*Rail Connected Port + Tourism*
Decongestion	$158 m	$30 m	$158 m
Net user benefit	$41 m	$7 m	$41 m
Crash cost savings	$20 m	$3 m	$20 m
CO_2 cost savings	$16 m	$2 m	$16 m
Tourism expenditure	$0 m	$0 m	$123 m
Total benefits	**$236 m**	**$42 m**	**$359 m**
Operating costs	$389 m	$47 m	$506 m
Capital costs	$870 m	$404 m	$875 m
Service rate of return	$70 m	$23 m	$74 m
Revenue	($618 m)	($27 m)	($735 m)
Savings to government	($153 m)	($21 m)	($153 m)
Funding assistance required	**$558 m**	**$425 m**	**$567 m**
Benefit Cost Ratio (BCRg) Government	**0.58**	**0.10**	**0.63**

Source: Deloitte and AECOM analysis

3.27 A key difference between the BCRn and BCRg calculation is the treatment of costs. The marginal net economic cost is $729 million for the Rail Connected Port option (PV) but the funding assistance required is $558 million. This difference is largely because operating costs and revenue are assumed to be a transfer from road to rail transport providers, consequently having a net $0 impact in the net economic cost calculations.

3.28 A number of assumptions were made to derive the BCR values. Sensitivity tests were performed to test the assumptions. These sensitivities include variations on the degree of road to rail shift, the level of existing congestion on the network, number of cars per heavy commercial vehicle (HCV), used to derive congestion reduction savings for each HCV removed, the operating costs of roads versus rail, the user tariff per tonne/km currently paid for road transport, and the weighted average cost of capital, as summarised below. The results of these sensitivities on the BCR are presented in the sensitivity section. A scenario capturing the impact of a significant movement of containers from Auckland to Northport is also calculated and presented in the sensitivities section below. However, as assessing the merits of Northport servicing as a satellite port of Auckland is outside the scope of this business case and the costs of doing so are not quantified, the results are not included in the range of sensitivities below.

Table 11. Sensitivities performed to test assumptions

	High	*Central*	*Low*
Freight demand (tonnes/pa)	2,594,558	2,202,058	1,878,829
Decongestion (% of time congested conditions exist)	75%	50%	25%
Rate of return	6%	5%	4%
Number of cars per HCV	3.5	3	2.5
Costs (low is 150% of base cost)	-	100%	180%
Freight growth (pa)	4%	2%	-
Operating costs (% of road)	75%	100%	125%
Price per tonne km	$0.2	$0.15	$0.1

Source: Deloitte and AECOM analysis

3.29 Table 12 presents the ranges of BCRn and BCRg from the sensitivities performed for the Rail Connected Port option. From a national perspective, the BCRn is most sensitive to the decongestion assumptions

used, varying 0.22 to 0.44. Increasing the level of freight on the network has a moderate effect on the BCR – giving a range of 0.32 to 0.36. The BCRg is highly sensitive to rail pricing. If rail charge per tonne km is increased to $0.20 per tonne km (in line with the assumed average rate charged for road transport), then the net present value of funding assistance falls, lifting the BCRg to 1.27 (from a central assumption of 0.58). In other words, for every $100 invested by the government in this project, $127 of value to the public is created, through decongestion, user benefits, fewer crashes, and less CO_2 emissions. Likewise, if the assumed rate of return is lifted, it assumes that the service provider requires a higher level of funding assistance to meet its rate of return requirements.

Table 12. Result of sensitivities on BCRn and BCRg of the Rail Connected Port option

	BCRn		*BCRg*	
	High	*Low*	*High*	*Low*
Freight demand (tonnes/pa)	0.36	0.32	0.79	0.46
Decongestion (% of time congested conditions exist)	0.44	0.22	0.78	0.39
Rate of return	0.34		0.75	
Number of cars per HCV	0.37	0.30	0.64	0.52
Costs (low is 150% of cost)		0.34		0.43
4% growth	0.33		1.01	
Operating costs (% of road)	0.37	0.29	0.77	0.47
Per tonne km			0.38	1.27

Source: Deloitte and AECOM analysis

3.30 It is important to note that there are other benefits derived from these options beyond the quantifiable benefits presented in Table 12. For instance, jobs would be created during the initial construction period, as well as ongoing jobs to maintain and operate the network. Indirectly, these jobs increase the level of expenditure in the Northland economy, lifting regional GDP. Furthermore, having a better connected region, through an interoperable rail network, could make the region a more attractive place to live, invest in and visit. The value of having the option of a rail-connected port provides Northland with the ability to handle more freight volume, relieving pressure from Auckland, and increasing resilience of the area. These unquantified benefits are explored in more detail below and in the Detailed Evaluation section.

Preferred Way Forward: Rail Connected Port - Summary

3.31 The Rail Connected Port option has been selected as the preferred way forward, due to having the highest BCR and potential for realising benefits that were unquantified.

3.32 The preferred way forward is to invest as follows:

- Renew and upgrade of the existing Auckland to Kauri line;
- Construct a branch line to Marsden Point;
- Re-open the Kauri to Otiria line;
- Reinstate the line to Moerewa; and
- Re-open of the Dargaville Branch line.

3.33 This analysis assumes the investment occurs over a period of four years, with all lines worked on concurrently.

3.34 This preferred way forward is referred to as the “Rail Connected Port” option in the remainder of the business case. The Rail Connected Port would increase the capacity, scale, and scope of rail in Northland, including connectivity to the port which will in turn support the port to grow its role as an enabler of economic growth and prosperity in the upper North Island. The preferred way forward is expected to produce quantified and unquantified benefits. Consideration of both benefit types led to this

option being chosen as the preferred way forward. These quantified and unquantified benefits are discussed briefly below and in more detail in the Detailed Evaluation section.

3.35 Connecting the port also provides substantial resilience value should any of the other main ports in the upper North Island be unusable for any reason. An example of this resilience value is from 2016 following the Kaikōura Earthquake, when CentrePort's container terminal was severely damaged. To allow trade to continue moving a large proportion of containers went by rail to/from Port of Napier for an extended period. This benefit cannot be monetised but is a significant benefit arising from the preferred option.

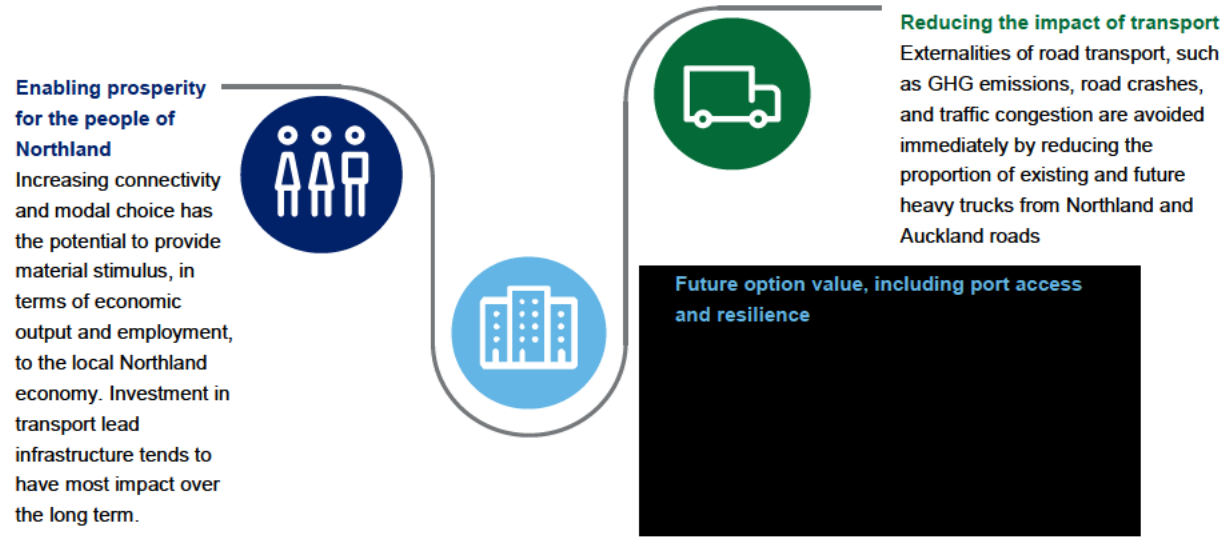
3.36 The Rail Connected Port option also provides strategic option value through the potential of providing an additional connection between Northport and the surrounding industrial area and Auckland. This option value is described in the Strategic Case in more detail. The benefit cannot be directly monetised but also represents a significant benefit arising from the preferred option.

3.37 Some key assumptions of the analysis completed to date, which should be refined in the next stage of development prior to confirming an investment proposal, include:

- Development of an Economic and Industry Development Strategy which specifically considers how improved connectivity could deliver enhanced economic prosperity, set in the context of other economic development initiatives.
- The sequencing of investment (capital works), designed to prioritise early delivery of benefits where possible, but also to optimise cost efficiency, and to manage delivery risks. This would support decisions as to which sections of track, or assets are delivered first. It assumes that the upgrades to the existing lines will occur first, over a period of three years, and the construction of the Marsden Point spur line will take place concurrently, over a period of four years.
- Delivering service quality standards to meet needs of key customers, in particular, whether enlarging tunnels could be avoided and other technical details.
- Further work on cost estimates to enable reduction in risk-based assumptions around contingency or optimism bias. In other words, to remove the need for high levels of contingency allowances.
- Ensuring that the Marsden Link meets the requirements of port users.
- The specific costs and benefits of adding a tourist service in addition to the Rail Connected Port base case. Providing the service can get a comparable level of patronage to other tourist rail services in New Zealand, tourism rail is generally increasingly profitable and could improve the BCR of the preferred way forward as well as provide regional benefits.
- Deeper consideration of options or scenarios which would promote future growth and usage of rail in Northland and down to Auckland and take into account any decision by the Government in relation to upper North Island logistics. In particular, potentially enabling optimal upper North Island port arrangements that provide the highest overall economic benefits to New Zealanders.
- The NZ Transport Agency's economic evaluation procedures (EEM) are limited in that there is no ability to structurally change freight volumes year-on-year. This limitation means that modelling of operating costs and revenue (driven by freight volumes) may differ slightly from the 'economic cost', BCRs, and other values calculated using the EEM procedures.
- More detailed analysis of the impact on congestion within Auckland and related travel time savings would be important to understand the true national economic benefit arising from shifting freight from road to rail, as well as understanding the full costs.
- The Rail Connected Port + Tourism option receives a higher BCRn using an assumption of 60,000 passengers a year, growing at 2.0%pa. This higher BCR is due to the line becoming profitable after six years, as additional operating and rolling stock costs is met by revenue over the 40 analysis period. However, with half as many passengers, the line is not expected to be profitable and the BCR falls below the Port Connected Rail option. Due to this option's reliance on a passenger assumption, which has not been based on surveys or evidence beyond what is occurring on other lines, the Port Connected Rail option was selected as the Preferred Option. However, the Port Connected Rail option allows for passenger services to be considered in the future without significant additional investment.

Benefits of the preferred way forward (Rail Connected Port)

3.38 There are a number of quantifiable and qualitative benefits associated with the preferred way forward. These benefits fall into the following broad categories:



Enabling economic development and enhanced prosperity for Northlanders

3.39 Non-quantified benefits in relation to supporting regional economic growth explored in this business case are:

- Supporting jobs and employment, through increased business investment and economic activity
- Supporting growth industries and agglomeration of economic activity
- Improved supply chain efficiency and modal choice
- Better access to international markets.

3.40 Northland's connectedness both domestically and internationally has regularly emerges as a key theme when Northlanders discuss their regional development needs, with a key domestic constraint on Northland's connectedness being limited transport linkages south. Northland under-performs New Zealand on a number of social and economic measures, including GDP per person, employment, and education attainment; despite being rich in natural resources and in relative proximity to the largest economic region in New Zealand.

3.41 This underperformance suggests that there is significant untapped economic potential, in terms of both people and business. Unlocking this potential and realising these outcomes involves increasing the opportunities that enable people and businesses to take advantages of Northland's natural comparative advantages. Northland has opportunities to grow jobs and economic well-being through building on its core strengths in horticulture, aquaculture, dairy farming, forestry, natural resources and tourism. Northland also has emerging opportunities in high value industries such as marine manufacturing, engineering and agri-technology business or food processing.

3.42 A relationship exists between economic growth and transport investment, and given Northland's currently constrained transport linkages, improvements in productivity and economic expansion could be enabled through greater investment in its land transport system.

3.43 Initially, the impact of the rail investment on Northland would be seen through the jobs created through construction activity, along with ongoing operation and maintenance of the network. Additional jobs could be added at the port and the Marsden Point industrial area if rail connectivity results in increased activity there, either organically or as a result of decisions to move freight and logistics activity there. Some of these jobs might therefore be relocated from other ports. Longer term, there are benefits resulting from improved supply chain, better access to international markets, and better opportunities for trade,

competition and specialisation, particularly for those industries where Northland has a comparative advantage in, such as primary industries.

3.44 Improved choice of transport mode is a benefit to some freight users which materialises in productivity improvements. In other words, freight users could achieve higher output with the same level of inputs. The outcome is better access to domestic and export markets, which would support higher regional GDP, assuming that freight users see the benefits as real, and take up the option to use rail.

3.45 The potential for regional economic development is explored in more detail in the Detailed Economic Evaluation section.

Providing future option value, including port access and resilience

3.46 It is possible that Northport could become a significant upper North Island container port in the future, in order to help manage growing volumes and larger exchanges of containers. If long-term container trade growth is likely to exceed capacity at the Port of Auckland, then costly delays for importers and exporters can be expected.

3.47 Northport has the potential to be a catalyst for economic development across Northland, delivering direct and indirect benefits to the local area, industries and communities. Available industrial land could be used to develop industrial parks and production facilities, stimulating additional economic growth in the local area.

3.48 A third port in a fast growing part of the country would also provide some additional future-proofing and resilience to the national logistics chain, in the event of trade through Auckland or Tauranga being disrupted. The experience of the 2016 Kaikōura earthquake and the impacts of that significant disruption to the key strategic highway and rail corridors connecting the North and South Islands, demonstrated the importance of ensuring alternative infrastructure is available.

3.49 The option of an inter-regional container port at Marsden Point means Northland could also have a material role to play in supporting the growth of Auckland, as the economic powerhouse of New Zealand. Auckland's population is expected to reach 2 million residents by 2033 and by 2045, 40% of New Zealand's residents are expected to live in Auckland (Auckland Growth Monitor, 2017). Continued population growth puts pressure on resources, infrastructure, and ultimately liveability of the region. As a region grows, so does the need for goods and services to support that growth. But despite being geographically proximate to Auckland, Northland does not currently play a substantive supporting role. A key reason for this is the lack of connectivity to the region, in the sense of reliable, safe, transport routes. Although rail is not the sole answer to these connectivity issues, together with other modes, investment in rail between Northport and Auckland could make a material difference for very significant and specific types of freight – such as import/export containers.

Reducing transport externalities drives broader social and economic benefits

3.50 Shifting freight from road to rail reduces transport externalities. An immediate outcome of upgrading and extending the rail network is the removal of a proportion of existing and future trucks from Northland and Auckland roads. These benefits can be quantified using local parameters.

3.51 The following benefits were quantified and monetised:

1. Faster travel times and more pleasant rides for remaining road users. This benefit is derived from the removal of some trucks from the roads where there is congestion since this removal reduces congestion (where it exists), providing travel time savings and improved reliability.
2. Public sector cost saving from avoided cost of road maintenance, estimated using Road User Charges (RUC) as a proxy for road damage.
3. User benefits (reduced direct transport costs, including the price paid to transport operators).
4. Reduced cost to individuals and society from fewer truck-related crashes and fatalities.
5. Societal benefits from fewer Greenhouse Gas (GHG) emissions and reduced noise pollution.

3.52 The preferred way forward, Rail Connected Port, has calculated benefits of $297 million in net present value over a 40 year period. The largest component of benefits is decongestion of roads through Auckland, which account for 53% of total benefits. The next largest benefit arises from net user benefits

(34%). Crash cost savings, and reduced GHG emissions account for 6.9%, and 5.3%, respectively.[26] This compares to the Upgrade NAL option, with present value net benefits of $42 million over the same period.

3.53 Approximately 10 million truck kilometres per year could be avoided with full implementation of the preferred way forward. The ability to transport freight directly to the port means that rail is a viable option for businesses moving imports and exports in the Northland region. Significant engagement with around three dozen existing and potential businesses moving freight to, from and within Northland allowed for the estimation of rail to road shift resulting from each of the options examined.

3.54 Under the preferred way forward, approximately 10-14% of the future freight task could be carried by the rail network, up from around 1% currently (based on tonnage moved). Table 13 shows this range as low, high and central scenarios. By comparison, the current proportion of the national freight task attributable to rail is approximately 6.5%, according to the National Freight Demand Study.[27] This expected rail modal share is comparable to the Bay of Plenty, where approximately 11% of freight originating in the region is carried by rail. A large proportion of this tonnage is logs and other wood products, as would be the case in Northland under the preferred way forward.

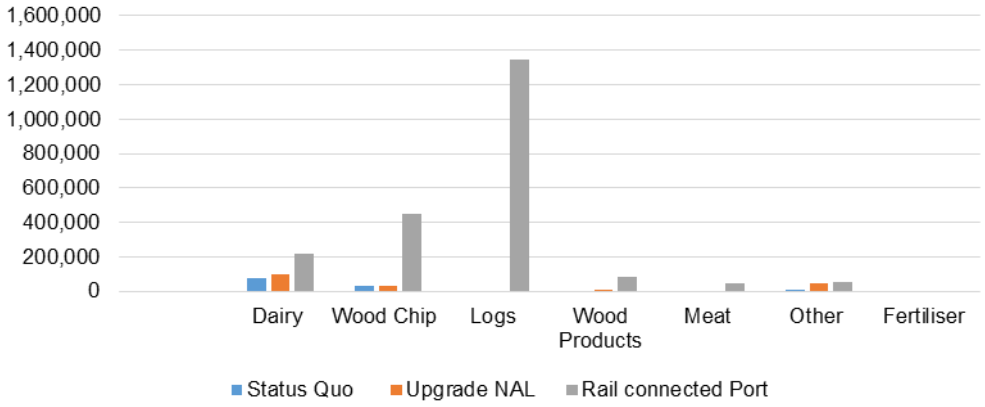
Table 13. Scenarios of the preferred way forward based on existing demand

Scenario	*Rail connected Port*
Scenarios derived from freight user discussion	
Central scenario	2,202,000
% of freight task	12%
High scenario	2,595,000
% of freight task	14%
Low scenario	1,879,000
% of freight task	10%

Source: Deloitte and AECOM analysis

3.55 A key reason why the potential freight task proportion is larger in Northland than elsewhere is the presence of heavy but low value commodity such as wood. The graph below shows the quantities in tonnes of expected commodities.

Table 14. The volume of freight, by commodity, central scenario



Source: Deloitte and AECOM analysis

3.56 There are a number of reasons why freight users may consider shifting from road to rail (see Appendix D for a discussion on mode choice drivers), including the ability of rail to transport high volumes, particularly import and export containers. Under the preferred way forward, current and future users will benefit from a higher degree of certainty of service, integration into the wider rail network, better connectivity to the North

[26] Based on current input values prescribed by the EEM, including $/tonne of carbon, value of life, user costs.
[27] National Freight Demand Study (2012), Ministry of Transport, escalated to 2018 based on 1.1% p.a. growth.

Island and the world and increased modal choice. Further quantification of these benefits should be undertaken as part of any next steps.

Cost of the preferred way forward (Rail Connected Port)

3.57 On a whole of life cost basis, the preferred way forward's total marginal net cost to government, compared to the Status Quo, is approximately $1.3 billion over 40 years on a discounted basis (Table 15).

Table 15. Marginal quantifiable costs and benefits (BCRn) of preferred way forward (PV discounted at 6%)

	Rail connected Port
Total rail cost	**$1,259 m**
Upgrade costs	$679 m
Rolling stock	$140 m
Annual capital cost	$52 m
Above track operating costs	$377 m
Below track operating costs	$12 m
Avoided costs	**$530 m**
Road operating costs	$377 m
Road maintenance cost	$153 m
Net costs (rail costs - avoided road costs)	**$729 m**

Source: Deloitte and AECOM analysis

3.58 The total proposed investment for the preferred way forward is estimated to be $729 million over a period of four years (in absolute 2018 values). These were estimated by Bond Construction (BondCM) for KiwiRail and include the cost of upgrading the rail, reopening mothballed lines and constructing new rail from Oakleigh to Marsden Point. BondCM did not carry out a formal risk analysis, instead adopting uplifts for risk to reflect their understanding of uncertainty around each section of the line. Uplifts were between 20% and 50% of the base cost.

3.59 The actual cost of upgrade is presented by section of track below. The largest cost incurred is to upgrade the Swanson to Whāngārei section of the track, at $356 million, followed by the new spur line to Marsden Point, at $329 million.

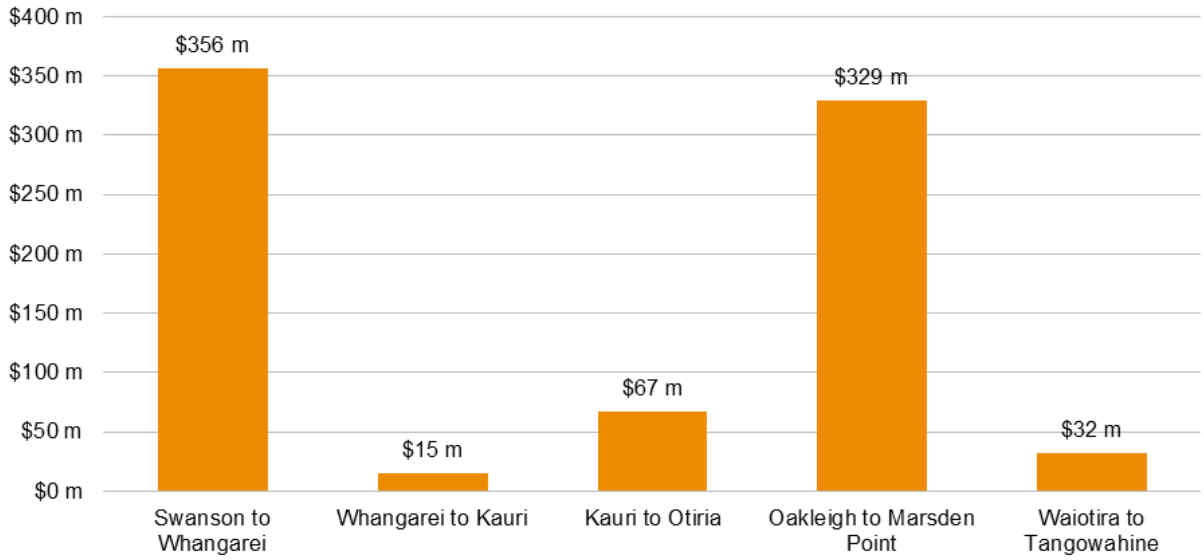


Figure 16. Cost of upgrade, absolute undiscounted costs, over 4 years (in 2018$)

Source: Deloitte and AECOM analysis based on KiwiRail data

3.60 The annual capital cost is then assumed to be around $3.0 million per year over 40 years, to allow for ongoing renewals and upgrades of remaining assets that are not required to be replaced in the initial upgrade. The PV is $52 million. These costs are explored more fully in the Detailed Evaluation section and in the Financial Case.

Assumptions and Limitations

This section presents the assumptions and limitations associated with the modelling. Evaluation methodology and road to rail scenarios are presented in Appendix G.

Limitations and procedure of the EEM

3.61 The EEM is the typically used as the base methodology for any land transport-related business case, to quantify costs and benefits associated with transport. For this business case, Simplified Procedures 8 (SP8 - Freight transport services) and Simplified Procedures 9 (SP9 - New public transport services) from the EEM were adapted and used to calculate costs and benefits.[28] Current and forecast freight volumes and operating costs are the key levers used in modelling options and scenarios, and are determined outside of the EEM, using assumptions set out below.

3.62 Inputs included:

- Indicative projected freight volumes based on stakeholder consultation;
- Capital and Operating Costs from KiwiRail;
- Average road transport rate based on stakeholder consultation and added margin;
- Average distance travelled by road;
- Average distance travelled by rail (based on proportion of the average distance travelled by road);
- Traffic data - AADT from NZ Transport Agency (using an average across the AADT for different segments along SH1 from Northland to Auckland) and
- Larger heavy commercial vehicles (HCVII) numbers removed from the road network based on the volume of freight that would shift to rail (using KiwiRail freight conversion methodology, development by KiwiRail with the NZ Transport Agency as part of the 2014 Rail Review).

3.63 Assumptions used include:

- Service provider rate of return per annum is assumed to be 5%. The expected service provider's rate of return is used to discount the balance of operating and capital costs, and revenue to determine the required funding assistance.
- In the absence of more detailed data for road, road and rail operating costs are assume to be comparable (sensitivities based on 75% and 125% of road costs were also tested).
- Road freight costs to the customer of $0.2 per tonne km, rail freight costs $0.15 per tonne km (sensitivities base rail costs of $0.10 and $0.20 are tested).
- The options were evaluated over a period of 40 years (2020-2060).
- All costs are in 2018 dollars (i.e. no inflation) and GST has not been included.
- Rail infrastructure is estimated to have an economic life of 100 years, rolling stock 30 years, tracks and other fixed infrastructure - 40 years. A terminal value is not calculated for the remaining life of the assets at year 40.
- Benefit parameters were established using the EEM as the start point.
- Cost estimates were derived from KiwiRail, and have not been peer-reviewed.

[28] SP8 is used for the evaluation of rail and sea freight transport activities, and SP9 is for new passenger transport services. Parameters for decongestion benefits are used from SP9 only and an assumption is made for how many passenger cars is equivalent for an average heavy truck. See: https://www.nzta.govt.nz/assets/resources/economic-evaluation-manual/economic-evaluation-manual/docs/eem-manual-2016.pdf

- Discount rate of 6% per annum (p.a.) (real).
- Congestion is applicable for 50% of the time that road freight spends travelling through Auckland. With some journeys in the off-peak, return journeys in the peak and for other journeys both trips are made at peak times. Sensitivities based on congested conditions at 25% or 75% of the time are tested).
- Average freight carried is assumed at 28 tonne per truck loaded (there is variability in the weight of goods, where the volume of freight occupies the capacity of the truck before it reaches its total mass – including for 44-46 tonne limits, 50MAX and full high productivity limits of 50-58 tonnes).
- HCVIIs representing 3 passenger car equivalents (sensitivities based on also 2.5 and 3.5 cars per HCVII is tested)

3.64 As noted above the Government has indicated it is reviewing the economic evaluation procedures, including the value of costs and benefits. This review is in large part a result of the concerns the Government has that land transport activities involving modes other than roads are not appropriately evaluated using current procedures. These reviewed procedures are not yet available, so the business case has applied the existing methodology as its start point.

3.65 Generally SP8 is used for a single freight transport service using an alternative mode (rail, barging, coastal), where the undiscounted funding gap is less than or equal to $5 million over three years. In this case, the funding gap is considerably larger than $5 million. Also multiple services are involved, for which undertaking an individual assessment is not practical. However, given that this is an indicative evaluation, the Simplified Procedures were deemed the most appropriate method of economic evaluation at this time.

3.66 Specific limitations of the EEM simplified procedures include:

- Step changes in volume not considered as part of the central scenario, as the simplified procedures only consider a linear increase. Step changes in volume in Year 1 have been considered as part of the road to rail scenarios.
- A result of shifting freight from road to rail is a reduction in HCVII travel, and therefore reduced revenue to the National Land Transport Fund (NLTF) from road user charges (RUC). The loss of this revenue to the NLTF is not included in the analysis as it is assumed to be a transfer payment and is assumed to be already accounted for in road operating costs.
- Existing values for the statistical value of life and serious injuries were used. The additional costs incurred to other road users, such as lost travel time from minor crashes involving heavy vehicles, were not calculated.
- Decongestion benefits have not been fully modelled using the Auckland Strategic Model, so assuming 50% congestion may not necessarily reflect congestion levels. Therefore decongestion benefits calculated using Simplified Procedures should be treated with caution as they may over or understate the benefits of freeing up road space for other road users.
- Conversion of HCVII (large and heavy trucks) to passenger car equivalents for SP9 is not explicitly prescribed in the EEM. Rather different options are given for converting a heavy vehicle (being a vehicle over 3.5 tonnes, including light trucks, trailers, buses and coaches) to different numbers of passenger vehicles depending on road types and road conditions. In this instance the business case has calculated the reduction in HCVII vehicles (defined in the EEM as trucks and trailers and articulated vehicles with or without trailers with five or more axles in total). These heavy vehicles operating in combination tend to be between 20-23 meters long today (compared with passenger vehicles that are mostly less than 4.8 meters). HCVIIs travel at a slower legal maximum speed of 90kmphs, compared to 100kmphs for passenger vehicles. They take longer to come to a complete stop and take longer to begin moving again at speed. Due to this the NZ Road Code sets out longer following distances for trucks and vehicles travelling behind trucks, of 6 seconds as opposed to 2 seconds for passenger vehicles. The central assumption used is 3 cars per HCVII, and 2.5 and 3.5 is tested.

Assumptions

3.67 The key assumptions used in cost and benefit modelling are listed below.

- Construction is assumed over a period of four years, with Marsden Point, upgrading of the existing line, and reopening of mothballed tracks to take place concurrently. Alternative staging of project is assessed in the sensitivity section and in the Management Case.

Table 16. Potential staging of works

Track section	Expected cost P50	Year 0	Year 1	Year 2	Year 3	Year 4
Swanson to Whāngārei	$356,000,000	0%	10%	60%	30%	0%
Whāngārei to Kauri	$15,000,000	0%	20%	40%	40%	0%
Kauri to Otiria	$67,000,000	0%	20%	40%	40%	0%
Oakleigh to Marsden Point	$329,000,000	0%	15%	35%	35%	15%
Waiotira to Tangowahine	$32,000,000	0%	20%	40%	40%	0%

Source: KiwiRail

- Total Northland freight volumes are calculated from the National Freight Demand Study (2012) and inflated by 1.1% p.a. to 2018.
- Growth in the freight volume is expected to increase by 2.0% p.a., in line with long term GDP forecasts.
- Freight volume estimates are based on existing potential demand.
- A more detailed discussion of road to rail scenarios and modal shift is presented in Appendix G.

3.68 Operating cost assumptions are listed below.

- No allowance is made for reduced asset costs that might result from better utilisation of Locomotive Engineers, Locomotives and Wagons.
- Train Costs have been calculated allowing for empty wagon moves as required.
  - For Log, Bulk Milk and Woodchip trains, an empty (return trip) train follows a loaded train
  - For Containerised trains, the analysis assumes utilisation of trains is 80%. Additionally, utilisation can vary by day of the week, month of the year as well as direction of the train.
- The requirement for double crewing of trains north of Helensville is removed with upgrade to network.
- DL Locomotives (50 tonne) able to run North of Auckland, with the exception of the Dargaville line.
- No allowance has been made in log train costings for the following costs:
  - Road costs to transport logs from to Rail head / Rail yard.
  - Any transfer costs incurred at Rail Head / Log Yard to transfer logs from truck to rail wagon. (estimated at $4 per tonne)
  - Any unload costs at Port
  - Any costs associated with operating log yard
    - Land Requirement (if not on KiwiRail Land)
    - Siding to connect log yard with mainline rail
    - Ground formation work required to make site suitable for log handling.
- Locomotive load constraints

Table 17. Assumptions made for locomotive load constraints

Section	Maximum axle load (tonnes) for representative consist	Maximum load (tonnes)	Representative consist for single loco	Representative consist for two locos
Auckland-Whangarei (or Marsden)	18	1750	950t for 1 DL	1750t for 2 DLs
Otiria-Marsden	18 (to be confirmed)	1300	950t for 1 DL	1300t for 2 DSS
Tangowahine-Marsden	16.3 (to be confirmed)	1430	850t for 1 DFB (or DSS)	1430t for 2 DSS

Source: KiwiRail

3.69 The following assumptions have been applied in relation to passenger services:

- Annual passenger patronage of 60,000 a year is assumed possible, based on other tourist focused passenger services in New Zealand. This assumption is tested in Appendix E: Detailed Passenger Rail Analysis.
- Adult price of $100 (return).
- The operating costs are related to the number of services, with the operating costs dominated by rolling stock and consumables such as fuel and labour.
- No additional capital costs are accounted for beyond $4.5 million for passenger wagons.
- Operating costs are assumed to be recovered by the passenger revenue with 250 passengers per day, 3 trips a week.
- Each passenger is estimated to spend $190 per night, based on the average spend per night in the International Visitor's Survey, and stay 2.2 nights in Northland (based on the average length of stay in the accommodation monitor). It is assumed that 25% of the 60,000 passengers are visitors to the region that would have not otherwise come had there not been a tourist rail.

Wider economic considerations

3.70 The impact on employment is not quantified in this report. A Computable General Equilibrium (CGE) model could be used to estimate the net impact of the construction activity on employment in Northland along with nationwide impacts.

3.71 CGE models simulate an economy's response to an economic shock – such as an extended period of intensive construction activity to upgrade and extend the NAL and build the Marsden Link. The modelling accounts for all markets and resources in an economy simultaneously, and captures the realistic crowding-out effects that can occur. For example, increased output in one market must come at the expense of reduced output elsewhere.

3.72 However the same benefit could be gained from many different types of activity. Any large scale construction project, whether it be on rail, road or buildings, will provide new jobs and an uplift to the local economy for the duration of the construction. While this is useful for a period, the impact is not enduring unless the investment itself provides support more generally across the economy to support new economic activity, increased private investment, greater productivity and ultimately more permanent jobs.

3.73 For this reason, the business case does not calculate or attempt to claim as a benefit the jobs that are created in Northland through the build period as a result of the construction activity.

Uncertainty Log

3.74 The following uncertainties have been noted when undertaking this business case.

Table 18. Uncertainty log

1.	Future freight volume growth is an unknown.
2.	Potential rail freight volumes are indicative only.
3.	No formal risk analysis was undertaken. Contingency is qualitatively applied to only those risks identified by estimators.

4.	Cost of transfer of freight from road to rail at railhead not included and unknown.
5.	Risk that revenue is less than forecast and the funding gap is higher than assumed leading to a lower BCRg.
6.	Upgrade work may disrupt rail freight volumes.
7	Whether the upgrade work undertaken during extended block of line is realistic.
8	Assumptions associated with Beca 2009 estimate of quantities (which were used by the estimators) are unknown.
9	The outcomes of other work streams currently underway that are unknown could materially change outcomes presented. In particular, the Government's review of land transport evaluation procedures, the Ministry of Transport led work around the future of rail, and the Upper North Island logistics study.

Detailed Economic Evaluation

3.75 This section provides analysis on the costs and benefits of the four short listed options. Specifically;

- Quantified costs
- Quantified and non-quantified (qualitative) benefits,
- Sensitises of key assumptions, and an alternative scenario of shifting freight through Northport.

Quantified costs

3.76 Indicative capital and operating costs were estimated for each option based on the above assumptions, high-level cost estimates prepared by Bond Construction (BondCM), and additional information provided by KiwiRail. At a high level, capital costs include fixed infrastructure and rolling stock capital costs. Operational costs include track maintenance and repair, terminal operation, train operation and maintenance, and other ongoing costs such as labour and safety case requirements.

3.77 Table 19 describes the comparison of discounted whole of life costs between the four NAL options. All costs are in addition to those associated with Status Quo.

Table 19. Marginal costs of short listed options (PV, discounted to 6% p.a.), in addition to the status quo

	Rail connected Port	*Upgrade NAL*	*Rail Connected Port + Tourism*	*Status Quo*
Total rail cost	**$1,259 m**	**$451 m**	**$1,381 m**	**$65 m**
Upgrade costs	$679 m	$345 m	$679 m	$20 m
Rolling stock	$140 m	$27 m	$144 m	$7.2 m
Annual capital cost	$52 m	$32 m	$52 m	$0 m
Above track operating costs	$377 m	$41 m	$495 m	$35 m
Below track operating costs	$12 m	$6 m	$12 m	$3 m
Avoided costs	**$530 m**	**$62 m**	**$530 m**	**$35 m**
Road operating costs	$377 m	$41 m	$377 m	$35 m
Road maintenance cost	$153 m	$21 m	$153 m	$0 m
Net costs (rail costs – avoided road costs)	**$729 m**	**$389 m**	**$851 m**	**$30 m**

Source: Deloitte and AECOM Analysis

Capital cost of upgrade

3.78 The marginal upgrade below-track cost of the Rail Connected Port option is estimated at around $679 million (discounted at 6%), as prepared by BondCM for KiwiRail. BondCM did not conduct a formal risk

analysis, instead adopting uplifts to reflect their understanding of the uncertainty around each section of the line to account for risk.

3.79 The cost estimates prepared by BondCM were broken down into track section. Rail capital costs are assumed to occur over a four year period.

3.80 KiwiRail estimates 65 bridges will be renewed in NAL upgrade, along with work on 13 tunnels. Together these costs comprise over a third of the entire cost to upgrade the NAL. These bridges and tunnel upgrades are required to be replaced if the track is to remain open safely. The following costs provide a breakdown of capital upgrade costs as calculated by BONDCM.

Table 20. Breakdown of capital upgrade costs, actual costs, undiscounted

	Swanson to Whāngārei	*Whāngārei to Kauri*	*Kauri to Otiria*	*Oakleigh to Marsden point*	*Waiotira to Tangawahine*	*Total*
Tunnels	$91 m	$0	$0	$0	$0	$91 m
Drainage	$4.8m	$1.7 m	$0.6 m	$1.1 m	$0.7 m	$15 m
Bridges	$15m	$0	$0.5 m	$0	$0	$20 m
Embankment works	$5.2 m	$1.3 m	$5.2 m	$0.07 m	$0.7 m	$13 m
Civil infrastructure - immediate	$7.6 m	$0.6m	$2.4 m		$0.8 m	$11 m
Civil infrastructure - investment over 15y	$18 m	$0.9 m	$3.5 m	$91 m	$1.9 m	$116 m
Other civil cost provisions	$20 m	$0.2 m	$2.0 m	$0	$0	$22 m
Rail track upgrades	$65 m	$5.0 m	$19 m	$102 m	$12 m	$204 m
Uplifts	$57 m	$1.2 m	$7.9 m	$79 m	$5.3 m	$150 m
Base cost	$285 m	$11 m	$52 m	$273 m	$22 m	$643 m
Risk and contingency	$71 m	$3.3 m	$15 m	$55 m	$11 m	$156 m
Total cost (P50)	$356 m	$14 m	$67 m	$329 m	$33 m	$799 m

Source: KiwiRail

3.81 The marginal capital upgrade cost of enabling passenger services is uncertain but expected to be relatively small. Costs accounted for are new passenger wagons ($4.5 million) and $118 million in operating costs in NPV terms over 40 years. Operating costs are for a train to run five services a week with 230 passengers on average per trip (60,000 a year). As discussed in the Strategic Case, there is little scope in the short to medium term of viable Intra-Auckland (north of Swanson), Intra-Northland, or Intra-City commuter rail, but there is potential for tourism rail. Tourism rail could run on the line if it were upgraded to an interoperable level.

Annual capital cost for renewals

3.82 Additionally, an estimated $3 million is the average annual capex required to renew the remaining assets that were not renewed during the initial upgrade. This is to account for the assets which do not need to be renewed immediately (for example they have been replaced recently) but will within the next 40 years. The total net present cost of these annual capital costs for renewals for the preferred way forward is estimated to be $22 million.

Rolling stock costs

3.83 Rail rolling stock costs were based on KiwiRail information. “DL” locomotives were costed at $4.5 million each, shunting locomotives at $1 million, and 60 tonne and 50 tonne wagons at $160,000 and $145,000 each. Wagons and locos are replaced after 30 years. Total net present costs for Rail Connected Port are $140 million, Rail Connected Port + tourism is $145 million and Upgrade NAL is $27 million. The status quo rolling stock costs are $7.2 million.

Maintenance and repair

3.84 Periodic refurbishments including 'over and above' routine planned and unplanned maintenance were $12 million (net present cost). For the closure of the rail (the Status Quo option), decommissioning costs were measured, as well as the release of assets for use elsewhere. In most cases, existing assets were near or fully depreciated. This cost had a net present cost of $3 million.

Above rail operation and capital

3.85 Above rail costs largely depend on the level of use. Above rail costs includes fuel, rolling stock maintenance, locomotive engineers, operation of rail terminals, handling associated with container terminals, and over heads. The breakdown of these costs is as follows (Table 21).

[redacted]

Benefits

Commercially Sensitive

3.86 There are a range of quantifiable and non-quantifiable benefits associated with upgrading the north Auckland rail network and building a rail connected port.

3.87 These quantified and non-quantified benefits, if realised, could support the transformation in the role and use of rail connecting Northland into the North Island, for the future prosperity and wellbeing of the people of Northland and wider. That is:

- To better connect Northland into Auckland and the rest of New Zealand.
- To improve the quality of service and choice for customers and enable better transport mode integration.
- To reduce the cost and impact of transport for customers and wider New Zealand road users.
- To encourage better use of existing infrastructure such as Northport.

3.88 The success of each option to achieve the benefits desired varies by option. The following section evaluates the level of success.

Quantitative Benefits

3.89 Where benefits are quantifiable, they have been estimated for each of the four shortlisted options. Monetary benefits listed in this section are expressed in PV whole-of-life costs, shown and discussed below.

Table 22. Marginal benefits, compared to the Status Quo, central scenario

	Rail Connected Port (preferred option)	*Upgrade NAL*	*Rail Connected Port + Tourism*
Decongestion	$158 m	$30 m	$158 m
Net user benefit	$41 m	$7 m	$41 m
Crash cost savings	$20 m	$3 m	$20 m
CO_2 cost savings	$16 m	$2 m	$16 m
Tourism expenditure			$123 m
Total benefits	**$236 m**	**$42 m**	**$359 m**

Source: Deloitte and AECOM Analysis

3.90 Given that the future is inherently uncertain, a number of assumptions were varied to test the robustness of the results and give a broader range of possible benefits. The following table presents the impacts of sensitising a range of assumptions, including the volume of potential demand for freight, degree of congestion present on roads and the number of cars per HCVII. More detail on these sensitivities is discussed below.

Table 23. Marginal benefits, compared to the Status Quo, range of sensitivities

	Rail Connected port (preferred option)	*Upgrade NAL*	*Rail Connected Port + Tourism*
Decongestion	$79m-$238 m	$19m-$56 m	$79m-$238 m
Net user benefit	$41m-$41 m	$4m-$5 m	$41m-$41 m
Crash cost savings	$17m-$24 m	$2m-$2 m	$17m-$24 m
CO_2 cost savings	$13m-$19 m	$1m-$2 m	$13m-$19 m
Tourism expenditure			$82m-$205 m
Total benefits	**$157m-$315 m**	**$25m-$63 m**	**$239m-$520 m**

Source: Deloitte and AECOM Analysis

Reducing the impact of road freight

3.91 An immediate outcome of upgrading and extending the rail network is the removal of a proportion of existing and future heavy trucks from Northland and Auckland roads. An estimated 10 million truck travel kilometres across the regions are expected to be avoided with full implementation of the preferred way forward. The ability to transport freight directly to and from the port would mean that rail is a viable option for a higher proportion of freight distributors in the Northland region than is currently the case. It would also provide optionality and a resilience benefit should another port in the North Island not be usable for a period for any reason. Extensive consultation with existing and potential freight users in Northland allowed estimation of rail to road shift resulting from each of the options examined.

3.92 Under the preferred way forward, approximately 10-14% of the future freight task could be carried by the rail network, up from less than 1% currently (based on tonnage moved). By comparison, the current proportion of the national freight task attributable to rail is approximately 7%.[29] For volume and distance moved (tonne-kilometre), the national average of rail modal share is 16% and Northland is 2.4%.

3.93 The following impacts arising a reduction in road freight are:

- Decongestion benefits
- User benefits
- Crash cost savings
- Greenhouse Gas (GHG) emissions reduction.

3.94 The Rail Connected Port option produces economic benefits of approximately $300 million over 40 years – across the four benefits described above (PV). These benefits are higher than those associated with the Upgrade NAL option, which produces economic benefits of approximately $40 million over the same

[29] National Freight Demand Study, (2012)

period. Adding tourism services on the preferred way forward produces additional economic benefits from passenger revenue, and an estimated $123 million in additional visitor spend (based on the assumption that 25% of users are visitors to Northland that would have not come otherwise and each visitor spends $190 per night and stays for 2.2 nights on average).

3.95 The largest component of projected benefits is avoided congestion-related costs (travel time savings to both Northland and Auckland), which account for over to 60% of total benefits for the preferred way forward. The next largest increase in benefits arises from net user benefits (due to lower cost of transport) and the third comprises of other externality benefits, such as CO_2 emissions and reduced crash risk.

3.96 "User Benefits" captures the difference between what a user would pay for rail versus road. Estimating revenue is difficult as it is dependent on commodity and distance travelled. A degree of price discrimination is also likely, based on the customer. For the purposes of this study, a simplifying assumption of $0.20 per tonne km for road and $0.15 per tonne km for rail is used, in that it is assumed that rail freight pricing is 75% of road freight pricing. This assumption is conservative and is sensitised to ascertain the degree it influences costs and benefits.

Improved journey times for remaining road users (decongestion benefits)

3.97 Removing freight traffic from Northland roads will deliver improvements in travel times for remaining road users. Reductions in road congestion would primarily benefit State highway users but the benefits extend past Northland and into Auckland, in terms of timeliness and the number of trips that can be completed for freight users and reduced travel time for other road users. The value from reduced congestion, and hence reduced journey times (and journey time reliability) for other road users accounts for the majority of quantified benefits.

3.98 The cost of congestion in Auckland is significant and increasing, with an average weekday motorway trip now taking almost 10 percent longer than it did four years ago.[30] For freight logistics increasing travel times caused by congestion, and events that close or slow the highways, has made the logistics task within Auckland and to points outside of Auckland more difficult, less reliable and more costly. This is particularly true for moving goods by road to and from the Ports of Auckland and MetroPort. Along with the increasing time it takes to get to the port, there have also been additional delays getting access into the port gates due to truck queues and the truck booking system. Unexpected travel delays due to worsening congestion can mean trucks miss their delivery windows.

3.99 Indicative estimates of the decongestion benefits of the preferred option show $146 million within Auckland is saved, based on an assumption that trucks from Northland are moving in congested conditions 50% of the time. When trucks are moving in free-flow traffic there is no benefit to other road users. For the Upgrade NAL option, the estimated decongestion benefit is $29 million.

3.100 For Northland, decongestion costs are estimated to be $12 million in the Rail Connected Port option and $1 million for the Upgrade NAL option. These are benefits derived from reduced travel on Northland's busiest highways, from Kawakawa down to and through Whāngārei, and on to the Auckland boundary.

3.101 Given that congestion costs contribute over 50% of these benefits, if it was assumed that trucks carrying freight to/from Northland moved within Auckland at peak or inter-peak at more than 50% of the time, the benefits would be much higher, as examined in the Sensitivity Analysis section.

User benefits

3.102 User benefits describe other non-price transport service impacts, such as improvements to trip quality and comfort. This business case adopts the consumer surplus methodology described in the EEM, which is based on the change in fare price. In this case, it is the difference in price per tonne km for road and rail. For the preferred option, the NPV service user benefits are $41 million for the 40 year modelling period and Upgrade NAL is $7 million.

[30] Phase One Report: The Congestion Question, Section 2.2

Safer roads and reduced accidents (crash cost savings)

3.103 Crashes involving trucks and the perceived crash risk to other road users from high truck volumes are a matter of widespread community concern. These concerns tend to be most acute in relation to log trucks in Northland due to the high volume of movements over the last ten years. The number of total crashes involving trucks in Northland accounted on average for 7% of total crashes in the region from 2007 to 2016 - despite Northland's population accounting for 3.4% of the total population. Over the same period, approximately 16% of crashes involving trucks in Northland resulted in fatalities. This indicates projects that lead to reduced truck movements on the road network are likely to have safety benefits.

3.104 The discounted social cost of truck accidents is estimated at $20 million over the 40 year modelling period for the preferred way forward and $3 million for the Upgrade NAL option.

Reduced environmental impact (emissions)

3.105 Society benefits could also be achieved from a reduction in environmental impacts from truck trips, as they contribute to local pollution through diesel emissions, dust, and material spillage. Road freight produces 16 times more carbon pollution than rail freight per tonne kilometre.[31] Road vehicle emissions rose 80% between 1990 and 2015 and made up 37% of all CO_2 emissions in 2015, meaning that the transport industry is well placed to materially contribute to reducing New Zealand's overall emissions.

3.106 Savings from reduced Greenhouse gas emissions that are the result of moving from road to rail as assumed in the preferred way forward compared to the Status Quo are $15 million over the 40 year period. Based on values sourced from the EEM, the cost of carbon was $40 per tonne.

3.107 Given the rural nature of Northland, benefits arising from noise pollution would be minimal. However, noise pollution of rail is considered to be less intrusive than road and rail freight can be consolidated to operate less frequently (due to higher per trip capacity). This value has not been quantified.

The public sector benefits from lower road maintenance costs

3.108 Heavy vehicles cause the vast majority of use-related wear and tear to New Zealand's roads. A reduction in truck movements in Northland will result in avoided maintenance costs to the New Zealand public and would slightly reduce the frequency of highway repairs and reconstruction. This would also marginally reduce the cost of road works on other road users, from travel time delays, damage to vehicles when travelling through road works, and the risk of road works and deteriorated road condition to more vulnerable transport users such as cyclists and motor cyclists. However, these values are not able to be quantified so are not monetarised.

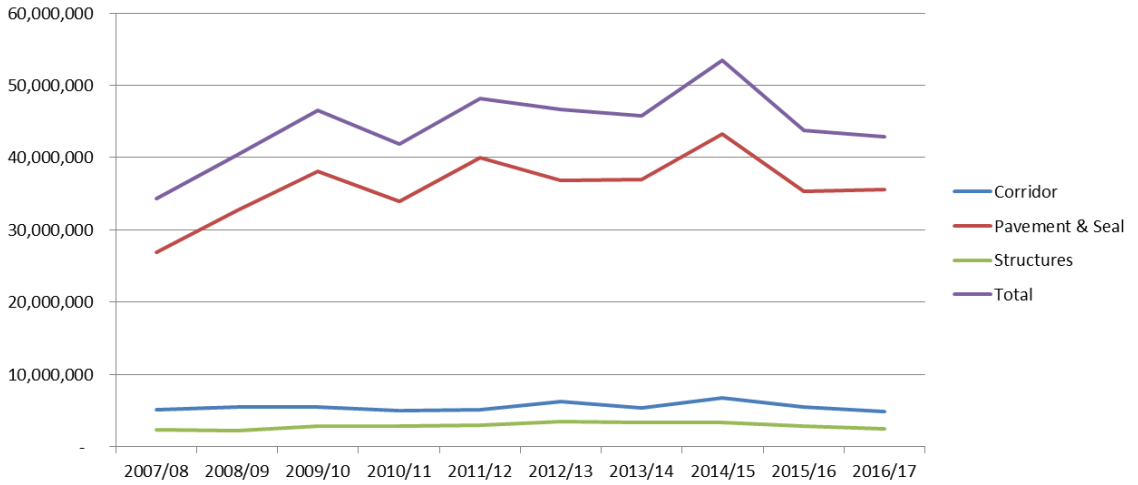


Figure 17. Northland State highway maintenance expenditure 2007-2016

Source: NZTA

[31] Deloitte Access Economics, 2017, Value of rail, the contribution of rail in Australia.

3.109 The total net present value of avoided maintenance cost for the preferred way forward by moving freight by rail instead of road is estimated to be $153m. For the Upgrade NAL option, the benefit is $21 million.

3.110 The forecast level of RUC collected can be used as a proxy for road damage cost, as it is intended to cover the costs of damage that vehicles cause to the road. RUC is paid by vehicles over 3.5 tonnes. However, RUC is only calculated at a national level, so the amount of RUC 'spent' in Northland is unknown.

Tourism as a growth enabler in Northland

3.111 Northland attracts both international and domestic tourists and benefited from the recent boom in tourism in New Zealand. Figure 18 shows the number of domestic and international visitors to Northland Region has increased. Domestic tourism in particular has been on an upward trajectory, with around a third of domestic visitors coming from Auckland. The tourism spend by visitors from Auckland to Northland was $303 million for the year to September 2018. The increase in demand is reflected in higher annual average accommodation occupancy rates, with 30% occupancy in the year to July 2018. This remains below the national average, but much higher than the 23% seen in the July 2014 year.

Figure 18. Big Steam Event, Easter 2018

Photo: NZRailPhotos

3.112 Australia is the largest source of international tourists to Northland, with over 83,000 visits in the year ending June 2018. Together, European visitors make up around 150,000 visits. The Far North was the most popular holiday destination, with the Bay of Islands the likely key destination.

3.113 Scheduled passenger services do not operated north of Swanson railway station. However, as identified in the Strategic case, there is an opportunity to attract more visitors to Northland through providing a range of unique experiences. There has also been an increase in the number of cruise ships anchoring in the Northland region – mostly in the Far North. The first cruise ship to berth at Northport in Whāngārei is scheduled for 2021. Given the significant growth of cruise ship tourism in New Zealand over the last decade, it is expected that up to 60 cruise ships will call into the port over the following five years.

3.114 At present, the only location where cruise ships anchor in Northland is the Bay of Islands. In the 2017/2018 season, 103,525 cruise ship passengers arrived in Northland and spent over $14 million. Cruise tourism's contribution to the New Zealand economy continues to grow, with estimates it will continue to do so at around 12% per annum. In the June 2018 year cruise ship expenditure in New Zealand was $434 million, up 18.3% from 2017. There is an opportunity to look at rail to bring Cruise ship passengers further inland on day trips to see attractions, improve their experience and in doing so spend more money in Northland. A well-run rail offering, including a rail link to the port, could help facilitate this as it does in other places like Dunedin.

3.115 To estimate the impact of additional tourists in Northland, an assumption of 60,000 passengers per year with 2.0% growth a year was used. Each passenger is expected to spend $190 per night, which is the average spend per night in the International Visitors Survey. According to the Commercial Accommodation Monitor, guests stayed for 2.2 nights in Northland. It is assumed that only 25% of tourists came from outside Northland. Based on these assumptions, the net present value of tourism expenditure is $123 million over 40 years. See Appendix E for detailed passenger analysis.

Wider economic benefits

3.116 Rail services are an enabler to Northland and the regional context. Any improvements to rail services will assist in the delivery of regional economic benefits. While these benefits cannot be directly attributed to this project, the potential benefits are linked.

3.117 Regional economic development benefits considered in this section include:

- The link between transport and regional economic growth
- Creating jobs and supporting employment
- Encouraging specialisation in industry clusters
- Improved resilience of the Northland region by having more than one freight transport mode
- Better access to international markets

3.118 The wider economic benefits have been evaluated based on the level of benefit each option is expected to generate (Table 24). A discussion of these benefits follows.

Rating evaluation	
	No benefits are expected to be generated
	Some benefits are expected to be generated
	Significant benefits are expected to be generated

Source: Deloitte and AECOM analysis

Table 24. Benefits Expected

Benefit	Status Quo	Upgrade NAL	Rail Connected Port	Rail Connected Port + Tourism
Supporting jobs and employment				
Supporting growth industries				
Supporting new industries				
Improved resilience of the Northland region by having more than one freight transport mode.				
Better access to international markets				
Improved supply chain and modal choice for freight users				
Certainty and quality of service				

Source: Deloitte and AECOM analysis

Impact of options on Northland's regional development

The link between transport and regional economic growth

3.119 The link between economic growth, transport investment and innovation is evident throughout history. This was true of colonial New Zealand, with the development of rail and road infrastructure, and is especially true of developing economies. Although there is less scope for the sort of rapid growth from transport investment seen then, for Northland significant improvements in productivity and economic expansion could be realised through investment in transport networks. Furthermore transport is a form of economic activity in its own right, and makes up over 5% of New Zealand's GDP.

3.120 The initial impact of transport investment for Northland could be seen in a number of different ways, including increases in jobs; travel time savings; lower vehicle operating costs; and economic growth. Increases in jobs in Northland would be derived from the construction of rail infrastructure and assets, as well as the operation and maintenance of an upgraded and extended rail network. Travel time savings for remaining road users and lower vehicle operating costs are also tangible benefits from an initial investment. Importantly, beyond the initial benefits there are significant and positive long-term impacts on economic growth from investments in transport. These long-term benefits include productivity gains from increased opportunities for trade, competition and specialisation. Further, the improvement of transport networks offer businesses the opportunity reorganisation of their production, distribution and land use, simultaneously realising cost savings and promoting growth.

3.121 There is a two-way effect with transport investment. New connections from improved transport networks could stimulate new economic activity. However it could also draw economic activity away from the regions. The key to realising economic growth depends on investment in transport being included in a wider package of measures aimed at supporting growth in the regions. A net improvement approach in economic development should be taken to ensure that regional economic gains are not at the expense of the surrounding regions. There is a risk that the majority of regional impacts may come solely from the transfer of economic activity from one region to another, as opposed to a nation-wide net increase.

Creating jobs and supporting employment

3.122 The construction phase and ongoing maintenance of an upgraded North Auckland rail line could support job growth within the Northland region. The Whāngārei District could benefit from the upgraded port potential a rail connection to Auckland would offer, with its greater natural catchment area, potentially providing new employment opportunities, and accelerates wider revitalisation of the areas around the edge of Whāngārei Harbour.

3.123 The influential Eddington Transport Study (2006) identified transport as reducing inefficiency in labour markets, and lifting access to and flexibility of jobs. For Northland, the channel through which this could occur is through increased business investment and innovation through lower cost of transport and costs of trading, increased accessibility to international and domestic markets, industry specialisation and market expansion.[32]

3.124 Implementation of all options (aside from the Status Quo) could drive up labour demand, the extent to which depends on the length and scale of investment. The Rail Connected Port option could see an immediate and strong lift in demand for employment in Northland's construction and engineering sectors. However, there are a number of interlinked sectors that will also benefit – such as hospitality, construction services, and retail. This is due to a higher number of people working in the region. If the operations at the port itself were to increase, then this would also provide additional jobs – noting that some of these jobs may be transfers from other locations such as Auckland.

3.125 Once the preferred option is completed, improved accessibility to Auckland and the upper North Island will increase the competitiveness of Northland as a region. This great degree of connectivity may encourage some businesses to establish or relocate to Northland, where land is relatively affordable (compared to Auckland) and in abundance – particularly industrial land at Marsden Point.

[32] The Eddington Transport Study (2006), Part 1

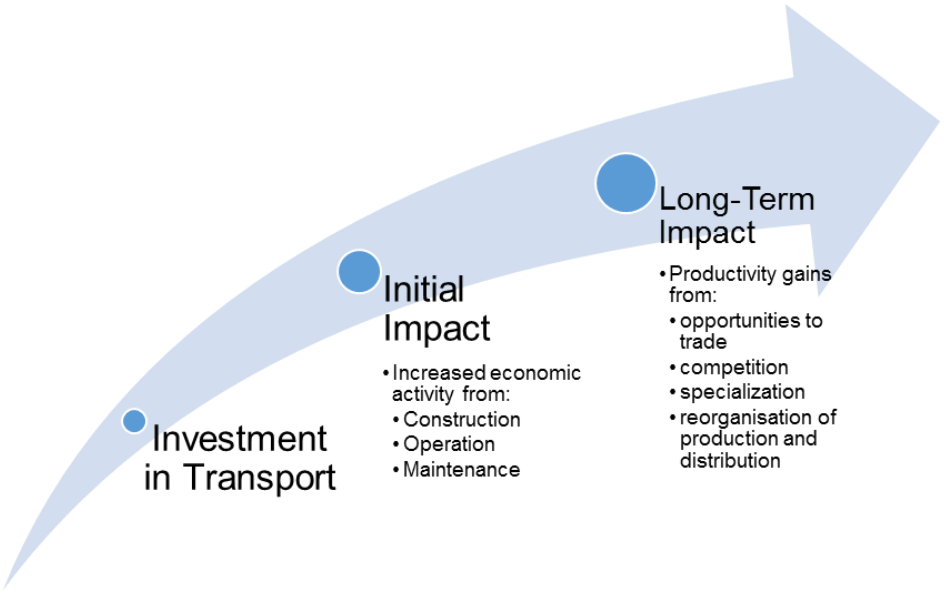


Figure 19. Economic impact of investment in transport

Source Ministry of Transport, 2016

3.126 Northland's labour market also has room to accommodate this growth: for instance, the average annual underutilisation rate (which is the proportion of people working less hours than they want to) in Northland was 14% in the year ending September 2018, which is well below the 2013 average of 20%, but still above the national average of 11.8%.[33]

3.127 Estimating the precise number of new jobs resulting from the four short listed options is difficult. Employment growth in Northland was 3.6% in the March 2018 year and 3.2% p.a. in Whāngārei. This growth is above the national average of 3.0%, but well below that of other cities in similar proximity to Auckland such as Hamilton and Tauranga City, which grew 3.6% and 5% in the March 2018 year, respectively. Furthermore, enterprise growth was negative across Northland generally and just 0.3% in Whāngārei.[34]

3.128 If Whāngārei was to achieve the same employment growth as Hamilton did in the year to March 2018, a marginal increase of 0.4%, then over 12 years the number of additional jobs filled could be around 2,000. Reaching the same growth of Tauranga would see an increase of close to 10,000 new jobs over this period.

Table 25. Potential employment created under growth rate scenarios over 12 years

	Marginal increase of 0.4%	*Marginal increase of 1.8%*
Job growth in Whāngārei	1,937	9,424

Source: Deloitte Analysis

Encouraging specialisation in industry clusters

3.129 Enhancements to the rail network could be a catalyst for increased specialisation in existing industries or growth in new industries by making Northland a more attractive place to invest in through better connectivity within the region, particularly to Auckland and beyond. Reducing the cost of transporting goods between locations — which decreases the effective distance 'between two points — transport improvements can promote trade, increase competition and variety, and facilitate specialisation in economic activities.[35]

3.130 The efficiency of similar industries, companies, consumers and workers sitting in close physical proximity to each other generates 'spill-overs', meaning that the combined economic value of the industries is worth

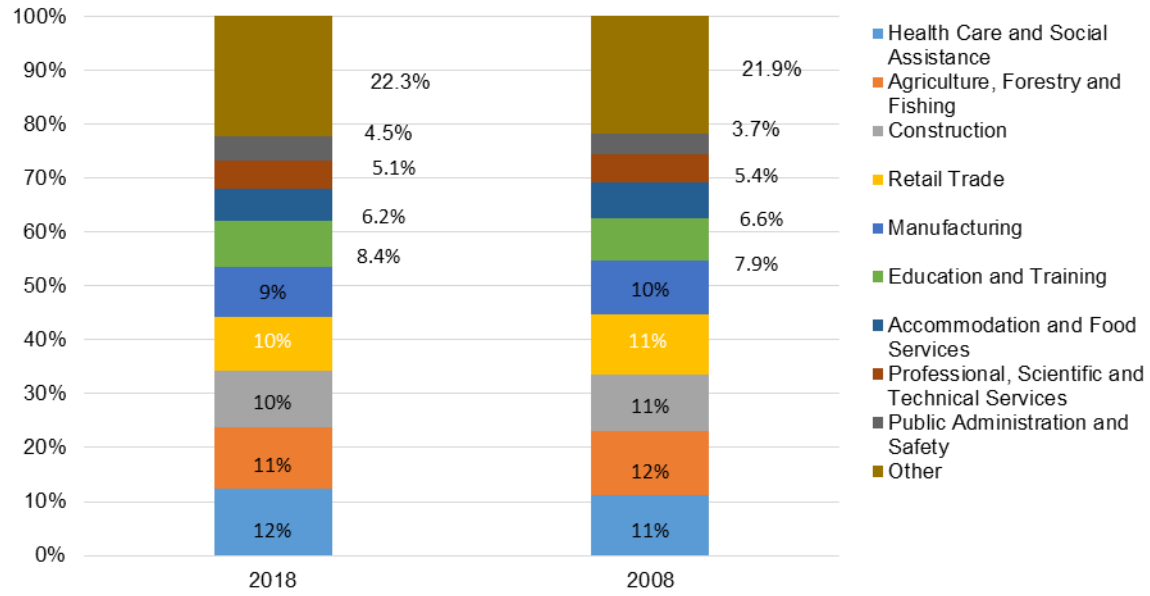
[33] Infometrics
[34] Infometrics
[35] Krugman, P, Geography and trade: Gaston Eyskens Lecture Series. Cambridge, 1991, MA: The MIT Press.

more than the sum of their parts. This concept is known as economies of agglomeration. Interactions between similar people and businesses stimulate creativity and innovation amongst each other, increasing the productive capability of resources. Industrial agglomeration occurs when there is a concentration of skilled labour, where there is access to specialised inputs, and when there are technology spill-overs.[36]

3.131 Northland is relatively concentrated in primary sector related industries and could grow jobs through its core strengths in strengths in horticulture, dairy farming, and forestry. Northland's petroleum and coal production manufacturing industry contributes 6.8% of the national's GDP. Wood product manufacturing, fishing and aquaculture, forestry and logging, and horticulture and fruit growing are among other industries which are highly concentrated in Northland. Additionally, Northland also has emerging opportunities in high value industries such as marine manufacturing and other advanced manufacturing industries.

3.132 Yet these industries have not contributed to employment growth in recent years, with population being the primary driver of job creation. Between 2008 and 2018, health care and social assistance accounted for 25% of new jobs. Over the same period, education training, public administration and safety and administration and support services contributed 15%, 13% and 10% to new job growth, respectively. Financial and insurance services and professional, scientific and technical services were the largest growth industry in terms of new businesses. The following graph shows the structure of the Northland labour market, by industry.

Figure 20. Employment by industry group, 2018 and 2008, March years



Source: Infometrics

3.133 Manufacturing is one of the largest contributors to Whāngārei's GDP, and accounts for 10% of jobs (around 4,000) in the city. Wood product manufacturing is the largest subindustry by employment, employing 2.1% of Whāngārei's labour force. Economies of value add processing are complex and historically challenging and would be subject to case by case assessment. However, considering forestry products are the largest commodity group produced by volume in Northland, there is value that could be derived by businesses moving up the supply chain. A significant proportion of domestic and international exports are sawn lumber, and processing could move to include structural engineered wood products such as cross laminated timber. As Auckland continues to face demand pressure for new housing, with an estimated 40,000 shortfall in homes, so too will demand for more innovative wood products. Other forms of pre-fabrication in factory type settings are possible too. Increased rail connectivity to the rest of New Zealand and through a rail connected port could enable Northland to be responsive to this demand.

3.134 Whāngārei also enjoys comparative advantages in the marine manufacturing industry, which includes local expertise in heavy engineering repairs and superyacht refits. This highly skilled cluster of industries is the second largest in New Zealand, after Auckland. The region is also conveniently located for both

[36] Lakshmanan, T.R, The broader economic consequences of transport infrastructure investments. *Journal of Transport Geography*, 2011, 19(1) 1–12

commercial and recreational vessels visiting from offshore, and will soon be home to a 560-tonne travel lift to hoist super yachts and other large vessels out of the water.

3.135 Globally, industries are emerging that could present opportunities for new businesses. Rail investment on its own will not open these opportunities, but it could complement other economic development initiatives in the areas by making the region area more accessible and better connected. Over the next 20 years, agribusiness is expected to among the fast growing industries worldwide. As a region based on primary production, Northland is well positioned to take advantage of this growing industry. Ensuring on-farm productivity gains has been the recent focus of the agribusiness industry, resulting in increased export volumes and 'doing more with less'.

3.136 Additionally, increased land-use pressure on traditional horticultural and processing areas such as Pukekohe and the Bay of Plenty could create opportunities for Northland. Consumers are increasingly looking beyond the traditional preferences of price and convenience, to include health and wellness, safety, social impact and broader taste experiences. This shift in what lies behind food purchasing decisions presents a meaningful opportunity for the food processing industry.

Improved reliance of the Northland region by having more than one freight transport mode

3.137 Road transport takes up by far the largest share of freight movements in Northland, at 90% (by tonne-km), compared to 70% nationally.[37] Northland's increased reliance on road transport is much higher than the national average because of the rapid decline in Northland's rail volumes over the last 20 years. Due to its long, skinny geography Northland the main intra and inter-regional freight connection is State Highway 1 (SH1). The region is also completely dependent on SH1 to move around 35% of its outbound down to Auckland.

3.138 A freight system that is impaired by shocks is less able to provide lifeline functions, such as the supply of food, medical supplies and other basic community functioning. It is also less able to perform the movement of goods required for economic activity. The ability of the freight system to support economic activity in the face of shocks is important to New Zealand's economic success. The economic losses from the Kaikōura earthquake, including tourism losses, but excluding infrastructure reinstatement costs, have been estimated at $465 million over two years.[38] In other words, retaining rail would also increase resilience in the event of a natural disaster or break in supply chain.

Better access to international markets

3.139 A key channel through which transport investment enhances economic growth and productivity is international and domestic trade, according to a study by Lakshmanan[39]. With the implementation of the Rail Connected Port option, travel cost reductions, quicker and easier access to markets accessibility to markets of local businesses expands to regional, inter-regional, and international markets.

3.140 In the year ending March 2018, 9 million tonnes passed through Northport, 5.7 million of this was exports and 3.4 million was imports.[40] These exports were primarily made up of logs and wood products. In 2017/18, an estimated 3.8 million cubic metres was harvested from Northland's forests. International demand is expected to remain solid and will support prices for exporters. Key risks to momentum are an economic slowdown in China and sustained softness in the domestic construction market. The largest constraint to exports is supply constraints.

3.141 Northland itself exports other goods aside from logs through other ports. In the June 2017 year, Northland produced 1.1 million trays of avocado for export, around 50% of national avocado exports and 3.3 million trays of Kiwifruit to Zespri. Furthermore, just under 90 million kilogrammes of milk solids were produced in Northland during the 2017/18 season, and had a national share of 4.8%, which are currently exported from the Port of Tauranga.[41]

[37] National Freight Demand Study, 2014, p.2 (based on 2012 data)
[38] Analysis carried out for the Ministry of Transport by Market Economics Ltd
[39] Lakshmanan, T.R, The broader economic consequences of transport infrastructure investments. Journal of Transport Geography, 2011, 19(1) 1–12
[40] Freight Information Gathering System, Ports and airports
[41] https://www.nrc.govt.nz/media/13429/economic-quarterly-issue-22-december-2018.pdf

3.142 Connecting Northport to the rail network could, given the proximity of our largest city, allow for increased competitiveness in the flow of international exports and potentially imports. The reduction in the supply price of export commodities makes goods produced in the region relatively cheaper for overseas buyers, which may result in an increase in international exports as the region becomes relatively more competitive internationally over the long run. Stronger and more efficient land transport connections to Northport, including rail which would be essential to allow the port to manage large volumes of containers from a larger catchment area, would enhance the long run offering of the port. It would also provide significant option and resilience value for import/export logistics in the upper North Island. There is, however, no current accepted methodology for quantifying these benefits.

3.143 As such, in the sensitivity section below, a scenario whereby Northport processed freight at rates in line with its potential capacity as a full-function deep-water port is explored. This assumption is hypothetically predicated on a scenario whereby Northport processes a large proportion of containerised freight moving to and from Auckland.

3.144 It is important to note that under this hypothetical scenario, there is no inherent uplift in freight in Northland itself. Rather it is a transfer of freight from another port (most likely Ports of Auckland) to/from Northport and to/from appropriate supply chain distribution points within Auckland. This would be a major shift to the way in which supply chains are currently organised in Auckland and this business case does not attempt to quantify the costs (or benefits) associated with this. The best way to look at this scenario for the purposes of this business case is that the Rail Connect Port provides a meaningful option value, since it would not be possible without a good rail connection to Northport to contemplate any such shift. This scenario is an attempt to quantify the benefits of this option value.

3.145 Clearly, such a shift – additional to providing some de-congestion benefits to Auckland (described in the Sensitivity section) – would also imply that international shippers then visit Northport and this could provide benefits to other companies in Northland through more convenient access to international shipping lines. It could also encourage companies to locate (or relocate) in Northland, in the same way that construction of the Kaimai rail tunnel in the 1970s enabled the process of Tauranga becoming a nationally significant export port and the surrounding area an important industrial hub.

Impact of options for current and future freight users in Northland

Improved supply chain and modal choice for freight users

3.146 Improved choice of transport mode is a benefit to freight shippers which could materialise in productivity improvements. The outcome is better access to domestic and export markets, which would support higher regional GDP.

3.147 An interoperable rail network improves supply chain options for current freight users. The preferred way forward allows current road operators to use other modes as part of an integrated logistics solution or when time permits, capacity overflows, goods are oversized or overweight, or when road operators cannot generate targeted return at agreed rates (such as a lack of backhaul for inter-island cargo).

3.148 A more efficient rail network increases competitiveness relative to other transport models. Less competition between modes means a greater reliance on one mode and therefore can lead to higher costs and lower efficiency for producers.

3.149 However, in many markets, including Northland there may be little competition between modes. Typically one mode is more efficient and effective for various product markets. As a general rule, road freight is more cost-effective over shorter distances, but rail; especially with large and heavy freight is more cost effective over longer distances. Customers who have time-critical deliveries, often perishable goods, use road freight, but if there is less urgency rail is often a better option over longer distances.

3.150 Therefore road and rail can complement each other and be part of an integrated supply chain and logistics – referred to as “intermodal freight”.[42] Such ‘intermodal’ freight services are said to be ‘complementary’, in

[42] See: Department for Infrastructure, Transport, Regional Development and Local Government, Road and rail freight: competitors or complements? https://bitre.gov.au/publications/2009/files/is_034.pdf; David Aitken, Road and Rail Freight is Complementary, https://www.natroad.co.nz/Story?Action=View&Story_id=2179

the sense that if the demand for one falls demand for the other also falls. However, such intermodal road–rail freight tasks can often be substituted by road-only freight services.

Figure 21. Truck and trailer (HCVII) in Whāngārei heading for Auckland

Photo: AECOM 2018

3.151 This is true for Northland, where after Fonterra, rail freight's second biggest customer is the road freight transport industry. Over the last decade some of the biggest nationwide trucking companies have made a conscious decision to move less-urgent freight by rail. Using a hub and spoke model, the freight is picked up and delivered to and from intermodal terminals with the first and last mile made by a truck or van. While Northland is relatively close to Auckland for this model to work, increasing road congestion in Auckland may make this model more attractive for some types of freight.

Certainty and quality of service

3.152 A key theme that emerged from stakeholders was that providing a greater longer-term certainty around significant infrastructure is essential. Greater surety allows the private sector, local government and government organisations to make better complementing decisions around the use of that infrastructure.

3.153 Certainty of transport linkages enables decisions to be made as to other infrastructure investment, such as building a new factory or plant, which utilises the rail infrastructure.

3.154 Measuring the effect that certainty and quality of service has on users would be difficult, partially in the short term. Longer-term benefits arising from greater certainty could include better supply chain considerations and long-term retention of freight users.

Sensitivity testing

3.155 However well risks are identified and analysed, the future is inherently uncertain. Sensitivity testing is used to test the vulnerability of options to future uncertainties and test the robustness of the ranking of the options.

3.156 This section presents the results from sensitising key assumptions along with including a significant transfer of freight volumes to Northport from Auckland. The assumptions sensitised are:

- Freight demand. The low scenario provides a greater level of certainty as to the degree of modal shift expected and the high scenario includes freight which users have reported to be conditional on a number of things, such as pricing or a shift in their current logistics modal.
- Decongestion. The central scenario assumes that decongested conditions are present for 50% of truck trips through Auckland. The high scenario assumes that congested conditions are present for 75% of the time and 25% in the low scenario.

- Rate of return. The central assumptions assume a required rate of return of 5%. 4% and 6% is also tested. The rate of return is only relevant for the BCRg calculations as it affects the size of the funding gap required to make the service commercially viable.
- The number of cars per HCVIIs has implications for decongestion benefits. The central assumption is three cars per HCVIIs, however, depending on the gradient of the road, it could be 2.5 or 3.5.
- Costs are inflated by 18% to account for optimism bias and uncertainty.
- Patronage. 60,000 passengers per year assumption is sensitised to test higher and lower tourist volumes.
- Price per tonne kilometre is sensitised to be in line with road pricing and higher than road pricing.

Table 26. Summary of assumptions used in the high, central and low sensitives

	High	*Central*	*Low*
Freight demand (tonnes/pa)	2,595,000	2,202,000	1,879,000
Decongestion (% of time congested conditions exist)	75%	50%	25%
Rate of return	6%	5%	4%
Number of cars per HCV	3.5	3	2.5
Costs (low is 150% of cost)		100%	150%
Freight growth (pa)	4%	2%	
Operating costs (% of road)	75%	100%	125%
Price per tonne km	$0.20	$0.15	$0.10

Source: Deloitte and AECOM analysis

3.157 Table 27 summarises results of the BCRn and BCRg for the preferred way forward. Increasing freight demand to include freight that was described as highly conditional lifts the BCRn (the ratio of benefits and costs incurred by all of society) to 0.36 in the preferred way forward. However, if congested conditions are present for 75% of the time, then the BCRn increases to 0.44. The BCRg, which is value returned to society for each $1 that government invests in the investment, is most sensitive to expected revenue. If rail pricing is $0.20 per tonne km, then the BCRg lifts to 1.27, due to lower ongoing government assistance required. Similarly, 4% p.a. growth in freight volumes produces more revenue, and consequently decreases the level of funding assistance required for the service to be commercially viable.

Table 27. Sensitivities performed to test assumptions

	BCRn		*BCRg*	
	High	*Low*	*High*	*Low*
Freight demand (tonnes/pa)	0.36	0.32	0.79	0.46
Decongestion (% of time congested conditions exist)	0.44	0.22	0.78	0.39
Rate of return	0.34		0.75	
Number of cars per HCV	0.37	0.30	0.64	0.52
Costs (low is 150% of cost)		0.34		0.43
4% growth	0.33		1.01	
Operating costs (% of road)	0.37	0.29	0.77	0.47
Price per tonne km			0.38	1.27

Source: Deloitte and AECOM analysis

Staging of works

3.158 Which parts of the project to invest in first has implications on costs and benefits. The central scenario assumes that works are undertaken for all options concurrently over a period of four years. For the Rail Connected Port option, there are reasons why considering alternative staging should be considered, such as the availability of labour. Maximising the cost benefit ratio involves completing aspects of the project that deliver the most value first, or which sections of the track have the best BCR.

3.159 The spur line to Marsden Point is costly but enables the highest magnitude of benefits, due to the high road to rail modal shift that occurs when the port is connected. Together with the addition of the mothballed lines north of Whāngārei (Whāngārei to Kauri and Kauri to Otitira) the spur line enables a marginal increase in freight volumes above 1,000,000 tonnes.

3.160 However, without an upgraded NAL along with the reopened and upgraded mothballed lines north of Whāngārei (Moerewa to Whāngārei), the port link does not realise these benefits. This is because a large proportion of the freight volume expected is wood, originating north of Whāngārei. Currently most of this bulk freight is trucked by road to Northport or moved within Northland for processing. Some volume is moved by road and rail to Bay of Plenty for further processing. If the Marsden Point spur line was constructed without a suitably interoperable rail line at origin and down through Auckland, much of this freight would continue to be moved by road. The BCR falls from 0.32 to 0.19, as shown in Table 29 benefit cost ratio (discounted at 6% p.a) for Rail Connected Port staging scenarios.

3.161 There is potentially a case for not reopening as the Waitiria to Dargaville line. Reopening the mothballed Dargaville line (Waitiria to Dargaville) enables just over 120,000 tonnes of logs to be transported by rail instead of road. The capital cost to reopen the line is estimated to be $26 million in net present value. Without reopening the Dargaville line, the BCRn lifts to 0.33 (from 0.32).

3.162 An additional consideration is New Zealand's tight labour market, which is currently facing workforce capacity constraints, meaning that it might be difficult to employ enough labour to concurrently upgrade the NA line as well as build a new spur line to Marsden Point.

3.163 If construction occurred over five to six years, rather than the central assumption of three to four, then the BCR falls to 0.24. This scenario assumes no benefits from a road to rail shift is realised until year seven. Costs are spread out over a longer period, but the later date of benefit realisation means that benefits are discounted at a higher rate overall, decreasing the NPV of the option. Alternatively, if the line was incrementally improved over a period of 10 years, some freight would be enabled on the network and some benefits would be realised earlier.

Table 28. Alternative staging option

Between	Length (km)	Expected cost P50	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Swanson to Whāngārei	181	$356 m	0%	10%	30%	30%	10%	10%	10%
Whāngārei to Kauri	14	$15 m	0%				20%	40%	40%
Kauri to Otiria	54	$67 m	0%				20%	40%	40%
Oakleigh to Marsden Point	20	$329 m	0%			15%	35%	35%	15%
Waiotira to Tangowahine	34	$32 m	0%				20%	40%	40%

Source: Deloitte and AECOM analysis

3.164 The following table summarises the BCRs from these three staging options. Further consideration of staging should be undertaken to determine the optimal timeframe.

Table 29. Benefit cost ratio (discounted at 6% p.a) for Rail Connected Port staging scenarios

	BCRn
Rail Connected Port w/o Otiria/Moerewa	0.19
Rail Connected Port w/o Dargaville	0.33
Extend works over five to six years	0.24

Source: Deloitte and AECOM analysis

Alternative demand scenario of inter-regional freight through Northport

3.165 Estimating the effect of a significant shift in freight volumes between Northport and Auckland is outside the scope of the analysis. However a possible future scenario was considered to test the potential strategic option value of the rail connection between the port and the city. This scenario assumes that a significant volume of freight is shifted between Auckland and Northport. Many costs of significantly increasing freight volumes through Northport have not been quantified and there are a number of limitations of this analysis. Therefore the BCR and associated costs and benefits should be interpreted as a rough indication.

3.166 A reasonable longer-term scenario is that around 400,000 containers (TEU) could be handled through Northport, with 100,000 containers (TEU) moving within Northland and 300,000 TEU to and from Auckland. With its planned and proposed developments (assuming investment in additional cranes), Northport estimates it could have the capacity to handle this many containers. The key question would be whether the port could attract this volume from beyond Northland. The constraints and additional costs of moving and storing containers within urban Auckland is a well-known problem. As Auckland grows some importers and exports might look to Northport and the Marsden Point area as a place to establish or relocate their businesses to take advantage of the storage space and potentially more cost effective logistics. Some freight volume destined for Auckland is already landing at Northport, to be road transported to Auckland when required. This model only works because the storage costs (including double handling) in Auckland outweigh the additional costs of moving the freight to/from Auckland. (See Appendix D for a more detailed discussion of the potential factors that might disrupt current trade flows).

3.167 The Marsden Rail Link and an upgraded NAL would be essential to enabling such a development. Assuming 300,000 containers were moved to and from Auckland, this would need up to 1,000 truck trips (500 each way) each working day. Alternatively the task could be handled by 12 trains a day (around six each way) carrying up to 80 containers (TEUs) each. To test this, the following scenario estimates the benefits expected with an additional 300,000 TEU trains each day between Auckland and Northland.

3.168 This sensitivity was tested using the EEM Simplified Procedures with a key simplifying assumption that this capacity is utilised in the short term - on completion of the rail upgrade. This is consistent with the other scenarios modelled and therefore enables a straight comparison of BCR results. Key caveats to be aware of with this test are:

1. Costs of $100 million have been included for additional cranes and operational costs increase linearly with freight volumes. Additional costs are not included.

2. In reality the throughput would not ramp up in a single year, more likely over 10-20 years.

3. Key benefits relate to reduced congestion within the Auckland metro area. The modelling takes a very simplified approach to calculating how this would flow through to travel time savings for other road users. The tools currently available do not allow for sophisticated analysis of how shifting container flows from within Auckland onto the North Auckland Line, would impact on different parts of the Auckland metro transport network. What is clear is that there would be a congestion reduction benefit and it would be significant. But this would need to be modelled in detail in order for it to be quantified.

4. The scenario estimates the potential benefits using the same assumptions as other scenarios in terms of travel time savings to road users within and outside of urban Auckland, and crash and emission reductions.

3.169 The BCR for this scenario is 1.19. Costs that are quantified include the above rail operational expenses, including fuel, labour, rail terminal operation, locomotive and wagon repair and maintenance, and other freight costs and overheads. These are assumed to increase linearly with additional freight volumes. However, it is more likely that there are efficiencies gained with additional freight volumes.

Table 30. Summary of results

	Rail Connected Port (preferred option)
Decongestion	$192 m
Net user benefit	$41 m
Crash cost savings	$76 m
CO_2 cost savings	$59 m
Tourism expenditure	
Total benefits	**$369 m**
Total Rail costs	$2861 m
Total avoided road operating and maintenance costs	$2552 m
Net costs (rail costs - avoided road costs)	**$309 m**
Benefit Cost Ratio (BCRn) National	**1.19**

Source: Deloitte and AECOM analysis

3.170 Over half of benefits in this scenario arise from decongesting Auckland's roads. Varying this assumption has a significant effect on the BCR, as presented below.

Table 31. The effect on the BCRn of varying the congestion assumption

% of time congested conditions exist	*BCRn*
75%	1.50
25%	0.88

Source: Deloitte and AECOM analysis

4. Commercial case

4.1 The Commercial Case provides an initial assessment of the most commercially viable approach to procuring the preferred way forward for investment in the Northland Rail, in terms of attractiveness to potential suppliers and providing long-term value-for-money (VfM) to the New Zealand government.

4.2 This section sets-out:

a. The overarching context and objectives that the procurement strategy should consider;
b. A high level assessment of the required services for procurement;
c. A preliminary comment on procurement options relevant to the preferred option;
d. An overview of market capability and market engagement; and
e. Potential risk apportionment between Ministry of Transport, KiwiRail, and third parties, including potential suppliers.

Outlining the procurement strategy

4.3 For the purposes of this commercial case, there is no assumption as to the procuring body of the rail investment, which is likely funded either through Crown equity, a Vote allocation, the National Land Transport Fund, or retained profits. Procurement of rail assets has typically been performed by KiwiRail as the national network owner and operator. However, to ensure that all options are considered (including going directly to market), KiwiRail is not necessarily assumed to be the procuring body. This question will be clarified by the Future of Rail policy work being undertaken by the Ministry of Transport.

4.4 If the Government were to proceed with the preferred option it is assumed that the procurement objective would be to procure an outcome rather than an asset. That is, procuring a solution that transforms the role and use of rail connecting Northland to the wider North Island, for the future prosperity and wellbeing of the people of Northland and New Zealand. The resulting capital asset would be an important part of this, noting that this business case does not address future ownership of the asset.

4.5 The aim is to deliver the investment on a best-value basis, keeping in mind that this does not necessarily mean the cheapest. The Procurement Strategy should consider the trade-offs, foundations and requirements for value for money, while taking logical sequencing factors and project dependencies into account.

4.6 There is a critical relationship to the Management Case since value for money can as easily be undermined by poor governance as it can be by suboptimal commercial practices.

4.7 Procurement considerations need to be made within the context of:

- The role of KiwiRail, as New Zealand's only national rail freight transport provider;
- The current investment requirements of Government to procure, operate and maintain rail assets;
- The current situation of rail in New Zealand including interoperability of the network, funding arrangements, safety-case, and other legal or regulatory requirements and obligations;
- The potentially limited pool of suppliers and the risk of cost escalation; and
- Ministers' decisions in regard to the Future of Rail policy project.

Commercial objectives

4.8 Draft commercial objectives have been developed to guide overall procurement options development and selection processes, these should be developed as more information is obtained and can then inform the evaluation criteria used to quantitatively evaluate the shortlist of procurement options. These objectives should be read within the broader context of the objectives set out within the Strategic Case and picked up in the Economic Case.

1. **Value-for-money -** The procurement strategy maximises value for money

   In traditional procurement processes, maximising value for money typically suggests opening up the project to national and/ global suppliers in order to increase competition.

   However, the procurement strategy should be conducive to supporting regional economic growth, as set out in the Strategic Case. Increasing the capacity and ability of domestic suppliers may be an acceptable trade-off for limiting supplier competition and could be seen to represent value for money.

2. **Fit for purpose -** The procurement strategy ensures that the assets and outcomes delivered by the project are fit for purpose, as set out in the Strategic Case, including interoperability of the North Auckland Rail Line with the wider KiwiRail network.

3. **Innovation and incentive** – the procurement strategy incentivises the introduction of best practice and, where appropriate, innovation in delivering the desired outcomes.

4. **Optimal risk transfer** –the procurement strategy allocates risks to the party(s) best placed to manage them.

5. **Accountability** – the procurement strategy provides an optimal level of accountability of service providers and contractors.

Required services

4.9 If the project were to go ahead through a competitive tender process (or multiple processes), a detailed technical specification is required to establish the basis from which potential tenderers could bid from. At a high level procurement will be considered across the following areas of outcome delivery. Even if the project was to be delivered through a direct appointment, the same detailed technical specification of services required.

4.10 The following assets or services would be required to be procured, by one or more suppliers:

- Under-track infrastructure, including civil land works.
- Above-track assets, including signalling
- Rolling stock
- Operation of network

4.11 **Upgrading of the existing line** - including upgrading or replacing bridges, upgrading tunnels and other infrastructure along the NAL. It also includes buildings and signalling requirements which satisfy track and use requirements, and ensuring that KiwiRail maintains its Safety Case. Outcomes sought include:

- Northland is more connected into the domestic economy and international trade;
- Improved quality of service and choice for existing or potential future customers;
- Modal shift from road to rail, better use of existing infrastructure;
- Lower cost and impacts of transport, including costs to the environment; and
- Infrastructure that is fit for purpose, opening up future opportunities for businesses.

4.12 **Building of the Marsden Point Spur line** – including construction of this line to Marsden Point with the same capability and service offerings as the upgraded NAL (up to 2000 tonne trains, 18 tonne axle loads, and tunnel clearances for up to IMEX (10’6”) containers).

4.13 Outcomes sought:

- Northland is more connected into the domestic economy and international trade;
- Lower cost and impacts of transport, including costs to the environment; and
- Modal shift from road to rail, better use of existing infrastructure.

- Open Northland up to international trade by having a port that is connected by more than one transport mode

4.14 **Rolling stock procurement** - Rolling stock needs to be interoperable with the rest of national rail network to maximise efficiency across the entire network with minimal double handling, and open up more opportunities and modal choice for freight users in Northland. The number of rolling stock to be procured will be dependent on a detailed assessment of the future fleet requirements of the network, as part of a DBC. Outcomes sought:

- Modal shift from road to rail, better use of existing infrastructure; and
- Northland is more connected into the domestic economy and international trade.

4.15 Within each of these outcomes, the contract could be split further into asset category, and by type of service or expertise. The procurement approach should consider options for design, construction, funding, ownership and ongoing maintenance and operation and could be managed in whole or in part by a Government Agency, with support from KiwiRail. Alternatively it could be managed by KiwiRail with support from other Government Agencies. Financing the project should be considered in light of current financing and funding arrangements, with consideration given to alternative funding models, such as a Public Private Partnerships (PPPs) or other alternative financing mechanisms.

Procurement Methodology

4.16 The procurement approach adopted across the project varies depending on existing delivery capacity from suppliers and market capacity and capability, particularly with respect to regional capacity and mobility of people and services to and within the Northland region.

4.17 A number of procurement arrangements are possible to deliver the project. The majority of solutions are asset based, but there are opportunities for alternative delivery solutions, including PPPs.

Procurement models

4.18 Procurement models that are appropriate to the NAL renewal and Marsden Link are:

- Traditional/staged delivery models
- Multiple Contracts (Design and Build or Design-Bid-Build)
- Design and build
- Design bid build
- Collaborative Arrangements (Alliance)
- Public Private Partnership

Contract provisions

4.19 Key contractual provisions will be informed by choice of delivery model, the scale and scope of investment, capacity of KiwiRail and suppliers and timeframe of investment.

4.20 These key contract provisions that will be considered at a DBC stage include the payment mechanism, length of contract, key contractual clauses, and implementation milestones.

Market capacity and engagement

Industry capacity

4.21 According to estimates provided by KiwiRail, potential Government investment is $799 million. The provisional capital expenditure profile over the construction period of the preferred option based on current estimates is set out below over four years.

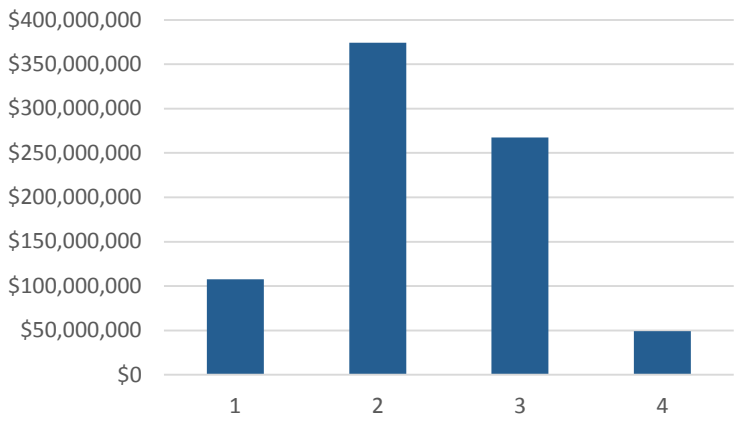


Figure 22. Expenditure profile of the preferred option

Source: KiwiRail

4.22 Although the proposed investment is not a significant increase from current levels of expenditure, a key constraint on the infrastructure sector is the supply of labour. This capacity constraint is particularly evident in Auckland.

4.23 According to the Ministry of Business, Innovation and Employment's 2018 national construction pipeline report national infrastructure activity is expected to increase from $6.9 billion in 2017 to $7.3 billion in 2023. These forecasts include transport, water, and subdivision projects that were planned in the six years from 1 January 2018 to 31 December 2023 for which building and construction activity is forecast in this report and is based on Statistics New Zealand March 2018 release of 2017 Gross Fixed Capital Formation data.

4.24 There are a number of projects taking place in the upper North Island which could limit the capacity of the supplier market. Infrastructure projects that have begun or are likely to start within the next year that are over $100 million include:

- City Rail Link Stations/ Tunnels
- City Rail Link Linewide Systems
- AMETI Panmure Corridor Phase 2
- Upper Harbour Highway Motorway to Motorway
- Northland Transportation Alliance (NTA)
- Egmont Roads Maintenance, among others.

4.25 Therefore it may be necessary to time the delivery around other projects or open the tender up to international suppliers. Alternatively, the delivery could be slowed, to allow local capability to be developed (See the Management Case for some options on this).

Market engagement

4.26 The market has not been engaged to ascertain the level of interest.

Potential for risk sharing

4.27 The Government has the ability to influence the commercial result through contractual terms, ensuring the optimum balance between risk and return, with risk borne by the party best able and willing to deal with it. An initial assessment of how the associated risks might be apportioned between the organisation and potential providers is outlined in the risk allocation table below. Parties which may be responsible for risk are shaded orange.

Table 32. Potential Risk Allocation

Risk Category	Potential Risk Allocation			
	MoT	KiwiRail	Related Govt. entities	Third parties, inc suppliers.
Design risk	■	■	■	
Construction and development risk		■		■
Transition and implementation risk	■	■		■
Availability and performance risk		■		■
Operating risk		■		■
Variability of revenue risks	■	■		
Termination risks	■	■		■
Technology and obsolescence risks	■	■		
Control risks	■	■		■
Residual value risks	■	■		
Financing risks	■	■		
Legislative risks	■	■		
Other project risks	■	■	■	■

Source: Deloitte

5. Financial Case

5.1 This Financial Case sets out the early estimations of the affordability of the preferred way forward including capital and operating expenditure as well as revenue generated over the appraisal period.

5.2 Commensurate with the detail required at this stage of the business case, a financial model has been developed leveraging the existing Cost Benefit Analysis model to provide consistency of assumptions (where appropriate), inputs and timing across the preferred way forward identified in the Economic Case and analysed here in the Financial Case.

5.3 Note this option excludes passenger rail services.

5.4 The assessed preferred way forward is below and consists of three elements;

- Firstly, to renew and upgrade Auckland to Kauri line and to bring the line up to a modern freight standard.
- Secondly, construction of a branch line to Marsden Point (the Marsden Link).
- Thirdly, reopening of the Kauri to Otiria to Morewea, and Dargaville Branch lines.

Assumptions

5.5 A number of assumptions have been made which should be subjected to further analysis at the next stage of business case development.

5.6 Revenue is assumed to be generated from one primary source; freight user charges. Revenue generated from freight users here excludes revenue generated by existing freight operations over the next 5 years, this aligns with the status quo option assumptions, notably that the network beyond Swanson will be inoperable within 5 years. This is seen as a robust assumption given the deterioration and limitations of the existing line and the lack of agreed funding and planning for any future rehabilitation of the line.

5.7 Freight User Revenue has been derived based on significant engagement with potential freight customers, existing generators of freight and econometric modelling of forecast demand in key industries such as forestry over the coming 40 years.

5.8 Three escalation rates have been applied to reflect the anticipated inflationary pressures on the final costs of the scheme over time. The rates assumed are based on Treasury calculated inflation rates:

- Construction Price Inflation at 4%, applied to capital costs;
- Labour Price Inflation at 1.7%, applied to wage related costs; and
- Consumer Price Inflation at 2% for all other costs.

5.9 Construction on any of the three project elements is highly unlikely to begin earlier than 2021 noting that further feasibility, detailed design and consenting needs to take place. The construction costs themselves have been phased to follow a typical S-curve while fitting within construction timing parameters supplied by KiwiRail.

5.10 For this appraisal, capital charges have been excluded. At the present time the funding approach that might be adopted is uncertain, options include private financing mechanisms, Crown equity advances to KiwiRail and a range of other possibilities. It is noted that the Economic Case discounts future costs and benefits at a real discount rate of 6% which could be considered a proxy for the cost of capital.

Financial Appraisal

5.11 To develop an understanding of the affordability and fundability of the project, the preferred option has been analysed under the proxy assumption that costs would be incurred by KiwiRail and thus the net imposts would fall on KiwiRail as a State Owned Enterprise. Any revenues or costs that are expected to be realised by KiwiRail from existing operations (i.e. if no investment into NAL was approved and

implemented), is excluded from the analysis. Therefore total actual budget requirements for operating rail north of Auckland over the entire period basis will differ from the figures shown here.

5.12 Total project costs are estimated to be $3,646 million (inclusive of risk) over the 40 year appraisal period in nominal terms. This translates to $724 million net cost, once forecast revenues are included. A breakdown of the nominal costs of the project is presented below.

Table 33. Breakdown of nominal costs (000s)

Commercially Sensitive

Cost Breakdown (000s)					
	FY19 - 28	FY29 - 38	FY39 - 48	FY49 - 58	Total
Capex	(1,014,946)	(101,159)	(73,156)	(49,503)	(1,238,764)
Opex	(226,480)	(500,921)	(711,290)	(968,941)	(2,407,631)
[redacted]					

5.13 Capital costs in nominal prices are estimated to total $1,239 million (inclusive of risk) over the 40 year appraisal period. [redacted] In other words, from an operational perspective, excluding depreciation, interest (financing) and tax (EBITDA) the North Auckland Line would not require subsidy over the majority of the project life as detailed further below.

[redacted]

Figure 23. Cumulative costs and revenues

5.14 Risk and contingency of 20% has been included in this financial analysis for operational expenditure (opex), utilising typical rates of risk used by KiwiRail, noting the stage, planning detail and knowledge of existing project delivery budgetary impacts. Capital costs include a weighted average risk rate of 24%, this has been derived based on specific risk rates attributed to sections of the proposed NAL by KiwiRail, that are weighted depending on each sections proposed capital cost.

5.15 Capital costs peak in the second year of the project, assumed to be financial year 2020 based on existing project plans and phasing. There may be some potential to smooth the costs and negate some of the negative financial implications, through targeted phasing of the project although the benefits of this approach may be offset by escalation in construction costs. This should be explored in the next phase of the project.

Commercially Sensitive

Figure 24. Cost and Revenue profile

5.16 EBITDA forecasts show that revenue is larger and grows more quickly than opex leading to an operating profit in FY22 which is forecast to increase further over the appraisal period. As a sensitivity test, the effects of removing the 20% risk allocation to the operating budget are presented. It can be seen that this significantly improves EBITDA.

Figure 25. EBITDA forecast (000s)

5.17 Reflecting the split in KiwiRail's business into above and below-rail components, the below tables separate the costs to show the impacts relative to these budgets. Below rail costs include but are not limited to the following elements:

- Tracks;
- Signalling;
- Ballast; and
- Sleepers.

Commercially Sensitive

Table 34. Above rail cost breakdown (000s)

	FY19 - 28	FY29 - 38	FY39 - 48	FY49 - 58	Total
Capex	(135,447)	(23,698)	(35,033)	(49,503)	(243,682)
Opex	(216,598)	(481,604)	(687,743)	(940,237)	(2,326,182)

[redacted]

5.18 Revenue is included in the above rail cost breakdown and excluded from below rail. Above rail cost consist of:

- Fuel;
- Rolling stock maintenance;
- Wagon maintenance;
- Engineering staff;
- Rail terminal opex;
- Container terminals opex; and
- Other freight costs.

Table 35. Below rail cost breakdown

	FY19 - 28	FY29 - 38	FY39 - 48	FY49 - 58	Total
Capex	(879,498)	(77,461)	(38,123)	-	(995,082)
Opex	(9,882)	(19,317)	(23,547)	(28,704)	(81,449)
Total	(889,380)	(96,777)	(61,670)	(28,704)	(1,076,531)

5.19 Risk and contingency form approximately 20% of opex and 24% of Capex, separating these out as per the tables below gives an indication to the value of contingency funding which should be allocated based on existing mechanisms to manage this level of risk exposure. For completeness the capital costs excluding risk have also been included.

Table 36. Risk only cost breakdown (000s)

	FY19 - 28	FY29 - 38	FY39 - 48	FY49 - 58	Total
Capex	(247,258)	(24,644)	(17,822)	(12,060)	(301,784)
Opex	(45,296)	(100,184)	(142,258)	(193,788)	(481,526)
Total	(292,554)	(124,828)	(160,080)	(205,848)	(783,310)

Table 37. Cost breakdown excluding risk (000s)

	FY19 - 28	FY29 - 38	FY39 - 48	FY49 - 58	Total
Capex	(767,688)	(76,515)	(55,334)	(37,443)	(936,980)
Opex	(181,184)	(400,737)	(569,032)	(775,153)	(1,926,105)
Total	(948,872)	(477,251)	(624,366)	(812,596)	(2,863,085)

5.20 A detailed breakdown of the annual spend can be found in Appendix R.

Funding Options

5.21 There is currently no committed funding identified to deliver the preferred Northland rail project option. There are a number of sources of potential funding, including the Provincial Growth Fund (PGF), which initial conversations have highlighted as a potential source for at least some of the required funding.

5.22 At this stage of the project funding and financing of the project has not been determined. Key next steps should be to develop the funding strategy further including:

- Discussions with Central Government funders;
- Discussions with Local Government funders;
- Consideration of the potential for private financing, possibly through a Public Private Partnership; and
- Consideration of the potential for 3rd party funding such as those businesses that may benefit from the line via some form of value capture mechanism or up-front funding contribution by key beneficiaries such as Northport.

5.23 Central government, through the Provincial Growth Fund, has committed to investing $1 billion a year over three years (2018–2021) in regional economic development to lift productivity potential in the provinces. Tai Tokerau/Northland has been identified for early investment and funding. The priorities of the Fund investments are to:

- Link to fund and government outcomes;
- Provide ‘Additionally’ i.e. not to duplicate efforts;
- Connected to regional stakeholders and frameworks; and
- Governance, risk management and project execution.

5.24 The National Land Transport Fund (NLTF) uses revenue collected from Fuel Excise Duty, Road User Charges, Motor Vehicle Registrations, surplus State highway land disposal and Crown allocations.

5.25 Auckland Transport and Auckland Council may see tangible benefits in the form of reduced congestion, improved journey times as well as safety benefits in moving freight from road to rail. These benefits within an Auckland context are unlikely to provide for a compelling funding case for regional authorities.

5.26 Northport itself will likely benefit from the scheme although the degree and the timeframe to how much is unclear currently and a potential stance of the port will be that it is simply a movement of existing trade to another form of transport and will not materially impact trade. Installation of the Marsden Link for current trade will have the effect of creating significant cost for Northport, as it integrates the railway into its operations, without additional revenue. The construction of the Marsden Link in advance of additional freight will likewise create significant costs for the port, without revenue. If other complementary projects are committed to, that increase volumes through Northport, as a primary beneficiary, further discussion and agreement for the scheme funding should be pursued.

5.27 The existing level of funding available for operation of existing freight services and rail operations allows for an ongoing funding surplus in the operational budget.

6. Management Case

Recommended programme of work

6.1 As this business case is running parallel with an implementation assessment project run by KiwiRail, a full management case of the project is not possible at this time due to the level of unknowns (such as committed freight volumes) . Based on what is known at this point the following activities are recommended, subject to further information and programme development from KiwiRail.

Programme staging

6.2 While significant components of the NAL are at the end of their economic life, much of the NAL still has significant working value left in it. There are also cargo owners who have indicated they could increase their volumes in a short period of time, given the right service levels were in place. As such much of the investment in the upgrade of the NAL could happen progressively over up to a 10 year period, depending on the optimal timeframe desired. There are also some major 'linchpin' capital costs that would need to happen in a concentrated timeframe, to unlock the potential of the whole network.

6.3 Potential staging could include:

- Undertake further discussions with potential users, including commercial negotiations. Only through better understanding the wider policy context, the Government's objectives for land transport and the real intentions of cargo owners can the rail investment proceed in the short-term.
- Develop a dedicated commercial start-up unit within KiwiRail to work with industry on the potential future commercial use of the rail network in Northland. Providing a focused resource within Northland will ensure that opportunities in the region can be progressed, without the needs of KiwiRail's substantive business taking precedent.
- Establish a formal iwi Māori and community engagement initiative. This initiative will work with affected landowners, communities, whānau, hapū and iwi on the potential opportunities and challenges of reintroducing rail services in the north of Auckland and in Northland. In some places trains have not operated for decades, which may mean that surrounding landowners may have concerns about the loss to them of amenity and liveability through their reintroduction. The aim of this initiative is to develop mutually advantageous solutions and to ensure that potential rail activities are supported by those directly affected.

6.4 If the Government wishes to progress aspects of the work concurrently with further discussions with potential rail users, thought could be given to:

- An early start on Marsden Link. Begin land purchase and detailed design for the Marsden Link. This would provide confidence to industry and other decision-makers that the rail line will become a reality. This will enable optimal planning and investment decisions on their behalf and affected parties. Protecting the corridor from further development, namely the creation of additional road access points and securing its connection to the port now, will potentially reduce the cost to all parties of doing this in the future. Securing the land corridor now will also provide certainty for affected landowners and mana whenua interests.
- A programme of minor upgrades and repair to the railway between Otiria to Portland. With some minor improvements and rolling stock, some log freight trains could begin operating in the short-term.
- A safety audit and education campaign for track and level crossing safety would be required. As trains have not operated in some areas for some time, or at low frequencies, the reintroduction of trains may present an additional safety risk as people will not be familiar with the risk. A similar approach was undertaken following the reintroduction of train services at Kaikōura. For more detail see Appendix H.
- Minor upgrades could begin on the remainder of the NAL from Portland to Swanson, through the provision of an annual allocation.

6.5 For substantive investment following a decision by Government, work may proceed with:

- The upgrade of the NAL tunnels, however, would require focused attention that keeps to a minimum the disruption to freight movements. There is value in undertaking this work rapidly in one programme, which would require the line to be taken out of service. Once the restriction on high-cube containers is removed, and depending on the availability of rolling stock and locomotives, additional volume could be moved on the line.
- Physical works for the Marsden Link could begin once the corridor is secured and a detailed design is completed, specifically to ensure functionality with the port. Due to the significant cost savings that could be achieved, serious consideration to undertaking the works in conjunction with an upgrade of SH1 from Whāngārei to the SH15 roundabout should be considered. As the main highway and the proposed railway share a corridor, the marginal cost of undertaking physical works has the potential to unlock value and savings similar to the joint work carried out by KiwiRail and the NZ Transport Agency in the Kaikōura infrastructure reconstruction work.
- Thought should also be given to the development of inter-modal terminals at key locations. These terminals will be critical for brining freight volumes to and from the rail network efficiently. Development of these hubs will need, apart from private sector customers, local network planning to make allowances for changes in truck travel to and from the hubs – including increasing truck travel on some roads. Locations to be explored, on the basis of commercial negotiations, include potentially:
  - Otiria (logs and/or containers)
  - Moerewa (containers, inter-modal) – subject to local agreement
  - Tangowahine (logs)
  - Maungaturoto (containers, inter-modal)
  - Whāngārei (containers, inter-modal) this site could be redeveloped or relocated.
  - Wellsford (logs)
  - Helensville (logs)
  - Kumeū (containers, intermodal)
  - As confirmed freight volumes are known the Dargaville Branch Line could be reinstated and reopened to services. Though current freight indications are that this is unlikely to be viable in the short-term
- The line to Moerewa could also be reinstated due to the potential for container movements from that catchment area. But as the corridor is now used for other purposes by the community it should only be reinstated with the consent of adjoining landowners, affected whānau, hapū and the wider community. Alternatively containers could be road bridged a short distance to a container transfer site at Otiria.
- Options for reinstating the line to Kaikohe and Okaihau, raised during iwi Māori engagement, should be the subject of specific investigations, in a similar way as other proposed land transport activities are developed and accessed. This would depend on potential freight volumes. In those areas also the corridor, while still in place, is now used for other purposes and affected landowners, whānau and hapū may be adversely affected by any reinstatement.

6.6 It is important when looking at the NAL and the Marsden Link not to assume that the investment is entirely ‘all or nothing’. Some smaller parts of the network can have minimal or no investments while the proven freight or tourism potential is confirmed. Just and the highway network is improved on a progressive basis, including minor and major works depending on their merits, so to could improvements be made to North Auckland’s and Northland’s rail infrastructure.

7. Conclusions

7.1 The renewal of the North Auckland Line and the construction of the Marsden Point Rail Link are, using traditional transport assessment tools, marginal projects. While they will deliver in part on the Government's regional development and transport policy objectives the identifiable benefits will be less than the indicative costs of building and operating the rail infrastructure. While the rail investment will measurably mitigate some of the problems associated with road transport to, from and within Northland, the region will still require ongoing upgrades to its road and highway networks to improve access, safety, productivity and regional development.

7.2 However the two potential rail investments, which are inherently linked, do provide considerable future strategic option value for providing significantly improved connectivity for heavy industry and freight volumes between the flat industrial area around Marsden Point and the natural deep-water access at Northport. This proposition has been discussed for almost 20 years, with many significant stakeholders wanting a definitive decision to allow them to develop their own long-term planning within this context.

7.3 As there is no current proven demand for either the NAL renewal or the Marsden Link, further work is need to secure greater certainty from likely users of the line. Unlike most infrastructure built in New Zealand, this investment is not responding to existing demand. Rather, investment in the NAL and the new link to the port will be lead infrastructure made in advance of, and to stimulate, freight demand. Such an investment can only be made on the attributes of the origin and destination that this rail connection will serve, these being our largest economic centre – Auckland and Marsden Point with its freight handling and industrial potential.

Regional development potential

7.4 The analysis of potential utilisation of the rail network, including strategic considerations over the next forty years lead to the following conclusions.

- Potential freight demand, based on feedback from potential users of rail freight, suggests between 1.8 to 2.5 m tonnes of freight could move to rail if the price of cartage and services levels were appropriate. Of all the options the inter-operable, port connected option would carry the most volume both between Northland and Auckland, and within Northland itself.
- The increasing cost of road transport and the lack of a rail option is having the effect of making it harder to do business in Northland. This may result in the region moving backwards. Upgrading the NAL and providing the Marsden Link will provide an option for some cargo owners to move a proportion (up to 5-7%) of the region's freight.
- The renewal of the NAL and the construction of the Marsden Point rail link will provide an initial benefit of increased local economic activity, as well as the potential to train younger Northlanders in infrastructure projects. This workforce could then be used in future infrastructure projects across Northland and Auckland.
- With the greater uptake of rail, road-rail terminals will be required at a number of strategic locations such as Otiria/Moerewa, Helensville, Wellsford, Maungaturoto and Dargaville. Hubs are important for freight to access the rail network, usually being transferred to and from road. The development and operation of these road-rail terminals will generate ongoing employment opportunities in those areas. These hubs will also potentially attracted future industrial development around them, to make use of the transport connection they provide.
- Given the decline in truck driver available, the loss of employment in the road transport industry with a shift to rail is unlikely in the medium term. Instead it is likely that greater use of rail within the region will play a modest part in helping to mitigate the driver shortage problem, with an estimated 100-150 truck drivers freed up for other work in which rail is not suitable for the task. Given the shortage of suitable truck drivers, the shift to rail is unlikely to result in job losses.
- An upgraded rail line, and the link to Marsden Point, will allow for high-value tourism operations that potentially will attract additional visitors to both Auckland and Northland. This will be an additional marginal benefit to the case. It is estimated that a scenic operation of around 60,000 passengers a year is feasible given similar operations around Australasia.

Mode shift and Government's land transport objectives

7.5 Currently those moving freight to, from and within Northland currently have little choice but to use road transport. The Government has signalled its intention to move to a mode-neutral approach to land transport investment.

- Investment in the NAL and the Marsden Link will enable greater choice for those using the transport system, and help to mitigate some of the negative effects of moving freight by road. The GPS (2018) seeks to encourage mode shift to reduce congestion, road crashes and carbon dioxide emissions (CO_2).
- The Rail Connected Port option would, based on the potential rail freight volumes, avoid up to 75,000 heavy truck trips a year. This would equate to around 10,000,000 kms of avoided heavy truck travel each year, of which around 3,000,000 km would be within Auckland. The reduction in heavy truck travel would result in a marginal reduction in the crash risk, for crashes involving heavy vehicles – regardless as to who was at fault. Using the NZ Transport Agency's evaluation procedures this crash risk reduction is calculated at annual savings of $19,651,900 (PV). This reduction in heavy truck travel will also save around 10,072,000 tonnes of CO_2 emissions, which equates to around 3,744,000 litres of diesel.
- As the rail network is redeveloped and becomes more reliable and responsive to industry needs, it can be included in regional and national land transport planning and investment. This will allow regional decision-makers the ability to consider a broader set of transport investment options for Northland than just roads, depending on the merits of proposed investments. Re-establishing the rail line will also help shape future land use planning for local government and industry, with new freight and industrial developments able to be located at points around the rail network, State highways and the port.

Strategic option value of the rail link

7.6 While additional analysis is recommended due to the size of the investment required, there is sufficient information available to suggest that the construction of the Marsden Rail Link and an upgrade of the North Auckland Line from Oakleigh to Auckland has the potential to provide significant option and resilience value for the upper North Island's nationally significant trade in containerised imports and exports.

- Auckland is growing rapidly and in the last ten years faster than previously expected. Its population is now expected to grow to 2.4 million people by 2043. Around half of this future population will live in north of the Waitematā Harbour, with currently much of the freight they produce and consume being moved to them from the south of the city. New Zealand has also been growing, producing and consuming more goods, with Auckland the centre of much of the country's import and export freight activity. It is therefore conceivable that Northport will begin to function not just as Northland's main regional port, but also as a port that in time supports a portion of the trade to and from Auckland.
- Building the Marsden Link and upgrading the NAL will likely bring this process forward. A high quality rail connection, from Marsden Point to Auckland, is a critical pre-condition of Northport becoming an inter-regional container port. This better access for containerised freight in particular, will enable this strategic option value, in the same way as road and rail investments in the Waikato and the Bay of Plenty have enabled greater regional economic integration with Auckland in those regions. This integration and the ability for the private sector to have more choices about how to develop their supply chains, has the potential to generate economic benefits between both Northland and Auckland.

7.7 While the indicative case for investment on the basis of regional development, and achieving the government's transport agenda is not compelling on their own (either commercially or from a public value assessment), the strategic option value of the Rail Connected Port option should be progressed.

[redacted]

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Appendix A Context

Detailed historical background

7.10 To better understand the question of rail in Northland, particularly its current state, it is necessary to review the development, growth and decline of the region's rail infrastructure and services. Today less than 1% of Northland's freight is moved by rail (by tonne-kilometres), compared with around 16% nationally.[43] Historically the proportion of rail freight was much higher, although this has been declining since the golden age of rail from the early 1900s to 1950s. The region's rail infrastructure and services were then a critical part of Northland's economy, particularly as the NAL once provided strategic connectivity to Auckland and the main regional port at Port Whāngārei. The region's connectivity to Auckland by land was seen as vital for the prosperity of the region. With improvements to road transport, both roads and vehicles, rail declined in popularity as people and freight sought

7.11 Northland was one of the first places in New Zealand to have a working railway when a horse-drawn tramway was opened in 1868 to work a three mile section of what would later become the Ōpua Branch Line. This service took coal from Kawakawa down to the river, where it was barged down to the wharfs and loaded onto larger coastal ships for delivery to Auckland, around New Zealand and even to Australia. Soon after the coal company and locals residents began lobbying the colonial government for the line to be extended all the way to deep water at Ōpua. Extending the line and moving from horses to steam-powered locomotives was seen as essential to allow the efficient movement of freight, as well as opening the area up for settlement and development.

Figure 26. Whāngārei Railway Station 1908

Photographer, J T Cowdell. Train at Whāngārei railway Station loaded with kauri logs.[44]

[43] *National Freight Demand Study*, 2014, p.186
[44] Inscription reads "Northern Advocate, Whangārei, copyright, December 1925 (Northern Advocate neg no DC25). Copy negative at 1/2 6609 Alexander Turnbull Library

7.12 Rail in the nineteenth century was the most advanced land transport technology then available.[45] It revolutionised travel for both people and freight, providing a qualitative improvement in travel time, reliability and comfort. At that time New Zealand had few formed roads, mostly limited to the main towns and their immediate surrounds. Few regions or major towns were connected by formed roads. Travel which today by road would take hours, then would take days and even weeks. These roads, or often better described as tracks, were rough and uncomfortable and in wet weather the roads would turn to bogs. Travel by road, particularly crossing rivers, was also dangerous.

7.13 Before rail, travel by land was largely ineffective at moving significant numbers of people or freight long distances. Instead people and freight travelled longer distances by river and coastal ships, at first wind powered and later by steam. Although travelling by water was still an effective mode of travel; these river and coastal journeys could also take days, freight was often damaged or lost. Travel by sea was not without dangers with shipwrecks, particularly on the wilder west coast were a regular feature of life in the second half of the nineteenth century. For this reason settlements and businesses around the colony clamoured for railways to create new strategic connections that opened access to distant markets and enabled people to travel efficiently and safely. Thus, the development of railways was seen as sign of regional and national development and progress, enabling social and economic opportunity.

Building nationally strategic connections

7.14 During the 1870s New Zealand initiated an ambitious and substantial railways building scheme to deliver these strategic connections under the leadership of Sir Julius Vogel. The Government's strategy was to build a uniform, connected network linking the major ports to their hinterlands, and connecting the main towns and provinces together. The goal was to reduce the cost and difficulty of transport and most importantly open New Zealand for immigration, settlement and economic development. The Government of the time saw railways as the key mechanism to join a then disconnected New Zealand together: economically, socially and politically. With the initial focus on the main centres, Northland however was largely overlooked during the first phase of the national railway building scheme. With the onset of the 1880s economic depression, railway building slowed significantly.

7.15 It should be noted that the building of these railways had significant impact on iwi Māori. Around New Zealand and in Northland the Public Works Act was in some cases used excessively when it came to taking Māori-owned land for railways.[46] Māori-owned land could also be taken for railways without compensation. There were even instances where large portions of Māori-owned land were taken for railways without compensation, and then sold-on by the railways Department for a profit.[47] The negative impacts of this compulsory acquisition of land for the railways, and the severance impacts it had, is still remembered in some communities, notably around Moerewa where the NAL ran through the community.

7.16 For Māori in the Kaipara the railway was seen as an opportunity to benefit both Pākehā and Māori, so much so that Ngāti Whātua even gifted large amounts of land to the Crown to help facilitate the construction of the railway to Auckland. In 1871 during a hui at Helensville, prominent Ngāti Whātua kuia Māta Tira Koroheke told the representative of the Provincial Government that:

> *We give the land you ask for, and we give it willingly, without cost. You know my lands; take your railway through them. It will do good. Our land will rise in value. We can travel quickly, provisions and clothing will be cheap, and Europeans will come to dwell amongst us. Kaipara will come to be a dwelling place of chiefs, as Auckland now is. When we die, we will leave our children among a people who will treat them kindly, as we, when living, treated the Pākehā.*[48]

7.17 Also seeking the economic benefits of better connectivity to Auckland, the prominent citizens of Northland continued to campaign and lobby for a line to be built to connect the Bay of Islands to Whāngārei, and Whāngārei to Auckland. In advocating this, Northlanders saw that the region needed both a strategic transport connection through the region, as well as a direct line to Auckland. Only with these connections could Northland's prospects for economic development be advanced. Finding a balance between

[45] See Geoffrey B. Churchman and Tony Hurst, The Railways of New Zealand, Wellington, 2nd edition, 2001

[46] Statement by the Crown, Te Paparahi o Te Raki, (Wai 1040), Regional Inquiry, Tribunal Statement of Issues for Stage 2, 5 December 2012, p.24

[47] See: Peter McBurney, 'Northland: Public Works & Other Takings: c.1871-1993, July 2007. A Report commissioned by the Crown Forestry Rental Trust for The Northland Inquiry Districts

[48] Waitangi Tr bunal, *Kaipara District Inquiry Report*, Wai674, pp.213ff

available funds and public pressure Northland's rail network was built incrementally over the next fifty years, at first in relative small pieces that served short runs for specific freight tasks. In the 1870s a short line was built from Kamo to carry coal down Port Whāngārei, from where it was shipped around New Zealand and exported to Australia. There was also growing demand for rail to move Northland's kauri and totara timbers that were being milled and shipped down to Auckland for use in the city's buildings and townhouses. Later in 1894 the Kamo line was extended north to Waro and by 1899 it was extended to Waiotu. That year Parliament approved linking this line with the one at Kawakawa.

Promise of economic development from improved transport links

7.18 Meanwhile the line from Auckland was extended north in 1881 to connect with the Kaipara-Helensville railway. The Government's approach throughout had been to fund a modest sum each year to continue extending the railways, depending on the financial and political situation of the colony. In most cases the priority was on linking up short-haul lines, some of which had been built privately. The high cost of the works due to the region's challenging geography, and the relatively small population in the north made some question the line's value. In 1910 the Hon. John Millar Minister for Railways caused indignation from a visiting delegation of prominent Northland citizens when he was reported as telling them that "I know you gentlemen anticipate an enormous increase from the North Auckland Trunk line, but I tell you that I don't think it will even pay a half per cent., and the further you go the worse it will become."[49]

Figure 27. Road transport in Northland c.1916-18

Team of horses hauling a log, taken by the Northwood Brothers. Note on the back states that "this team was washed down river by a flood - came out unharmed 4 miles later." Northland Region.[50]

7.19 A Commission of Inquiry was initiated in 1911 to examine the merits and feasibility of continuing the line's construction north, including the proposed route and the economic benefits. The Commission recommended continuing the railway, determined for the more westerly line, primarily to control costs and report back that:

[49] *Evening Post*, 10 June 1910, p.3
[50] Ref: 1/1-004887-G. Alexander Turnbull Library, Wellington, New Zealand. /records/23214211

We have made a thorough personal inspection of the land through which the several railway routes under consideration pass, and also of the land in other districts commercially affected… From our own observations, and from the evidence brought before us, we are firmly of the opinion that the excellence of the land, enhanced by a most favourable climate, fully justifies the immediate construction of the Trunk Railway through the peninsula, with the object of opening out and developing the lands of the north…[51]

7.20 By 1913 the line had moved slowly, but progressively north reaching Topuni 130 kilometres from Auckland, but still 80 kilometres short of Whāngārei. With the onset of the First World War construction all but stopped.

Pressure for improved connectivity to Auckland

7.21 After the First World War, the government under the guidance of local Member of Parliament Hon Gordon Coates, who was also the Minister of Works and also Railways, approved the investment to make the final push to link together what would become the North Auckland Line. The difficult topography and geology of the land between Whāngārei and Auckland were particularly challenging for the Public Works Department, which was charged with the job of finally connecting up the network. The high rainfall of the area also caused ongoing slip problems, which slowed construction and increased construction and ongoing maintenance costs. The final challenge was the 600-meter Golden Stairs Tunnel. Once sections of track were completed by the Department of Works, made as a 'public good' investment, the working tracks were handed over to the Railways Department to be run on a commercial basis.

Figure 28. Coastal shipping in North Auckland ca.1910

Photo: Topsail schooner, Houto, and timber, at a North Auckland wharf.[52]

7.22 In 1925 the Northland region celebrated the achievement of having a working railway that finally linked Auckland with Whāngārei, Okaihau and Ōpua. In March Gordon Coates, the Minister of Works, joined with local dignitaries to celebrate the opening of the railway station in Whāngārei followed by a celebration dinner at the Settler's Hotel.[53] For the Northland region this represented fifty years of the aspiration and ambition of having a world class land connection to Auckland and the rest of New Zealand for passenger travel and freight. The new connection therefore provided significant new opportunities for travel and

[51] Report of Commission on the North Auckland Railway, 11 May 1911, *Appendix to the Journals of the House of Representatives*, 1911 Session I, D-04
[52] Ref: 1/1-004900-G. Alexander Turnbull Library, Wellington, New Zealand. /records/22839068
[53] *Northern Advocate*, 10 March 1925, p.4

commerce. For a region that keenly felt its isolation, the achievement was a significant one, being immortalised today with a brass plaque in the Cameron Street Mall in Whāngārei. At the time the Northern Advocate boasted of the region's new, more reliable connectivity by land that:

> *The railway has been developed until the furthest point north of the present system has been connected with Auckland and Wellington. Thus various towns now connected by rail are not dependent, as formerly, upon the waterways as an outlet for exportation and importation.*[54]

Since the 19th Century Northlanders saw the importance of high-quality connectivity to Auckland to ensure their economic development.

7.23 One of the impacts of this new inter-regional connectivity, however, was the almost immediate disruptive impact it had on the coastal trade between Whāngārei and Auckland. In the 1890s due to the limitations of the old wharfs, deep-water wharves were built out to the west of Whāngārei at Onerahi. To service these docks a railway was built out to Onerahi (also known as the Grahamtown Line). Before the final rail connection was made to Auckland the line to Onerahi was busy carrying people and freight to and from the wharfs to then board ships that would sail and then steam down to Auckland and back. With the completion of the North Auckland Line and a direct connection by land to Auckland, coastal shipping almost immediately dried up as people and freight used the train to get to Auckland. The Auckland Star noted that the port had a significant loss of traffic within a year after the rail connection was made to Auckland.[55] As a result the line to Onerahi was closed and dismantled.

Figure 29. New Zealand rail network – activity late 1950s (1 ton = 1016 kilogrammes)[56]

Decline of passenger rail

7.24 For the next twenty years the rail network in Northland was gradually expanded with work beginning in 1920s on the line to Dargaville, though this was paused during the 1930s economic crisis. It was not until the 1940s that regular train services began running to Dargaville with mixed trains of passengers and

[54] *Northern Advocate*, 19 December 1925, p.10
[55] *Auckland Star*, 8 February 1926
[56] A.H. (ed) McLintock, *A descriptive atlas of New Zealand*, 1960, p.63.

freight running until 1967 when the line was only used for freight. Plans to extend the North Auckland line beyond the northern terminus at Okaihau towards Kaitaia were also curtailed by the 1930s depression. After the Second World War the country began to experience strong demand for road transport, as road vehicles became more available, the government began investing in roads – particularly the main roads that would become New Zealand's future State highway system. The growth in road transport, both buses and private vehicles, allowed for a more responsive and door-to-door travel experience.

7.25 As road transport improved there was a corresponding decline in demand for passenger rail services. This was particularly true for passenger travel to and from Auckland. Due to curves and short sharp gradients on the North Auckland Line the passenger services were always slow, taking over five hours from Auckland to Northland. The introduction of more modern locomotives reduced this time down to just over four hours in the 1950s. The construction of the Auckland Harbour Bridge in 1959, however, reduced the equivalent road journey by 30kms. Progressive road improvements over time the increasing availability of coach services and private motor vehicles further reduced the demand for passenger rail.

7.26 With passenger demand dropping progressively the Railways department began ceasing services to reduce their losses. In 1956 the Ōpua Express to Auckland, which once ran three times a week, was stopped in 1956. The Railways Department sought in 1967 to rationalise back its services by replacing dedicated passenger trains with mixed trains, for both people and freight. Despite this the last scheduled passenger service ended in 1976.

Decline of rail freight

7.27 Just as the rise of private and commercial road transport ended passenger rail services in Northland, so to would the rise of road transport for freight. Demand for road freight services, and improved roads for them to travel on, increased from the 1930s and accelerating after the Second World War. Trucks could offer point-to-point pickup and delivery, in much faster timeframes than rail. As a result, rail was increasingly used by larger processing plants that could benefit most from the scale that rail provides. These volumes were, relatively low compared to the ongoing cost of maintaining the rail lines. Increasing many of the branch lines were no longer commercially viable for freight services, resulting in track closures.

7.28 By 1984 there were no regular trains past Kawakawa and by 1985 the Ōpua Branch Line was leased and sold to the Bay of Islands Scenic Railway (now the Bay of Islands Vintage Railway Trust). The Okaihau Branch from Otiria via Kaikohe to Okaihau soon followed and was closed and the tracks lifted in 1987. The line between Kawakawa and Moerewa was closed in 1993 and the rails removed (Figure 30). The Dargaville line continued to carry coal and dairy produce from the Northern Wairoa Co-operative Dairy Company, until it was mothballed in 1998 due to slips and derailments and the closure of the dairy factory. The line was reopened in 2000 for log traffic but then closed again in 2014 due to damage to the track.

Figure 30. Decommissioned section of NAL at Moerewa

Photo: AECOM 2018

Rail policy context

7.29 In the context of falling freight volumes and increasing losses the Railways Department was corporatised in 1982 with the new Railways Corporation required to make a profit. At the same time road transport was deregulated, lifting the remaining regulatory limits on the distance trucks could travel in order to artificially protect rail freight volumes. In 1990 the core rail operations of the Corporation were transferred to NZ Rail Limited, which was made a State Owned Enterprise. This placed railways on a fully commercial basis, with the Crown as the principle shareholder. NZ Rail Limited was then privatised in 1993, with the new entity TranzRail being a fully privately-owned business.

7.30 The move to privatisation was seen as allowing the national rail business to rationalise back the business to those aspects that generated the best commercial return. This would also remove the need for significant infrastructure investment in the rail network from Government.[57] During the TranzRail period rail freight volumes did substantially recover, although the condition of rail infrastructure nationally and in Northland continued to decline. There was also no significant investment in new or improved infrastructure in this time. For the NAL this meant that few improvements or renewals were made, such as increasing tunnel height to accommodate high-cube containers. With high-cube containers becoming more popular with exporters, those using them had no option but to shift their freight to road.

7.31 In 2004 Toll Holdings purchased TranzRail with the below-track infrastructure returned to Crown ownership for $1, reflecting the poor state of the network and the investment required to maintain and renew it. Until May 2008 ONTRACK, a subsidiary of the NZ Railways Corporation, managed part of the NAL track network. Since 2004 when the rail network was reacquired by the Crown, the approach has been to spend minimum capital on the Northland network given its poor commercial returns, reducing freight volumes and an absence of a vision for its future. The exception was for the southern end of the NAL within urban Auckland, which is used for Auckland Transport's Western Line passenger services as far north as Swanson. This section was extensively rebuilt from the mid-2000s, including double tracking, electrification and station upgrading.

Moving the Port

7.32 The decline in Northland's rail freight accelerated between 2000 and 2008 with a 66% drop in rail freight, triggered largely by the relocation of the port. In 2002 the then Port of Whāngārei began developing wharf facilities to the south at Marsden Point to allow for the moving of operations there. While the port at Whāngārei had rail access, the new port at Marsden Point did not. The impact of the port relocation in April 2007 without rail access, coupled with declining service reliability, tunnels restricting high-cube containers access to Auckland, effectively turned the rail network 'off' with annual rail freight volumes falling from almost 1,000,000 tonnes in 2000 to less than 300,000 tonnes by 2008.[58] One rail commentator noted at the time that:

> *If the port [at Marsden Point] goes ahead without rail access, then the woodchips and much of the log traffic will be lost to rail, and both the Otiria and Dargaville lines would probably close. It is unlikely that TranzRail would fund the whole cost, so the future of rail in Northland depends very much on whether other parties, such as central or regional government, will pay a share of the cost.*[59]

7.33 The 2008 National Freight Demand Study, commissioned by the Ministry of Transport, also commented on the situation left by this lack of connectivity:

> *Lately, Northport, once vying to be the sole container interchange in the country, has moved from the heavily-silted, up-river port of Whangarei to take advantage of deeper water and the shorter, harbour-steaming distances afforded by a new development at Marsden Point. The port is still trying to be accepted as a regular service, container port, but this may be inhibited by its remoteness from the main population and producing areas within the country, the lack of a direct rail link to the port and the limited capacity of the rail system north of Auckland, unless*

[57] This was the view of the Institute for the Study of Competition and Regulation, See 'KiwiRail: strategic asset or strategic blunder?', *Competition and Regulation Times*, July 2009
[58] Kelvin Taylor, Turning Northland Rail into a Self-Sustaining Business, 2012, p.4
[59] Geoffrey B. Churchman and Tony Hurst, *The Railways of New Zealand*, Wellington, 2nd edition, 2001, p.98

major expenditure is committed. In addition, the major rationalisation of shipping services may also impede its development.[60]

Figure 31. Whāngārei CT Site

Photo: AECOM 2018

7.34 To re-establish this connectivity the Northland Regional Council began investigating a new 16 kilometre branch line from Oakleigh south of Whāngārei to Marsden Point around 2004. Following establishment of a preferred route the Regional Council formed a joint venture with ONTRACK to secure the designation to protect the routes and to purchase the land required along the corridor. The line was designated in 2009, but not yet constructed, although geotechnical investigations KiwiRail began in 2018.[61]

Disconnecting the network from the port qualitatively reduced the relevance of rail to moving freight in Northland.

7.35 ONTRACK and Northland Regional Council began investigating building a branch line from Oakleigh to Marsden Point. The project developed the preferred route, indicative costings, engineering designs and potential environmental impacts. To protect the route from development, the Northland Regional Council included a Statement of Proposal for a designation of the rail link in its 2007/2008 Annual Plan. The Regional Council then entered into a joint venture with ONTRACK to complete the designation and begin purchasing the land required along the corridor. The line was designated in 2009, being the first designation for a rail line in New Zealand for over 30 years.

Minor Lines review

7.36 In 2009 the Government repurchased the rail business from Toll Holdings. Today KiwiRail Ltd operates as a commercial entity, owned by the Government, but operating on a commercial basis as a State Owned Enterprise. As such, investments in the rail business are determined on potential profitability and the envisaged commercial returns. Due to the requirements for significant infrastructure and rolling stock investments, which would be unfunded, KiwiRail has not focused on growing its freight operations in Northland. While KiwiRail was open to new business in Northland, it was constrained by its existing network and rolling stock condition. This effectively ruled out any ability to either attract new business or provide additional services.

[60] *National Freight Demand Study*, 2008, p.154
[61] *Whangarei District Plan* Designation DNZRC 2 Oakleigh to Marsden Point Rail Link (NZ Railways Corporation)

7.37 In 2010 KiwiRail announced the Turnaround Plan that would improve commercial performance by improving service and capacity in key market segments. With Government support, KiwiRail would focus its efforts on improving journey time, reliability and capacity from Auckland to Christchurch. This included improving access into and through Wellington, improved Cook Strait Ferry operations and capacity. The plan also included a review of minor lines, including the North Auckland Line, with a view of either increasing volumes on them or closing them. In the review KiwiRail found that the NAL generated around $8-9 million in revenue each year, with the cost of operations about that amount.[62]

7.38 The key concern for KiwiRail was the future renewal costs of line's infrastructure, namely the need for a programme of bridge replacements that would be required over the next twenty years. As an outcome of the 2014 KiwiRail Review the Government of the day determined to maintain the Northland line operating in its current state due to the low freight volumes and poor economic returns. Most importantly KiwiRail, supported by significant government investment, would continue to work on its commercial return nationally. In Northland KiwiRail would operate its remaining network on the basis of managed decline, where the remaining value of the network was extracted until it was at the end of its economic life. Broader land transport considerations, such as resilience, externality reduction, option value and connectivity, were not part of company's operating policy environment. In answering a parliamentary question on the future of Northland rail services the Minister of Transport at that time set out the policy framework for rail in Northland as one of status quo:

> *I meet with KiwiRail regularly, and I discuss ways to improve the productivity of the rail network around New Zealand—that, of course, includes Northland. In short, KiwiRail considers that the Northland line's economics are challenging. This is because almost 99 percent of Northland's freight and 100 percent of its passenger travel is carried on the roads. That said, there are, of course, two return services per day, 5 days a week, between Auckland and Whangarei, moving mainly dairy and forestry products. There are no plans to change that.*[63]

7.39 In August of the following year, KiwiRail discontinued its log service from Otiria to Portland due to the retirement of the rolling stock used for woodchip traffic to Portland. As no agreement could be reached with the customer for increased cartage rates, which would support the purchase of new rolling stock, the service was discontinued for commercial reasons.[64] The two services a day from Whāngārei to Auckland was also rationalised back to one service a day. Today there is normally one return train service each weekday between the Whāngārei container terminal site and Auckland. This is mostly dairy produce from Fonterra's factory at Kauri, which is shunted down to the Whāngārei rail yards.

[62] KiwiRail, *The Northland Lines Review*, February 2011
[63] Hon Simon Bridges, Minister of Transport, *Parliamentary Debates*, 20 October 2015
[64] 'Last log train but line not closed', NZ Herald, 31 August 2016

Appendix B Northland's strategic freight network

Detailed analysis of current state

7.40 Strategic freight networks are made up of the most critical parts of the transport system that moves high volumes or values of freight to significant locations. These locations include domestic and international markets, ports, airports, intermodal terminals and areas of high freight production, consumption, storage and distribution. There is not currently a formally identified strategic freight network in Northland. But the infrastructure and services that have the attributes of nationally and regionally strategic connections (carrying high volumes and/or values of freight) include the main intra and inter-regional State highway routes (such as SH1, SH14 and SH15), the railway (due to its option value), coastal shipping services, the Refinery to Auckland Pipeline and Northport. Rail and road are discussed in detail below.

Refinery to Auckland Pipeline

7.41 A significant amount, in terms of volume and economic value, of petroleum products are moved from the Marsden Point Refinery to Auckland by way of the fuel pipeline. The Refinery to Auckland Pipeline supplies petrol, diesel and jet fuel from the Marsden Point Refinery to the Wiri Oil Terminal in South Auckland. The pipeline is critical national infrastructure suppling around 90% of Auckland's petrol and diesel requirements and 100% of Auckland International Airport's aviation.[65]

Coastal shipping services

7.42 After road transport, coastal sea freight is currently Northland's second largest mode comprising 11% of volume for freight movements between Northland and Auckland and 31% for movements between Northland and the rest of New Zealand (tonnes-kms, using 2006/07 data for freight movements originating or terminating in Northland). Most of this is bulk products, mainly fuel and cement with dedicated ships moving this around the coast.[66] Apart from these bulk commodities, most of the remaining freight moving to/from Northland has its origin/destination in Auckland or the wider the upper North Island.

7.43 Due to the extra time and handling costs that would be involved in moving it by ship, most of the freight currently moving by land is unlikely to move to coastal services. This would be made up of the time and handling costs it would take for the freight to reach the port, be loaded onto a coastal ship, steamed to either Auckland or Tauranga and then unloaded and moved inland. Transfers from coastal to international shipping can also be expensive compared to moving freight by land. It was these same cost drivers that led to the decline of the coastal trade between Whāngārei and Auckland in the 1920s when the NAL was first opened for inter-regional travel. There is potential for export containers to be moved to Northport and trans-shipped by coast to Tauranga for export. Most exporters spoken to for this business case stated that this was not their preferred option at present.

Northport

7.44 The rest of Northland's outward goods are sent out through Northport, which predominantly handles bulk freight such as logs. Recently Northport has been developing its container handling capability and has attracted some container volumes and in 2018 established a regular international container service.[67] Northport's import volumes are also increasing. While mostly bulk goods are bound for the Northland region, small volumes of bulk freight are now being landed for the Auckland market at Northport. This includes structural steel, which can be stored at the port before road transported to Auckland. However, for the foreseeable future, most of Northland's exporters will need to continue sending their containers to

[65] MBIE, *Review of New Zealand's oil security Discussion paper*, October 2012
[66] *Puhoi to Warkworth – Transportation and Traffic Assessment* Report dated 20 August 2013, p.45 (Adapted from *National Freight Demand Study*, 2008.
[67] *NZ Herald*, 23 April 2018, https://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=12037434

either Ports of Auckland or Port of Tauranga in order for them to be loaded onto the shipping services that make the necessary international connections.

Northland rail network current extent and condition

7.45 As previously discussed very little of Northland's freight is currently moved by rail due to the condition of the line and its poor functional connectivity with key origins and destinations. Northland's current rail connection to Auckland provides a longer journey time than road, with trains running from Westfield Junction (near Ōtāhuhu) in Auckland, through to Swanson, Helensville and up to Whāngārei and Kauri. Travel by rail from Whāngārei to Westfield is approximately 215 kilometres, compared with 185 kilometres by road. The winding nature of the line and its poor condition means that travel times for freight trains rail are longer and more unreliable than by road (see Table 23 on outages). The rail journey now takes approximately 7 hours (4.5 hours before speed restrictions put in place to manage the declining track condition). This is compared to around three hours by road (excluding additional time spent in Auckland's congestion during peak times).

7.46 To summarise the Northland rail network has not seen any significant investment, other than the minimum maintenance and reinstatement work, for the last fifty years. The NAL remains largely as it was originally constructed, with circuitous alignment that result in lower operating speeds. Most of the original, including wooden, bridges are still in place limiting axle loads to 16 tonne – limiting the loads that can be carried and restricting access to newer locomotives that require 18-tonne axle loadings. The originally constructed tunnels have not, like others around New Zealand, been enlarged to accommodate for the taller (high-cube) and longer (40 foot equivalent) shipping containers that are becoming increasingly standard. Some of the tunnels also need significant maintenance work to stay operational.

The North Auckland Line is not currently fit-for-purpose and cannot respond to today's freight requirements.

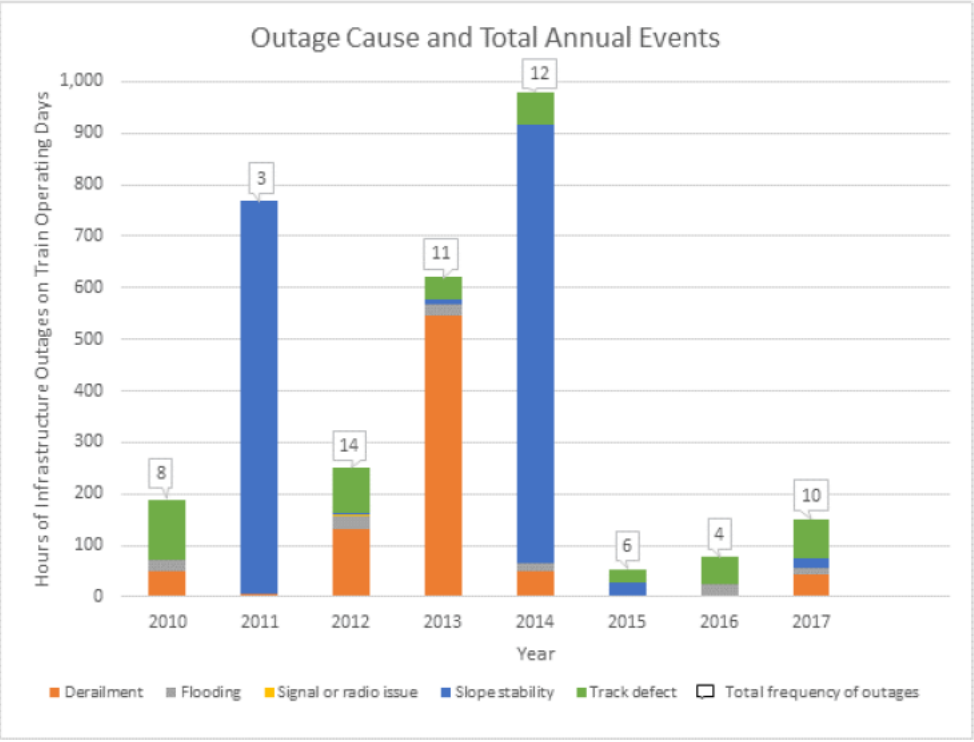


Figure 32: North Auckland Line Infrastructure Outages 2010-17

Source: KiwiRail

7.47 Table 38 outlines high-level features and characteristics for the NAL between Swanson and Otiria and the mothballed Dargaville branch line. Key operational constraints compared to other parts of the KiwiRail Network in the Upper North Island are maximum axle load and container height – 18 tonne tonnes axle loads and vertical clearances for 9-foot 6-inch high-cube containers are typical elsewhere. Additionally the low operating speeds in Northland increase journey times and contribute to higher operating costs than might otherwise be possible. In the case of the Dargaville Branch Line, significant reconstruction would be required to allow the return of passenger or freight trains.

Figure 33. High-cube container restricted tunnel on the NAL

Source: KiwiRail

7.48 KiwiRail has advised that without significant investment to renew life expired assets, the condition of the North Auckland Line will continue to deteriorate. Without significant renewal investment it is unlikely that the rail line will be operating at all within the next five years once operations can no longer be continued safely. The capital costs assumed in the options assessed in the Economic Case reflect the considerable investment required to bring the Northland rail network back to a sustainable and fully operational condition. This investment can however be staged to manage costs, while also generating activity. Options for this are set out in the Management Case.

7.49 Because of this deteriorating network condition as well as the unreliability of the aging locomotives operating on the line, existing rail freight services are increasingly unreliable. Between 2010 and 2017, there were 68 separate unplanned infrastructure outages on the NAL. The majority of which were 24 hours or less in duration, but in three cases the line was closed for 14 days or longer. Weather related events (slope stability issues and flooding), followed by derailments, were the main cause of outages over time (see Figure 32). This reflects both the difficult terrain traversed by the NAL and the constrained maintenance expenditure over the period.

Table 38. Northland Rail Key Statistics

Item	Swanson to Whāngārei	Whāngārei to Otiria	Waiotira to Dargaville
Operational status	Open	No services currently beyond Kauri	Out of service (Tangowahine to Dargaville leased to tourism operator)
Length (km)	181	68	50
Maximum Line Speed for Express Freight trains or equivalent	50	50	40/ 25 (Tangowahine to Dargaville)
Ruling gradient	1 in 34 Northbound 1 in 32 Southbound	1 in 44 Northbound 1 in 50 Southbound	1 in 50 Westbound 1 in 50 Eastbound
Nominal Maximum Axle load for locomotives and wagons (tonnes)	16	16	16
Maximum container height on standard wagons	Standard (8'6")	High-Cube (9 '6")	Standard (8'6")
Bridges	88	64	20
Tunnels	13	0	2
Public Level Crossings (vehicle and pedestrian)	35	29	10
Private Level Crossings	71	38	31

Without significant investment it is unlikely that the Northland rail network will be operating within the next five.

Current service offering on the NAL

7.50 Northland's rail network has now only limited use with processed dairy products moving from Kauri to MetroPort and then on to Tauranga. A relatively small volume of high value, refined china clay is also railed between Whāngārei and MetroPort. Some woodchip and logs are railed from the north of Auckland to the Bay of Plenty.

7.51 The present poor state of the rail network in Northland, in terms of infrastructure condition and current services has shaped the view that the network has little potential utility going forward. The Auckland to Whāngārei Strategic Assessment, for example, in 2010 concluded:

> *There is little scope to transfer significant volumes of additional freight from road to rail as the main commodities using rail (dairy, forestry and cement products) are already at capacity. Passenger rail in Auckland also limits line capacity and there is limited potential for increased freight capacity with resources currently available.*[68]

7.52 These findings (assuming no change in rail capacity) were echoed in the Whāngārei to Auckland – Connecting Northland Programme Business Case in 2017.[69] The 2017 report noted that rail capacity was limited by the few daily freight services running each day, along with size and weight restrictions. The Case also suggested the biggest constraint for greater rail uptake in Northland is the ability for trains to move through the urban Auckland rail network. This is a constraint on the Auckland Western line, with potential additional freight trains needing to move between scheduled metro services. This timetable pressure will increase qualitatively with the opening of the City Rail Link and the subsequent increase in

[68] *Auckland to Whangarei Strategic Assessment: Strategic Context Report*, NZ Transport Agency, July 2010
[69] *Whangarei to Auckland – Connecting Northland Programme Business Case*, NZ Transport Agency, 2017, p.17

the frequency of passenger services. The potential investment required to enhance the level of service on the NAL was also a concern, although the report did not seek to quantify this in any detail.

7.53 Analysis undertaken by KiwiRail has identified that there is sufficient capacity on the Auckland metro rail network to operate from Northland to Southdown up to four daily return train services a day within the inter-peak and an additional four services in the off-peak. This estimation is based on identified time slots between scheduled passenger services after metro train services are increased after the opening of the City Rail Link. These services can also be operated without significant additional investment in the Auckland network. Given that each train could carry up to 80 containers (TEU), the potential train capacity through Auckland is significant.

7.54 North of Swanson the potential rail capacity is much greater, as it would not be competing with metro services for the foreseeable future. This could allow the operation of tourist trains from this location and additional freight trains if freight and logistics operations were feasible in the northwest of the city, such as around Kumeū which has both rail and highway access as well as available industrial land. A full examination of this potential is outside the scope of this business case.

State highway network

7.55 Road transport handles by far the largest share of freight movements in Northland, at over 95% (by tonne-km), compared to 70% nationally.[70] This share is mainly because of the reliability, efficiency and flexibility of road transport compared to rail for most types of freight. The market share of road transport has increased as a result of further reductions in rail services since the latest freight data available was collected in 2012. Northland's increased reliance on road transport is much higher than the national average because of the rapid decline in Northland's rail volumes over the last 20 years. Due to its long and skinny geography, Northland's main internal freight connection is State Highway 1 (SH1). The region is also completely dependent on SH1 to move around 35% of its outbound freight to Auckland.[71] This single lifeline route is how most of Northland's highest value goods access domestic and international markets. This main highway is also critical for the flow of inbound freight (imports and domestically produced goods) that Northlanders, and those visiting the region, rely on every day.

7.56 The reliance on SH1 is reflected in the heavy vehicle average daily flows from 2010 to 2014 were between 900 and 1800 (or 8-14% of the traffic composition travelling on State Highway 1 between Whāngārei and Auckland.[72] The greatest of these heavy vehicle flows were between Whāngārei and State Highway 15 (SH15, to Marsden Point), and Warkworth to Pūhoi. The latest data heavy vehicle released by the NZ Transport Agency shows that average daily traffic volumes on Northland's State highway network (including SH1) have increased by an average of 20% between 2013 and 2017 (for all vehicles). The general trend has been a year-on-year increase of 3-7%. The proportion of heavy vehicle trips has also risen relative to other vehicles such as cars and light commercial vehicles (weighing less than 3.5 tonnes).[73] Traffic growth, including heavy vehicle travel, has experienced progressive growth on SH1 between Whāngārei and the intersection with SH15.[74]

7.57 This heavy vehicle growth has largely been driven by increased log harvesting, much of which was taken to Northport for export (see Figure 34). State Highway 15 (connecting to Northport and the Marsden Point industrial area) has seen variable growth year-on-year with a 10% increase in annual average daily traffic (AADT) between 2016 and 2017. This increase is likely due to particularly high log export volumes that year, as well as increased truck travel to and from the Marsden Refinery during the aviation fuel pipe leak from September to December 2017.[75]

7.58 On the boundary area between Northland and Auckland traffic volumes have been increasing at a consistent rate of approximately 7% annually from 2014. This has resulted in an AADT increase of 27%

[70] *National Freight Demand Study*, 2014, p.2 (based on 2012 data) and excluding the Marsden to Wiri Pipeline
[71] Northland Regional Transport Plan, p.4
[72] *Whangarei to Auckland – Connecting Northland Programme Business Case*, 2017, p.18. Note this data is Annual Average Daily Travel (AADT).
[73] Although the data has given an overall percentage of heavy vehicles for each location analysed, a percentage was not provided for each year. The use of ADDT also reduces the number of truck movements during weekdays, with the use of data across 365 including weekends and public holidays. For a comprehensive study into heavy vehicle traffic behaviour, more date on heavy vehicle would be required.
[74] Source: 2014 Daily Traffic Volumes (AADT) Auckland to Whāngārei, Figure 4
https://www.nzta.govt.nz/assets/projects/whangarei-to-auckland/SH1-Auckland-to-Whangarei-programme-business-case.pdf
[75] Refining NZ, Annual Report 2017 www.refiningnz.com/refininglogin/wp-content/uploads/2018/06/annual_report_2017.pdf

since 2013. This is being driven both by inter-regional trade, increasing residential development as well locally harvested logs being trucked north for export and processing. As residential development intensifies to the north of Auckland, travel times for freight movements are decreasing as local traffic on the SH1 grows. This growth in trucks on the Northland roads has taken place even in the context of increasing uptake of high productivity motor vehicles (HPMVs, including 50MAX). These heavier and longer trucks can carry up to 10-20% more freight per trip, which across the country has helped constrained increased truck travel through this improved productivity.

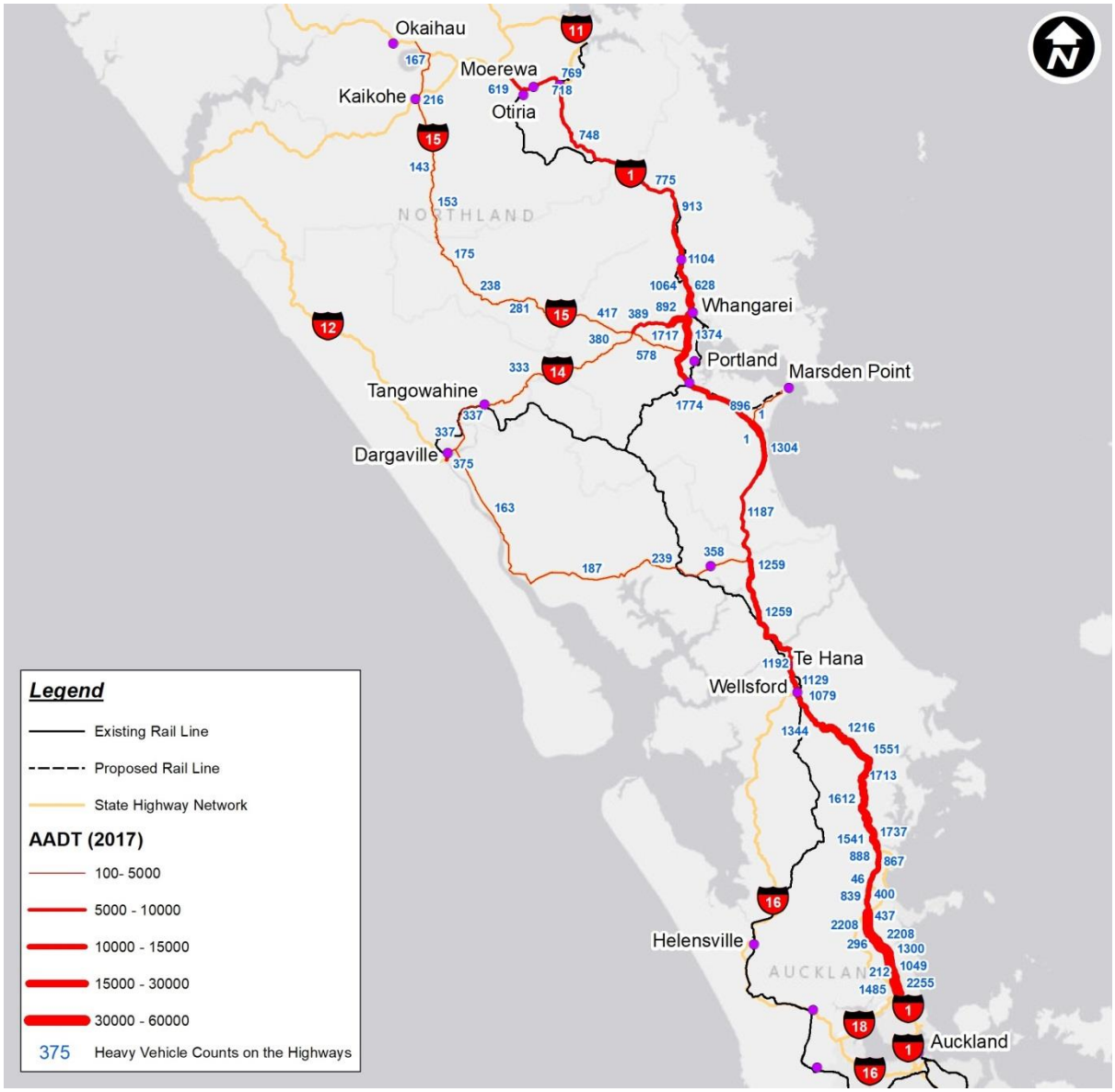


Figure 34. Annual Average Daily Travel, with Heavy Vehicle counts – State Highway 1

Source: NZTA

7.59 This growth in traffic has likely impacted on the condition of the road network in Northland, particularly the State highways in Northland. Because of their additional weight, trucks have a disproportionate wear and tear impact on the road network, notably for the road pavement and seal. This greater impact on the maintenance requirements of the road network is reflected in the higher road user charges (RUC) paid by heavy vehicles. Generally the heavier the loaded weight of the vehicle, the higher the RUC charge per kilometre travelled. While it is difficult to attribute specific road network deterioration from heavy vehicle travel, including trucks carry freight that was previously moved by rail, the increased truck travel over the last ten years has likely increased maintenance requirements. Maintenance expenditure on Northland's State highway network has increased steadily since 2007. In the same time maintenance expenditure nationally has 'flat-lined' in accordance with previous Government Policy Statements (GPS 2009), which set maximum amounts for maintenance investment. Northland's maintenance requirements are likely due

to the combination of increasing heavy vehicle traffic, high rainfall and poorer geology (for the purpose of highway building and maintenance).

Northland's growing freight volumes are dependent on one constrained highway corridor.

Road safety in Northland

7.60 Without a viable rail option in Northland the increasing volume of freight being moved has resulted in a corresponding increase in truck travel from the late 2000s (see Figure 39). The presence of these additional truck movements on the region's main State highways has had a negative impact on road condition, network resilience and possibly road safety. The increase in truck travel will create an additional crash risk, which is not necessarily because the trucks are operated in a way that is dangerous. Around 60% of all crashes involving a truck are caused by primary factors other than the truck or its driver. While for the other 40% of crashes the truck driver is identified as being at fault, or partially at fault for the crash.[76] The presence of a heavy vehicle on the road network, because of its larger size and weight, however presents a greater safety risk than other smaller vehicles. For these reason, serious crashes involving trucks contribute to around 20% of the deaths and serious injuries on the national road network, while trucks themselves account for only 6% of the total road kilometres travelled. Because of their size and mass, a mistake made in or around a truck is more likely to result in a crash, with this crash more likely to be a serious or fatal one due to the greater crash forces involved.[77]

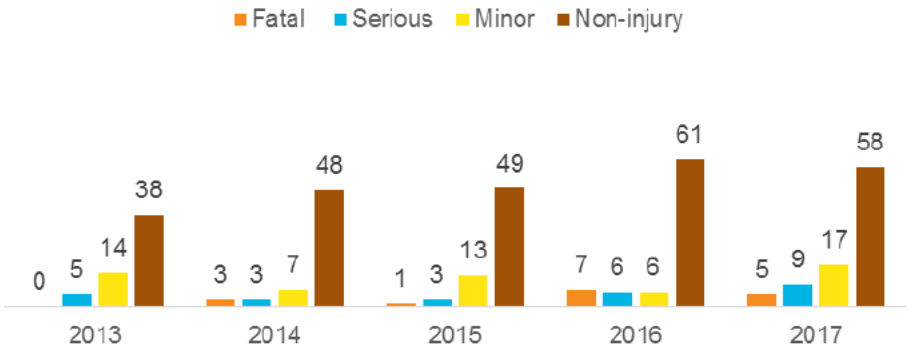


Figure 35. Northland Crashes involving Heavy Vehicles 2013 to 2017

Source: NZTA/CAS

7.61 In Northland the crash risk relating to increased truck travel is acerbated by the poor safety rating of the region's State highways. The critical SH1 Auckland to Whāngārei corridor is itself of a low safety standard, considering that it is classified as a National route by the NZ Transport Agency.[78] Using the safety star rating the corridor is of a predominantly 2 or 3 star standard, which does not meet the National route safety standard. Most of the road is classified in KiwiRap (New Zealand Road Assessment Programme) safety assessment as, due to its high crash history, as having a High to Medium-High collective safety risk. In 2014, there were 27 incidents which closed the road for 7-8 hours on average per incident.[79] To address this crash risk the NZ Transport Agency is looking to undertake a programme of safety improvements.

7.62 Due to these combinations of high crash risks, around 28% of crashes in Northland involve a heavy vehicle. This is slightly above the national average of around 20%. Between 2013 and 2017, there were 353 crashes involving heavy vehicles in the main State highway segments from Moerewa down to Auckland. The two sections with significantly more truck crashes are SH1 Wellsford to Portland Road and SH1 Wellsford to Auckland. An area map of crashes by incident type is illustrated in Figure 37.

[76] Ministry of Transport, *Trucks*, 2016, p.6
[77] Commonwealth Government, *Inquiry into the National Road Safety Strategy 2011-2020*, September 2018, p.25
[78] See the One Network Road Classification, https://www.nzta.govt.nz/roads-and-rail/road-efficiency-group/projects/onrc/
[79] *Whangarei to Auckland – Connecting Northland Programme Business Case*

Table 39. KiwiRap Safety Risk Assessments

State highway section	*Collective Risk (2012-2016)*[80]
SH1 Kawakawa – Whāngārei	Medium-High
SH1 Whāngārei – SH15 junction	High
SH1 / SH15 junction - Warkworth	Medium-High
SH15 / SH1 junction - Marsden Point	Medium
SH14 Dargaville – SH15/SH1	Low-Medium
SH1 – Warkworth - Pūhoi	High

7.63 Although data for 2018 is not yet available, crash data from the last five years shows a trending increase in the number of fatal, serious and minor crashes involving heavy vehicles in Northland. In this same time heavy vehicle travel on the State highway network within Northland increased from 91 million kilometres travelled to 105 million kilometres Figure 36. While most crashes involving heavy vehicles are minor, there has been an increase in fatal and serious crashes between 2015 and 2016. Between 2013 and 2015 the number of fatal and serious crashes was steady from 4 to 5 crashes; Particular areas of high risk along SH1 include Kauri, Portland, the turn-off to (SH15) Marsden Point, and Brynderwyn Hills (Figure 37).

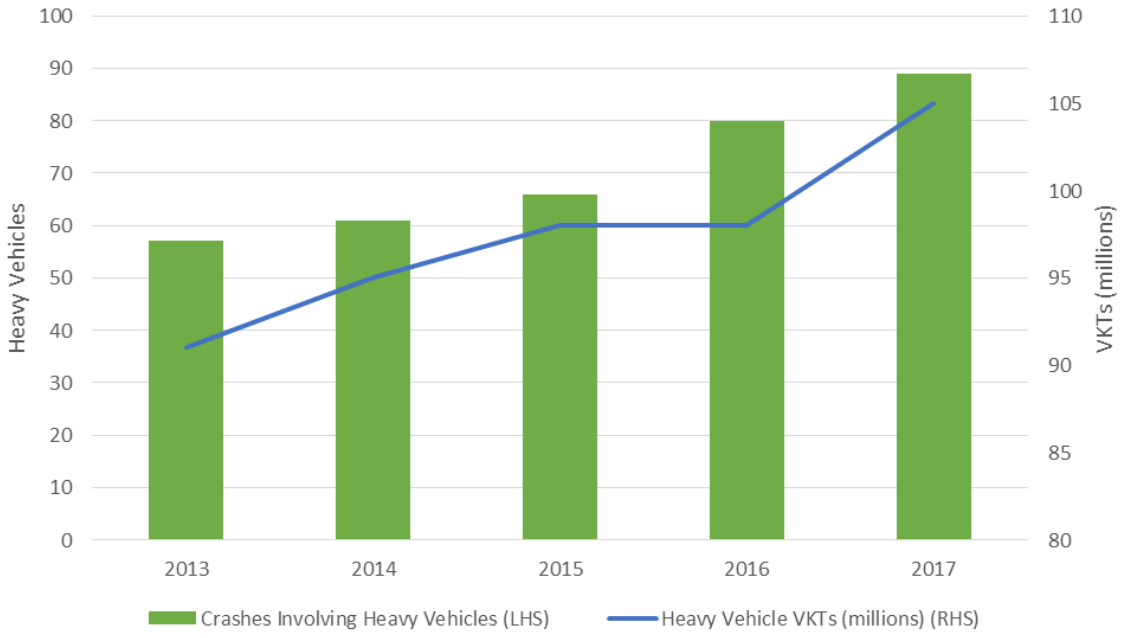


Figure 36. Northland heavy vehicle crashes compared with heavy vehicle travel - 2013 to 2017

Crashes involving heavy vehicles (all Northland) against heavy vehicle kilometres travelled (Northland State highways) Source: NZTA/CAS

7.64 It is difficult to determine precisely what impact the movement of freight from rail to road, notably logging travel, has had on road safety in Northland over the last 20 years. An increase in truck movements will marginally increase the crash exposure risk (being the increased possibility of there being a crash involving an additional truck that was not previously travelling on the road). This increase in crash exposure risk may not, on its own, necessarily directly result in any crashes. But over time this additional crash exposure risk of will likely result in more crashes, including fatal and serious ones. It is difficult to calculate what the number of crashes those would be. However, using accepted economic evaluation criteria the value of a reduction in crash risk exposure is calculated in the Economic Case.

[80] KiwiRap, *Highway Safety Ratings 2012-2016*, p.29

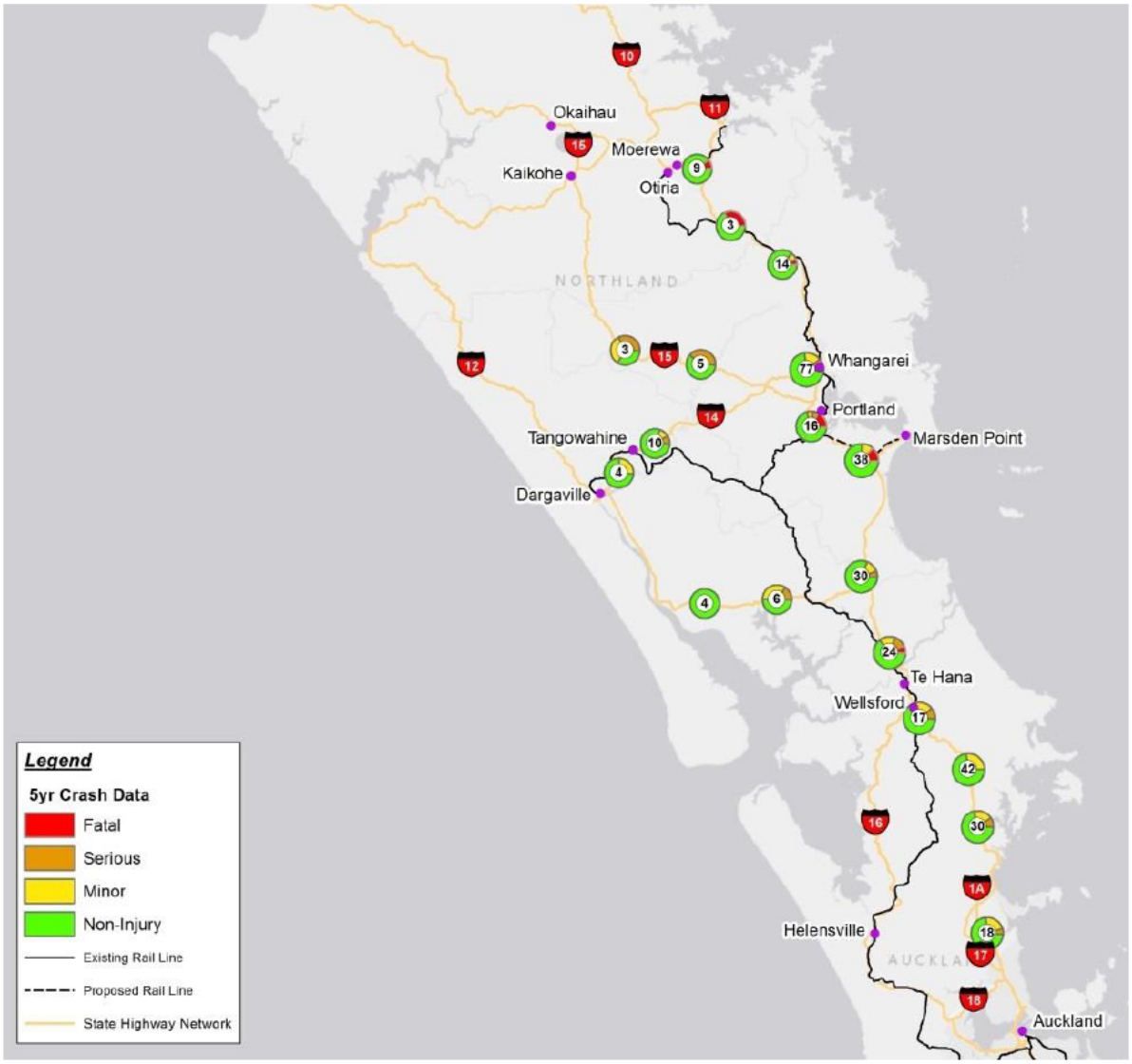


Figure 37. Locations of heavy vehicle crashes by incident type in Northland (2013 to 2017)

Source: AECOM/CAS

Increasing truck travel will marginally increase the crash risk, though it may not directly increase the crash rate.

Appendix C Freight Demand

Detailed freight demand analysis

7.65 Moving freight safely, effectively and efficiently is vital for a small, exporting country like New Zealand. Each year New Zealand exports around 37 million tonnes of freight each year (worth around $50 billion) and imports around 22 million tonnes (also worth around $50 billion).[81] Our road, rail, air and coastal shipping networks move around 236 million tonnes of freight every year within the country, being around 50 tonnes per person. The volume of freight being moved is growing and is expected to increase by 50-60% over the next two decades, from 236 million tonnes back in 2012 to 373 million tonnes by 2042.[82]

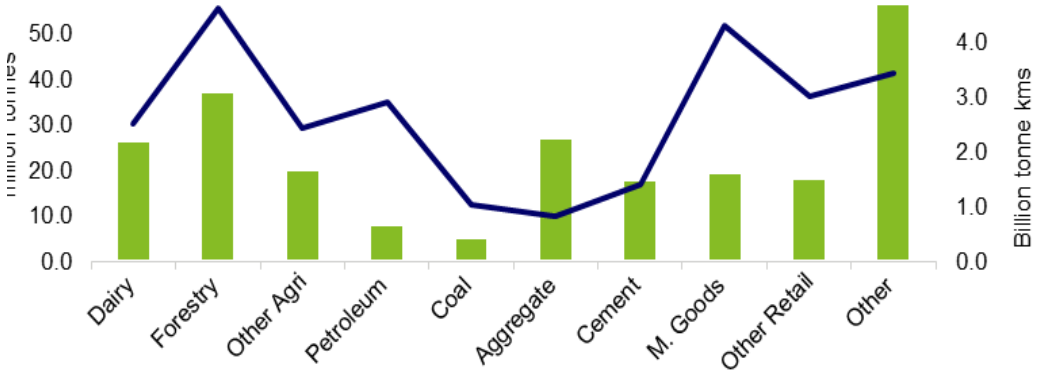


Figure 38. Total freight generated by commodity type - volume/distance.

Source NFDS 2014

Northland within an upper North Island context

7.66 The upper North Island of New Zealand is critical to New Zealand's long-term economic success. More than 55% of New Zealand's freight travels through the Northland, Auckland, Waikato and Bay of Plenty regions, and collectively these regions generate over 50% of New Zealand's gross domestic product. Freight demand in the upper North Island is likely to grow significantly with volumes forecast to increase in Auckland by around 78% (50 million to 88 million tonnes per year by 2042), Waikato - 54% (32 million to 49 million tonnes) the Bay of Plenty - 41% (25 million to 35 million tonnes) and Northland - 35% (17 million to around 23 million tonnes).[83] This additional volume will place increasing demands on the land transport system, particularly those parts that manage high volumes of passenger vehicle travel.

7.67 The upper North Island also contains around 51% of New Zealand's growing population and generates around 52% of New Zealand's gross domestic product. As with freight movements, the population of the four regions is expected to grow significantly over the next 40 years. From 2006 to 2013 alone the population grew from this is expected to grow with the four regions has seen its population increase by 147,000 to reach over 2.2 million people.[84] This growth will create new freight demand as more people buy and sell the things they produce and consume. It will also place pressure on some of New Zealand's already most constrained parts of the land transport system, notably within Auckland City. Auckland's population is now approaching 1.7 million people and is forecast to grow to two million by 2028 and up to 2.7 million by 2048.[85]

7.68 The upper North Island is not just critical to our economy for what it produces and consumes, but also because it handles a significant amount of freight produced and destined for the rest of the New Zealand. The Upper North Island contains three of New Zealand's most important import and export ports: Ports of Auckland, Port of Tauranga and Auckland International Airport. The two sea ports handle most of New Zealand's high value trade in containerised goods, both imports and exports. Ports of Auckland handle

[81] Statistics NZ/customs data
[82] *National Freight Demand Study*, 2014
[83] *Upper North Island Freight Accord*, 2015 – from freight generated in each region
[84] Statistics NZ, Census
[85] Auckland Transport Alignment Project, April 2018,

over 800,000 containers (twenty foot equivalent units (TEUs)) a year made of mostly imports, but also exports. Most of the import containers are taken to with 30 kilometres of the port to destinations like the freight and logistics belt across Onehunga-Penrose-Ōtāhuhu and other industrial parts of Auckland to be unpacked and often send on to other locations within Auckland and the rest of New Zealand. As a result many of the imported goods that New Zealanders buy throughout New Zealand, from tinned food to televisions, have been imported through the Ports of Auckland and then moved by road within Auckland to be handled and sorted by distribution centres throughout the city. Port of Tauranga manages over 1,000,000 TEUs a year that are predominantly exports, but also imports.[86] Many of these imported goods are dispatched from processing and consolidation centres in south Auckland and from the wider upper North Island, notably the Hamilton area. Since 1999 Port of Tauranga has operated an inland port, MetroPort at Penrose. The facility, which relies on a rail connection to Tauranga, handles around 180,000 containers a year. Currently most of Northland's exporters moving goods in containers, rely on Ports of Auckland and the Port of Tauranga to access international markets.

Current state - Northland freight demand

7.69 Moving freight effectively and safely is important for the Northland region which produces and moves around 16.9 million tonnes of freight each year. The National Freight Demand Study 2014 (using data from 2012) was the last study undertaken on the freight task within New Zealand. The study showed that most of the freight generated within Northland, around 12 million tonnes, is moved within the region. Looking at the volume of freight multiplied by the distance it is moved, Northland sees just under a billion tonne-kilometres of freight movements each year. This generates around 100 million kilometres of truck travel on the region's extensive State highway network alone each year. This means that Northland on average has higher vehicle kilometres travelled by trucks on its State highway system than other comparable regions like Southland, Nelson/Tasman/Marlborough, Taranaki and the West Coast.[87]

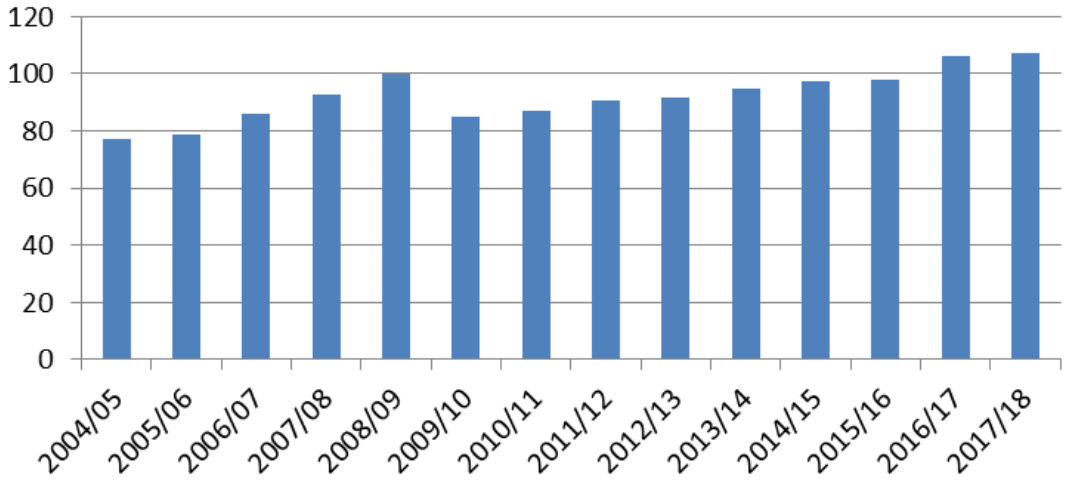


Figure 39. Heavy vehicle travel in Northland State highways (million kms).

Source: NZTA

7.70 Northland is a significant producer of primary produce, notably logs and milk. The region has at least 161,559 hectares of planted commercial forest, though much of this has been recently harvested. These logs are either directly exported or processed locally. Figure 40 highlights the importance of forestry as a generator of freight transport demand. The region has around 400,000 dairy cows, 380,000 beef cattle, 441,000 sheep and 273,200 lambs. Each year around 360,000 tonnes of livestock is moved around Northland either between farms or to processing. The largest freight commodities produced in Northland in 2012 were estimated at:

- Log (3.41 million tonnes, being 3,425,000 cubic meters);
- Petroleum products (2.72 million tonnes) from the Marsden Point refinery;
- Cement (2.45 million tonnes);

[86] Ministry of Transport, Freight Information Gathering System (FIGS)
[87] NZ Transport Agency, Vehicle Kilometres Travelled – State Highways

- Aggregate (1.69 million tonnes);
- Limestone (1.345 million tonnes);
- Milk (1.04 million tonnes, or 1014.4 million litres); and
- Horticulture (68,000 tonnes).

7.71 Northland also produces a smaller volume of higher-value processed products that make a significant contribution to regional employment and economic wellbeing. Some of the main processed products, using 2012 estimates, are:

- Sawn timber (210,00 tonnes, being 370,000 cubic meters);
- Wood panel inputs and outputs (690,000 tonnes);
- Dairy (160,000 tonnes);
- Meat products (33,000 tonnes); and
- Ready-mix concrete (199,000 tonnes).

7.72 Northland is also responsible, in terms of national production for:

- 98% of kūmara production (1,260 hectares in 2013);
- 37% of avocados (1,550 hectares);
- 31% of mandarins (210 hectares);
- 12% of olives (201 hectares);
- 9% of tomatoes (109 hectares); and
- 4.5% of kiwifruit (575 hectares).

7.73 Northland also consumes round $844 million worth of retail sales in terms of Supermarkets and Food, based on the National Freight Demand Study (2014). Most of Northland's inward goods are warehoused and distributed from south Auckland by road. Some is moved to Whāngārei, being the largest market and distributed throughout Northland from there. But most is point-to-point with trucks used as 'moving warehouses', where fast-moving-consumer-goods are moved daily up to Northland with trucks off-loading at multiple retail destinations. Most stores try to keep their inventories of stored goods to a minimum to reduce costs. As a result to meet customer needs, they are resupplied on a daily basis. This just-in-time approach means that Northland's receives daily shipments of inbound goods from Auckland, with each trucks carrying products that are either ambient (at room temperature), chilled or frozen.

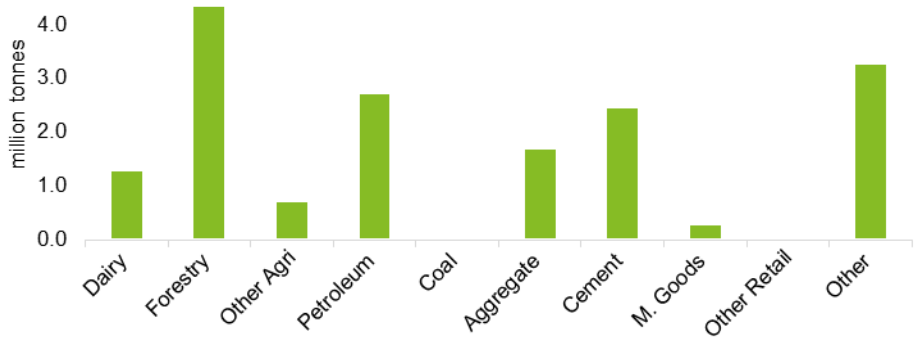


Figure 40. Northland freight generated by commodity.

Source NFDS (2014)

7.74 Most of the bulk freight moved out of Northland is either taken directly by road to Northport. Much of that volume is logs moved to Marsden Point for export through Northport. But significant log volumes are moved within Northland for processing. Large volumes of bulk wood products, such as chip, are moved to the port by road for export. Some volume has been moved by road and rail to the Bay of Plenty for further processing. Petroleum products are either piped to Auckland, or shipped out directly from the Marsden Point refinery. Cement from the Gold Bay Cement at Portland is coastally shipped directly from the plant directly, or moved in ISO containers from Northport to destinations around the New Zealand and the

Pacific. As such, only a fraction of the petroleum products and cement volumes produced in Northland are actually moved within the region. Most of Northland's higher-value exports are moved to and through, Auckland by road with a small volume and declining volume on rail (see below).

7.75 Rail today transports out of Northland a small amount of wood, pulp and paper, dairy and other general freight items. Wood, pulp and paper transported by rail has reduced from 0.15 million tonnes in 2012 to 0.03 million tonnes in 2017. Dairy volumes have remained constant over the past six years, with the current single daily service catering primarily for it. KiwiRail has no plans currently to increase rail services, due to the poor condition of infrastructure and limitations on locomotives and rolling stock.

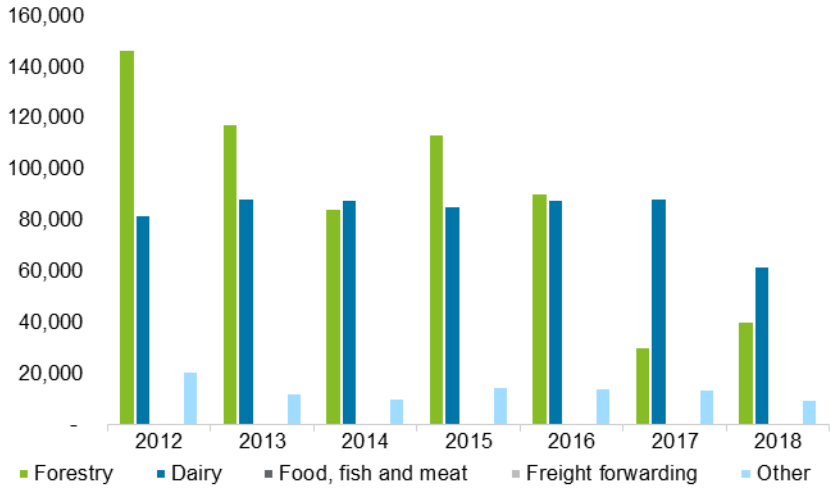


Figure 41. Rail Movements - Origin Northland.

Source MoT: Freight Information Gathering System (FIGS)

Future freight projections

7.76 The 2014 NFDS prepared a 30-year forecast of freight movements out to 2042 (using data collected in 2012). The forecast was by origin / destination only and did not include forecast movements by commodity. Northland data also includes petroleum products, most of which are either carried out of Northland by the fuel pipeline to Wiri in South Auckland or moved around the rest of New Zealand by coastal fuel tankers.

Figure 42. Regional freight demand forecast (tonnes) – 2012 versus 2042.

Source: NFDS (2014)

7.77 Northland's future freight task, assuming natural growth from a 'business-as-usual' outlook, is forecast to grow from around 12 million tonnes moved within the region to 16.34 million tonnes by 2042. In terms of volume and distance freight movements would increase from under a billion tonne-kilometres to around 1.19 billion tonnes-kilometres within the region. As the origin of freight moved within Northland and out to

destinations across New Zealand, the 16.9 million tonnes estimated in 2012 would grow to 23.23 million tonnes moved by 2042.[88] While much of this 35% increase would be petroleum and cement products that would not be moved within Northland, a significant amount of this increase would be moved on the main highways to and from Northport and Auckland. The National Freight Demand Study does not provide a forecast of freight by commodity by region for 2042. So trends for other major commodities, where change is likely to affect overall land transport demand and supply within Northland, are discussed below. This business case has assumed business-as-usual growth for the region's freight at 1.1%.

Milk and dairy

7.78 On current trends in terms of business-as-usual growth there is limited potential for dairy growth in Northland as few new areas are being converted to dairying in the foreseeable future.[89] Though there is potential to bring under-utilised multiple-owned Māori land into production if some of the barriers to development can be overcome, such as access to finance. The Ministry for Primary Industries estimate that around 5,601 hectares of Māori land in Northland is potentially available for conversion to dairy, if this land use aligns with the aspirations of the land owners.[90] As an example of this potential for increased production is the Rangihamama Dairy project near Kaikohe. The project converted 278 hectares of Māori-owned land into a highly productive dairy farm with the agreement of the land's more than 3,000 shareholders. The project estimated that the conversion to commercial dairy in 2014 would see production grow from 180,000 kg of milk-solids in the first year to 230,000 kg of milk-solids from year three.

7.79 There is also potential for significant improvements in productivity for existing farms. When compared to farms in other regions dairy farms in Northland produce less milk solids per effective hectare (988kg compared to 645kg) and per cow (346kg compared to 282kg).[91] Northland farmers are also less likely than farmers nationally to carry out regular herd testing to inform decision-making and herd management. Not surprisingly, the operating profit per hectare from Northland's dairy farms is relatively low, at $1,214 per hectare, compared to $1,830 nationally.[92] A comprehensive shift to practices similar to those undertaken in other regions could significantly lift Northland's dairy production volumes. This would increase daily truck travel to and from farms and dairy production facilities, as well as freight volumes from production centres to Auckland. This potential for growth would be particularly impact on the land transport system during the milk flush – the peak of the season where raw milk is moved from Northland and through Auckland by road for processing in the Waikato.

7.80 This additional milk volume could supply, and also be stimulated by, additional added-value processing capacity in Northland. Over the last ten years a number of companies have proposed building UHT (ultra-high temperature) milk processing plans in the region.[93] One proposal that has received resource consent is for a production plan to the west of Kerikeri. Owned by Northland Milk NZ the proposed plant will process around 300,000 litres of milk daily, producing up to 12 refrigerated containers a day that will be road transport to Auckland.[94] As the plant is not yet built or in production, it is not clear if this production will source milk currently supplying dairy processing elsewhere in Northland. But once built this plant will increase freight in the mid-north area of the region not far by road from Otiria/Moerewa.

Logs and wood products

7.81 For forestry there are indications that the 'wall of wood' is coming to an end. This sharp peak in log supply was due to harvesting of the significant number of forests that were planted in the late 1980s-1990s, planting then slowed for an equivalent period of time. Recent harvesting has also seen younger trees cut in Northland, further reducing the age profile of the trees that remain. The total annual harvest in Northland is therefore projected to reduce gradually from 4.3 million cubic metres in 2018/19 to 3.7 million cubic metres in 2026/27. At that time harvest volumes continue to decline to a low of 1.97 million cubic metres in 2032/33 before starting to rise again, eventually rising to 4.3 million cubic metres in 2042.

7.82 Large forest-owner harvesting will reduce from the dominant 2018/19 levels of approximately 2.5 million cubic metres to a low of 1.2 million cubic metres in 2022 / 2023 before starting to climb again. While small

[88] National Freight Demand Study, 2014, pp.276-277
[89] National Freight Demand Study, 2014, p.251
[90] MPI, *Tai Tokerau Regional Growth Study*, 2015, p.59
[91] *Tai Tokerau Regional Growth Study*, 2015, p.57
[92] *Tai Tokerau Regional Growth Study, 2015,* p.57
[93] 'UHT dairy factory planned for Northland', *Northern Advocate*, 28 March 2010; 'Chinese to Spend over $42m on Northland farms', *Northern Advocate*, 5 May 2015.
[94] 'Brown's $40m plan to cream it – ethically', *Northern Advocate*, 15 February 2016.

forest-owner harvests will begin to replace large forest owner harvest dominance with 2.5 million cubic metres per annum from 2019 to 2027. This will then drop off, eventually bottoming out at 0.7 million cubic metres. It is also possible that small forest-owner volumes have also been undercounted. Small forestry owners may also harvest early (or later) based on a response to price, whereas commercial growers are generally likely to follow a more stable harvesting profile. There is therefore some uncertainty in the future freight transport demand, though a significant decline for the next 20 years is likely. This decline will be experienced around Northland and North Auckland differently, with some areas like the Hokianga and around Helensville potentially increasing activity as forests there reach maturity.

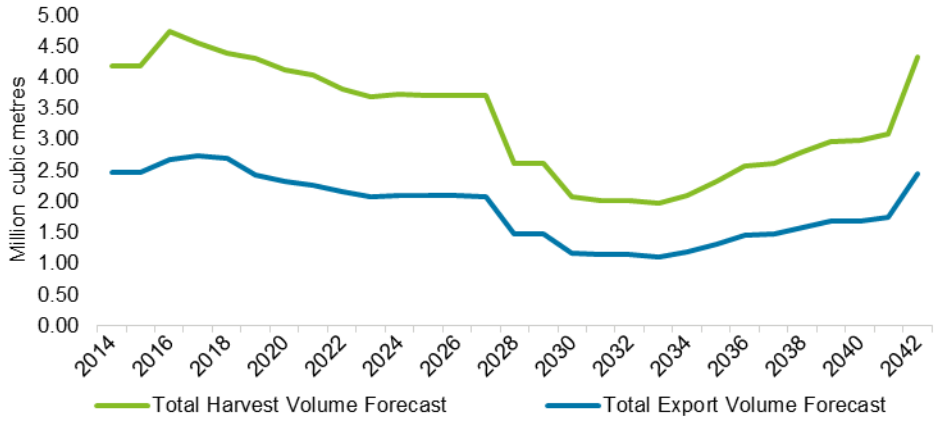


Figure 43. Forecast Northland Wood (logs) Availability.

Source: Forme Consulting Report, Commissioned by Northport

7.83 Assuming harvest levels are maintained at 100% of the Northland wood availability forecast projections, log exports are estimated at between 2.69–2.74 million cubic metres in 2018/19. Between 2019 and 2027 log exports are expected to gradually reduce to an estimated 2.09 million cubic metres. From 2028, Northland's log exports will decline steadily to eventually bottom out at approximately 1.2 million cubic metres per annum between 2030 and 2034. This decline is not however spread evenly across Northland, with some areas seeing increased harvest activity as trees in those areas reach maturity.

7.84 The reduction in log availability will have a significant impact on wood processing activities in Northland. As fewer logs become available, there will be increased competition for logs between processors and exporters. The relative costs for log transport will therefore become a more important industry concern, as forest-owners receive the 'delivered price' for logs. This will mean that the transport options available, their relative costs and the relative distance between harvest site and market destination will have an even greater significance to the purchase, utilisation and export of logs than they do now. The pricing of potential rail services, therefore, will need to be comparable to road transport to ensure the export of logs is not favoured at the expense of wood processing (with most logs delivered by road transport).

7.85 With replanting on most harvested areas completed, underway or proposed, a steeply increasing level of logging activity can be expected as these new trees reach maturity in the late 2030s. Additionally the Government's announcement to plant one billion trees, including some areas in Northland not currently replanted due to a lack of capital, will provide significant volumes over the coming decades. As such log exports are expected to exceed 2.4 million cubic metres per annum by 2042 and rise steeply from there.

Horticulture

7.86 Northland has over 5,400 hectares in horticultural production. Overall plantings and production is increasing, with some crops increasing slightly, some declining and others substantially increasing. Avocados are a standout in this picture with significant growth in plantings and production recently in the mid-north, particularly around Kerikeri. Due to the rise in avocado demand and price there have been an estimated 1,000 hectares of new plantings in the last three years, adding to the area already in production.[95] There are indications the industry is also moving to using containers, over break bulk.

7.87 Kiwifruit plantings are also increasing, with the region's climate, water supply and soils ideally suited to growing the high-value crop. While Northland currently accounts for only 1% of New Zealand's green

[95] NZ Avocado, *Annual Report* - 2018, p.24. Data for the Far North region of Avocado NZ, so only represents some of the Northland region.

kiwifruit production and 5% of SunGold, it could increase substantively with limited land available for growth in the Bay of Plenty.[96] The area under cultivation in Northland already produces substantial volumes with an estimated record of 5.5 million trays of kiwifruit being harvested in Northland in the 2018 season.[97] With additional SunGold planting licences being sold to Northland-based producers, volumes are expected to double by 2030.[98] Most current and future plantings are around the Kerikeri area, with some around Whāngārei. Into the future therefore export production is likely to grow substantially. The Ministry for the Environment however has warned that due to the loss of winter chilling, production in Northland could be adversely affected by climate change over the next thirty years.[99] This poor winter chilling already affects production for green kiwifruit, but SunGold may prove to be able to tolerate this.

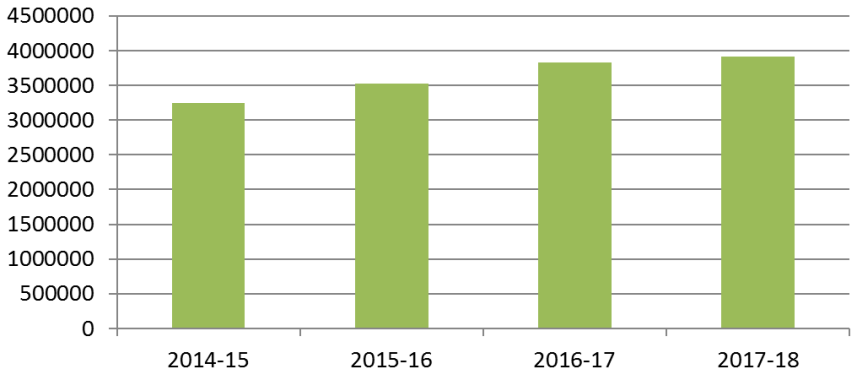


Figure 44. Far North Region - Avocado production

Source Avocado NZ

Aquiculture

7.88 Northland has around 750 hectares of consented aquaculture areas but only around 270 hectares is currently used for oyster (240 hectares) and mussel (around 22 hectares) production. Around 100-150 hectares of the remaining areas consented for oyster production could be developed for production. The Ministry for Primary Industries suggests that mussel production could increase from current levels to almost 3500 tonnes by 2025 and over 4800 tonnes by 2035, assuming that space increases by 160 hectares by 2025 and an additional 50 hectares by 2035.[100] This represents substantial growth in output of around 17.5 percent per annum over 20 years. Much of the space required for this production will not be currently consented.

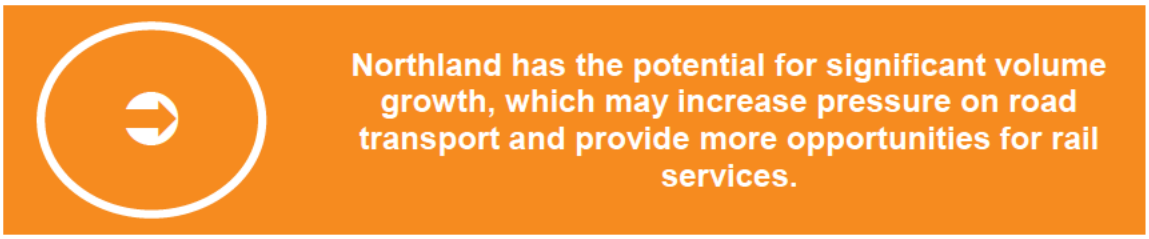
Opportunities for higher freight demand growth

7.89 A number of other disruptive events could significantly increase freight demand within Northland. The most probable one is agreement on the remaining comprehensive Treaty of Waitangi settlements in the region and the transfer of assets. While negotiations between iwi Māori and the Crown are ongoing, the potential of a significant settlement in cash and assets has the potential to transform the Northland economy. As experienced in other regions, the settlement process has resulted in the development of both strong iwi-owned businesses, generating dividends that have been reinvested in social outcomes such as housing and education. This growing Māori-led economic activity has also had wider regional economic benefits.[101]

7.90 Northland's Māori asset base has been estimated at $2.4 billion in 2012 and is expected to grow as settlements are finalised. The financial resources settlements could enable Māori in Te Tai Tokerau to leverage their existing asset base to develop new high value industries, which create greater employment opportunities for Northlanders. Starting with its natural advantages, Northland could build on its primary industries to develop value-added production of its forestry, dairy and meat resources. New and growing industries such as tourism, kiwifruit, avocado, production of medicinal mānuka honey products and aquaculture could be further stimulated by new Māori enterprises.[102] These ventures would lift regional incomes and help the region attract and retain more people, including Māori returning to the region. This

[96] ANZ, *Kiwifruit Industry Insights Update 2019*, February 2019
[97] 'Bumper harvest for Northland kiwifruit growers this year', *NZ Herald*, 12 December 2018
[98] 'Northland earmarked for kiwifruit expansion', Market Intelligence Ltd, 7 February 2018
[99] www.mfe.govt.nz/climate-change/how-climate-change-affects-nz/how-might-climate-change-affect-my-region/northland
[100] *Tai Tokerau Regional Growth Study*, p.70
[101] Chapman Tripp, *Te Ao Māori – trends and insights 2018*, 2018
[102] https://www.nrc.govt.nz/media/9238/taitokerauregionalgrowthstudyfinal2015martinjenkins.pdf

higher population growth and development of added-value industries would both alter and grow regional freight demand.



Potential for rail utilisation growth – Freight

Modal-choice decision-drivers

7.91 While central and local government can and do shape modal choices through the provision of infrastructure and regulation, logistics is fundamentally a private sector activity. The companies that produce, transport and consumer freight are usually the key decision-makers in both how freight is moved as well as the wider logistics considerations of things like warehousing, distribution, packing. It is important to remember that individual transport movements are often decided within the context of a wider supply chain strategy, such as storage and distribution choices. See Table 40 for a summary.

7.92 Often these decisions are not necessarily made locally, but sometimes nationally or even inter-nationally as part of a comprehensive supply chain strategy. These supply chains, of which modes of transport are therefore a subset, are driven primarily by production and customer requirements. They also cover the full production, distribution and delivery aspects of making goods that are then delivered to end-users, sometimes on the other side of the world. These decisions are driven by the need for freight to arrive within agreed timeframes, in good condition and at a reasonable cost.

Identifying potential freight demand for upgraded rail services in Northland

7.93 From the perspective of the private sector the condition of the line and the services offered means that rail is not seriously considered as an option in Northland by cargo owners and logistics operators. In making significant supply chain decisions, the private sector requires longer term certainty about how rail will meet their service requirements now and into the future. Rail in Northland currently, without significant investment, does not meet these requirements. With the future of the NAL being uncertain, KiwiRail has not been able to respond to potential interest from companies to make more use of the rail network as it currently is. This is because KiwiRail as a business has had to justify any potential investments in Northland rail, even minor ones, on the basis of whether it would provide a commercial return. These investments had to be considered against the many other investments needed across the country, including on lines that are more profitable. Given the impending need for significant renewal investment KiwiRail was also reluctant to take on new business, given that a longer-term commitment to moving that freight depended on a potentially costly reinstatement of assets.

7.94 To better understand the potential uptake of improved rail services in Northland, interviews were conducted with a number of significant cargo owners and freight transport operators. Those approached included representatives of companies that had previously moved freight within Northland by rail, had the types of freight suited to being moved by rail or had expressed an interest in rail. Coastal shipping and road transport operators were also involved in discussions. Those companies interviewed are noted in Appendix J. To ensure the free and frank exchange of ideas these discussions were conducted on a strictly in-confidence basis with members of the project team only. This allowed the sharing of commercially sensitive information with the project team. These discussions were also undertaken on a 'without-prejudice' basis, so that anything disclosed or suggested to the project team would not commit the participants to any actions in anyway.

7.95 The discussions covered the required attributes that Northland rail services would need to provide, including levels of service, for them to consider using it for their particular cargo. The conversations largely assumed a business-as-usual approach unless known changes to the operating context were on the horizon. The discussions also included broader observations about rail, freight and logistics in Northland more broadly. If there was a possibility of the NAL offering a suitable freight service, those companies who

expressed an interest agreed to share freight volume data with the project team to help to determine utilisation, costs and benefits. The insights gained from these conversations were also collated to inform the report over all. As such no particular views or comments in this report should be inferred as having attributable to any company or individual.

Table 40. Mode choice decision drivers – summary

Supply chains operate to meet customer requirements to ensure that the goods they want arrive on time, in good condition and at the best price. Critical criteria for determining mode, where there are realistic choices are usually shaped by some or all of the following decision criteria.

Reliability

Supply chains are built around the seamless inter-connection of a range of components with freight arriving at a specific time (within often contracted time windows). Failure to deliver or receive goods within the specified time can result in disruption of production and the potential loss of customer trade.

Product care

Goods must arrive in good condition and in full. Damage or loss to a product may result in reduced value of the goods, lost time in production or the loss of sale. This is particularly important for perishable or fragile products.

Safety

This is important for products where mishandling poses a danger to staff, the transport operator or the wider public. Particular examples include hazardous goods because of the risk involved with the product.

Timeliness

This is a specific dimension of reliability, based on rapid delivery. Many manufacturers and wholesalers have incorporated timeliness or just-"time delivery", as an integral part of their value proposition, offering delivery anywhere in New Zealand within 24 hours.

Cost

Customers and businesses are constantly looking to minimise cost, either through improved efficiency and/or productivity across their entire supply chain. For an increasing number of companies cost can also now mean costs met more widely, such as environmental.

Connectivity

Single movements of freight are often only one component of a supply chain, which can include warehousing, distribution, consolidation, exporting and importing. Mode choices are often linked to arrangements made across the supply chain that are designed to deliver on wider objectives.

Stakeholder perceptions on Northland rail - summary

7.96 During these stakeholder conversations cargo owners and freight transport operators, particularly those using rail elsewhere in the country, were asked why they did not use rail in Northland. The answers can be summarised as:

- **Rail does not connect to the port.** For many commodities, such as logs, this would require triple handling where freight is taken by truck to an intermodal terminal, transferred to rail, railed a short

distance down to Oakleigh and then transferred back to a truck. The cost of these transfers, and potential damage and loss to the freight, would make the option not worth considering.

- **Rail cannot accommodate high-cube containers**. Modern shipping containers have been increasing in time as cargo owners and shipping lines look to boost productivity. Along with the increasing uptake of forty-foot containers, most standard containers of 8.5 feet (2.59 meters), are being progressively replaced by high-cube containers that stand at 9.5 feet high (2.89 meters). While most of the tunnels around the national rail network have been enlarged to accommodate these taller containers, the tunnels in Northland have not been. As a result a number of cargo owners chose to move to road transport in order to take advantage of the improved productivity that these new generation of containers can offer.
- **Rail services have been unreliable and unresponsive**. Due to the condition of the rail network (tracks, bridges, tunnels and culverts), as well as the older locomotives and rolling stock being used in Northland services in the region can be cancelled or significantly delayed. Similar due to the events concerning the rail network over the last twenty years (outlined above), the uncertainty surrounding the future of services has meant that Northland.

Appendix D Detailed Commodity Analysis

Potential mode share

7.97 The following section reviews the potential rail utilisation of Northland's main commodities that are either moved by rail already around New Zealand, or have been mentioned by stakeholders as potentially able to be moved by rail. In reviewing the movement options of these commodities it is assumed that there will be a largely status quo scenario for the next 10 to 15 years, in terms of major commodity composition and assumed volume growth of 2% a year. The engagement with cargo owners sought to better understand their specific supply chain arrangements for different commodities, without assuming a need to change some of the fundamentals that shaped them. Where significant changes were likely or 'known' into the future, such as a decline in log volumes, these are incorporated into the analysis.

Table 41. Freight moved by rail (all NZ 2012) and forecast all-mode volume growth by 2042.[103]

Commodity Group	Billion tonne-km	Current rail mode share (tonne-km)	Estimated Commodity Growth by 2042
Coal	0.94	91%	47%
Dairy	0.47	75%	49%
Iron, steel and aluminium	0.21	64%#	37%
Meat	0.11	51%	5%
Other minerals	0.05	42%	109%
Pulp & paper	0.17	27%	28%
Retail & manufacturing	1.47	19%	48%
Panel	0.03	15%	86%
Wool	0.01	15%	0%
Logs	0.36	11%	-33%*
Milk	0.19	4%	60%
Horticulture	0.04	1%	61%
Fish	0.01	7%	25%
Sawn timber	0.02	5%	50%
Limestone, cement & fertiliser	0.07	5%	118%
Grain	0.05	5%	111%

Note: #Iron and steel only. *Log exports will decline after years of significant volume growth

7.98 Over the last 20 years rail in New Zealand has undergone an evolution as it has moved back from some markets, such as some bulk commodities, and moved more towards supporting containerised import/export flows. As a result some of New Zealand's largest companies continue to use or have made greater use of rail as part of their supply chain arrangements. It should be remembered that rail is only suitable for parts of most logistics chains. But these can be significant parts of the task, moving large volumes over long distances. This can also include high value goods, such as processed final product. The following table presents a national snapshot for the current rail mode share for those commodities most moved by rail, the level of rail utilisation and projected commodity growth. The best way to understand the function of rail (and coastal shipping) in the national supply chain is to look at the freight task from the perspective of the volume of goods moved by distance – using tonne-kilometres. Appreciating the relative value of the commodities moved is also important to understand the economic contribution the freight provides to regions and New Zealand as a whole.

[103] Interpreted from *National Freight Demand Study*, 2014, pp. 196, 273

7.99 This context demonstrated in Table 41 that illustrates those commodities in other regions around New Zealand that are efficiently and effectively moved by rail: notably the high-value commodities of dairy, iron and steel, meat, pulp and paper and retail. The significant modal share for these commodities suggests that in across the country rail is heavily or substantially utilised because it suits these commodities and there is adequate infrastructure and services available. It also suggests that rail provides certain advantages over the alternatives, being either road or coastal shipping – depending on the distance travelled and the origin and destinations. In some cases the types of freight moved by rail, are owned by the same companies that currently move the same freight in Northland by road. Using this commodity snap-shot as a guide and comparator, the business case approached a number of these companies to discuss the reasons for the way their supply chains operate this way in Northland.

Table 42. Estimated average haul (kilometres) by commodity and mode - 2012. [104]

Commodity	Road	Rail	Coastal
Coal	47	309	-
Dairy	57	180	-
Iron, steel	39	437	-
Meat	138	259	-
Other minerals	108	495	-
Pulp & paper	272	146	-
Retail & manufacturing	162	362	1040
Panel	147	184	-
Wool	350	246	-
Logs	111	124	-
Milk	84	237	-
Horticulture	90	369	-
Fish	41	239	-
Sawn timber	127	418	-
Limestone, cement & fertiliser	85	246	380
Grain	132	669	-
Petroleum	90	-	966

7.100 A key decision-driver is the cost per kilometre of travel and required delivery timeframes. Businesses will generally choose rail where timeframes are less urgent and freight is moved longer distances, volumes are large or other alternatives are problematic like using roads through congested areas. Rail generally has a lower cost per kilometre than road transport over longer distances. However the cost of double handling and transfers often mean that rail needs to be moved over and above a 'distance threshold' to be commercially viable. Nationally the average distance commodities are moved by rail is around 260 km (Table 42 for detail of each commodity group).[105] Depending on the commodity type, distances can be longer depending on the origin and destination, the additional cost factors in the journey (such as travel over elevated terrain, or through congested parts of the highway network). Depending on the costs of alternatives, rail is considered against the specifics of each supply chain and geographical area.

7.101 Rail can also provide benefits through being able to marshal and consolidated freight volumes together to reduce the overall cost of moving freight. Some companies are also looking to reduce their carbon footprint, and other negative impacts of moving freight, so will look to use rail if it is feasible. The question asked was whether they would consider using rail in Northland if the rail network provided a service that

[104] Adapted from *National Freight Demand Study* (2014), p.198
[105] National Freight Demand Study (2014), p.198

met their requirements, and if so what were their requirements. As these discussions were conducted on an in-confidence basis (and without prejudice to any future discussions or considerations), the discussion below is based on an analysis of commodities not companies. Due to the sensitivity of cartage rates, the matter of how much they would pay for rail services was not discussed specifically. Instead it was stated that the cost of rail services would need to be comparable to those currently offered by road transport, which it should be noted is a highly competitive industry.

Forestry

7.102 Forestry is the largest commodity by volume generated in Northland and relies overwhelmingly on road transport in Northland. While Northland's forest estate is geographically dispersed rail historically played a significant role in moving logs. This was particularly true for log movements to the old port at Whāngārei, discussed in the introduction. Northport is the natural gateway for most of the export of logs out of Northland and also for logs from the north of the Auckland region (see map). Higher grade logs can however be transported further for processing. Some processors, including some up until recently, railed logs to processing facilities including as far away as the Bay of Plenty. The movement of logs by rail was achieved by road transporting logs from harvest areas to a number of log yards around the region, such as Otiria, Dargaville and Wellsford (the later still in use). From there the logs were transferred to rail. Moving logs by rail can be efficient where distances moved by rail are greater than at least 80-90 kilometres, depending on the road distance to the log yard and the ability of rail to take the wood to its final destination. For trips shorter than this it is more economic for the truck to continue taking the logs to their destination, rather than incur the cost of transferring them off the truck and then onto rail. It was for this reason that before the port was moved, TranzRail (KiwiRail's predecessor) had expected in the 1990s to be able to carry potentially up to 70% of the upcoming 'wall of wood' volumes in the Otiria and Dargaville catchment areas.[106]

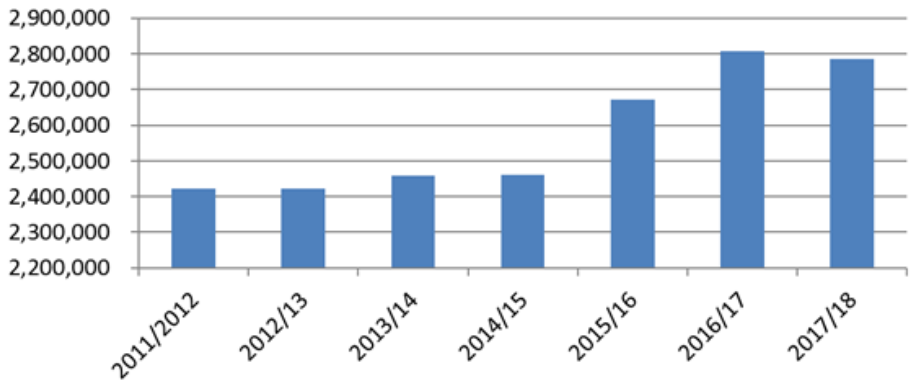


Figure 45. Northland Log Exports July 2012 – June 2018 (tonnes)

Source: Marsden Maritime Holdings

7.103 In Northland and northern Auckland there are a number of potential 'rail catchment areas' where log transfers from road to rail might be economically viable, using a rail-enabled log transfer yard. Locations that could be explored could include Otiria, Dargaville, Tangowahine, Te Hana, Wellsford, and Helensville (see the map below). Without these yards the transfer to rail and its movement to Portland and Marsden Point would not be feasible. The benefits from this approach would be to enable improved log truck utilisation. Fewer trucks would be required - instead making shorter, and more frequent, trips to deliver more logs between the forest and the rail yards. Assuming harvest sites are more than 80 kilometres from Northport, the average log truck working 13 hours a day can make two to three return trips a day. With loggings trucks in Northland operating as either 50MAX units (depending on the tare weight - carrying around 32 tonnes) and standard 44 tonne trucks (carrying about 28 tonnes), this could move around 96 or 84 tonnes of logs to the port in a day respectively. If an inter-modal terminal was available nearby, each truck could make shorter trips carrying out of the forest much more volume each day from the harvest site to the terminal. This could mean fewer trucks and drivers are needed to move the same volume of logs from the harvest area. This accumulation could then be moved to the port or to processing as required, with one 10-wagon train being able to carry around 320 tonnes of logs (being the equivalent of around 11 to 12 combination truck trips, one way). It was for this reason that before the port was moved, TranzRail

[106] Financial and Economic Evaluation of Northland Rail, 2002, p.69

(KiwiRail's predecessor company) had expected in the 1990s to be able to carry potentially up to 70% of the wood volumes in the Otiria and Dargaville catchment areas.[107]

Figure 46. Wellsford rail log yard

Photo: AECOM 2018

7.104 While in the right circumstances moving logs by rail can be more efficient, it will still mean truck travel is required between harvest site and log yard. As a result, log truck activity on council roads to and from the log yard would increase. This would however be off-set by other public benefits such as a reduction in truck travel on the highways between the log yard and the processing site or port. But some local mitigation may be required for the local roads concerned.

7.105 Given the above it is assumed that around 60% of the log harvest will not be economically viable for transfer to and transport by rail. However in examining the potential for moving logs using the NAL and Marsden Link it was assumed that the cost of cartage was comparable at least to road transport. It was also assumed that log transfer yards were in operation where they are viable to do so, the rolling stock and locomotives were available to operate reliably and the rail infrastructure was capable of handling the trains. Given these caveats it is estimated that around 1,175,000 tonnes of logs each year could be transported within Northland and from the northern Auckland region by rail (based on current harvest volumes). This would equate to avoiding around 170 truck and trailer trips each weekday, (excluding the return trip) or 42,000 trips each year. This reduction in required truck travel would avoid approximately 3,183,000 kilometres of heavy truck travel on highways in the Northland and Auckland regions (notably SH1, SH14, SH15, and SH16).

Table 43. Logs - potential demand for rail services

Annual demand potential – logs (export, domestic)

	Low	Medium	High
Tonnes	950,000	1,175,000	1,348,000
Equivalent truck trips (one way)	34,000	42,000	55,400

7.106 Into the future, as today's plantings mature over the next 20 years, the demand for log transport is likely to grow again. This future wall-of-wood could likewise be managed in part by rail. Rail to the port would also be better utilised if future wood processing facilities were located in the large area of industrial land adjacent to Northport. Or alternatively adjacent to the railway line at hub areas, such as Otiria. One suggestion from a number of companies was that Marsden Point could host in the future the development of bio-fuels using wood mass, depending on the relative economics of using petroleum fuels or other alternatives. This production would make use of the rail network across the catchment areas it covers throughout Northland and the northern part of Auckland.

[107] Financial and Economic Evaluation of Northland Rail, 2002, p.69

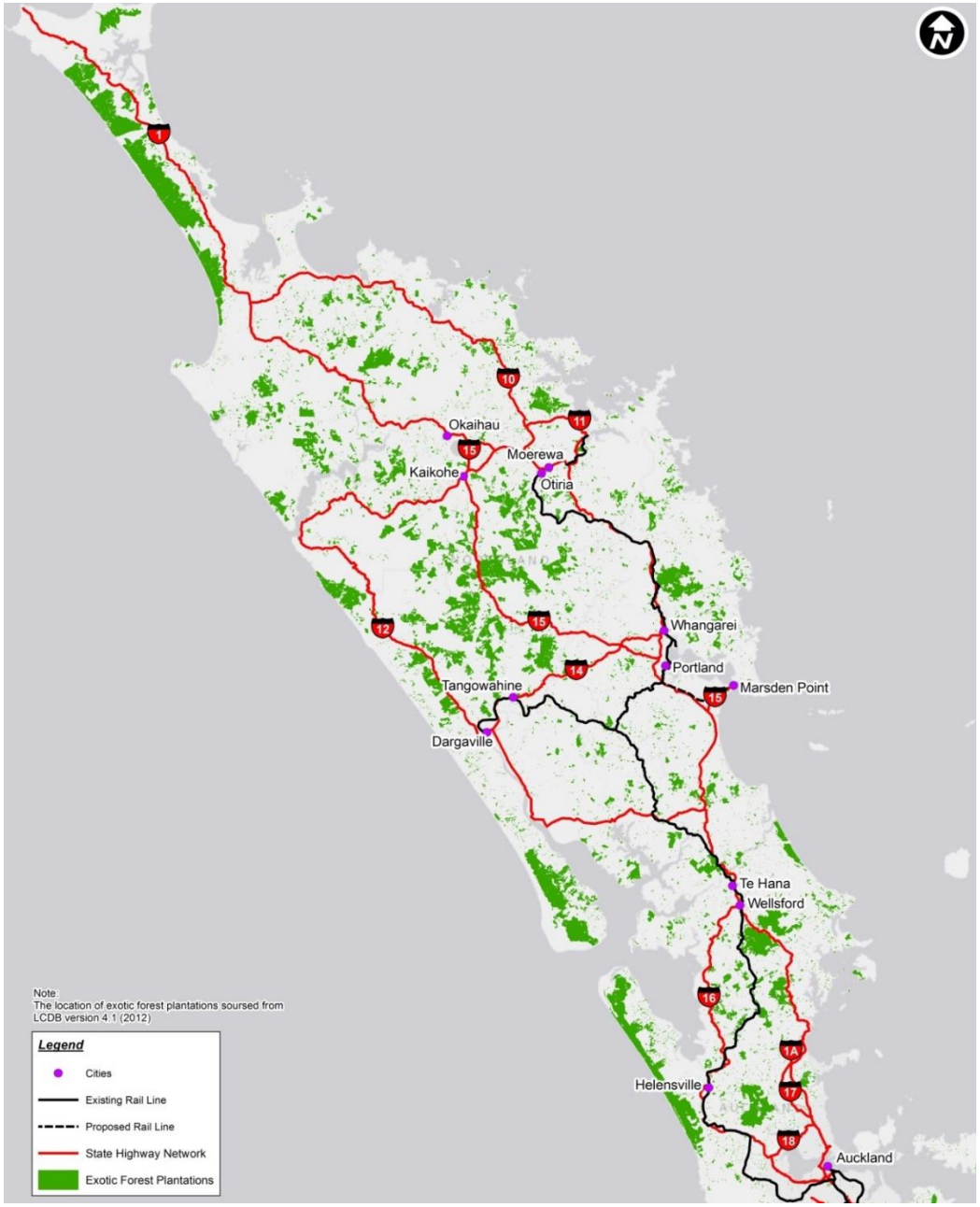


Figure 47. Northland and north Auckland commercial forestry plantations

Processed wood products

7.107 Northland produces significant amounts of higher-value processed and manufactured wood products such as woodchip, mouldings, panels, structural timber, triboard, fence posts and laminated veneer lumber (LVL). Wood products manufactured in Northland are exported around the world, notably to Australia, the United States and Japan. These wood processing facilities employ hundreds of people throughout the region and play and important role in the Northland economy, particularly for some communities.

7.108 Forecast declining log supply over the next twenty years is of significant concern to the processing industry and has created some uncertainty around production levels. There will still be significant log volumes available across Northland and in the northern part of the Auckland region. Processors compete for logs supplies with exporters, usually on the basis of a delivered price. So the price of transporting logs is of great significance to the industry and its outlook in being able to source the logs it needs for production (see below for more on this question). Despite this uncertainty the industry is expecting production to substantially continue, though some adaption will be required. As one indication of this

Juken New Zealand announced in 2018 its intention to undertake a $30 million upgrade and modernisation of its 30-year-old triboard mill in Kaitaia.[108]

7.109 Northland's wood processing facilities rely on road transport for most of their inbound log supply as few are near the railway or have the scale to make rail economic. Rail is also seen as unreliable in Northland and as the NAL cannot handle high-cube containers, it is not currently considered an option. Most processors in Northland also currently rely almost completely on road transport to move their goods out to domestic and international markets, notably to Northport and Auckland. The significant volume of woodchips moved to Northport today was previously moved by rail to the Port Whāngārei, with other volume moved as far away as the Bay of Plenty for further processing. Some wood products in breakbulk packaging, that is bound together but not in a container, is also trucked to Northport for export.

7.110 A large amount of wood products are trucked to Auckland City for local and national markets, and also for export. Along with being a significant market in its own right for Northland wood products, Auckland is being an important gateway to international markets. A large volume of these higher-value wood products are taken via SH1 to Auckland in curtain-sider truck combinations, where they are containerised into twenty-foot and forty-foot high-cube containers and then taken by road to the Ports of Auckland or by road or rail to the Port of Tauranga for export. It is worth noting that the last movement of these containers to the Port of Tauranga is often made by rail, with the container taken by road to MetroPort (Port of Tauranga's inland port in Penrose), from where it is railed. The use of curtain sided B-trains allows the trucks to carry on the return trip to Northland a backload of other freight such as retail goods. The ability to use the return trip for a backload significantly reduces the cost of travel. The current arrangements has up until now largely suited most cargo owners, however pressure on truck driver availability and travel times to and through Auckland are putting this model under pressure (see below).

7.111 As an alternative and on the basis of substantial investment in rail infrastructure, there is the potential for moving the container packing task up into Northland. To move by rail the freight would need to be containerised first as there is the risk the wood products being damaged. This would be to high-cube twenty-foot and forty-foot containers, which currently cannot be moved by the NAL. This container packing task could take place at key locations in Northland, depending on where the wood products originate from and availability of other freight to make the terminals commercially viable. Currently the best places to consider developing intermodal terminals, assuming an upgraded NAL, would be Whāngārei or Northport, and Otiria-Moerewa.

7.112 Small inter-modal terminals can be, in some locations around New Zealand, an effective means of managing local supply chain challenges. The Tokoroa road-rail terminal, for example, handles a small volume of local inbound and outbound containerised freight. Built for around $3 million, the terminal was opened in 2015 and moves around 6,000 containers a year from a number of local companies. While Tokoroa is only 100 kilometres from the container terminal in Tauranga, or about an hour and half by road, it an effective solution for moving non-urgent imports and exports annually to and from the South Waikato District.[109]

7.113 Shorter-haul road trips could deliver goods between the factory and the intermodal terminal, which also has storage and packing facilities. This concept would be most effective if backloads could be achieved between outbound and inbound goods. The inbound freight from Auckland being distributed throughout Northland from the terminal site. This could also be achieved using curtain-sided intermodal containers that can be transferred between trucks and trains. Because rail services are fixed to a specific corridor, they lack the flexibility of road transport to efficiently manage a range of origins and destinations. This means achieving backhauls can be more difficult, potentially reducing the economic efficiencies.

[108] See https://www.jnl.co.nz/about-us/news/
[109] South Wa kato District Council, *Proposal to Develop an Intermodal Road/Rail Terminal in Tokoroa*, 22 May 2014

7.114 With these caveats it is estimated that around 280,000 tonnes of woodchip and around 140,000 cubic meters (being around 4,700 containers (TEUs)), of processed timber product could be moved to rail. Excluding the return trip this would equate to avoiding around 2.9 million kilometres of truck combination travel for moving woodchip mainly within Northland. For the manufactured timber products this would avoid around 1.5 million kilometres of truck combination travel (one-way) a year. This reduction in required truck travel would be felt mostly on highways in Northland on SH1 south of Moerewa (assuming an intermodal terminal is located there), through Whāngārei, on SH15, and down to and within Auckland on SH1. That is around 57 heavy truck combinations per week day one-way.

Table 44. Processed wood products - potential demand for rail services

Annual demand potential - processed wood products

	Low	Medium	High
Meters^3	-	140,000	-
Tonnes (chips)	-	280,000	-
Equivalent truck trips (one way)	-	14,130	-

Dairy (including milk)

7.115 Fonterra is currently the only producer of scale of processed dairy products in Northland. Fonterra is also the main remaining user of Northland rail services. The Cooperative has two processing plants at Kauri, north of Whāngārei on SH1 and Maungaturoto, located on the northern edge of the Kaipara Harbour on SH12. While nationally Fonterra has made a strategic decision to centre its processed dairy supply chain around the rail network, in Northland onl around a third of its processed volume is now moved by rail. The single weekday train services, and the restriction on high-cube containers means that half of its processed volume from Kauri and all of its volume from Maungaturoto is moved to Auckland by road transport. This is despite the fact that Fonterra's factory at Kauri is rail enabled.

7.116 The factory at Maungaturoto, while not rail enabled, is close to the NAL and the now decommissioned dry shed and rail transfer site. If the NAL was able to handle high-cube containers and additional regular and reliable services were available, then all of the volume from Kauri could be railed to Auckland or onward to Tauranga for export. Likewise if an intermodal terminal was built at the NAL down the road from the Maungaturoto factory, that included rebuilt storage sheds, all of the processed volume from there could be railed from there as well.

7.117 Coastal shipping containers from Northport could be an option for Fonterra in the future. This would require road transporting containers from Kauri (just north of Whāngārei) and Maungaturoto about 40 kilometres or a 30 minute drive (one-way) to Northport.[110] Though this would add additional time and handing to the moves, compared to either using road transport or having rail straight from the processing site, or immediately nearby. The Cooperative also currently has a ten-year contract with the Port of Tauranga to consolidate its volume through that port using rail, in order to save costs throughout its international supply chain. But coastal shipping is an option Fonterra could consider in the future, though their preference is for the use of rail.

7.118 Fonterra often has capacity constraints in Northland, particularly at the peak of the season during the September 'milk flush'. The two Northland factories are unable to process the high levels of milk that are often produced by local dairy farms. This requires excess milk needs to be sent for processing by road to Fonterra's Crawford Street facility in the Waikato for up to 26 weeks a year. This movement has to be achieved within 24 hours to meet European Union entry requirements. If additional rail services were required, specifically milk trains, this peak could be accommodated using rail to other rail enabled processing plants. While this tanker service would likely only be fully utilised during the peak season, this

[110] "Port of Tauranga ties up 97% of North Island dairy exports after Coda deal", *National Business Review*, 24 August 2015, https://www.nbr.co.nz/article/port-tauranga-ties-97-north-island-dairy-exports-after-coda-deal-b-177636

would free up a significant number of tanker trucks and their drivers who are also fully utilised going to and from farms at this time of year.

Table 45. Processed dairy - potential demand for rail services

Annual demand potential (including current) – Dairy

	Low	Medium	High
Tonnes (processed product)	-	130,000	-
Litres (raw milk)	-	91,000,000	-
Equivalent truck trips (one way)	-	8336	-

7.119 Assuming additional, regular and reliable trains were provided that allowed for high-cube containers, and a transfer terminal at Maungaturoto was built, all of Fonterra's current volume could potentially move to rail. Moving all the processed goods of Maungaturoto and Kauri and excess milk to rail would avoid 1,500,000 kilometres of truck travel, or around 33 combination trucks every weekday.

Clay

7.120 Imerys Ceramics NZ Limited (formerly New Zealand China Clays) mines and processes Halloysite, a high value clay used mainly for the manufacture of fine bone china, porcelain and aluminous hotel-ware. Imerys has two mining sites about 100kms north of Whāngārei at Matauri Bay and nearby to that at Mahimahi, where the clay is extracted and then processed onsite at their factory at Matauri Bay. The processed clay, which is containerised for export, is a high value product that is sought after around the world. [redacted] Imerys is an important local employer in the Matauri Bay area and makes a sizeable contribution to the Northland economy.

Commercially Sensitive

7.121 Currently containers are packed at Matauri Bay from where they are trucked to Whāngārei for transfer to rail. From there they are railed out mostly through Tauranga, but also a much smaller number through the Ports of Auckland depending on which international shipping service connects to the destination market. This model may not be sustainable for much longer as the single weekday service is unreliable and has little resilience. If a service is cancelled, as it has been for the Friday service, Imerys has little choice but to make road transport arrangements to ensure their loaded container can reach port in Tauranga or Auckland in the desired timeframe. [redacted] and runs the risk of consignments not getting to the end customer on time. Finding road transport in short notice can also be difficult, and the company runs the risk of containers missing their intended international connection and being left to catch the next service. Missing international shipping services will likely mean delivering the product late to customers. This creates the risk of them sourcing supplies elsewhere, from providers that are not so far away.

7.122 Additionally the timeliness of the return trip is also important as it brings back an empty container to ensure Imerys can continue its operations. The limited space available on the single daily train also creates uncertainty for Imerys, being a small customer is worried that preference for space will be given to larger customers. Like other Northland producers of goods exported in containers, Northport is not yet an option until it has regular international container services making calls at the port. Coastal shipping would also add additional handling and time to the trip.

7.123 Imerys wishes to continue using rail to move their loaded and empty containers by rail. This would require at least two weekday services to be available for both outbound and inbound containers. The company would also consider using an intermodal terminal if one was developed at Otiria/Moerewa. Some time back the company trucked containers to Moerewa for transfer to rail there. This option would move this daily return truck trip taken off SH1, though Kawakawa and down through Whāngārei and triple the number of truck kilometres avoided in the rail scenario.

Table 46. Export clay - potential demand for rail freight services

Annual demand potential (including current) – Clay

	Low	Medium	High
Containers (TEU, one-way)	-	550	-
Equivalent truck kms (from Whāngārei - one way))	-	94,325	-
Equivalent truck kms (from Otiria/Moerewa – one way	-	127,435	-

Meat

7.124 Northland produces a significant amount of meat products, predominantly by the Silver Fern Farms at Dargaville and AFFCO processing plant at Moerewa. Both companies are significant local employers, with hundreds of people working at their plants. Previously both factories used rail, with the Moerewa plant having its own rail siding off the NAL. Due to the increasing unreliability of rail, however, the limitations on moving high-cube containers and the discontinuation of services on the Dargaville Line and the closure of the line to Moerewa neither now use rail in Northland. Both companies however continue to use rail around the country, including road bridging to transfer containers to rail.

7.125 As a product with a limited shelf life, chilled meat requires a reliable logistics chain. This includes facilities to ensure that the meat remains at the optimal temperature throughout transport and storage. Frozen meat is similar in its requirements, though has more flexibility in terms of transport time. Chilled meat however will fetch more premium prices if it is delivered on time to distant export markets. Any rail services therefore would need to be reliable and also have the necessary facilities to ensure the refrigerators in containers operated to keep the meat chilled or frozen. While the overall supply chain for meat needs to operate within a set timeframe, the journey itself from Northland need not be as fast as what road transport can provide. If rail services are reliable, overnight services to export ports can work if they meet the general logistics requirements.

7.126 Both companies are noticing increasing road transport rates due to the increasing shortage of truck drivers. While road transport services are still reliable and more flexible than rail, there is also increasing pressure on moving goods from Dargaville and Moerewa and down and through Auckland. Increasing travel times caused by congestion or events that either close or slow the highway have made the logistics task more difficult and less reliable. This is particularly true for moving containers by road to and from the Ports of Auckland. Along with the increasing time it takes to get to the port, there have also been additional delays getting access into the port gates due to truck queues and the truck booking system. The booking system requires trucks to turn up within a designated time, otherwise they are required to rebook and come back later at that time. Unexpected travel delays due to worsening congestion, minor or serious crashes can mean trucks miss their delivery windows.

Exporters in Northland are finding it increasingly difficult and costly to move goods to and through Auckland by road.

7.127 Both companies would consider rail if the cartage rates were reasonable and comparable to road transport. Services would need to be regular and reliable, and cater for high-cube containers that are increasingly in use. Both companies could consider road bridging to an intermodal terminal, so long as the overall cost of transport did not make it uneconomic. In the case of Silver Fern Farms road bridging would

be required as the plant is on the other side of town from the transfer yard of the Dargaville Branch Line. If the line was reinstated to Moerewa containers could be loaded directly from the processing plant if an intermodal terminal was developed.

7.128 Direct access to the rail network, avoiding public roads, could also offer productivity benefits from improved container loadings. Due to load limits on public roads for indivisible weights like export containers, containers in New Zealand cannot be fully loaded to their maximum gross weight. While all other aspects of the supply chain can handle the heavier weight (such as rail, international ships and overseas markets), limitations on the New Zealand road network require limited axle loadings. For chilled meat a forty foot container can only be loaded to 29.2 tonnes on road, while if carried only on rail or private roads it could be fully loaded to 30.3 tonnes. This productivity gain of 1.1 tonne would be experienced along the supply chain and return both economic and environmental benefits.

7.129 Most of Northland's containerised meat could be transported by assuming regular and reliable train services, with appropriate facilities for refrigerated containers, the capability to transport high-cube containers and that intermodal terminals were available at Otiria/Moerewa, Dargaville or Maungaturoto (64 kilometres south of Dargaville via SH12). This would avoid around 300,000 truck kilometres travelled or around six trucks every weekday.

Table 47. Export meat - potential demand for rail freight services

Annual demand potential - export meat

	Low	Medium	High
Containers (one-way, TEUs)	-	2248	-
Equivalent truck trips (one way)	-	1405	-

Fertilisers

7.130 Traditionally significant amounts of fertilisers were moved around the country by rail. As such most fertiliser plants around the country were rail enabled, as can be seen by the now redundant rail siding at the old Ballance factory off Fertilizer Road in Whāngārei. Over time road transport has become predominant due to the high price of cartage by rail due to the cost of renewing rolling stock, and the cost of double-handling from rail to road. Double-handling is a particular problem for bulk goods as each time it is handled some volume is broken-down or lost in the process. Also road transport is more flexible working point-to-point and is better at locating and carrying backloads which significantly reduce the cost of transport.

7.131 With increasing interest in companies reducing their environmental footprint, the growing shortage of truck drivers and increasing congestion on some parts of the network – particularly getting through Auckland, there is renewed interest in considering rail to move fertiliser over long distances. This would ideally require rail sidings to be reinstated at the origin, to avoid road bridging and double-handing, and a terminal at the destination. Rolling stock would also need to be available and cartage rates comparable to road transport. Fertiliser also is a highly seasonal product with spring and autumn peaks driving peak transport demand. This peak demand, particularly at the time of significant movements of other types of freight such as milk, is placing greater demand on existing supply chains. Using rail as an option to manage this could be explored, for bringing volume into and out of Northland (depending on where it is produced and purchased). Between the two main producers Ballance Agri-Nutrients Limited and Ravensdown Fertiliser Cooperative the potential volume that could switch to rail, given the caveats above, would equate to around four combination trucks every weekday. While the number of equivalent truck trips would be small, the distance travelled are significant and total around 382,757 avoided kilometres of truck travel per year in the upper North Island.

Table 48. Fertiliser -potential demand for rail freight services for fertiliser

Annual demand potential - fertiliser

	Low	Medium	High
Tonnes	-	-	23,500
Equivalent truck trips (one way)	-	-	840

Consumer / retail goods / construction materials

7.132 Northland relies on daily shipments of significant volumes of consumer and retail goods from Auckland to ensure the people of Northland have the products they need and want available at their local supermarkets and shops. As most of these products are either imported through Auckland, or manufactured there they are predominantly road transported from south Auckland up through SH1. Road transport either distributes the goods point to point, or trucks can make multiple stops as supplies are replenished around the region. As the volume of this type of freight is usually determined by the number of consumers (resident population, visitors and local businesses), most of this freight is bound for Whāngārei with around 77,000 people living in district, the rest for the Far North District with 56,000 people usually resident there and 19,000 in Kaipara. With a total population of around 152,000 volumes of consumer and retail are small, but an important part of the Northland economy.

7.133 As most retailers prefer not to hold significant inventory of goods, most freight is delivered 'just-in-time' to allow them to replace stock as it is sold. Not holding this stock allows for lower storage and inventory costs, but does increase transport costs with more regular deliveries. Road transport is very responsive in this regard, being flexible in timetabling and able to deliver and pickup from multiple locations. Road transport is also able to meet customer expectations of meeting tight delivery windows, particularly for perishable goods or where supply contracts include penalty clauses if deliveries are late. Road transport is also better for tracking the transit of this freight and preventing damage, making it preferred for these short-haul door-to-door deliveries of fast-moving goods. Because of its flexibility in accessing multiple pickup and delivery points, road transport is also able to utilise more back loads to reduce the cost of transport. This is particularly true for shipments that leave Auckland early in the morning, when traffic on the State highway network is light. Normally these truck drivers will be able to just make two return trips to Whāngārei and back within the 13 working hours they have in a day, or one return trip further north.

7.134 While road transport is the most preferred option, there is increasing pressure on road transport operators moving between Auckland and Northland to main the current level of services. The problems being faced include increasing congestion within the Auckland State highway network, deteriorating travel time reliability on SH1 between Northland and Auckland and heavy truck driver availability. Given these significant challenges, discussed further below, there is some interest from some operators and cargo owners to move some types of consumer and retail products to rail – if appropriate services were available. While the majority of fast moving goods, like perishable groceries and urgent consumer goods, will continue to be road transported, some north-bound volume could therefore move to rail. This would be important to ensure rail movements can backload, or carry volume on return trips. This would significantly reduce the cost of freight movements. This potential assumes that the price of cartage is comparable to road services, train services were reliable and frequent, and intermodal sites were available to allow goods to be moved on and off the trains to allow trucks to complete the last mile pickup or delivery.

Table 49. Consumer / retail goods / construction materials - potential demand for rail freight services

Annual demand potential - consumer / retail goods / construction materials

	Low	Medium	High
Tonnes	-	125,000	-
Equivalent truck trips (one way)	-	4450	-

7.135 While it was possible to only survey a select number of companies, they account for a substantial volume of these types of goods moved around the country, including by rail. They indicated that if reliable train

services were available, with freight transfer points at Whāngārei, and potentially at Maungaturoto (for the Kaipara area) and Otiria/Moerewa (for the Bay of Islands, Hokianga and Kaitaia areas), the private sector would likely respond over time with more volume. However based on current information it is estimated that moving to rail up around 703,000 kilometres of truck travel could be avoided each year or about 18 trucks a day. Some of these trips may currently be back-loaded into trucks that have brought other potential rail freight down in the first place.

Figure 48. ISO storage tanks, Northport

Photo: AECOM September 2018

Cement

7.136 Golden Bay Cement is New Zealand's largest cement manufacturer and supplier with its manufacturing plant at Portland, south of Whāngārei. The plant is located near the NAL and has its own docking facilities. From there it is able to supply bagged and bulk cement products around the country. The company relies primarily on coastal shipping and road transport for moving its bulk, breakbulk and ISO storage tanks (pictured) cement products around the country. Coastal shipping is particularly effective for Golden Bay as part of an existing logistics chain for moving large volumes around the country, with rail being more expensive. The company therefore has no plans to use rail, with road transport its preferred solution to move to ISO storage tanks to Ports of Auckland for the time being. Rail might be considered in the future if the situation changed. As such cement products was not included in potential rail volumes.

Petroleum

Commercially Sensitive

7.137 The potential of railing petroleum products from Marsden Point to Auckland and other places further afield has been raised a number of times in relation to the Marsden Link. With the rupture of the Refinery to Auckland Pipeline in September 2017, resulting in significant travel disruption in Auckland, there were further calls for the rail link to be built in order to allow trains to move fuel south. Currently there are no significant movement of petroleum products by rail in New Zealand. Though some other liquid hazardous goods are moved by rail here in small amounts. [redacted]

7.138 Assuming a rail link to Marsden Point and the appropriate rolling stock was available, it is technically possible to move fuels by rail. This could be achieved either for regular services or in the case of future supply emergencies. However it should be noted that despite the disruption of the 2017 pipeline outage, Refining NZ was able to recover supply in 10 days. This was the first major event the pipeline had experienced in 30 years and as a result of this event, [redacted]

7.139 During the outage fuel tankers were available to move fuel by road and emergency deliveries were made by ship into Auckland, and from there taken by road. The [redacted] demonstrated the value of coastal shipping capacity and capability in delivering fuel around New Zealand, either on a routine or emergency basis. Coastal shipping has existing capacity to respond quickly in this type of situation and a coastal ship

can move a significant volume of fuel in a short time frame. If it had been available, rail would have been an option however and there is some value in having that resilience. However it should also be noted that moving large volumes of fuel through dense urban areas, on lines shared with operating metro rail services, is not without some risk. Following the Lac-Mégantic crude-oil taker crash disaster in Canada in 2013, the Transportation Safety Board of Canada recommended that where technically feasible, hazardous materials like petroleum products are rerouting to avoid transportation of such hazardous materials through populated and other sensitive areas.[111] It is unlikely therefore that moving petroleum products from Marsden Point to Auckland by rail is likely to be the first option. As such this commodity has not been included in the indicative estimates for potential volume.

Horticulture

7.140 Due to the requirements of getting fruit and vegetables to domestic markets quickly and with minimal damage to the goods, road transport is the preferred mode. For that reason only around one percent of fruit and vegetables are currently moved within New Zealand by rail. For containerised exports rail can be considered if distances are long enough. However most outbound produce is road transported due the short distances between the growing areas and the nearest port. Generally rail has not been considered as an option for Kiwifruit transportation in Northland due to the condition of the rail network and the short distances involved, with most volume going to Northport by road. This includes ensuring the kiwifruit is kept at the optimal chilled temperature for the whole journey, ensuring consignments stay on schedule - so as not to delay or miss international shipping connections.

7.141 Containerised kiwifruit in Northland is exported through Northport now there is an international container service established. [redacted] by road, to then be railed to Tauranga. So the re-establishment of regular rail services in Northland would allow kiwifruit exports to be moved to other ports. The Marsden Link could also allow them to be railed down to Northport, where a shipping service is now available. It is also possible that if a container terminal was available in Otiria/Moerewa the significant and growing kiwifruit volumes from that catchment area (notably Kerikeri) could be economically road-bridged and railed to Northport or other ports. But based on industry feedback road transport is likely to be the dominant solution for the foreseeable future. The situation is also similar for Avocados grown in Northland, with road transport being the preferred option.[112] Accordingly horticulture has not included in potential rail freight volumes.

Commercially Sensitive

Motor vehicles

7.142 Passenger cars have also been identified by some stakeholders as a potential cartage for rail services out of Marsden Point. Historically NZ Rail moved cars from the Toyota car assembly plant in Thames. Though cars back then were generally smaller than many models today, it is technically feasible to move many makes of passenger vehicles by rail today – both second hand and new imports. Substantial numbers of cars are moved by rail around the world every day, particularly in the United States, Canada and Europe from manufacturing plants to distribution centres and ports. In 2017 Volvo even began moving finished cars from their production facility in Heilongjiang arriving by rail at the Belgian port of Zeebrugge around 20 days later.[113] However, these cars are of a standardised size, being factory produced, which allows for rolling stock to be customised to those vehicles.

7.143 Moving passenger vehicles by rail in New Zealand would assume that sufficient numbers of specifically designed rolling stock were available and the NAL line has its tunnels enlarged to accommodate these car transporters or high-cube containers that may be used to move them. As passenger car imports are of varying size, specialised rolling stock would be required to transport them without damage. Additionally other considerations for handling would be required such as using mounting racks (for loading and unloading) and protective wrapping (even for containerised vehicles), to ensure the finish is not damaged in transit. Care of the cars in transit would be a significant concern for importers, particularly for new cars that need to arrive in pristine condition.

[111] Transportation Safety Board of Canada, *Railway Investigation Report R13D0054 - Runaway and main-track derailment Montreal, Maine & Atlantic Railway Freight train MMA-002 Mile 0.23, Sherbrooke Subdivision Lac-Mégantic, Quebec 06 July 2013*, http://www.tsb.gc.ca/eng/rapports-reports/rail/2013/r13d0054/r13d0054.pdf
[112] The project team was unable to obtain any comment from the Avocado industry.
[113] https://dk.dbcargo.com/rail-danmark-dk/p20170630-2046972

7.144 The other major consideration is the commercial viability of moving imported new and/or used passenger vehicles from Northport. The main advantage of landing cars at Northport would be the abundant storage space available at the port. Currently in Auckland the vehicles landed there need to be moved off the wharf in a short period of time as they are cleared by the New Zealand Customs Service. The cars are often moved to storage locations in south Auckland until they can be delivered to dealers. A car may move three to five times on average around Auckland, before it gets to the final purchaser. This lack of storage space in Auckland can lead to double handling and additional storage costs. If cars were brought in by rail, new car storage and distribution centres would be needed adjacent to the railway. This may be possible in the northwest around Kumeū, but further within the city area there is limited land available for storing cars around the rail network.

7.145 However as Auckland is the final destination for many of the majority of the cars landed, it may still be more economic to land them directly in the city rather than to a port further away such as Northport, or also Tauranga. The cost of transporting them to Auckland from there may be higher than any benefits from not landing them at Auckland in the first place. An alternative model to car purchasing, such as click-and-collect for second hand vehicles could make use of Marsden Point's ability to store cars until they are purchased. In this case a significant proportion of cars are still likely to be road transported to their final destination (most likely being Auckland), with rail a possibility for some if a link was built from Marsden and the rolling stock was available. Given this uncertainty it is assumed that the movement of cars by rail from Marsden Point might be feasible, if significant changes were made to current arrangements. A full consideration of these major structural changes to the supply chain is out-of-scope for this business case. As such the potential movement of cars would need a more detailed exploration with industry, but recognising that the renewal of the NAL and the building of the Marsden Link could provide for this option in the future. But given the uncertainties this commodity has been excluded from the analysis.

Potential future disruptors and opportunities

7.146 The potential rail freight will likely increase as freight volumes grow overall. In reviewing the next forty years of transport demand, it can be assumed that freight volumes will likely grow at either:

- Low growth at 1.1% p.a. (historic growth)
- Medium growth at 2% (assumed level influenced by economic and population growth)
- High growth at 4% (potential for higher regional freight production)

7.147 In determining an infrastructure supply response to current and future freight demand, including what could be moved on rail, a number of disruptive factors should be considered as they may influence mode choice. These factors also need to be looked at within the context of the problem definitions developed through the ILM process for this business case. As stated above without significant investment it is likely that the NAL will no longer be functional within five years. As the railway is currently not fit-for-purpose the immediate impact of this closure today will be minor, with only a small volume of freight moving to road – about 22-23 trucks a day (one-way).

7.148 Once the railway is closed, however, its condition will likely further deteriorate and any future reinstatement may be more problematic and involve greater cost. Importantly industry in the upper North Island will plan and develop their logistics arrangements without regard to the actual or potential use of rail within Northland or between Northland and other regions. Without a rail connection some cargo owners may look to coastal shipping to send cargo for export to Tauranga. Or if the required international services become available export directly out of Northport. However for most freight moving within and to/from Northland road transport will be the predominant and only realistic option. Over the next 10 to 40 years there are indications that road freight transport is facing significant disruptive pressures to its existing operational model. It is worth examining these potential disruptive change-drivers to see how the future Northland freight system will be affected, given its heavy reliance on road transport.[114]

Heavy vehicle driver availability

7.149 One major disruptive factor being felt in the freight industry is the increasing shortage of licenced, experienced and suitable truck drivers - notably Class 5 licence holders (for large combination trucks). While only a proportion of the freight carried by road transport is contestable with rail, depending on the

[114] Noting a full account of road transport, including its economic structure, is out of scope.

type of freight and where it is going, it is the heavy combination trucks and their drivers that move this contestable freight. The shortage of drivers and an aging road transport workforce is a national problem, but also one being acutely felt in Northland and Auckland. Some major fleet owners operating in Northland have spoken of parking-up some of their trucks due to a lack of drivers, with one publicly stating that 28 trucks of their trucks were parked-up due to a lack of suitable drivers.[115] Some in the road transport industry estimate that the country is short of 2500 Class 5 drivers, and predicts 28,000 more will be needed over the next 25 years to meet growth in freight demand.[116]

Figure 49. Truck and trailer loaded for trip to Auckland – Whāngārei

Photo: AECOM 2018

7.150 But currently not enough drivers are coming in to replace those that are leaving, all the while freight volumes continue to grow. The demographics (see below) of the industry in Northland show that insufficient new Class 5 drivers are replacing those getting older and leaving the industry. The data available shows all those Class 5 Licence holders are not being replaced and so the industry as a whole is getting older each year. This data cannot distinguish whether those Class 5 Licence holders are still working, either full or part-time. But increasing the average heavy combination truck drivers in Northland is male, in their 50s, with some working into their 70s.

7.151 The pressure on driver availability, as current drivers retire and are not replaced, appears anecdotally to be increasing the cost of road transport in Northland. Some of the companies spoken to in the freight discussions have noted an increase in freight rates as operators need to pay more to retain and attract drivers. Any increase in the cost of road transport will place additional cost pressures on Northland businesses moving their goods to markets. Increasing transport costs will also potentially increase the cost of goods Northlanders buy that are brought up by road from Auckland.

7.152 The road transport industry and cargo owners have been raising concerns around the shortage of Class 5 truck drivers for some time, particularly following the removal of heavy vehicle drivers from Immigration NZ's Immediate Skills Shortage List in 2014. In 2014 the Road Transport Forum surveyed its members and found that 85% of 150 transport firms did not have enough HCV drivers.[117] Industry concerns include the ability to find skilled, safe drivers that are physically fit, clear of drugs and alcohol and are prepared to work the long hours required of them.

7.153 Entering the industry is seen as a lengthy process that is for many unattractive. The Government's Driver Licensing Review in 2016 found that 60 percent of drivers progressing from a Class 2 learner licence to a Class 5 full licence take more than 25 months. This length of time tends to create a significant barrier to younger people, who do require significant time behind the wheel to learn how to handle the vehicles.[118] The work is also seen by many younger people as an inferior career choice. Current truck drivers can work up to 13 hours a day and 70 hours a week (exclusive of mandatory rest-breaks). This includes starting work early in the morning to beat the traffic. An experienced Class 5 truck driver can get paid around $22-26 per hour as an employee, or around $90,000 a year (in 2011). New entrants to the industry

[115] www.newshub.co.nz/home/politics/2017/04/truck-co-owner-says-kiwis-won-t-work.html
[116] *Difficult and dangerous – why truck drivers are quitting*, Radio New Zealand, 25 November 2018
[117] Sophie Boot, "New Zealand's truck driver shortage", *NZ Listener*, 08 April, 2016
[118] Ministry of Transport, *Driver Licensing Review – Discussion Paper*, April 2016

will need to consider the attractiveness of working long hours, the opportunity for better pay in Australia, or other professions entirely. Much of the road transport industry is also made up of owner-drivers, who run their own small business under contract. In their case margins can be low, depending on the availability of freight, the cartage rates they can charge and operating costs.[119] As such owner-drivers are getting older on average, with fewer younger people replacing them.

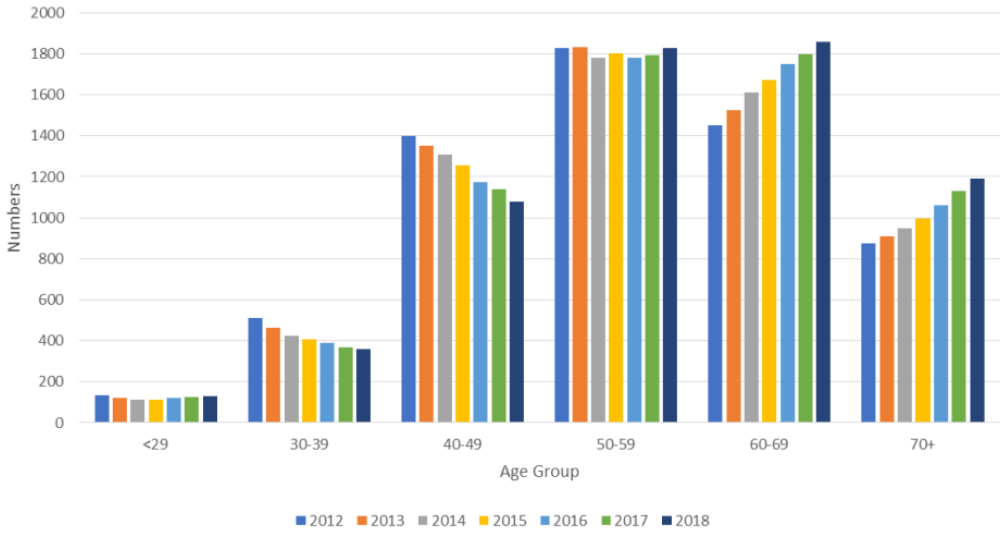


Figure 50. Age Profile of Northland Heavy Vehicle (Class 5) Licence Holders, 2012-2018

Source: NZTA

7.154 To manage this growing problem a number of road transport companies in Northland, and around the country, are using overseas drivers to fill vacancies. While other companies have set up programmes to help train more drivers, including trying to recruit more women into the profession. Uptake in the use of high productivity motor vehicles (HPMVs including 50MAX) has also helped to reduce the truck drivers required to manage the significantly rising freight volumes in Northland. These longer and/or heavier truck combinations can carry more freight per trip, reducing the required trips needed by around 10 to 20%.[120] Further uptake of HPMVs within Northland through the upgrade of bridges will assist with driver availability, but most long distance trucks now operate at high productivity levels. In the longer-term new and emerging heavy vehicle technologies may provide additional assistance for truck drivers, to improve safety and manage fatigue. However, it is likely that trucks operating on public roads will require human drivers for the foreseeable future.

7.155 Greater use of rail in Northland could be part of the way industry help manage constraints on road transport, with other workforce initiatives also being required. While rail could only undertake a proportion of the current and future freight task, it would mean truck drivers could be freed up for other runs that only road transport can undertake. Based on the indicative freight volumes that could move to rail, around 80-100 Class 5 heavy vehicle drivers could be freed-up for other road transport work each weekday.[121] As such for at least part of the journey for some types of freight, one locomotive engineer could do the work of around 30-40 truck drivers. Reducing the pressure on driver availability in Northland would be of particular value in the peak of New Zealand's freight season between September and December. While rail cannot pickup milk from farms, they could be used to replace the 680,000 kilometres of truck travel needed each year to move surplus seasonal milk from Northland to the Waikato for processing.

7.156 This method of partially-managing the shortage of truck drivers was one reason for the development of the Tokoroa road-rail terminal.[122] The road transport company involved in the terminal's development saw the rail as a way of managing the freight task to and from the Port of Tauranga, leaving their trucks and drivers to focus on local pickups and deliveries. As the driver shortage worsens, given the age profile of the workforce (see graph above), cargo owners and logistics operators may consider rail for some tasks if a

[119] See: Road Transport Forum, "Submission to the Productivity Commission's Evaluation of International Freight Transport Efficiency", October 2011
[120] David Stimpson & Co., *Monitoring, Evaluation & Review of implementation of the Vehicle Dimensions & Mass Rule 2010 HPMV Amendment May 2011 to June 2016*, 4 November 2016
[121] Based on approximately 90,000 avoided truck trips a year, assuming 250 working days with three trips on average per day.
[122] SWDC, *Proposal to Develop an Intermodal Road/Rail Terminal in Tokoroa*, May 2014

viable service was available. This may make rail services more attractive for moving freight in Northland in the short to medium term. There may be some short-term disruption to road transport businesses from freight moving to rail. However the overall growth in the freight task will generate more demand for freight moves not suited to rail. This will mean demand for suitable Class 5 truck drivers will likely increase.

The growing shortage of heavy truck drivers may disrupt Northland's freight supply chains. Greater use of rail could help mitigate this.

Increasing inter-regional travel times

7.157 While congestion within Auckland is a well-known problem for those living there, it is also something that negatively affects freight movements to and from the region. Increasing congestion within urban areas, which are spreading further north into once-rural areas of northern Auckland, is reducing travel times and increasing travel time unreliability. SH1 Northland's key lifeline route to Auckland has seen significant increases in traffic volumes – both passenger vehicles and other trucks. The AA reported that in 2017 around 700 million additional kilometres of travel were added to the Auckland road network as a result of population growth and more cars being on the road. The result of this additional pressure was a reduction in travel speeds on key strategic routes, including SH1 between Albany and the CBD. Though as a result of the opening of the Waterview Tunnel (SH20) travel times fell and there was some reduction in congestion in the second half of 2017.[123] During 2018 tracking of average travel speeds on SH1 Albany to CBD shows a continuing decline in speed and a resulting increase in travel time.

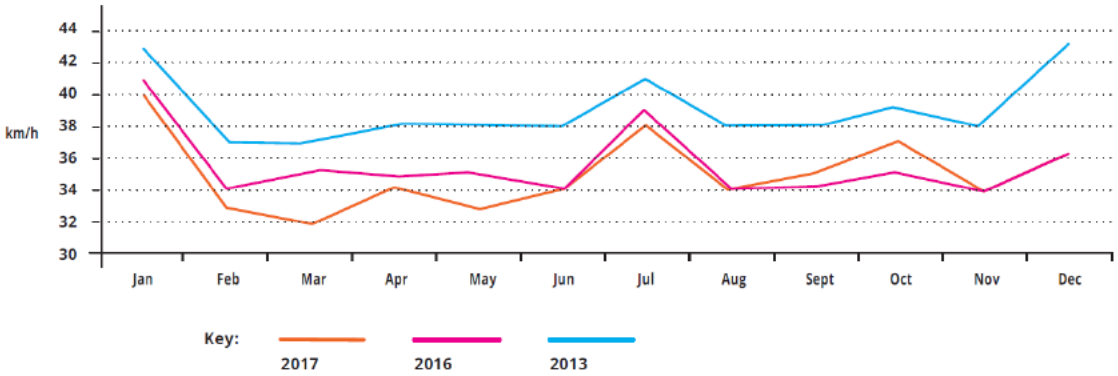


Figure 51. Auckland arterial road network - morning peak average speed, 2013-2017

Source: Auckland Transport

7.158 Responding to this growing congestion Auckland Council and the Government have established a joint project to investigate congestion pricing for Auckland.[124] Congestion pricing may help manage peak capacity on the road network, but it will make moving freight in, out of and through Auckland by road more expensive. A key finding of the project is that Auckland has grown faster than previously forecast. Statistics NZ recently revised its medium population projections for Auckland's population with the region reaching 2,000,000 people by 2028, four years earlier than previously assumed.[125] The report acknowledges that the travel demand of this growing population is placing significant pressure on Auckland's transport networks (see traffic volume growth below). This includes increasing travel times and reducing reliability and access. Currently, approximately 700 additional cars are being registered in Auckland every week, with many of these cars ending up operating on the region's roads. The increasing demand for space on a finite network is causing longer peak demand and longer travels times – meaning congestion will only get worse and will affect the city for longer periods each day. To quote the report:

> *Overall, the impact of growing congestion is increased travel times and unreliability, and ultimately higher cost. In Auckland, this impact can be seen in significantly reduced average*

[123] AA, *Auckland Congestion Report 2017 – Annual Review*, March 2018 (using Google travel-time data).
[124] Auckland Council and NZ Government, *Phase One Report: The Congestion Question*, November 2017
[125] *Phase One Report: The Congestion Question*, Section 2.2

travel speeds on the motorway network, meaning that an average weekday motorway trip now takes almost 10 percent longer than it did only four years ago. Meanwhile, increasing unreliability means that motorists now need to allow an additional 40 to 55 percent more time for their trips to be assured of arriving on time. **Phase One Report: The Congestion Question.**[126]

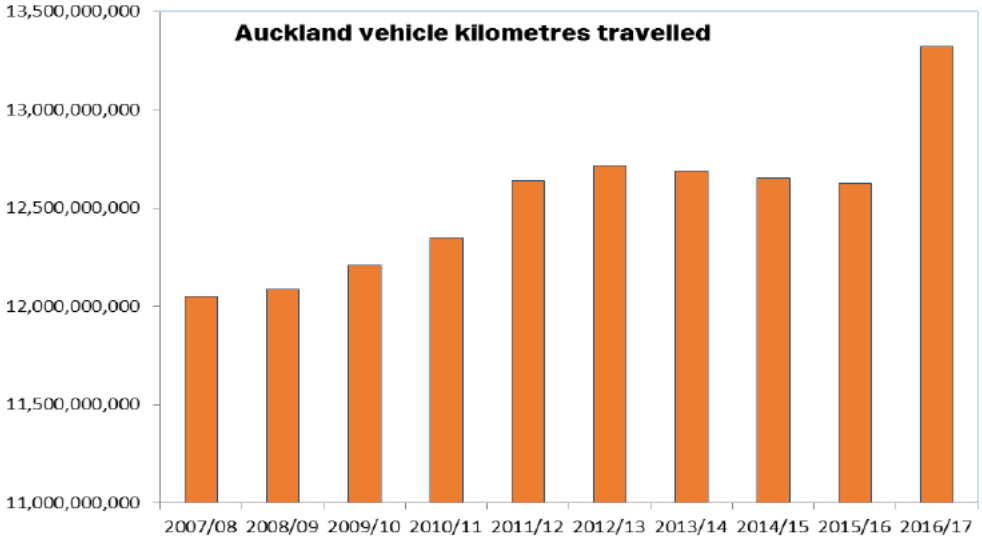


Figure 52. Total vehicle kilometres travelled within Auckland region.

Source: NZTA VKT data

Longer and less reliable travel times are putting pressure on inter-regional supply chains. Greater use of rail will mitigate this for some freight types.

7.159 Increasing travel times and greater travel time unreliability on SH1 has the potential to negatively impact on the efficiency of freight movements to and from Northland. Freight movements operate within defined time-windows, particularly for dropping off and picking up containers at MetroPort or Ports of Auckland, which operate booking systems with strict arrival time-gates. When trucks miss their designated time slot, they need to rebook and wait until that new time. Rebooking can create cost and additional travel time for road transport operators, including needing to find a convenient spot to park up their truck while they wait for a new time. Once inside the port gates truck turn-time, off-loading/on-loading and paperwork, can take around 30 minutes.

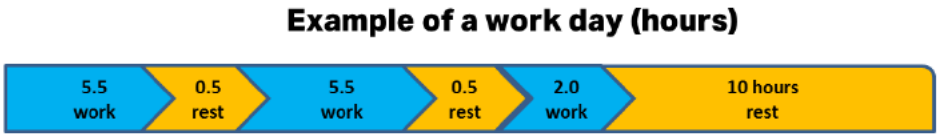


Figure 53. Heavy vehicle driver work time requirements

Source: Land Transport Rule: Work Time and Logbooks 2007

7.160 Road transport operators must also adhere to work-time requirements designed to manage fatigue, set out in the Land Transport Rule: Work Time and Logbooks 2007. These requirements proscribe the number of hours that drivers can work legally, which are then logged in either an electronic or physical log book. In total truck drivers can work (including loading, unloading, driving and any other tasks associated with their job) for 13 hours each day. Additional to that the driver must have two rest-breaks no shorter than 30 minutes. After 13 hours they must rest for a full 10 hours before being able to resume work.

7.161 As congestion worsens on SH1, it is likely that moving freight by road between Northland and Auckland will undergo a step-change in cost. This change will be caused by truck drivers running out of work-time to

[126] *Phase One Report: The Congestion Question*, Section 2.1

complete the optimal number of runs between Northland and Auckland. If freight moves cannot be completed within legal working hours then truck drivers will need to 'rest over' for the night or call in a second driver. This will add additional cost and time to moving freight to and from Northland. Feedback from industry representatives is that those moving freight to and from north of Whāngārei are experiencing work-time constraints due to increased travel time and travel time unreliability on SH1 to Auckland.

Case study

Hypothetical return trip from Whāngārei to MetroPort (two trips, one day)

Most travel estimates for a return trip from Whāngārei to Metroport (Auckland) is around 5.5 hours, including 30 minutes unloading/loading at MetroPort (see Table below). Trucks however cannot travel as fast passenger vehicles, being restricted 90 km/h, and take additional time to start moving from a standing stop. So an addi ional 30 minutes has been added to take this additional travel time into account.

This allows for two round trips within a 13 hour single day, but there is little margin for error during daylight hours.

Potential regular delays include: heavier traffic Pūhoi to MetroPort, missing the booked time-window at Metroport, longer turn-around at MetroPort, heavy traffic MetroPort to Pūhoi, heavier traffic within Whāngārei.

More irregular delays include: poor resilience on SH1 from Whāngārei to Pūhoi corridor means crashes can add substantial delay. For example, in 2014 there were 27 full closures along the route with an average delay of 7-8 hours (a total of 216 hours of closure, equivalent to an average of nearly 20 hours per month), while in 2015 there were 19 incidents with an average delay of 2-3 hours. The Brynderwyn Hills is particularly high-risk, and while alternative diversion routes are available these add time and cost.

Encountering a crash or any other delay would likely case the driver to miss heir 'window' at MetroPort. A short delay of 2 – 5 hours may allow one return trip to be completed, albeit uneconomically. Any delay beyond this and not even one same day return journey is not possible because of work time restrictions. Improvements are underway (and planned) to improve resilience and safety on the exis ing roads between Whāngārei and Northland, in lieu of proposed four-laning (while corridor protection for this will progress, if approved any construction is unlikely before 2030, with the exception of the Pūhoi to Warkworth highway that is currently under construction and due for completion in 2022).

Annual traffic growth in Northland is predicted to be minimal (1 – 1.5%), however increased travel is impacting travel times on SH1 within Northland, particular for travel through Whāngārei. Auckland's ongoing urban growth and deteriorating travel times will make travel to and from the city longer. Some relief will be provided by current and future highway improvements (an example is the Waterview Tunnel). But this will be off-set by Auckland's continued growth.

Table 50. Predicted and current travel times Northland to Auckland

Journey Segment	AA Time & Distance Calculator*	NZTA (usual travel time)**
SH1 Whāngārei to Pūhoi	1hr 36min	1hr 32min
SH1 Pūhoi to Newmarket ***	37min	36min
SH1 (Newmarket) to MetroPort	16min	16min
Metroport turn-time	*30min*	*30min*
MetroPort to SH1 (Newmarket)	17min	17min
SH1 Newmarket to Pūhoi	40min	36min
SH1 Pūhoi to Whāngārei	1hr 35min	1 hr 34 min
Additional travel time for trucks	30mins	30mins
Total	**6hr 01 min**	**6hr 05 min**

*Sources: * https://www.aa.co.nz/travel/time-and-distance-calculator/*
*** www.journeys.nzta.govt.nz*
****(Alternatively Pūhoi to Massey (SH18) - 35mins, Massey (SH18) to MetroPort (SH20) – 27mins.)*

Northport's potential for inter-regional logistics

7.162 The strategic option value of an investment in the NAL between Oakleigh and Auckland and the Marsden Link can only be understood in the context of the potential future freight function of Northport. While a full analysis of the container trade and future function of the upper North Island's ports are out of scope for this business case, an indicative assessment of the potential demand for moving containers between Northport and Auckland needs to be considered. This is undertaken below, recognising that a comprehensive assessment of the port question is being undertaken by the North Island Supply Chain Strategy Working Group (175).

7.163 Auckland is New Zealand's most important centre for freight importation, production and distribution. Within the city are some of New Zealand's largest freight and logistics warehouses, distribution and consolidation centres. Within the Auckland metropolitan the Ports of Auckland, Auckland International Airport and the Port of Tauranga (MetroPort) are located, which together account for a majority (by value) of New Zealand's import and export trade. New Zealand's containerised freight task is also growing and is already concentrated in the upper North Island – notably within Auckland. By value containerised freight

represents about 80% of New Zealand's international trade by sea and often has time critical movement windows, due to the arrival and departure of international shipping services.

7.164 As noted above increasing congestion within Auckland is having a significant impact on the flow of freight within and through the city. Road transport companies operating within Auckland make on average fewer delivery runs today than they could ten years ago. The increasing travel time required to move freight within Auckland is of particular concern for access to and from the central city where the Ports of Auckland is located. The port has a nationally important role as the main gateway for high value, containerised, imported goods. Most of these imported goods are transported by truck to within 30 kilometres of the port, with many going to Onehunga-Penrose-Ōtāhuhu logistics belt where they are unpacked for distribution across Auckland and the rest of the country. The port is also a vital export port for high-value containerised goods produced across New Zealand. The increasing difficulty experienced by road transport providers moving containers to and from the Ports of Auckland will therefore have national economic impacts.

7.165 Along with the increasing travel time, and increasing variability of travel time, it takes to get to and from the Ports of Auckland, there are indications that delays within the port gates are also affecting truck movements. In the last few months of 2018 the port has had significant disruption to the movement of import and export containers. This has included disruption within the port due to congestion and also around the city due to significant road works in the downtown area.

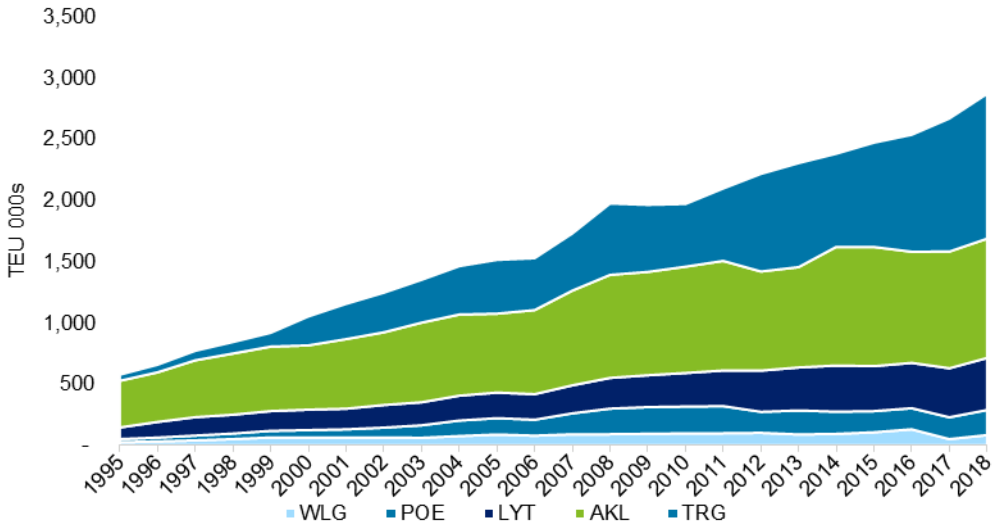


Figure 54. New Zealand's port container throughput

(CentrePort, Port Otago, Lyttleton, Auckland, Tauranga). Source: Deloitte Port and Freight Yearbook

7.166 The growing numbers of containers, including when they arrive together in large numbers is also causing problems, due to handling and storage constraints. Across Auckland storage space for containers is becoming constrained as a result of the increasing cost of land and raising freight volumes. As a result there have been problems getting containers out of the port when a number of ships arrive at once, because the final destination for the container is at capacity. Demands on land within Auckland, for residential and industrial use, means space for freight activities like storing containers is now at a premium. This situation has resulted in additional costs and delivery delays as containers are stored at freight hubs longer and re-handled more, to manage the space available.[127] The situation is made more acute when several ships arrive at the same time to unload their containers, with some often arriving out of schedule. This creates an uneven flow of containers which puts pressure on the whole system.

7.167 There are also challenges around the growing size of container ships and managing the resulting increase in the numbers of containers moving on and off each ship visit. Ten years ago most international container ships visiting New Zealand were capable of carrying only around 2,500 containers (TEUs). Today around half of New Zealand's containerised exports and imports travel on ships capable of carrying 4,500 containers. These larger ships drive larger container exchanges. In 2012 only around 2922 containers were exchanged by 4,000+ TEU ships. By the last quarter of 2018 the number of containers exchanged by 4,000+ TEU ships had risen to 72,198.[128] The increase in the average size of these exchanges has

[127] NRC and POAL working to sort out Auckland's supply chain complications, *FTD Magazine*, December 2018 / January 2019
[128] Ministry of Transport, Freight Information Gathering System (FIGS), Export Ships Sizes (P3).

placed additional capacity pressure on ports, land transport connections and storage areas. This has been part of the drive by Ports of Auckland and other ports to increase their container and storage capacity and handling capability.[129]

7.168 In Auckland these capacity pressures have meant that a number of immediate events such as accidents inside the port, ship arrival delays or lack of storage space for containers have created significant disruption for container movements. David Aitken, CEO National Road Carriers a spokesperson for the road transport industry in Auckland, recently commented on these system-wide impacts that:

> *The supply chain is running at capacity, so unexpected problems can have a domino effect. At its heart, the problem is Auckland's growth. The supply chain needs to evolve, and we're all going to have to change the way we work to prevent future problems. Better planning and coordination are key.*[130]

7.169 Ports of Auckland has responded with initiatives to manage the increasing pressure on the port. This has included the introduction of larger and automated container straddle carriers and new cranes. Both have the potential to significantly improve container handling. There are also calls for making greater use of off-peak time for moving containers, including moving to 24-hour operations. This would require businesses across the city to move to long working hours, and ensure their people are available to handle inbound and outbound freight movements. In the medium to longer-term other solutions may be considered by businesses, including moving some container volumes to other ports if adequate land transport connections and international shipping services were available. The key question for this business case is the degree to which rail could be utilised if Northport became a satellite container port for Auckland within the forty-year evaluation period. To do this it needs to be assessed whether it is a realistic possibility that Northport could, and potentially might, handle inter-regional container movements.

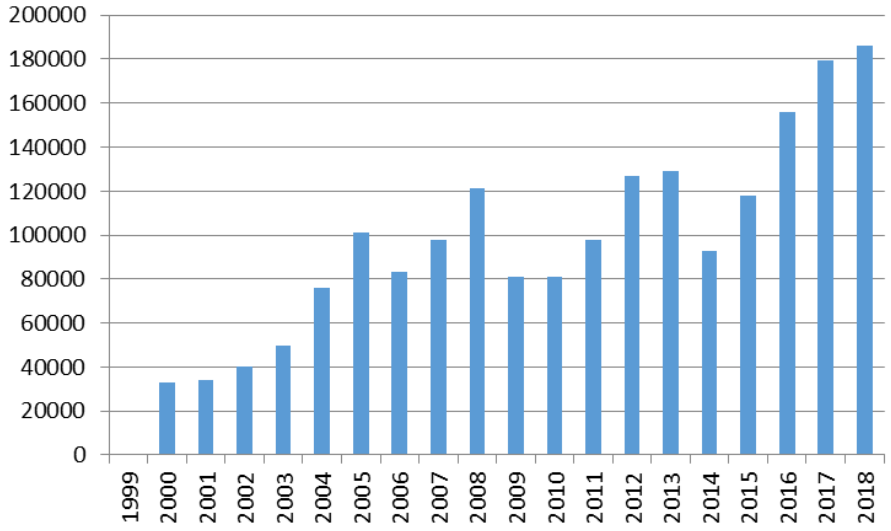


Figure 55. Port of Tauranga railed containers from MetroPort

Source: Port of Tauranga

7.170 New Zealand's containerised trade has undergone significant structural changes over the last ten years, in which the use of rail has been a critical factor. The port sector in particular has and continues to be dynamic in the way containers are being moved. Freight volumes, including imports and exports, have grown significantly as New Zealand's population and economy grows. This growth has been centred on the upper North Island as Northland, Auckland, Waikato and the Bay of Plenty that continue to produce and consume more freight. But freight demand in the upper North Island, notably in Auckland, has grown as more freight is moving to and from other regions has been consolidated in large intermodal hubs. An example of this is the Coda Intermodal Freight Hub in Ōtāhuhu that since its opening in 2016 has grown to handle more than 300 containers (TEU) of freight each day.[131]

7.171 Over the last decade a number of exporters, notably led by Fonterra, have sought to better streamline their freight logistics to reduce the overall cost of moving their goods to overseas markets. This has led to the development of larger, multimodal logistics hubs in Auckland. These hubs use a mix of road and rail to

[129] Ministry of Transport, *Future Freight Scenarios Study*, 2014, p.43
[130] NRC and POAL working to sort out Auckland's supply chain complications, *FTD Magazine*, December 2018 / January 2019
[131] 'How rail is sustaining NZ', *FTD Magazine*, December 2018 / January 2019, p.10

send and receive freight over longer distances to allow it to be consolidated at key strategic points.[132] This change in approach has resulted in some dramatic changes in shipping, ports and land-side logistics arrangements. In 2011 Maersk stopped container calls to Port Taranaki, only a few years after the shipping line had considered the port to be well positioned to handle volume from across the central North Island. The move was a consequence of Fonterra's 2009 decision to rail processed dairy volume out of Taranaki and on to Tauranga, enabled by improvements to the rail line including tunnel improvements that had previously restricted access for high-cube containers. The departure of this anchor customer resulted in the loss of around a third of the port's container business. With other companies soon following, Port Taranaki went from handling around 65,000 containers a year in 2008/09 to none within five years.

7.172 Another example of the dynamic change underway in the port sector is the establishment of MetroPort in Auckland in 1999. MetroPort is well positioned within the Onehunga-Penrose-Ōtāhuhu logistics belt, near to SH1 and SH20 for access around Auckland and critically the North Island Main Trunk to access (via the East Coast Main Trunk) the deep-water port at Tauranga. The inland port gave Auckland-located importers and exporters the option of accessing by rail the container terminal at Sulphur Point in Tauranga and the international container services that called there. As a result Tauranga began handling increasing volumes of containers originating in, or bound for, Auckland. This growth in container volume (see above) was despite the fact that Tauranga is 200kms (235kms by rail) from MetroPort in Auckland, compared with the Ports of Auckland which is only 14 kilometres away from Penrose by road. From handling a few containers in 1999 when it opened, MetroPort now handles over 180,000 containers (around 300,000 TEU) for the Auckland market import/export market each year.[133] This function could not have been enabled by road transport given the required truck drivers, trucks, distances and travel time involved.

7.173 To manage the demand generated by MetroPort, KiwiRail has progressively increased freight trains running between Auckland and the Port of Tauranga from a few per day in the 1990s to up to six freight trains a day, seven days a week now. These services carry around 2,600 containers each week with 40% of freight moving to and from the Port of Tauranga moves by rail. This arrangement has in large part helped the Port of Tauranga grow its container trade from around 460,000 containers (TEU) in 2006/07 to over a million today, replacing Auckland as New Zealand's largest container port.

Table 51. Comparison of the port distance to Onehunga-Penrose-Otāhuhu (kms)

Port distance to Onehunga-Penrose-Ōtāhuhu comparison (kms approx.)

	Tauranga	Northport
Road	200	150
Rail	235	215

7.174 Northport is comparable in distance (though with slower travel speeds) from the Onehunga-Penrose-Ōtāhuhu area. Given the above it is possible that Northport could become an upper North Island container port in the future, in order to help manage growing volumes and larger exchanges of containers. A third container port in the fast growing part of the country would also provide some additional future-proofing and resilience to the national logistics chain, in the event of trade through Auckland or Tauranga being disrupted. A recent example of this value was when CentrePort was earthquake damaged in the 2016 Kaikōura earthquake, a large proportion of goods being moved by rail to/from Port of Napier for an extended period. It is therefore worth considering the option value of Northport as a rail connection into the port, along with an upgrade of the existing NAL, would mean it was connected into the national rail network and able to move containers to and from Auckland or further afield if economic to do so.

7.175 Located at the mouth of the Whāngārei Harbour, the port currently is a three-berth facility with 570 meters of wharf space along its wharves, excluding the jetty. Berth 1 and 2 cover 370 meters and have a maximum draught of 13 meters (chart datum). Berth 3 covers 280 meters and has a maximum depth of 14.5 meters (chart datum). With current port boundaries there is approximately 33 hectares of open paved hardstand available for cargo storage and handling.[134] Immediately adjacent to the port is a potential

[132] This shift was signalled in the Shippers' Council Report, *The Question of Bigger Ships*, 2010
[133] Port of Tauranga, *MetroPort overview*, October 2015
[134] Northport Limited, *Port Information and Operating Criteria for Shipping Operations*, January 2015. Chart datum is the most conservative assessment of depth, being a water level so low that the tide will but seldom fall below it.

footprint a further 180 hectares of land that could be developed for port-related use. This is part of a wider area of 700 hectares of designated port and commercially-zoned land nearby. This land has the potential to house a number of import, export and manufacturing businesses. The available land area is greater than any other port in New Zealand, with most constrained by a lack of available space.

Figure 56. Northport current state

Photo: Northport - A Vision for Growth [135]

7.176 In 2017 Northport issued its 'Vision for Growth', to prompt discussions in the community and between key stakeholders about the future potential of Northport, particularly moving to handling containers. This step-change would require the wharf area to double in size to cater for this trade. There is an existing consent to extend the current by 270 meters. Northport is proposing the idea of a further 250 meter extension on the 13 hectares of reclaimed land to the east and 300 meters on 9.3 hectares of land to the west. These extensions would provide 1,390 m of total linear berth, allowing the port to handle additional ships – including cruise, bulk and container vessels. Overall the port's footprint could be expanded to 75 hectares.

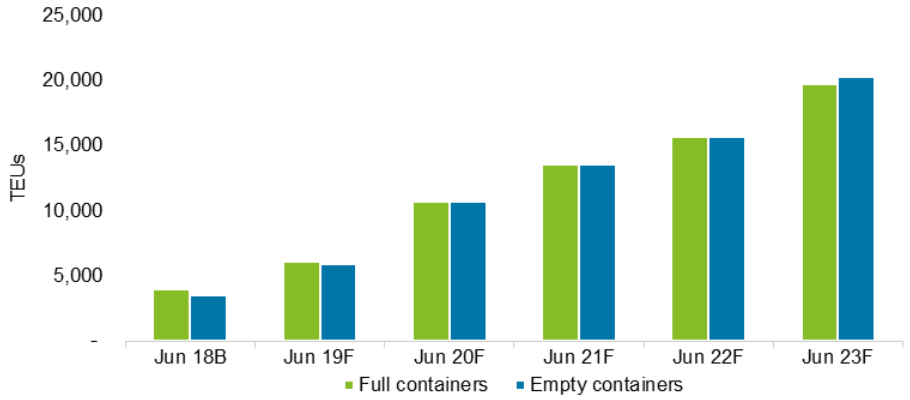


Figure 57. Northport TEU and volume projections

Source: Northport

7.177 Northport is looking to grow its container trade, building on the containerised kiwifruit and cement now moved through the port. This growth is currently focused on exporters within the Northland region who rely on the ports of Auckland and Tauranga to handle their containers. Key to attracting containers is attracting regular, scheduled international shipping services. These shipping services are in turn attracted to call into ports based on known and reliable volumes of freight. At present the container shipping services that most Northland exporters rely on do not call at Northport. Over the next 10 to 20 years this could change. The arrival of other shipping services may make Northport an attractive proposition for Northland businesses moving containers, as well as potentially others from Auckland or further afield.

7.178 Given its location and current network access, Northport believes it is well positioned to begin attracting containerised freight from within Northland and also from the northern part of Auckland. Over time as Auckland grows, the port believes its proximity to the city by road and potentially rail, as well as its natural deep-water anchorage and its abundant land area will begin to attract companies looking at supplying the city – especially its northern half. This includes both containers and passenger motor vehicles that could be stored at Marsden Point and then relocated to Auckland as required.

7.179 With its currently planned and proposed developments (including investing in additional cranes), Northport estimates it could handle up to 400,000 (TEUs) containers a year, about the same as the Port of Lyttleton.

[135] See: https://www.vision4growth.co.nz/

This would require additional crane capacity at the port. The key question would be whether the port could attract this volume, from within Northland and further afield. The Marsden Link and an upgraded NAL would be essential to enabling such a development to access Auckland. Assuming 100,000 containers were moving within Northland, 300,000 containers would otherwise need around 1000 truck trips (500 each way) between Northport and Auckland each working day. Alternatively the task could be handled by 12 trains a day (six each way) carrying up to 80 containers (TEUs) each. KiwiRail indicate that the Auckland metro rail network has capacity to deal with these volumes during the inter-peak and off-peak.

Figure 58. Northport potential for growth

Photo: Northport - A Vision for Growth

7.180 A critical factor in whether Northport could make this step-change to an inter-regional container port will be its land transport connections to origins and destinations for container movements. Container movements within Northland could be served by road transport to move to and from the port. A rebuilt NAL and a Marsden Link would allow a portion of these containers to potentially be railed to the port. But if Northport were to attract containers from outside of the region, a direct rail connection would be required first. While some container volume might be road transported from Auckland using SH1, the cost of doing so would make the continued use of Auckland or Tauranga more compelling. Without a rail connection, therefore, Northport could not even be considered as an option for moving significant volumes of containers to and from Auckland. Therefore if constructed within the next ten years the Marsden Link would be lead infrastructure, intended to facilitate development of the Marsden Point area as a future freight and logistics hub to support freight logistics in the upper North Island.

Northport has the potential to handle a portion of the upper North Island's container flow. The Marsden Link and an upgraded North Auckland Line are essential to enable that potential.

Appendix E Detailed Passenger Rail Analysis

Figure 59. Big Steam Festival - Easter 2018 Whāngārei

Photo: David Wagstaff

7.181 Along with using the line to move more freight, a number of stakeholders have also called for the North Auckland Line to be used for passenger rail. This includes commuter and tourist trains. While the main focus of any investment would be to manage current and future freight volumes, passenger services could provide some additional utilisation and regional development opportunities. The existing rail infrastructure from Swanson in West Auckland and up to Whāngārei is capable of handling passenger trains, so long as the carriages allow for front and rear exit from the trains in tunnels. Inter-regional passenger services have not been run on the line for some years now, the last passenger trains run being one-off day excursions by heritage rail operators. The viability of long-haul commuter services were indicatively assessed using discussions with stakeholders, a review of relevant land transport planning documents and the examples of passenger rail services of a similar type in other places.

7.182 Based on this there appears to be little scope for a Northland rail passenger service to be re-instated in the short to medium-term. However opportunities for a tourism offering are worth further investigation with rail tourism industry participants. From a strategic perspective, the potential for passenger (tourism) rail is considered to be an additional and a complementary offering alongside the core freight services.

Figure 60. Helensville Railway Station

Photo: AECOM 2018

Intra-Auckland commuter rail

7.183 Auckland Transport is not currently considering running metro services north of Swanson due to the low population density of the area and the high cost of providing services. The most recent assessment of the concept found that inter-regional commuter rail options for the NAL did not meet value-for-money requirements. As such it would be unlikely to receive funding support from the NZ Transport Agency. Therefore the idea of passenger rail was discarded due to the high cost of implementation, estimated at over $1 billion, and the likelihood of only removing a small proportion of traffic from the main State highway corridor.[136]

7.184 Swanson is for the time being at the edge of suburban Auckland, with the area following the NAL to Kumeū being low density outer residential. Northwest of Kumeū, to Waimauku and Helensville up through the lower Kaipara harbour, is still rural. Passenger services to and from Helensville were discontinued in 1980 due to low patronage. Passenger services to Waitākere were discontinued in July 2015 due to low patronage and the cost of electrifying the network up to that point, due to the low height of the Waitākere Tunnel. As a result the old diesel train was replaced with a bus service. It is possible that commuter services could be offered again in the future again up to Waitākere, Kumeū and even as far as Helensville. But there is currently no indication on when this might happen, but it is likely to be in the longer term given the likely low passenger numbers and the cost of enlarging the tunnel to allow for electrification. For that reason, however, there is value in maintaining the North Auckland Line to as far as Helensville or even Wellsford to provide for those future inter-urban options.

Intra-Northland commuter rail

7.185 Northland with its small population and low densities around most of the areas serviced by the NAL is unlikely to be able to support regular commuter passenger train services in the foreseeable future. The relatively short distances between Whāngārei and other urban areas, mean that it would be more cost effective and quicker to continue using and developing schedule public bus services. Northland Regional Council is not currently considering proposals for regular train passenger services. Regular train services could potentially be considered in the longer-term, where regular bus patronage rises significantly

[136] *Whangarei to Auckland – Connecting Northland Programme Business Case*, NZ Transport Agency, p.50

Figure 61. Whāngārei Railway Station

Photo: AECOM 2018. With thanks to MENZSHED Whāngārei

Inter-city commuter rail

7.186 The current alignment of the NAL would allow for a journey of around four to five hours between Swanson and Whāngārei. As such it would be too long a journey for regular commuter traffic for workers or students. The route could be improved in some places to allow for some marginal travel time improvement, with travel time of four hours being seen as ideal for a scenic journey. But the current alignment of the line would not allow for faster travel times, without substantive and likely prohibitive realignment investment. The NAL also travels through areas that are lightly populated, with low population density around stations at the moment. This slow travel time and low potential passenger numbers would likely make regular, scheduled services unviable.

7.187 If higher speed light or heavy rail infrastructure and services were to be considered in the future for commuters moving to and from Auckland, northern Auckland and Northland, thought should be given to this investment being made to the east. This potential investment could be better integrated with future improvements to SH1, and land use developments that open up new residential and commercial areas where there is current population growth and growing density.

7.188 The road alternative using SH1 is around 2.5 to 3 hours by private motor vehicle, depending on travel conditions. The current bus journey between Auckland and Whāngārei is around 2 hours and 45 minutes to 3 hours. This bus service is operated by InterCity four or five times a day for prices ranging from $1 to $44NZD. A new bus service operator, Skip, is running trips from Auckland to Whāngārei twice a day from the end of November 2018. Skip is part of the InterCity Group. Thus, passengers seeking low cost, rapid travel between Whāngārei and Auckland would unlikely see rail as an attractive travel option.

Rail tourism - potential

7.189 A more feasible passenger rail option to generate more value from investment in the NAL is tourism. This feasibility is premised on the line being reinstated for modern freight services, with tourist services providing additional regional economic benefits. There are several examples that can be drawn on to suggest there is viability for local and inter-regional tourist services. These services could be provided by KiwiRail, by other parties or a combination of the two. Rather than just being a travel option, rail tourism in Northland could be an experience that is integrated into a wider tourism offering for the region.

7.190 Northland attracts large numbers of international and domestic tourists and has benefited from the recent tourism boom. In the year ending June 2018 there were 332,564 international tourists traveling to Northland, out of the 3.7 million arrivals that came to New Zealand. Australia is the largest source of international tourists to Northland, with over 83,000 visits in the year ending June 2018. Together, European visitors make up around 150,000 visits. The Far North was the most popular holiday destination, likely due to the Bay of Islands.

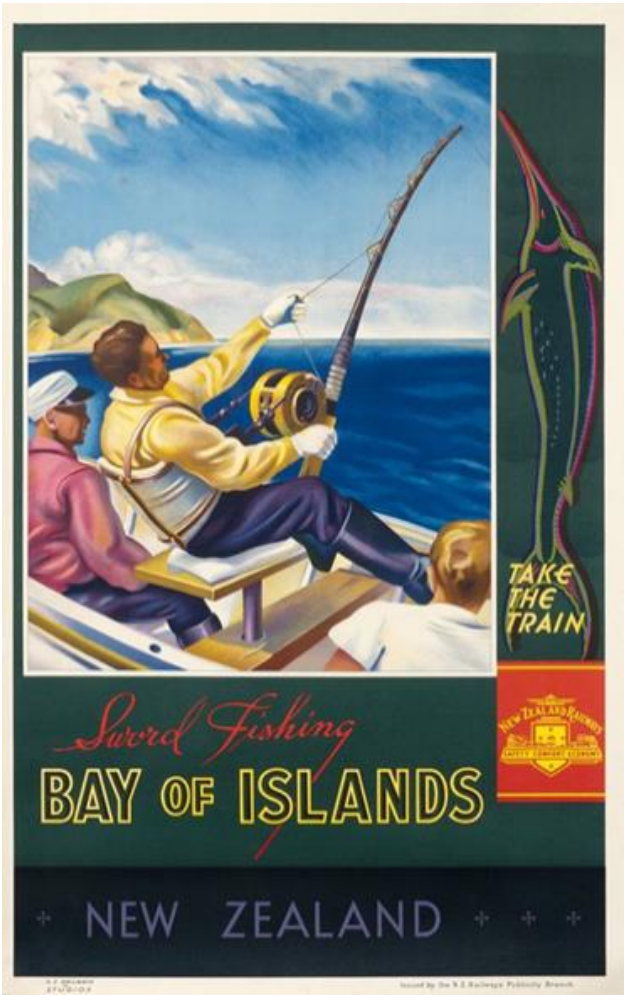


Figure 62. Northland Rail Tourism 1930s

Photo: New Zealand Railways. Publicity Branch: Sword fishing, Bay of Islands Take the train[137]

7.191 There is potential for this market to grow as international visitors arrivals are forecast to reach 5.1 million by 2024, and total spending nationally is forecast to reach nearly $15 billion by 2024.[138] Domestic tourism in particular has been on an upward trajectory, with around a third of domestic visitors coming from Auckland. The tourism spend by visitors from Auckland to Northland was $303 million for the year to September 2018. The increase in demand is reflected in higher annual average accommodation occupancy rates, with 30% occupancy in the year to July 2018. This is below the national average, but well higher than the 23% seen in the July 2014 year.

7.192 More importantly, there is an opportunity to attract more visitors to Northland through developing a range of unique experiences. The majority of international tourists arrive in New Zealand through Auckland, with most travelling south when exploring New Zealand. An observation often made about this flow of tourists south is the suggestion that travelling to the Northland region goes 'against the current', particularly as they then have to travel back through Northland rather than head on to another region. As such most of the visitors going from Auckland to Northland generally plan to spend a longer amount of time in the region. In the year ending June 2018, the average length of stay for international tourists was 2.24 nights. This is higher than the average stay in Auckland, Rotorua, Canterbury, and Dunedin.

[137] N.Z. Railways Studios. Issued by the N.Z. Railways Publicity Branch. [1930s]. Ref: Eph-E-RAIL-1930s-02. Alexander Turnbull L brary
[138] Ministry of Business, *Innovation & Employment, New Zealand Tourism Forecasts 2018-2024*, May 2018, https://www.mbie.govt.nz/assets/5c05b7bfce/nz-tourism-forecasts-2018-2024-report.pdf

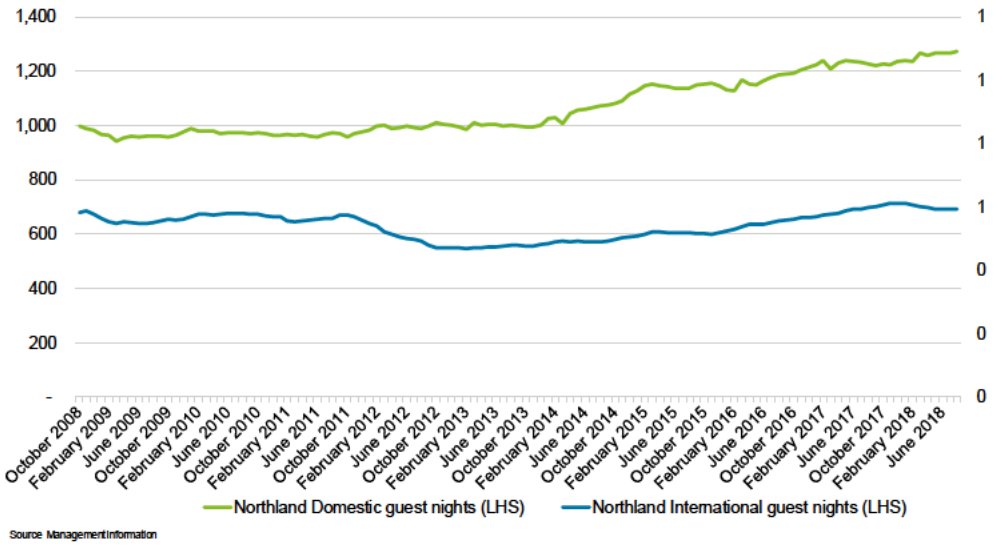


Figure 63. Northland domestic and international guest nights – year end

Source: Ministry of Business, Innovation, and Employment, Accommodation Monitor

7.193 There has also been an increase in the number of cruise ships anchoring in the Northland region. The first cruise ship to berth at Northport is scheduled for 2021. Given the significant growth of cruise ship tourism in New Zealand over the last decade, it is expected that up to 60 cruise ships will call into the port over the following five years.[139] At present, the only location where cruise ships anchor in the Northland region is the Bay of Islands. Passenger numbers have increased in the Bay of Islands from around 59,000 in 2015 up to 103,000 in 2018. In this time their spending also went from around $6.4 million in 2015 to $14 million in 2018.[140] Cruise tourism's contribution to the New Zealand Economy 2017 continues to grow, with estimates it will continue to do so at around 12% per annum.[141] In the June 2018 year cruise ship expenditure in New Zealand was $434 million, up 18.3 percent from 2017. There is an opportunity to look at rail to bring Cruise ship passengers further inland on day trips to see attractions, improve their experience and in doing so spend more money in Northland. A well-run rail offering, including a rail link to the port for cruise ship passengers, could help facilitate this as it does in other places like Dunedin.

Figure 64. Hundertwasser Public Toilets, Kawakawa

Photo: AECOM, 2018

7.194 To attract more tourists to Northland further attractions are being developed or being proposed such as the Hundertwasser Wairau Māori Art Centre in Whāngārei, the Twin Coast Discovery Trail, and Waitangi

[139] *First cruise ship at Northport will arrive for Hundertwasser and hotel opening*, NZ Herald, 28 July 2018
[140] Statistics NZ, Cruise ship unique passengers by regions and ports visited – Bay of Islands
[141] Based on the New Zealand Cruise Association's study, reference

Museum and Education Centre. There is an opportunity to attract more high-paying tourists, especially with opening of Hundertwasser Wairau Māori Art Centre in 2020. It has been estimated that there will be between 120-140,000 paying international and domestic (from outside Northland) visitors to the Art Centre annually.[142]

7.195 Domestic tourism is also significant for the Northland economy. New Zealanders visiting Northland spend around three times the amount of international visitor spending. Much of this is domestic travel is from Auckland, often taking advantage of long weekends, school breaks and longer holidays. Most international and domestic tourists self-drive or drive their own motor vehicles respectively, usually up SH1. So any rail service would need to provide easy connections at either end, such as rental cars or chartered coaches.

Other comparable rail tourism examples

7.196 Around New Zealand and Australia there are comparable examples of what could be operated in Northland to both better utilise rail and grow Northland as a tourist destination. KiwiRail currently run three scenic services, branded as Great Journeys of New Zealand. These services include the Northern Explorer between Auckland and Wellington. This long-haul service operates three-days a week and includes stops at Palmerston North, Ohakune, National Park and Hamilton. The Coastal Pacific between Picton and Christchurch, including stops at Rangiora, Kaikōura and Blenheim. The TranzAlpine with between Christchurch and Greymouth, with a one hour stop in the West Coast town. Depending on when you book and the type of fare selected, tickets cost between $140 and $240. Food and beverages can be purchased on board.

Table 52. Comparable rail tourism service details

Source: KiwiRail

Service	Services	Adult fare (approx.)	Journey time (approx.)
Northern Explorer	Three days	$180 - $240	11 hours
Coastal Pacific	Daily	$140 - $200	6 hours
TranzAlpine	Daily	$160 - $220	10 hours (return), 4.5-5 hours one way

7.197 These services account for about five percent of KiwiRail's revenue and the company is looking to expand its offering in this space due to growing demand. Despite the impact of the 2011 Canterbury and 2016 Kaikōura earthquakes that significantly impacted tourism in Canterbury and the later quake closing the Coastal Pacific Services, patronage and revenue have remained strong. Operating revenue for the services has begun to recover from the effects of the earthquake rising from $22.8 million in 2017 to $27.8 million in 2018.[143]

7.198 KiwiRail reported that the peak summer season of 2017/18 was one of the strongest they had seen. February and March 2018 were the busiest months ever on the TranzAlpine and Northern Explorer services, with ticket sales up more than 10%. On average the scenic services were at least 95% full during that period. Over the previous five years the TranzAlpine passenger business has grown by 90% over the past five years, and the Northern Explorer has grown 71%. KiwiRail report that this growth was driven by increasing demand from both international tourists and New Zealanders. Importantly for a business that carries all year the cost of rolling stock and staff, this growth was starting to spread from the peak seasons into the off-peak months.

[142] Deloitte, Hundertwasser Wairau Māori Art Centre – Feasibility Study Update For Whangārei District Council, March 2015
[143] KiwiRail, *Integrated Annual Report*, 2018

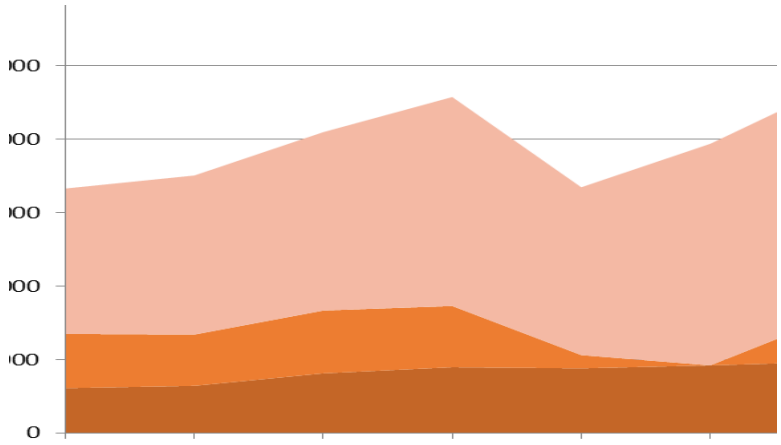


Figure 65. KiwiRail Scenic Passengers - Financial Years 2013-2019 (forecast)

Source: KiwiRail

7.199 Dunedin Railways offers both connector and scenic services and is a successful council controlled company. The tourist operator has as its main offering a popular scenic return journey through the Taieri Gorge for four hours to Pukerangi or six hours to Middlemarch. These services depart from and arrive back into Dunedin six days a week for an adult fare of $105. A big part of Dunedin Railway's business is cruise ship passengers taking the trip to and from Port Chalmers and also on the Taieri excursion.

7.200 In addition to the Taieri service, Dunedin Railways offers a 90 minute scenic rail journey down the western harbour and out to Waitati. The company also offers a regular multi-day rail tour from Dunedin to various locations in the South Island. These packages include accommodation when the train parks up for the night in a number of locations around the South Island. During 2017/18 around 363,149 international visitors made it to Dunedin, with around fifteen percent of them taking one of the Dunedin Railways journeys. While there is no passenger data available for Dunedin Railways, it is estimated that based on the ticket price and the businesses profitability, around 50,000 – 100,000 people could ride their trains every year, with the majority of passengers being international visitors.

Figure 66. School holidays rail trip

Photo: Bay of Islands Heritage Railway

Bay of Islands Heritage Railways

7.201 Currently, there is a vintage steam railway in the Bay of Islands operating as a trust. This train takes passengers down the Kawakawa to Taumarere section of the former Ōpua track through scenic countryside. While this section of track is no longer part of the NAL, and therefore outside the scope of this business case, it is worth noting the patronage they are enjoying and their plans to improve the condition of the line to eventually allow trains to run through to Ōpua. A future goal of the Trust is to allow for cruise ship passengers to make the journey to and from Kawakawa.

7.202 For the last few years, patronage on the railway has been growing with up to 100 people riding the trains for the 50 minute round trip to Taumarere, site of the original 1868 railway. Currently the Trust charges $20 for an adult and $5 for a child.

Table 53. Bay of Island Vintage Railway – Patronage [144]

Financial Year (July-June)	Passengers (approx.)	Trips (approx.)
2013/14	14,844	864
2014/15	16,500	715
2016/17	18,642	1,416
2017/18	18,795	814

Dargaville Rail Tours

7.203 Dargaville Rail Tours run tours seven days a week on the old Dargaville Branch Line using converted golf carts. The company offers a 2.5 hour round trip to Tangowahine $80 for an adult and $40 for a child. Recently they added the 98 kilometre round trip to Waiotria junction, which takes approximately seven to eight hours and costs $180 for an adult.

Figure 67. Dargaville Rail Tours

Photo: John Hansen, Dargaville Rail Tours

7.204 The company, which also runs river tours, has seven and a half years left on their lease of the Dargaville Branch Line from KiwiRail. They are the Rail Operator, as defined under the Railways Act 2005 and are responsible for maintaining the railway line. Over the time they have leased the line, they have undertaken substantial clearing of weeds on the line as well as maintaining and repairing the tracks.

7.205 The business employs three people full time and since December 2015 has carried over 5,200 people on their rides. They estimate that around 60% of their passengers are from Auckland, around 12% from the rest of New Zealand and around 6% from overseas. As such they play an important role in bringing revenue into the Kaipara District. The owners of Dargaville Rail Tours believe they have helped bring people into Dargaville who have often extended their stays so they can do the day trip. They hope to continue operating on the line and potentially expand their business, particularly with school visits. This year they have entered into a contract with 48 Auckland schools to start taking student groups on the tour, which will substantially grow their business and the value it provides the Kaipara District.

There is potential for commercially viable passenger rail operations in Northland as part of an integrated tourism offering.

[144] Sourced from Bay of Islands Heritage Rail

Opportunities for Northland Rail Tourism

7.206 While the operation of rail tourism would only provide modest benefits in the case for investing in the NAL, they could still play an important role in growing Northland as a holiday destination. Even small numbers of higher-paying tourists taking advantage of well-run scenic rail services could provide significant value to the local economy. These services would need to be connected into a larger tourism offering, so people's journeys are seamless and their time in Northland can be filled with many things to do and see and is enjoyable.

7.207 This type of service connecting Auckland and Whāngārei could target the international and domestic market for those wanting to explore Northland, but do something different from driving. The service would connect to events and accommodation and other onward travel within Northland. Meals and beverages could be served and the travel sold as an interesting and unique experience, as much as a transport solution. Along with KiwiRail there other providers that have expressed an interest in working with Auckland and Northland tourism interests to develop an operating model. For example Glenbrook Vintage Railway has operated five to six return train trips to Northland a tear, which proved popular.

7.208 To be sustainable the services would likely to depart/arrive from Swanson. With travel time ideally at around four hours, with travelling speeds at around 50 to 70 kilometres an hour to make the journey enjoyable and not too long. The journey would need to include connections at each end, be it car parking or rental vehicles and accommodation choices.

Building a tourism experience around rail

7.209 Northland is a weekend and holiday destination for many domestic visitors, notably from Auckland. There would be benefits in more cooperation between Auckland and Northland on cross-regional tourism, to provide economic benefits for both regions. Regional rail could follow the example of V\Line in Australia where regional events are held, such as food and wine festivals, sporting events, bike tours, concerts and kapa haka events in which people can travel there and back by rail and connecting local service such as coaches. The Dunedin Railways example would suggest that a well-run scenic service, travelling around the eastern side of the Kaipara Harbour and up through rural Northland could be successful in attracting around 60,000 passengers a year. This estimate is less than Dunedin Railways' likely patronage and around half that of the TranzAlpine service. This number could be higher if the service connected to local events and was part of a package. But further work would be required to check the viability of such as service and the costs associated with it.

7.210 These services would only have a marginal benefit in reducing travel demand on the State highway network to and from Northland. For those prepared to pay for a ticket, it would provide an alternative to driving and marginally reduce the possibility of crashes on the road network. However this benefit is too marginal to calculate so has not been included in the economic analysis.

7.211 One potential operator, Antipodean Explorer, is proposing to offer a new luxury rail tourism business – or as they call it a 'moving hotel'. From late 2019 they propose bringing higher-spending visitors to Northland to run north from Auckland to Kawakawa. This service, 35 weeks a year, would require both an upgrade and a reinstatement of the track from Moerewa to Kawakawa, the latter being outside the scope of this business case. Antipodean Explorer believes this service will provide around $10 million in economic benefits within Northland. This work could not be accessed for this business case, however, so has not been included in the economic analysis. The sleeper carriages for this venture, being 31 SA/SD class rail carriages purchased off Auckland transport, are currently being refurbished at Hillside Workshops in Dunedin.[145] The service would include such activities as visiting the Hunderswasser Māori Art Centre once opened, excursions to the Tutukaka, and also a stop at Kawakawa and the Bay of Islands, the Hokianga and the Far North (by connecting coach).[146] Antipodean Explorer has indicated that they have obtained an access agreement with KiwiRail to traverse the entire network.

Potential tourist opportunity in Northland

7.212 In summary, there are broadly three types of rail tourism offerings that could be viable in Northland being:

[145] 'Luxury carriages take shape at Hillside Workshops', *Otago Daily Times*, 8 August 2018 https://www.odt.co.nz/news/dunedin/luxury-carriages-take-shape-hillside-workshops
[146] Antipodean Explorer NZ Ltd, submission on draft Northland Regional Land Transport Plan Review, 31 January 2018

- heritage and/or boutique short-run services within Northland;
- connector journeys that provide a tourist experience while delivering customers to a destination (including for connections);
- scenic journeys over longer distances that provide an interesting, visually pleasing and comfortable tourism experiences.

The basis for these opportunities is the proximity of Northland to the Auckland market for international and domestic tourism and the potential of Northland as a destination. This potential would need to be further explored and an integrated offering, involving connecting travel, accommodation and activities would need to be developed to make the offering attractive to domestic and international tourists.

Figure 68. International tourists visit the Hundertwasser Public Toilets, Kawakawa

Photo AECOM, 2018

Appendix F Detailed Analysis of Options

Long list options

7.213 A long list of options was developed from the option dimensions by combining the choices within the various dimensions. A high level description of the long list options is set out below.

Table 54. Long list options

Option	Description
Managed decline of the current rail network (the Status Quo)	This option requires no additional funding and/or investment in existing rail infrastructure. The network beyond Swanson is estimated to be inoperable in around five years.
Enabling future use of the existing network	This option ensures the future use of rail for freight in Northland. Minimum amount of work is required to restore and maintain on an ongoing basis the current capability of the operational rail network north of Swanson. This option is focused on addressing the most urgent short term issues at minimal cost.
Supporting inter-modal freight transport within Northland	This option enables additional usage of existing lines by including access to Marsden Point. The minimum amount of work to restore and maintain on an ongoing basis the current capability of the operational rail network north of Swanson. The new rail to Marsden Point would be good freight standard.
Restoring rail use in wider Northland	Connects previously rail serviced sections of the network into the wider network. Investment to restore usage of the mothballed lines to their former service level and maintain the line between Auckland and Kauri to the current level of service. Do not invest in opening up a line to Marsden Point.
Bringing Northland into the integrated New Zealand rail network	Investment in the rail network to upgrade the current Northland rail network and mothballed lines up to good freight standard. The Northland freight network is fully interoperable with the rest of the North Island rail network.
Interoperable rail between Northland, Auckland and the Central North Island (Shortlisted option: Upgrade NAL)	Invest to upgrade the line from Auckland to Kauri up to a good freight standard. No opening of mothballed lines or construction of new rail lines.
Integrated Northland Transport Systems (Shortlisted option variant: Rail Connected Port, defer decision on Dargaville line)	This option connects Northland to the domestic economy and international trade and improves service level. Investment in the rail network to build the branch line to Marsden Point and upgrade the current Northland rail network to good freight standard. The Northland freight network is fully interoperable with the rest of the North Island rail network.
Integrated transport systems and reopen line to Dargaville (Shortlisted option: Rail Connected Port)	Improves connectivity across all previously operable lines and opens northland up to international trade and the rest of New Zealand. Reopening and upgrading mothballed lines and upgrading main trunk line to good freight standard. Build a new line to Marsden Point.
Supporting tourism growth in Northland (Shortlisted option: Rail Connected Port + tourism)	This option supports tourism in the Northland region and connects the Northland freight network to New Zealand and the world. It enables both passenger and freight use of the Northland rail network by investing to upgrade the line from Auckland to Kauri to Moerewa and build a new line to Marsden Point to the same freight standard. Enables a tourism train services where commercially viable.
Driving growth in rail as a key transport mode into the future	Transforming the role of rail as an environmentally friendly and efficient transport option for both passengers and freight users. Invest in the rail network to radically re-route the existing rail network closer to the current and planned population in Northland, and shorten the Auckland-Kauri rail travel times. Double track electrified railway from Auckland to Whāngārei (via Kaiwaka and Marsden Point) to support both increased freight and passenger services to be operated.
Full reinvention of rail within Northland	Repositioning rail as a key economic enabler in Northland. Heavily invest to rebuild the rail network, strategically placing the lines to best service Northland, based on current and future demand.

Source: Deloitte and AECOM Analysis

7.214 Options within the long list may not meet project objectives and realise benefits of this business case. To ensure they deliver the objectives of the business case the options in the long list are initially assessed against the Investment Objectives and Critical Success Factors. As part of the evaluation process, each option was scored by the project team from 'Does not meet' through to "Exceeds" the expectations of the objective and criteria. Where an option does not meet the Investment Objectives and/or the Critical Success Factors it is removed from consideration.

7.215 This initial assessment is not based on any cost or benefit analysis. It is meant as a 'first pass' to discard impractical options and/or options that do not meet the set agreed project Investment Objectives or Critical Success Factors and to avoid undue analysis effort. The project team consulted with stakeholders to assist in evaluation. The assessment is preliminary and may be revised upon further analysis. Analysis of costs and benefits will only be undertaken against the short list of options defined later in the process.

7.216 A summary of the long list aligned to the options dimensions is provided in Appendix O. This presents the evaluation of each option against the Investment Objectives and Critical Success Factors and highlights those options which meet the project objectives and are taken forward for further consideration. A summary of the rating method applied is in Appendix P.

7.217 As a result of this initial evaluation, a set of six options, the 'medium list', were carried forward for a second round of evaluation, and taken to stakeholders for discussion. Appendix P provides a summary of evaluation.

Short list

7.218 The options from the medium list that were carried forward formed the short list of options. The short list is a list of options which meet or practically meets the Investment Objectives and Critical Success Criteria and will be taken forward for further analysis. The options taken forward were limited to four, including the Status Quo. Costs, benefits, and uncertainties are not currently valued in this section. These are shown in the Economic Evaluation section.

Status quo (base case): Managed decline

7.219 The Status Quo is the comparator case which other options are assessed against. Without significant investment, the condition of the NAL will continue to decline leading to probable closure in around five years when it can no longer be maintained in a safe condition. Major maintenance required includes sleeper and bridge replacements. In addition, the light axle loads, small tunnels and slow operating speeds of the current NAL both limit its usefulness for freight customers and results in poor operational productivity for KiwiRail.

Upgraded North Auckland Rail line ("Upgrade NAL")

7.220 Under this option (only) the existing NAL from Auckland to the Fonterra plant at Kauri north of Whāngārei would be upgraded to the equivalent standard of other parts of the North Island network. Sleepers and a number of bridges would be replaced. It is Kiwirail's assessment that many existing tunnels are too small for high-cube shipping containers and would be enlarged. KiwiRail's assessment of the current state of the network has not been independently verified by a third party.

Rail Connected Port

7.221 This option renews and upgrades the rail line between Auckland to Kauri together with constructing a branch line to Marsden Point and reopening the line between Kauri and Otiria. It generates the most overall demand and therefore economic benefits (but also costs). For this reason **it is the preferred option**.

Rail Connected Port with Tourism Services ("Rail Connected Port + Tourism")

7.222 This option provides optionality for passenger services to be added if commercially viable. Although the circuitous nature of the NAL route between Auckland and Whāngārei compared to SH 1 means that there is little potential for regular passenger rail services, there is potential for tourist focused passenger trains to be operated in Northland.

Appendix G Economic Evaluation Methodology and Assumptions

7.223 This section presents the economic evaluation assumptions and methodology. This section focuses on:

- Scenarios which influence the degree of freight shift from road to rail, which in turn provide a range of potential outcomes that drive the economic, social and environmental benefits. This also includes discussion regarding future freight growth scenarios.
- The conditions under which freight users might switch from road to rail
- Evaluation methodology
- Limitations of the EEM
- Assumptions
- Uncertainty log

Road to rail scenarios

7.224 Scenario analysis of the degree of modal shift was performed to explore potential economic benefits. Future freight demand and the extent of modal shift are key uncertainties that require sensitivity testing. This is because underpinning the magnitude of cost and benefits is the future demand for freight in Northland as well the behavioural changes that the investment will induce. For example, a higher quality rail network not only improves the service for existing freight customers, it will likely induce other companies to use the network as an alternative to road.

7.225 AECOM and Deloitte engaged stakeholders to ascertain the level of likely modal shift, consulting with more than 30 stakeholders including; rail operators, infrastructure owners, shippers/consolidators and other key regional stakeholders in the port catchment area. Rail demand forecasts were formed based using discussions with potential freight users, along with forest harvest data, described in the Strategic Case. Rail demand for other freight types was forecast based on conversations with freight users to estimate an initial 'uptake' in rail services, then escalated using a conservative growth measure of 2.0% p.a., in line with long term GDP projections. This measure may be conservative, with the ANZ Truck meter for the Northland Region recording an annual average growth of 4.6% in the December 2018 year. Without upgrading the track or building a spur line to Marsden Point, all current Northland rail freight tonnage is assumed to be transported by road in the Status Quo option after year five. The resulting costs of ceasing rail services under the Status Quo have not been quantified due to limitations of the EEM Simplified Procedures. This is discussed in more detail below.

7.226 The central scenario captures the volume of freight that has potential in the short-term to be moved by rail for each option, as indicated through stakeholder discussions. The low scenario provides a higher level of certainty and the high scenario includes estimates of potential for modal shift that are highly conditional on a number of factors – such as reconfiguring national supply chains. These scenarios are described below. In all of these scenarios, the number of tonnes switch from road to rail is assumed to be achieved after full implementation of the respective investments.

Table 55. Freight demand scenarios of the short listed options based on existing demand

Scenario	Total freight task (tonnes)	Status Quo (rail)	Upgraded NAL (rail)	Rail Connected Port (rail)	Rail Connected Port + tourism (rail)
Scenarios derived from freight user discussion					
Central scenario	18,000,000	116,275	180,564	2,202,058	2,202,058
% of freight task		0.65%	1.00%	12.23%	12.23%
High scenario	18,000,000	116,275	277,439	2,594,558	2,594,558
% of freight task		0.65%	1.54%	14%	14%
Low scenario	18,000,000	116,275	180,564	1,878,829	1,878,829
% of freight task		0.65%	1.00%	10.44%	10.44%

Source: Deloitte and AECOM analysis

7.227 The total Northland freight task (including outbound freight generated by the region) in 2012 was estimated at 17 million tonnes, according to the National Freight Demand Study (2014). An estimated 1.1% p.a. growth has occurred in the freight task since then to bring the 2018 freight task to approximately 18 million tonnes per annum. The total freight task includes freight moved by shippers, rail and road in the Northland region. In tonne/kms, approximately 14 million of around 4.7 billion travel by rail (2012 data).[147]

7.228 Currently 116,000 tonnes per annum is estimated to be moved on rail, with the majority of this attributable to Fonterra. Investing in the line between Auckland and Whāngārei and north to Kauri extends the potential rail freight task to 180,000 tonnes (25 million tonne/km) a year, including additional milk and dairy products and other general containerised freight. This is a marginal rise of around 65,000 tonnes per year.

7.229 Upgrading the NAL to be fully inter-operable between Northland, Auckland and the Central North Island, reopening the Dargaville line and between Otiria and Moerewa as well as constructing a line to Marsden Point, is expected to have a much more significant impact on volumes. It is estimated that this could increase freight volumes to around 2.2 million tonnes once the option is fully implemented. This is a marginal increase of 2 million tonnes a year.

7.230 The key freight commodities are logs and wood products. After 2026, the supply of logs is expected to decrease, but will remain relatively high and from 2040, supply is expected to pick up again. To account for this, the forecast of the Rail Connected Port option, the forecast follows the wood availability profile.

Table 56. Summary of freight volumes for Central Scenario - Rail Connected Port

	Status Quo	Upgrade NAL	Rail Connected Port
Logs	-	-	1,348,000
Woodchip	30,000	30,000	453,000
Dairy	75,000	95,000	221,000
Other	11,275	45,850	57,125
Wood Products	-	9,714	80,229
Meat	-	-	42,704
Total	**116,275**	**180,564**	**2,202,058**

Source: Deloitte and AECOM analysis

[147] National Freight Demand Study, 2012

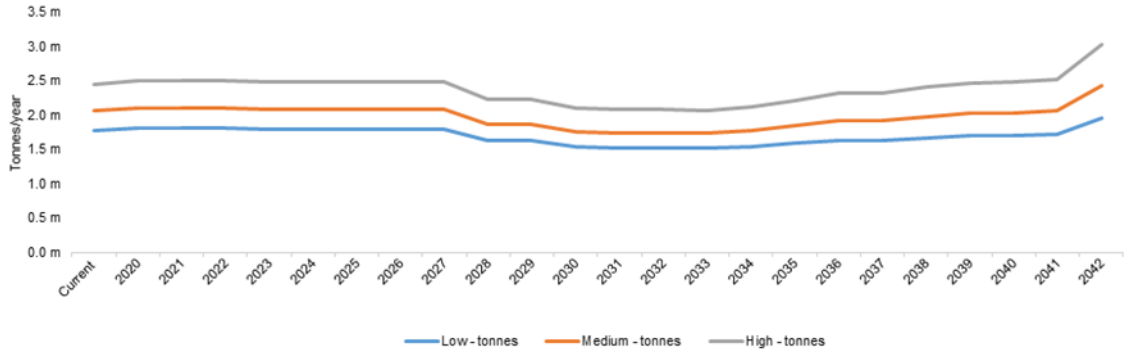


Figure 69. Wood Availability Profile

Source: Deloitte and AECOM analysis

Road to rail scenarios: Significant shift of freight through Northport

7.231 In addition to road to rail scenarios based on potential demand, a new scenario to estimate the impact of a significant shift in freight through Northport from Auckland was developed. Key assumptions made, and caveats noted, for this new scenario include the following.

1. With planned and proposed developments, Northport estimates capacity of up to 400,000 (TEU) containers a year, about the same as Port of Lyttleton. Of these 400,000 containers, 100,000 is assumed to move within Northland and 300,000 moved potentially between Northland and Auckland.

2. Equal volumes are moved in each direction (such as 150,000 containers are moved in each direction between Northport and Auckland per year.) The task requires around 500 truck trips between Northport and Auckland each week way, or 6 train trips each way, each day.

3. Additional costs associated with these increased freight volumes are not captured, including the cost of the proposed development at Northport, the cost of doubling handling, any additional upgrades to the network, among others.

4. The effect of removing trucks from Auckland roads is calculated by using the same assumptions as under the potential freight demand scenarios. In reality, there could be significant difference in assumptions required, particularly in terms of decongestion.

5. The scenario assumes additional capital cost for Northport, mainly in the purchase of additional cranes. KiwiRail indicate that the Auckland metro rail network has capacity to deal with these volumes during the inter-peak and off-peak. As such there will only be marginal cost to the rail network for the additional volume.

Evaluation Methodology

7.232 At a high level, a Cost-Benefit Analysis (CBA) is a decision-making tool that evaluates the benefits and costs of the short listed options at today's prices for the national economy, including for those in both the public and private sector. This analysis is performed all on short listed options, including the Status Quo. The Status Quo is evaluated to create a benchmark from which to compare the other options. Using a CBA to inform which option represents the best value for money ensures that all relevant economic, social, and environmental impacts of decisions on people, whether they can be quantified or not, are identified. Figure 70 sets out the process for completing the economic assessment and identifying the preferred way forward.

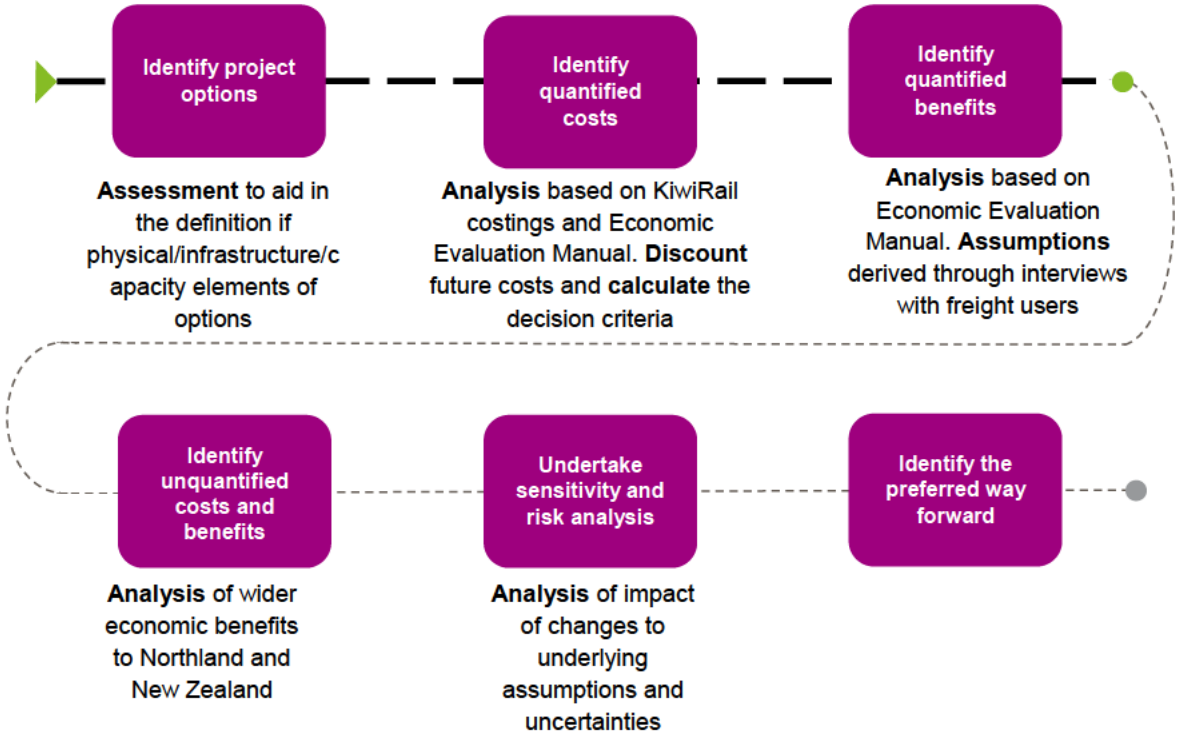


Figure 70. Cost benefit analysis process

Source: Deloitte Analysis

7.233 The economic evaluation of the short list options was undertaken using a number of methodologies. The majority of costs were provided by KiwiRail. Costs associated with the loss of road user charges (RUC) or rail externalities were derived from public sources or the Economic Evaluation Manual (EEM). From a national perspective, where possible, the assessment of the options follows the guidelines set out in the NZ Transport Agency's EEM. The EEM sets out a method for capturing and calculating the costs and benefits relevant to the assessment of transport projects. A key assumption driving the EEM analysis was the level of demand for rail freight, as described above.

7.234 A critical element of the Economic Case is the identification and quantification or qualification of costs and benefits. Figure 71 describes the key costs and benefits assessed as part of this Economic Case.

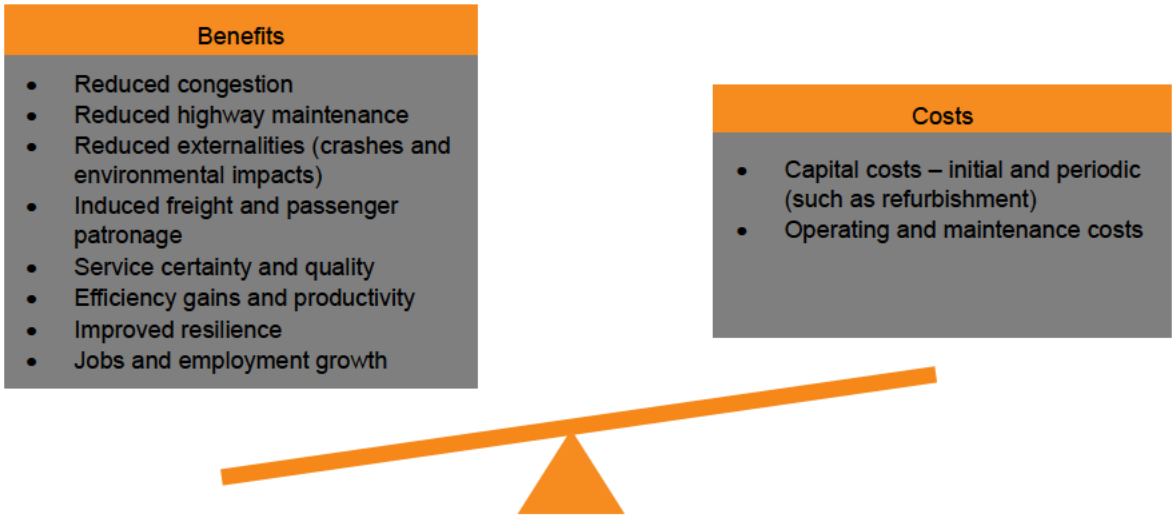


Figure 71. Costs and benefits summary

Source: Deloitte analysis

Appendix H Level Crossings

Managing safety risk on rail level crossings

7.235 Level crossings are locations where roads or footpaths cross a railway at the same level (meaning they are not grade separated by a bridge or underpass). There are 219 road level crossings on the existing NAL. Figure 72 shows that 147 level crossings are on private roads (67%) with 72 on public roads (33%). There are also 18 pedestrian crossings, many of which are adjacent to vehicular level crossings. Only two of the 18 pedestrian crossings currently have active warning systems, elevating the level of risk at pedestrian crossings as pedestrians have to rely on their own awareness.

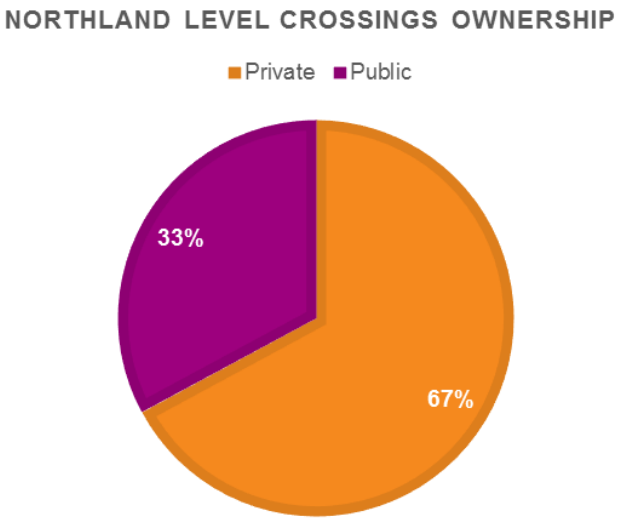


Figure 72. Proportion of public v private level crossing ownership in Northland

7.236 While level crossings in Northland meet minimum safety requirements for existing crossings, these requirements are below international standards. While the minimum standard for new active road protection in New Zealand is flashing lights and bells. Depending on the level of both road and rail traffic and the site-specific risk profile, public level crossings have either passive (signage only) or active (flashing lights and bells and in some cases half arm boom barriers). Private level crossings have only passive protection.

7.237 Where there is construction of new rail lines, it is recommended that no new crossings are created. In a number of jurisdictions the building of new level crossings is not recommended or prohibited for safety and efficiency reasons.[148] For the same reason KiwiRail does not wish to introduce any new level crossings to the rail network. Therefore all roads crossing new lines, such as the proposed Marsden Link, should be grade separated.

7.238 The upgrade of the NAL will enable the return of regular rail services, which will pose an increased safety risk at level crossings. To mitigate this risk it is recommended that a rail safety plan be prepared to determine appropriate mitigation that can be implemented as trains return. It is commonly acknowledged that more serious and fatal injuries occur on passive crossings compared with active crossings. There is a higher risk due to both potential sense of complacency from infrequent train movements. The only protection for people comes from road users looking out for approaching trains.

7.239 This plan should involve an education campaign targeted at communities, including schools near the NAL. This campaign can benefit from the work to increase rail safety awareness in other parts of New Zealand as train travel has increased in many areas. Part of this approach will involve a shift to look at level crossing safety collaboratively, rather than leaving sole responsibility on the road controlling authority or KiwiRail to create safety awareness. Examples for Northland include recent TrackSAFE New Zealand campaigns such as ‘Look Right, Look Left, For Trains’ as part of Rail Safety Week 2018, and ‘Expect Trains’ as part of the Main North Line Rebuild.

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7.240 A safety review of all level crossings on the NAL is also recommended, with upgrades considered as part of the safety plan. Upgrading public crossings is a collaborative effort involving KiwiRail and NZ Transport Agency, and the local road controlling authority if the crossing is on a local council-controlled road.[149] The costs of installing and maintaining alarm systems at public level crossings are generally shared 50:50 between KiwiRail and NZ Transport Agency or the relevant Road Controlling Authority (usually the local council). The upgrade and maintenance of level crossings on private land are usually the responsibilities of the landowner.

7.241 KiwiRail prioritises level crossing upgrades based on a holistic approach that considers factors including:

- Australian Level Crossing Assessment Model (ALCAM) risk score
- Crash and incident data
- Personal and collective road risk
- Vehicle delay–short stacking, and
- The opinion of locomotive engineers (train drivers).

7.242 The risk system is used to develop risk scores for both private and public road and pedestrian level crossings. This can guide the appropriate level of intervention for each level crossing.

Figure 73. SH1-NAL Towai level crossing

Photo: NZRail Photos

[149] http://www/tracksafe.co.nz/rail-in-nz/upgrades-to-crossings

Appendix I Terms of Reference

Terms of reference:

Preparation of Single-Stage Business Case

Upgrade of North Auckland Line

Purpose

This document describes the requirements for the preparation of a single-stage business case on a proposed upgrade of the North Auckland (rail) Line (NAL). The business case must conform to the Treasury *Better Business Case* model for a combined strategic and programme phase business case. It should also be consistent with the New Zealand Transport Agency's *Economic Evaluation Manual* (EEM) where applicable. The project rationale and deliverable requirements are specified here.

Introduction

Northland has significant challenges and opportunities. It has a growing population and its regional economy is growing strongly. However, on a number of measures of economic and social well-being Northland lags behind other regions.

Northland has opportunities to grow jobs and economic well-being through its core strengths in horticulture, dairy farming, forestry and tourism. Northland also has emerging opportunities in high value industries such as marine manufacturing.

To be successful, Northland needs to be connected to markets further south and overseas. Improving Northland's connectedness to the wider world has regularly emerged as a key theme when Northlanders have been asked about their regional development needs.

Currently Northland's products leave the region via State Highway 1 or through Northport at Marsden Point. The business case will explore how Northland's connectedness to markets can be enhanced by making greater use of rail as connecting infrastructure.

Deliverable

The primary deliverable will be a single-stage business case conforming to the Treasury Better Business Case model for strategic and programme phases that describes the costs and benefits of bringing all of the NAL up to a modern freight standard, with the ability to operate passenger services south of Whāngārei. Construction of a branch line to the port at Marsden Point should be separately analysed as part of the business case.

The business case should identify:

- the potential market for rail freight to, from and within Northland
- the interest from the business community in enhanced rail freight services to and from Northland
- potential passenger rail services, including tourism opportunities
- the views of local government, Iwi and Northland Inc
- costings using existing sources of information (eg from KiwiRail, Regional Council and the like) will be analysed and updated together with a project description for an upgrade of the NAL, including the Dargaville branch line.

Significant communication and discussion with interested stakeholders will be necessary to produce the report and that their views have been adequately considered in the development of the Business Case. The Ministry may request some early analysis and advice during October. The Ministry will give adequate notification to the Contractor.

The contractor will need to be available for discussion and follow up questions subsequent to submitting the final business case. This will assist in providing advice to Ministers. The Ministry undertakes not to make unreasonable requests of the contractor's time. The contractor will not be required to answer any such queries after one month after submission of the final report.

Scope

The business case should consider:

The Northland freight task	Volume, origins and destinations, modal split, commodities currently moved and the potential to do more with rail.
Freight growth	What is the likely future growth in the Northland freight task?
Potential mode shift	Are there freight customers that would use rail in preference to their existing arrangements if an improved rail freight service was available? What is the strength of their interest?
Northland community perspective	The report should summarise the views of the Northland business community, local government and iwi about Northland's transport infrastructure. The appetite for an upgrade of the rail line should be assessed. Note that the contractor will not be required to conduct a public consultation exercise.
Benefits	The business case should identify all of the potential benefits (using the NZ Transport Agency's Economic Evaluation Manual) of upgrading the rail line. This should include (but is not limited to) emissions benefits, congestion benefits, road safety benefits and impacts on road investment for both local and central government. Potential wider economic benefits should be identified including freight system efficiency, and tourism benefits. The contractor may model their approach to the cost benefit analysis on the NZTA Economic Evaluation Manual where applicable. KiwiRail can provide detailed information about the existing rail infrastructure. The analysis of the Marsden Point branch line proposal should incorporate potential impacts on the growth and development of Northport.
Costs	The consultant will need to work closely with KiwiRail to develop costings for an upgrade of the existing Northland line and costings for a Marsden Point branch line. The costings should identify risks. As far as possible risks should be quantified.

Five Cases/Better Business Case Model

The information for inclusion in the document should be organised around the five cases in the Treasury Better Business Case model, i.e. the:

- **Strategic Case** – the compelling factors for change
- **Economic Case** – including discussion of wider economic benefits, and options analysis (likely to be the status quo, investment in NAL with and without the Marsden Point branch line, see also limitations below)
- **Commercial Case** – the commercial viability of rail operations the investment would facilitate, expectations around any requirements for ongoing Government funding support
- **Financial Case** – funding requirements on Government, the region and KiwiRail as appropriate and the extent to which the costs of the investment can be met
- **Management Case** – timeframes, requirements and a high level plan for successful implementation of the investment

The level of detail to be provided shall be consistent with the strategic and Programme Business Cases

Limitations on scope

The business case should confine itself to analysing the options for enhancing Northland's rail infrastructure. Options for investing in other transport infrastructure are out of scope.

The business case may consider the benefits to other regions (especially Auckland) from investing in Northland's rail infrastructure. However, the project is not intended to be a wider examination of the benefits of rail or of the need for infrastructure investment in regions beyond Northland.

Engineering site investigations (eg geotechnical, topographical or asset condition) are excluded.

Timeframe

A draft document for review is required by the end of December 2018

The final document will be available by late March 2019

Project governance

The project lead for the project is the Ministry of Transport. The Ministry's contact person for the project is *[Redacted]* in the Rail and Freight Team. The contractor may also need to have contact with other Ministry staff. Regular progress meetings during the project will be agreed with the contractor. The Ministry will determine whether the business case meets requirements at its sole discretion. Questions about objectives and scope shall be directed to the Ministry in the first instance.

Appendix J Stakeholders

Northland Rail Stakeholder Reference Group

Table 57. Northland Rail Stakeholder Reference Group

Person or group	Role	Focus area
Minister Hon Shane Jones	Government Minister	Forestry, Infrastructure, Regional Economic Development, Transport, and Finance
NZ Transport Agency	Crown Entity	Safe and effective transport by land
Te Puni Kōkiri	Public Service Ministry	Policies and issues affecting Māori community
KiwiRail	State-Owned Enterprise	Rail operations
Northland Regional Council	Local Government	Transportation, economic development
Whāngārei District Council	Local Government	Road controlling authority
Northland Transport Alliance	NZTA & Local Government collaboration	Road and Passenger transportation
Northland Inc.	Council-Controlled Agency	Tourism, Economic development
Northport	Port Company	Freight supply chains
Marsden Maritime Holdings Ltd	Private Company	Freight
Fonterra	Cooperative	Freight, potential shippers
Marusumi	Private Company	Freight, potential shippers
Carter Holt Harvey	Private Company	Freight, potential shippers
Golden Bay Cement	Public Company	Freight, potential shippers
Semenoff Group	Private Company	Freight, potential shippers
Imerys Ceramics NZ	Private Company	Freight, potential shippers
Rosvall Sawmill	Private Company	Freight, potential shippers
Northsawn Lumber	Private Company	Freight, potential shippers
Culham Engineering	Private Company	Rail infrastructure, freight
Woodcorp Holdings Limited	Private Company	Freight supply chain

Interested Parties

Table 58. Interested parties of Northland Rail

Type	Person or group	Role	Focus area
(Local and Central) Government Organisations	KiwiRail	State-Owned Enterprise	Rail
	Auckland Transport	Council-Controlled Organisation	Auckland transportation services excluding State highways
	Auckland Council	Local Government	Transportation modes and Economic development
	Northland Regional Council	Local Government	Transportation modes and Economic development
	Whāngārei District Council	Local Government	Transportation modes and Economic development
	Far North District Council	Local Government	Transportation modes and Economic development

Type	Person or group	Role	Focus area
	Kaipara District Council	Local Government	Transportation modes and Economic development
Iwi	Otiria Marae, Moerewa	Venue for open hui	Te Ao Māori
	Whāngārei Te Renga Paraoa Marae	Venue for open hui	Te Ao Māori
	Te Hana Te Ao Marama Marae	Venue for open hui	Te Ao Māori
	Tai Tokerau Iwi Forestry Strategy	Forest Owners	Potential rail users
Freight interests	AFFCO	Private Company – Meat processing	Potential rail user
	Ballance	Cooperative - Fertiliser	Potential rail user
	Busck Prestressed Concrete Ltd	Private company – Precast and Prestressed Concrete	Potential rail user
	Carter Holt Harvey	Private Company - Wood products	Potential rail user
	Countdown	Public Company - Supermarket	Potential rail user
	Farm Forestry Association	Forest Owners	Potential rail users
	Fletchers Steel	Public Company - Steel	Potential rail user
	Fonterra	Cooperative - Dairy Products	Current rail user
	Foodstuffs	Cooperative - Supermarket	Potential rail user
	Forest Managers (1995) Ltd	Forest Owner (representative)	Potential rail user
	Golden Bay Cement	Private Company - Cement	Potential rail user
	Halls Intermodal	Private Company - Container transportation	Potential rail user
	Hancock Forest Management NZ	Forest Owner Representative	Potential rail user
	Imerys Ceramic Group	Private Company - Ceramics	Current rail user
	Juken/JNL	Private Company - Wood Products	Potential rail user
	OnTruck NZ Ltd / Kaitaia Transport	Private Company – Road Freight	Road transport
	Maersk Line	Shipping Line	Shipping
	Mainfreight	Public Company - Freight transportation	Current rail user
	Marusumi	Private Company - Wood products	Former rail user
	Northland Forest Managers	Public Company - Forestry	Potential rail user
	Northland Wood Council	Association - Wood products	Potential rail user
	Northport	Commercial Port	Affected party
	NZ Refinery	Oil	Potential rail user
	PF Olsen Ltd Northland	Forest Owner	Potential rail user
	Ports of Auckland	Port owner	Shipping
	Port of Tauranga	Port owner	Shipping
	Ravensdown	Fertiliser	Potential rail user
	Rayonier Matariki Forests	Forest Owner	Potential rail user
	Rosvall Sawmill	Lumber/Timber	Potential rail user
	Silverfern Farms	Meat	Potential rail user
	Summit Forests New Zealand Ltd	Forest Owner	Potential rail user
	Swire Shipping / Pacifica	Shipping line	Coastal Shipping
	Toll	Freight transportation	Potential rail user

Type	Person or group	Role	Focus area
Passenger	Antipodean Explorer	Rail Tourism	Tourism
	Bay of Islands Heritage Railway	Rail Tourism	Tourism
	Dargaville Rail Tours	Rail Tourism	Tourism
	Dunedin Railways	Rail Tourism	Tourism
	Glenbrook Vintage Railway	Rail Tourism	Tourism
Public	Dr Shane Reti MP	Member of Parliament for Whāngārei	Whāngārei constituents
	Grow Northland Rail	Interest Group	Promoting rail investment

Appendix K Relevant current and previous studies

Future of Rail

This Government initiative is being led by the Ministry of Transport to look at the purpose of rail within the wider transport system, including the benefits and the optimal structure and funding for rail.[150] The initiative will put rail on a longer-term sustainable footing. The review will investigate long-term funding for KiwiRail and will influence future Government Policy Statements on Land Transport, including investment priorities and objectives.

Upper North Island Supply Chain Strategy

7.243 The Government has commissioned a comprehensive Upper North Island logistics and freight review to ensure New Zealand's supply chain is fit for purpose in the longer-term. This review includes a focus on:

- The long-term future of ports in the Upper North Island, with a particular focus on Ports of Auckland and Northport
- Priorities for investment in rail and road.

7.244 The review will guide the development and delivery of a freight and logistics strategy for the Upper North Island, including a feasibility study to explore moving the location of the Ports of Auckland (with serious consideration to be given to Northport), and priorities for investment in rail, roads and other supporting infrastructure, with the goal of creating a robust supply chain that delivers to New Zealand's interest over the next 30 years.

7.245 Cabinet will determine how the Government responds to the advice of the working group. Subject to the Government's endorsement of the review, the findings will then form the basis of a government strategy.

Marsden Point rail link investigations

7.246 In October 2018 KiwiRail began geotechnical investigations along a section of the Marsden Point rail link. The proposed spur from Oakleigh to Marsden Point is discussed later in this report. Once these investigations are completed, the detailed information and potential construction methods will inform this business case.

SH1 Whāngārei to Te Hana and Warkworth to Wellsford RoNS

7.247 In 2017 the Whāngārei to Auckland – Connecting Northland Programme Business Case recommended an $0.88 - $1.43 billion programme of work between Whāngārei to Auckland, including a new alternative route around the Brynderwyn Hills. The do minimum assumed the Pūhoi to Wellsford highway would be completed by 2027 (the Pūhoi to Warkwork section was approved by a Board of inquiry and is expected to be completed in 2022).

[150] *Stronger Connections. Better New Zealand. Annual Integrated Report,* Kiwi Rail, 2018

7.248 The Whāngārei to Te Hana four-laning project (as well as the Warkworth to Wellsford section of Pūhoi to Wellsford RoNS) has been recently re-evaluated to align with the GPS (2018).[151] Following re-evaluation, the NZ Transport Agency has now committed to:

- delivering short term safety improvements between Whāngārei and the Marsden Point Highway (SH15)
- to work with Council's to support land use development and enable greater transport choices within the existing road corridor
- safety improvements planned for the existing road between the Marsden Point Highway (SH15) and Te Hana
- upgrading existing alternative routes around the Brynderwyn Hills to improve resilience
- completing safety improvements already underway through the Dome Valley

7.249 Work will continue to designate and protect a new future route for the Warkworth to Wellsford section of the Pūhoi to Wellsford RoNS, but construction is unlikely to be progressed before 2030. Further, land will be designated for a new four-lane route between Whāngārei and SH15, with construction timing and the form of the new route dependent on growth and on the prioritisation of projects across the country.

7.250 Construction of substantial future road projects between Warkworth and Whāngārei is uncertain and no statutory approvals have been obtained. The short-medium terms focus is on safety, enabling greater mode choice, and improving resilience (upgrading existing alternative routes around Brynderwyn Hills).

Auckland Strategic Growth Alliance North West Programme Business Case

7.251 Auckland's North West is expected to triple in population over the next three decades. The Supporting Growth Programme for North West Auckland includes a rapid transit network route connecting Huapai and Kumeū to Westgate, and Westgate to Albany. The options currently being investigated for the integrated 10-30 year plan for the North West Auckland transportation network include:

- Passenger rail from Swanson to Kumeū (depends on decisions made on light rail and rail freight between Auckland and Northland)
- Alternative SH16 corridor
- SH16-SH18 Connection upgrades

7.252 The consultation period on the options closed in October 2018.

Northport vision for growth

7.38 Northport is owned jointly and equally by Marsden Maritime Holdings Ltd and Ports of Tauranga Ltd.

7.39 In 2017, Northport issued their 'Vision for Growth', to prompt discussions in the community and between key stakeholders about the future of Northport and doubling the size of the wharf to cater for increased business. The existing wharf is 570 metres long and there is an existing consent for a 270 m extension to the east. Northport is proposing the idea of a further 250 m extension on the 13 hectares of reclaimed land in the east and 300 meters on 9.3 hectares of land in the west. This would provide 1,390 metres of total linear berth. Following the consultation period, Northport will conduct technical and environmental studies and modelling.

7.41 If the studies produce expected results, Northport will then undertake detailed stakeholder consultation.

[151] NZ Transport Agency Project Update Whāngārei to Te Hana, 24 October 2018,

Appendix L Strategic context

Government policy direction

7.253 The Government's Coalition Agreement and Government Policy Statement on Land Transport Funding are addressed in the body of this report. The following reflects wider strategic support for this business case.

Government Policy Statement (GPS)

7.254 The GPS (2018) outlines the Government's strategy and objectives to guide land transport investment over the next decade. While rail freight is identified in the GPS as requiring further investment policy development, it is indicated that to meet its transport objectives the Government would like more freight moved by rail and also coastal shipping. Any investment in Northland rail may be consistent with the Government's policy framework and direction, if investment in NAL would enable an efficient transition of freight volume onto rail.

7.255 The GPS (2018) has four strategic priorities and provides a commitment to close the widening infrastructure deficit in New Zealand's regions, towns and cities. The GPS (2018) priorities by which the NAL will be considered against are:

- Safety
- Access
- Environment
- Value for Money

Figure 74. Government strategic priorities for land transport investment 2018-21.

Source: GPS (2018)

7.256 The priorities of safety, value for money and environment are assessed within the business case using in part existing transport assessment methodology.[152] A qualitative assessment is also made as this methodology is under review and not all benefits can be given a monetary value, or a monetary value that potentially reflects any recent appreciation in the value of these benefits at this point in time (see the Economic Case). Examples of this include road safety where the Government has signalled that it wants an immediate reduction in deaths and serious injuries, with targeted investment in safety infrastructure. The GPS (2018) also sets out the Government's aspirations for to achieve environmental outcomes, notably the reduction in carbon dioxide emissions as a critical government objective.

7.257 The GPS (2018) also sets out the Government's intention to focus investment to deliver a land transport system that provides increased access for economic and social opportunities and greater individual and

[152] The Business Case has used the NZ Transport Agency's Economic Evaluation Manual

collective wellbeing. There is a particular focus on enabling greater choice of modes, including more use of rail and coastal shipping. Sustainable economic development of regional New Zealand is supported by safer and better transport connections that make existing businesses operate more efficiently, and also enable new businesses to develop. The Government's regional development objective is the most directly relevant for the strategic case for any potential investment in Northland rail. The objectives for access from land transport investment are in three areas:

1. **Increased access to economic and social opportunities**: This objective has a particular focus on nationally important routes, where access constraints are limiting business productivity or tourism, or where demand is growing or changing. This has an emphasis on enabling regions to be more competitive in getting freight to markets, enhancing tourism experiences, and to build on the strength of provincial New Zealand.

2. **Enables transport choices and access**: This objective is focused on considering land transport activities that provide a higher level of access to markets through the use of rail or coastal shipping. Along with this increased choice, the shift to other modes may reduce other costs. These costs may include private transport costs as well as externalised costs that are felt by other transport system users and the wider public, such as greenhouse gas emissions, road congestion and deaths and serious injuries.

3. **Resilience:** This objective seeks to improve network resilience for the most critical land transport connections. The Government wants a particular focus on those connections where disruptions would provide significant adverse economic effects, such as from climate change, earthquakes and other significant events.

Business Partnership Agenda and Urban Growth Agenda

7.258 In August 2018, the Coalition Government released their Business Partnership Agenda, the key themes being:

- Supporting Innovation
- Growing the Value of our Exports
- Building a Skilled Workforce
- Promoting a Productive Economy
- Preparing for the Changing Nature of Work, New Technologies and Climate Change
- Unlocking New Growth by Building Infrastructure for a more Productive Economy
- Creating Opportunities for Regional Economies
- Wages and Workplaces for a Modern Workforce

7.259 The idea of the Business Partnership Agenda is to partner 'with business to develop a productive, sustainable and inclusive economy'. The Coalition Government is looking to grow the value of New Zealand exports by implementing strategies and schemes for moving from volume to value. The idea behind these schemes is to deliver sustainable (economical, environmental, and social) benefits across New Zealand. It has also committed to supporting small businesses to encourage improvement and innovation.

7.260 Climate change response is another key issue addressed in the Business Partnership Agenda. This includes helping businesses, industries, and communities to plan and transition to a low-emissions economy, and setting up an independent climate commission. This is to help New Zealand meet its international obligations as well as achieve its target of a zero-emissions economy by 2050.

7.261 Economic growth is also supported through infrastructure investment and funding. The Government Policy Statement on Land Transport has outlined the NZ Transport Agency's direct investment of $4 billion in 2019 to projects which will help connect regions and increase regional productivity. The Coalition Government is also investing $28 million towards the Auckland Transport Alignment Project to ease congestion and improve productivity in Auckland.

7.262 Developing and providing opportunities to regional economies are addressed in the Business Partnership Agenda, giving regional areas more support in terms of economic and sustainable growth. These areas

will be supported through the Provincial Growth Fund, the One Billion Trees programme, and the accelerated roll-out of rural broadband and mobile networks.

7.263 The focus of the Urban Growth Agenda is to create the conditions for the market to respond to growth, improve housing affordability in urban areas and support thriving communities. The five pillars of the Urban Growth Agenda are:

- Infrastructure funding and financing
- Urban planning
- Spatial planning
- Transport pricing
- Legislative reform

7.264 This business case acknowledges the urban growth agenda.

Provincial Growth Fund

7.265 Central government, through the Provincial Growth Fund, has committed to investing $1 billion a year over three years (2018–2021) in to lift productivity and development potential in the provincial New Zealand. Tai Tokerau/Northland has been identified for early investment and funding. The priorities of the Fund are to:

- Enhance economic development opportunities
- Create sustainable jobs
- Enable Māori to reach their full potential
- Increase social inclusion and participation
- Build resilient communities
- Improve transport connections within and between regions
- Help meet New Zealand's climate change targets (including planting 1 billion trees)

New Zealand’s transition to a low emissions and cleaner economy

7.266 Climate change response is a key priority of the New Zealand Government. It is also crucial to achieving an environmentally, economically, and socially sustainable future for New Zealand. This can be seen as a theme throughout the Government Policy Statement, Business Partnership Agenda and with the Green Investment Fund.

7.267 These policies will attribute to the Government’s ‘plan to build a clean, sustainable, low-carbon economy that has both lower emissions and profitable enterprises’.[153] The Zero Carbon Bill (in development) if enacted is likely to commits New Zealand to achieving zero carbon by 2050 (or sooner), setting a legally binding pathway to achieving this target, and requiring the Government to create a plan towards this.

7.268 Transportation accounts for approximately 20% of New Zealand’s total greenhouse gas emissions annually.[154] Some 25% of road transport emissions are from heavy vehicles.

7.269 The New Zealand Productivity Commission released a report on a low-emissions economy in August 2018, which signalled the importance of decarbonising light and heavy transport. This business case addresses the potential for the NAL and Marsden Link to contribute to a cleaner economy. This is explored in the Economic Case.

Regional and district policy direction

7.270 The Northland Regional Land Transportation Plan (RLTP) was reviewed in 2018 for the final three years of the 2015 – 2021 RLTP. The review reflected the views of the Government Policy Statement for land transport. Northland’s transportation priorities are listed below (it is noted that safety is a key value in each):

[153] www.labour.org.nz/green_investment_fund
[154] www.transport.govt.nz/multi-modal/climatechange/

- Regional and national connectivity
- Economic and tourism development (including addressing perceptions of travel in the region)
- Route resilience and security
- Addressing constraints due to topography and geography
- Future proofing and long term planning
- Reducing the environmental effects of the transport network
- Greater alignment between central and local government
- Considering the needs of the transport disadvantaged (includes addressing social deprivation)
- Improving transport choices in rural communities

7.271 The RLTP addresses the connectivity issues which Northland faces. These issues range from road safety, road quality, pinch-points, lack of alternative routes, peak season holiday traffic, and topography. The connection from Whāngārei to Auckland is a lifeline for many as it connects Northland with the rest of New Zealand for freight. Challenging issues on this road connection can affect the Northland economy.

7.272 The Whāngārei District Council Long Term Plan 2018-2028 recognises that social and environmental sustainability are also critical in a transportation network (on top of its economic benefits). In this LTP, there is a stronger emphasis on pedestrian and cycle ways. Sustainable infrastructure is also emphasised in the Far North District Council Long Term Plan 2018-2028. The main vision for the Far North District is with enhancing their communities by achieving connection, sustainability (environmental, economic and social), and good management. Following a similar theme, the Kaipara District Council Long Term Plan 2018-2028 recognises the importance of a safe and effective road network for improving community well-being and economic connections.

Marsden Point- Ruakākā Structure Plan

7.273 In 2009 the Whāngārei District Council adopted the Marsden Point- Ruakākā Structure Plan 2008 (Structure Plan), an update from the Structures Plan 2000.[155]

7.274 The Structure Plan is principally a strategic policy document, and has a non-statutory status. Land use and development proposals are indicative only and intended to guide future actions to position the area around Marsden Point as a future regional urban industrial development node (and satellite to Whāngārei). This Structures Plan considers very long term future of the area (30-40 years), although the effective planning horizon is intended to guide much shorter term development (around 10 years).

7.275 Structure Plan identifies the outcomes for living, working, playing and protecting the area based on the growth of work opportunities, with projections of 18,000 work opportunities resulting in a population of 40,000 people. This growth is directly related to the uptake of the industrial land, with growth cycles, and staggered population growth. Key aspects of the Structures Plan are:

- Sufficient land for port and port-related land
- Residential development is separated from the industrial development and will occur in One Tree Point and Ruakākā
- Open space network will create separation between industrial uses and residential areas, but also provides for the low impact stormwater management system
- One central primary node as the future town centre, with two local centres
- Proposed railway connection between Oakleigh and Marsden Port (the Marsden Link)
- New roads, integrating with the existing SH 1 and SH15 (see Figure 75)

[155] www.wdc.govt.nz/PlansPoliciesandBylaws/Plans/CoastalPlanning/StructurePlans/Documents/Marsden-Point-Ruakaka-Structure-Plan/Marsden-Point-Ruakaka-Structure-Plan.pdf

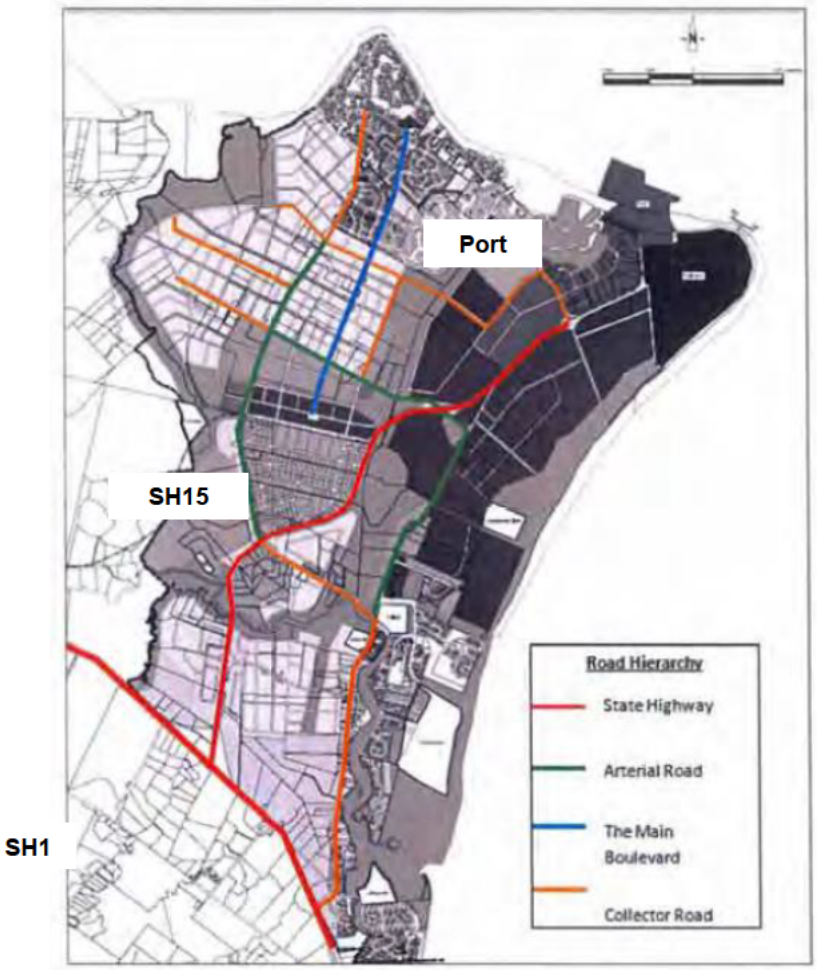


Figure 75. Marsden Point- Ruakākā Structures Plan proposed road hierarchy (annotated)

Source: Marsden Point- Ruakākā Structure Plan 2008, Transport Assessment (Figure 8)

Appendix M ILM

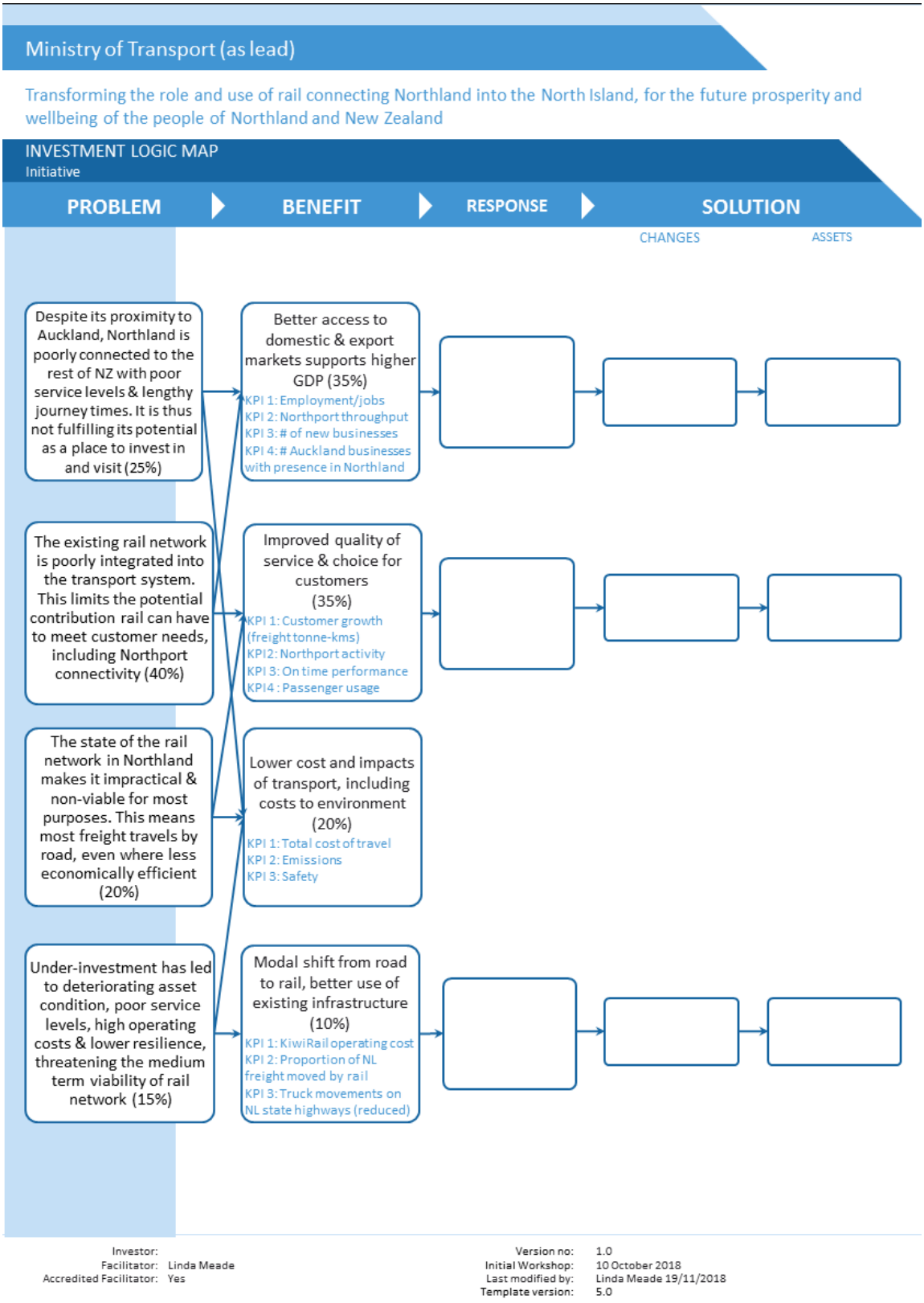


Figure 76. Investment Logic Map

Appendix N Project Dimensions

Extent of investment

7.276 Extent of investment is the scale of required spend, relative to current operating and capital expenditure. The extent of investment ranges from using existing budget to increasing both operating and capital expenditure. The Status Quo option assumes current spending is within existing KiwiRail and Auckland Transport Budgets. These budgets do not allow for additional capital investment in the line and only very limited operational spend, which would see the line become inoperable within five years. The next choice within this dimension allows for additional operational expenditure to maintain current levels of service, and the last choice enables increases in both capital and operating expenditure.

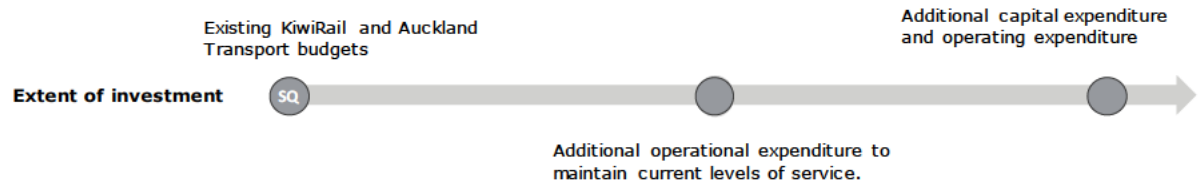


Figure 77. Extent of Investment

Service level

7.277 Service level describes the network capability in terms of required outcomes for supporting freight and passenger rail services. Service levels range from current network standard, through to best international freight standard with passenger services. The degree to which the line is upgraded relies on the selection made in this dimension.

7.278 The status quo option is the current level of freight service to remain for as long as the network is open. Keeping the network open for longer than five years may require bridge and tunnel renewals, as assets are beyond their assumed useful life. Other maintenance and renewal expenditure may also be required to keep the network safe. Upgrading the infrastructure to a 'modern freight standard' enables operation of freight services to, from and within Northland to be interoperable with the rest of the Upper North Island KiwiRail network. Modern freight standard is assumed to be compatible with the rest of the KiwiRail network and equipment. This includes access for high-cube containers, limited speed restrictions, 18 tonne axle loads across the line and appropriate safety controls at level crossings.

7.279 Enabling passenger services requires the same infrastructure and asset upgrades as modern freight standard, but requires additional safety tests and measures.

7.280 A higher level of service, such as building high speed electric track capacity, is a much larger investment and is a significant deviation from the Status Quo. Upgrading the tracks to the best international standard would mean the track is a higher standard than the rest of the KiwiRail network.

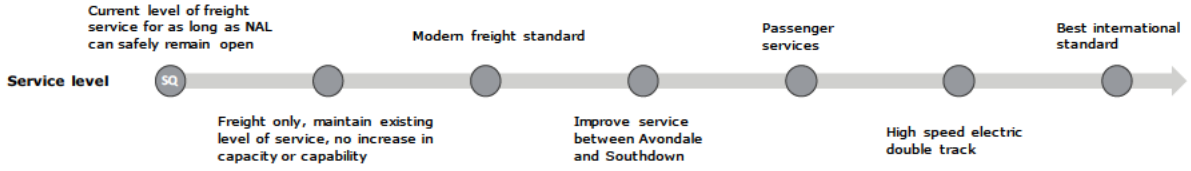


Figure 78. Level of Service

Location

7.281 Location specifies the section of the rail line to be upgraded, or in the case of Marsden Point Spur line, to be built. The currently operational portion of the NAL runs from Swanson in West Auckland to the Fonterra plant at Kauri, a short distance north of Whāngārei – as reflected in the Status Quo option. There is a further section of the NAL from Kauri to Otiria near Moerewa, together with a branch line to Dargaville, are currently mothballed out of use. The line across Auckland to Swanson in West Auckland is used by Auckland Transport suburban passenger trains as well as by KiwiRail freight services to/from Northland

7.282 A branch line to Marsden Point does not currently exist, but is a primary consideration of this business case and opens up Northland to global trade. The final choice within this dimension is creating a Marsden Point to Kaiwaka line, which is a completely new line.

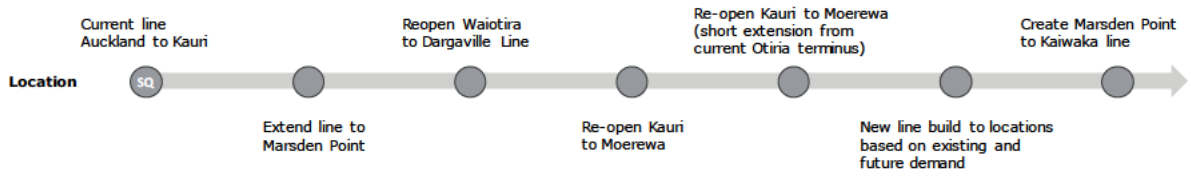


Figure 79. Potential Location

Rolling stock

7.283 Rolling stock describes the new rolling stock that could be purchased, ranging from no new rolling stock, to new passenger wagons and best international standard. Rolling stock purchases are determined by the level of service capacity selected and the degree to which the line is upgraded or extended.

7.284 The Status Quo option is a managed decline of, and no investment in, new North Auckland Rail specific locomotives and freight rolling stock. The second choice along the dimension involves purchasing more rolling stock to current KiwiRail 18 tonne TAL standards as required for interoperable freight services between Northland and Auckland and the Central North Island. The other end of the spectrum requires purchasing additional rolling stock that is of international standard of 25 tonne TAL. The infrastructure required for 25T rolling stock is beyond the capability of the wider KiwiRail network.

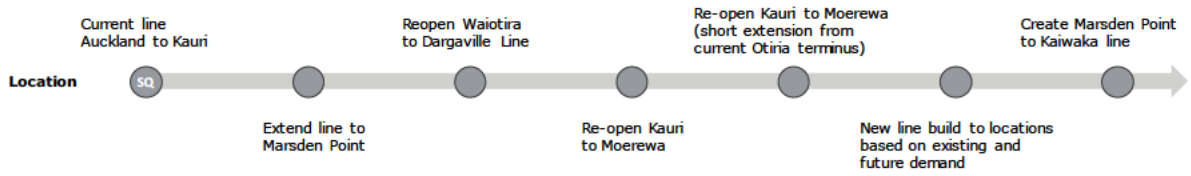


Figure 80. Rolling Stock

Service solution

7.285 Service solution focuses on how the project will be delivered. This is predominantly based on asset ownership options and who has responsibility for maintaining the assets and operating services.

7.286 KiwiRail currently owns and maintains rail infrastructure and operates freight services (Status Quo). Other options include KiwiRail retaining ownership but outsourcing the maintenance, operations, or both. Alternatively, KiwiRail could sell all assets to a third party to own, operate, and maintain.

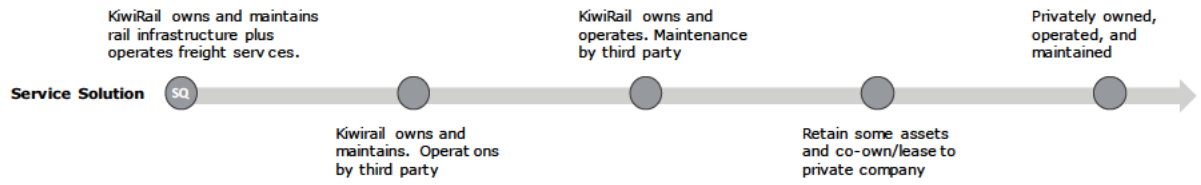


Figure 81. Service Solution

Service delivery

7.287 Service delivery describes who will deliver the solution. The delivery solution options range from internally delivered by KiwiRail to entirely outsource to a third party.

7.288 The Status Quo option would be internally delivered by KiwiRail. The most significant departure from this would be to outsource the entire project construction to a third party.

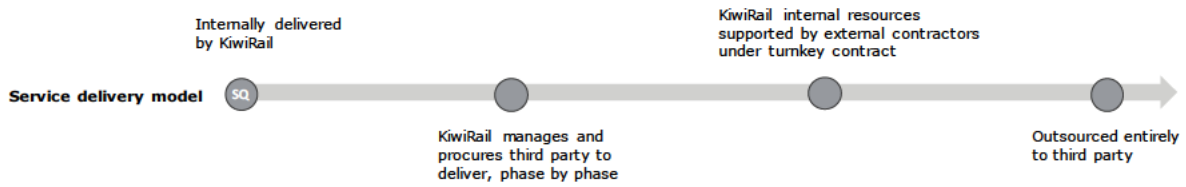


Figure 82. Service Delivery

Implementation

7.289 Implementation offers choices on when the project is delivered. Implementation choices range from incremental improvements concurrent with operations, to closing down the network and constructing over a set period of time. The Status Quo option is to gradually decline the rail over a period of five years.

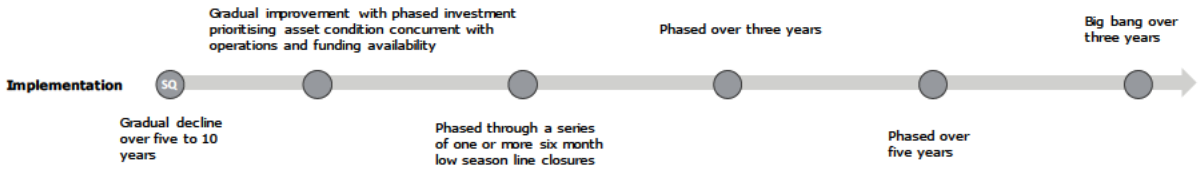


Figure 83. Implementation

7.290 In addition to when the project takes place, consideration of prioritisation of phases is required. This is not reflected in the implementation dimension. From consultation with KiwiRail, the following options would be possible and all should be considered:

- Scenario A: Build Marsden Link and upgrade the lines to the north of Oakleigh, which would help to address road and forestry issues. Then subsequently upgrade the NAL to the south
- Scenario B: Build Marsden Link and upgrade the NAL to the south, which would open the export/import opportunities to the south. Then subsequently upgrade the lines to the north
- Scenario C: Upgrade all lines concurrently

7.291 The above construction sequencing options need to be further assessed in terms of the local construction market capability within the context of regional skill development and growing heavy civil construction capability in Northland.

Funding

7.292 Funding considers the range of options for funding the project, including alternative funding to Government, such as public-private contracts. Using existing KiwiRail and Auckland Transport budgets to deliver the requirement is the Status Quo option.

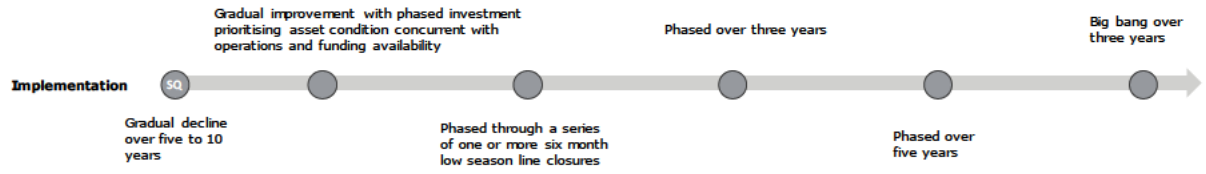


Figure 84. Implementation

7.293 The range of choices is presented in Table 59.

Table 59. Full Range of Choices

Extent of investment	SQ		Existing KiwiRail and Auckland Transport budgets		Additional operational expenditure to maintain current levels of service.		Additional capital expenditure and operating expenditure
Service level	SQ	Current level of freight service for as long as NAL can safely remain open	Freight only, maintain existing level of service, no increase in capacity or capability.	Modern freight standard	Improve service between Avondale and Southdown	Passenger services	High speed electric double track	Best international standard
Location	SQ	Current line Auckland to Kauri	Extend line to Marsden Point	Reopen Waiotira to Dargaville Line	Re-open Kauri to Moerewa	Re-open Kauri to Moerewa (short extension from current Otiria terminus)	Create Marsden Point to Kaiwaka line	New line build to locations based on existing and future demand
Rolling stock	SQ	Managed decline of and no investment in new NAL specific locomotives and freight rolling stock	Existing rolling stock replaced at end of useful life with new or cascaded vehicles from other lines	Purchase additional locomotives and wagons (to current KiwiRail 18 TAL standards) as required for interoperable freight services to Auckland/ Central North Island	Purchase additional passenger carriages	Purchase diesel-electric locomotives	Purchase electric locomotives	Purchase additional rolling stock (25T – international standard)
Service Solution	SQ	KiwiRail owns and maintains rail infrastructure plus operates freight services.*	Kiwirail owns and maintains. Operations by third party		KiwiRail owns and operates. Maintenance by third party		Retain some assets and co-own/lease to private company	Privately owned, operated, and maintained
Service delivery model	SQ	Internally delivered by KiwiRail		KiwiRail manages and procures third party to deliver, phase by phase		KiwiRail internal resources supported by external contractors under turnkey contract		Outsourced to third party
Implementation	SQ	Managed decline over a period of five to ten years	Gradual improvement with phased investment prioritising asset condition concurrent with operations and funding availability	Phased through a series of 1 or more 6 month low season line closures	Phased over 3 years		Phased over five years	Big bang over three years
Funding	SQ	Existing KiwiRail and Auckland Transport budgets		Funding package from Government or National Land Transport Fund		Co-funding with private sector - special purpose vehicle		Shareholder funding - private sector only

7.294 Each dimension can be read independently and more than one choice could be selected for each dimension. A range of options are available across the dimension and form a continuum from the Status Quo, which represents no change to the most extreme change.

7.295 For example in the 'Service Level' dimension, the current level of freight services is the Status Quo, whilst upgrading the rail line to best international standard would be a major shift from current thinking.

7.296 The options dimensions are intentionally high level to enable the reader to conceptually understand the range of options available.

Appendix O Long list summary

#	Option	Outcome	Description	Extent of investment	Service level	Scale/locations	Rolling stock	Implementation	Service solution	Service delivery	Funding
1	**Status quo**	Managed decline of the current rail network	No additional funding and/or investment in existing rail infrastructure. Network beyond Swanson estimated to be inoperable in around five years	Use existing operational budgets. No additional capital expenditure	Current level of freight service for as long as NAL can safely remain open - estimated at five years. No passenger services north of Swanson.	Current line Auckland to Kauri	Managed decline of and no investment in new NAL specific locomotives and freight rolling stock		KiwiRail owns and maintains rail infrastructure plus operates freight services.	Internally delivered by KiwiRail	Existing KiwiRail and Auckland Transport budgets
2	**Enabling future use of the existing network**	Ensures the future use of rail for freight in Northland	Minimum amount of work to restore and maintain on an ongoing basis the current capability of the operational rail network north of Swanson. Focused on addressing the most urgent short term issues at minimal cost	Additional capital and operational expenditure to restore and maintain current network levels of service	Freight only. Maintain existing level, no increase in capacity or capability	Current line Auckland to Kauri	Existing rolling stock replaced at end of useful life with new or cascaded vehicles from other lines	Gradual improvement with phased investment prioritising asset condition concurrent with opera ions and funding availability	KiwiRail owns and maintains rail infrastructure plus operates freight services.	Delivered by KiwiRail internal resources supported by external contractors	Funding package from Government or National Land Transport Fund
3	**Supporting inter-modal freight transport within Northland**	Enables additional usage of existing line by including access to Marsden Point	Minimum amount of work to restore and maintain on an ongoing basis the current capability of the operational rail network north of Swanson. Build new rail to Marsden Point to a modern freight standard	Additional capital expenditure and operating expenditure	Freight only. Maintain existing level, no increase in capacity or capability. Enables higher capacity from Marsden Point to Oakleigh	Current line Auckland to Kaurinew branch line from Oakleigh to Marsden Point	Existing rolling stock replaced at end of useful life with new or cascaded vehicles from other lines	Gradual improvement concurrent with operations, prioritise by asset condition and build Marsden Point Branch line over a 3 to 4 year period (including land acquisition and securing consents)	KiwiRail owns and maintains rail infrastructure plus operates freight services.	Delivered by KiwiRail internal resources supported by external contractors	Funding package from Government or National Land Transport Fund
4	**Restoring rail use in wider Northland**	Connects previously rail serviced sections of the network into the wider network	Invest to restore usage of the mothballed lines to their former service level and maintain the line between Auckland and Kauri	Additional capital expenditure and operating expenditure	Freight only. Maintain existing level, no increase in capacity or capability	Current line Auckland to Kauri, reopened line from Kauri to Moerewa (short extension from current O iria terminus), reopened Dargaville line	Existing rolling stock replaced at end of useful life with new or cascaded vehicles from other lines	Gradual improvement concurrent with operations, prioritise by asset condition	KiwiRail owns and maintains rail infrastructure plus operates freight services.	Delivered by KiwiRail internal resources supported by external contractors	Funding package from Government or National Land Transport Fund

5	**Bringing Northland into the integrated New Zealand rail network**	Improves the reliability and efficiency of service within Northland and opens Northland up to domestic trade	Investment in the rail network to upgrade the current Northland rail network and mothballed lines up to modern freight standard. The Northland freight network is fully interoperable with the rest of the North Island rail network	Additional capital expenditure and operating expenditure	Freight only, modern freight standard. Upgrade infrastructure enables operation of freight services to/from and within Northland that are interoperable with the rest of the Upper North Island KiwiRail network	Current network Auckland to Kauri	Purchase additional locomotives and wagons (to current KiwiRail 18 TAL standards) as required for interoperable freight services to Auckland/ Central North Island	Upgrade exis ing network through a series of 1 or more 6 month low season line closures north of Swanson	KiwiRail owns and maintains rail infrastructure plus operates freight services.	Upgraded existing network delivered by KiwiRail internal resources supported by external contractors	Funding package from Government or National Land Transport Fund
6	**Interoperable rail between Northland, Auckland and the central North Island**	Improves the reliability and efficiency of service within Northland and opens Northland up to domestic trade	Investment in the rail network to upgrade the current Northland rail network and mothballed lines up to modern freight standard. The Northland freight network is fully interoperable with the rest of the North Island rail network	Additional capital expenditure and operating expenditure	Freight only, modern freight standard. Upgrade infrastructure enables operation of freight services to/from and within Northland that are interoperable with the rest of the Upper North Island KiwiRail network	Current network Auckland to Kauri plus reopened line from Kauri to Moerewa (short extension from current O iria terminus)	Purchase additional locomotives and wagons (to current KiwiRail 18 TAL standards) as required for interoperable freight services to Auckland/ Central North Island	Upgrade exis ing network through a series of 1 or more 6 month low season line closures north of Swanson	KiwiRail owns and maintains rail infrastructure plus operates freight services.*	Upgraded existing network delivered by KiwiRail internal resources supported by external contractors	Funding package from Government or National Land Transport Fund
7	**Integrated Northland Transport Systems**	Connects Whāngārei to the domestic economy and international trade and improves service level	Investment in the rail network to build the branch line to Marsden Point and upgrade the current Northland rail network up to modern freight standard. The Northland freight network is fully interoperable with the rest of the North Island rail network	Additional capital expenditure and operating expenditure	Auckland to Kauri to modern freight standard, build Whāngārei to Marsden Point to modern freight standard	Current network Auckland to Kauri plus 1) new branch line from Oakleigh to Marsden Point and 2) reopened line from Kauri to Moerewa (short extension from current O iria terminus), 3) possible reopen Dargaville branch if justified	Purchase additional locomotives and wagons (to current KiwiRail 18 TAL standards) as required for interoperable freight services to Auckland/ Central North Island	Upgrade exis ing network through a series of 1 or more 6 month low season line closures north of Swanson and build Marsden Point Branch line over a 3 to 4 year period (including land acquisition and securing consents)	KiwiRail owns and maintains rail infrastructure plus operates freight services.*	Upgraded existing network delivered by KiwiRail internal resources supported by external contractors and Marsden Point branch line delivered by external contractors under turnkey contract	Funding package from Government or National Land Transport Fund
8	**Integrated Northland Transport systems and reopen line to Dargaville**	Improves connectivity across all previously operable lines and opens northland up to international trade and the rest of New Zealand	Reopening and upgrading mothballed lines and upgrading main trunk line to modern freight standard. Build a new line to Marsden Point.	Additional capital expenditure and operating expenditure	Modern freight standard.	Re-open Whāngārei to Kauri	Purchase additional rolling stock (18T- in line with modern freight standard)	Phased over 3 years	KiwiRail owns and operates. Maintenance by third party	Delivered by external contractors. Turnkey	Funding package from Government

9	**Supporting tourism growth in Northland**	Transforms the tourism and freight industry in the Northland region and connects the Northland freight network to New Zealand and he world	Enable both passenger and freight use of the Northland rail network by investing to upgrade the line from Auckland to Kauri to Moerewa and build a new line to Marsden Point to the same standard modern freight standard. Enable s passenger train a service between Marsden Point and Otiria aimed at Cruise Ship passenger	Additional capital expenditure and operating expenditure	Freight and a daily tourist oriented service between Auckland and Whāngārei/Otiria and a service between Marsden Point and Otiria	Current network Auckland to Kauri plus 1) new branch line from Oakleigh to Marsden Point and 2) reopened line from Kauri to Moerewa (short extension from current O iria terminus)	Purchase additional locomotives and wagons (to current KiwiRail 18 TAL standards) as required for interoperable freight services to Auckland/ Central North Island and purchase additional carriages for passenger service	Close main trunk and work over 3 years. Priori ise based on asset condition, completion of spur line and enabling passenger rail within Northland	Retain some assets, passenger wagons owned by third party	Delivered by external contractors under turnkey contract	Co-funding with private sector - special purpose vehicle
10	**Driving growth in rail as a key transport mode into the future**	Transforming the role of rail as an environment ally friendly and efficient transport option for both passengers and freight users	Heavily invest in the rail network to radically reroute the existing Northland rail network to route the line closer to current and planned population in Northland and to also shorten Auckland-Kauri rail travel times. Double track electrified railway from Auckland to Whāngārei (via Kaiwaka and Marsden Point) to support both increased freight and passenger services to be operated.	Additional capital expenditure and operating expenditure	Modern international standard	Auckland to Kauri, via Kaiwaka and Marsden Point.	Purchase additional locomotives and wagons (to current KiwiRail 18 TAL standards) as required for interoperable freight services to Auckland/ Central North Island and purchase additional carriages for passenger service	Phased over 10years	KiwiRail owns, operates, maintain entire rail network	Public private partnership/ special purpose vehicle	Co-funding with private sector - special purpose vehicle
11	**Full reinvention of rail within Northland**	Repositionin g rail as a key economic enabler in Northland	Heavily invest to rebuild the rail network, strategically placing the lines to best service Northland.	Additional capital expenditure and operating expenditure	Modern international standard	Build a new rail network, including the Marsden Point to Kaiwaka line	Purchase additional rolling stock (40T – international standard)	Phased over five years	Privately owned, operated, and maintained	Public private partnership/ special purpose vehicle	Shareholder funding - private sector only

Appendix P Long list evaluation

Table 60. Long list evaluation

Investment Objectives		Option 1. Status Quo	Option 2. Enabling future use	Option 3. Supporting inter-model freight transport	Option 4. Restoring rail use	Option 5. Interoperable rail	Option 7. Integrated transport systems	Option 9. Tourism supporting	Option10. Driving growth	Option 11. Reinvention of rail
To better connect Northland into Auckland and the rest of New Zealand.		○	○	◔	◑	◕	●	●	●	●
To improve the quality of service and choice for customers and enable better transport mode integration.		○	○	◑	◔	◕	●	●	●	●
To reduce the cost and impact of transport for customers and wider New Zealand.		○	◔	◑	◔	◑	◑	◑	●	●
To encourage better use of existing infrastructure.		○	◔	◑	◔	◑	●	●	●	●
Critical Success Criteria		Option 1. Status Quo	Option 2. Enabling future use	Option 3. Supporting inter-model freight transport	Option 4. Restoring rail use	Option 5. Interoperable rail	Option 7. Integrated Transport Systems	Option 9. Tourism Enabling	Option 10. Driving Growth	
Strategic fit and business needs		○	◔	◑	◑	◑	●	●	●	●

Potential value for money										
Supplier capacity and capability										
Potential affordability										
Potential achievability										
Overall Assessment		**Carry forward**	**Do not carry forward**	**Do not carry forward**	**Do not carry forward**	**Carry forward**	**Carry forward**	**Carry forward**	**Do not carry forward**	**Do not carry forward**

Initial evaluation of the long list

7.297 Options within the long list may not meet project objectives and realise benefits of this business case. To ensure they deliver the objectives of the business case the options in the long list are initially assessed against the Investment Objectives and Critical Success Factors. As part of the evaluation process, each option was scored by the project team from 'Does not meet' through to "Exceeds" the expectations of the objective and criteria. Where an option does not meet the Investment Objectives and/or the Critical Success Factors it is removed from consideration.

7.298 It is important to note that the assessment is not based on any cost or benefit analysis. It is meant as a 'first pass' to discard impractical options and/or options that do not meet the set agreed project Investment Objectives or Critical Success Factors and to avoid undue analysis effort. The project team consulted with stakeholders to assist in evaluation. The assessment is preliminary and may be revised upon further analysis. Analysis of costs and benefits will only be undertaken against the short list of options defined later in the process. A summary of the rating method applied is in Table 61.

Table 61. Scoring used in initial options assessment

Source: Deloitte Analysis

Rating	Score	Description
Exceeds	●	The option meets all of the elements and provides additional benefits within the criteria or objective
Meets	◕	The option meets all of the elements within the criteria or objective
Meets with minor reservations	◑	The option addresses most of the elements within the criteria or objective
Meets with major reservations	◔	The option addresses a few of the elements within the criteria or objective
Does not meet	○	The option does not meet the criteria or objective

7.299 A summary of the initial evaluation of the long list options is set out in Appendix O.

Medium list

7.300 As a result of this initial evaluation, a set of six options, the 'medium list', were carried forward for a second round of evaluation, and taken to stakeholders for discussion. The medium list and a summary of the evaluation are set out in Appendix P. The table is read like a matrix, with the Investment Objectives and Critical Success Criteria presented along the left hand side and the medium list of options along the top. The evaluation process does not include estimated costs, benefits, risks, uncertainties.

7.301 The options are assessed and given a rating against how well they are expected to meet the Investment Objective and Critical Success Criteria, according to the rating method described in Table 61. If an option does not meet one of the Investment Objectives or Criteria, then it is not carried forward for further analysis.

Table 62. Summary of Options Evaluation on Medium List

Investment Objectives	Option 1. Status Quo	Option 2. Enabling future use	Option 5. Interoperable rail	Option 7. Integrated transport systems	Option 9. Tourism supporting	Option10. Driving growth
To better connect Northland into Auckland and the rest of New Zealand.	○	○	◕	●	●	●
To improve the quality of service and choice for customers and enable better transport mode integration.	○	○	◕	●	●	●
To reduce the cost and impact of transport for customers and wider New Zealand.	○	◕	◑	◑	◑	●
To encourage better use of existing infrastructure.	○	◕	◑	●	●	●
Criteria	**Option 1. Status Quo**	**Option 2. Enabling future use**	**Option 5. Interoperable rail**	**Option 7. Integrated Transport Systems**	**Option 9. Tourism Enabling**	**Option 10. Driving Growth**
Strategic fit and business needs	○	◕	◑	●	●	●
Potential value for money	○	○	◕	●	●	◕
Supplier capacity and capability	●	●	●	●	●	○
Potential affordability	●	●	●	●	●	○
Potential achievability	●	●	●	●	●	○
Overall Assessment	Carry forward	Do not carry forward	Carry forward	Carry forward	Carry forward	Do not carry forward

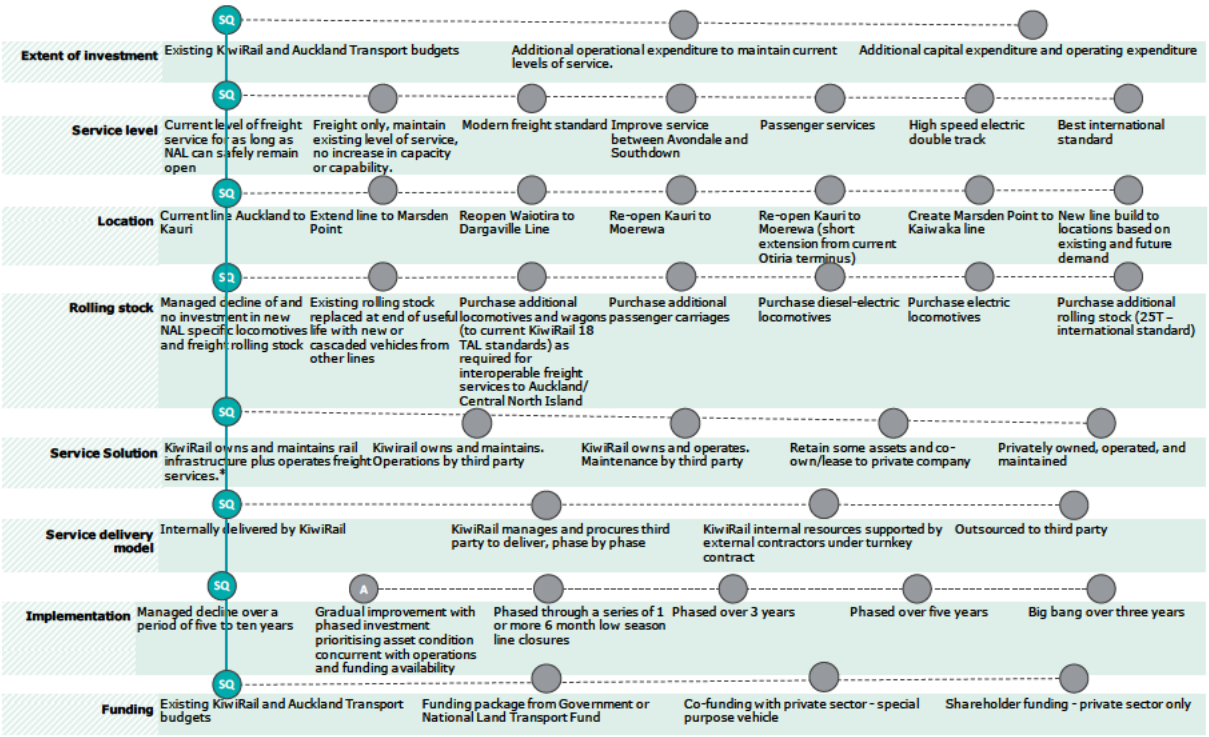
Appendix Q Short List Options Aligned to Project Dimension

Table 63. Short list options aligned to project dimensions

#	Option	Outcome	Description	Extent of investment	Service level	Scale/locations	Rolling stock	Implementation	Service solution	Service delivery	Funding
1	**Status Quo**	Managed decline of the current rail network	No additional funding and/or investment in existing rail infrastructure. Network beyond Swanson estimated to be inoperable in around five years	Use existing operational budgets. No additional capital expenditure	Current level of freight service for as long as NAL can safely remain open - estimated at five years. No passenger services north of Swanson.	Current line Auckland to Kaun	Managed decline of and no investment in new NAL specific locomotives and freight rolling stock		KiwiRail owns and maintains rail infrastructure plus operates freight services.	Internally delivered by KiwiRail	Existing KiwiRail and Auckland Transport budgets
5	**Interoperable rail between Northland, Auckland and the central North Island**	Improves the reliability and efficiency of service within Northland and opens Northland up to domestic trade	Investment in the rail network to upgrade the current Northland rail network and mothballed lines up to modern freight standard. The Northland freight network is fully interoperable with the rest of the North Island rail network	Additional capital expenditure and operating expenditure	Freight only, modern freight standard. Upgrade infrastructure enables operation of freight services to/from and within Northland that are interoperable with the rest of the Upper North Island KiwiRail network	Current network Auckland to Kaun	Purchase additional locomotives and wagons (to current KiwiRail 18 TAL standards) as required for interoperable freight services to Auckland/ Central North Island	Upgrade existing network through a series of 1 or more 6 month low season line closures north of Swanson	KiwiRail owns and maintains rail infrastructure plus operates freight services.	Upgraded existing network delivered by KiwiRail internal resources supported by external contractors	Funding package from Government or National Land Transport Fund
7	**Port integrated rail enabled to Auckland and Central North Island**	Connects Whangarei to the domestic economy and international trade and improves service level	Investment in the rail network to build the branch line to Marsden Point and upgrade the current Northland rail network up to modern freight standard. The Northland freight network is fully interoperable with the rest of the North Island rail network	Additional capital expenditure and operating expenditure	Auckland to Kauri to modern freight standard, build Whangarei to Marsden Point to modern freight standard	Current network Auckland to Kauri plus 1) new branch line from Oakleigh to Marsden Point and 2) reopened line from Kauri to Moerewa (short extension from current Otiria terminus), 3) possible reopen Dargaville branch if justified	Purchase additional locomotives and wagons (to current KiwiRail 18 TAL standards) as required for interoperable freight services to Auckland/ Central North Island	Upgrade existing network through a series of 1 or more 6 month low season line closures north of Swanson and build Marsden Point Branch line over a 3 to 4 year period (including land acquisition and securing consents)	KiwiRail owns and maintains rail infrastructure plus operates freight services.	Upgraded existing network delivered by KiwiRail internal resources supported by external contractors and Marsden Point branch line delivered by external contractors under turnkey contract	Funding package from Government or National Land Transport Fund
9	**Supporting tourism growth in Northland**	Transforms the tourism and freight industry in the Northland region and connects the Northland freight network to New Zealand and the world	Enable both passenger and freight use of the Northland rail network by investing to upgrade the line from Auckland to Kaun to Moerewa and build a new line to Marsden Point to the same standard modern freight standard. Enables passenger train services between Marsden Point and Otiria aimed at Cruise Ship passenger	Additional capital expenditure and operating expenditure	Freight and a daily tourist oriented service between Auckland and Whangarei/Otiria and a service between Marsden Point and Otiria	Current network Auckland to Kauri plus 1) new branch line from Oakleigh to Marsden Point and 2) reopened line from Kauri to Moerewa (short extension from current Otiria terminus)	Purchase additional locomotives and wagons (to current KiwiRail 18 TAL standards) as required for interoperable freight services to Auckland/ Central North Island and purchase additional carriages for passenger service	Close main trunk and work over 3 years. Prioritise based on asset condition, completion of spur line and enabling passenger rail within Northland	Retain some assets, passenger wagons owned by third party	Upgraded existing network delivered by KiwiRail internal resources supported by external contractors and Marsden Point branch line delivered by external contractors under turnkey contract	Co-funding with private sector - special purpose vehicle

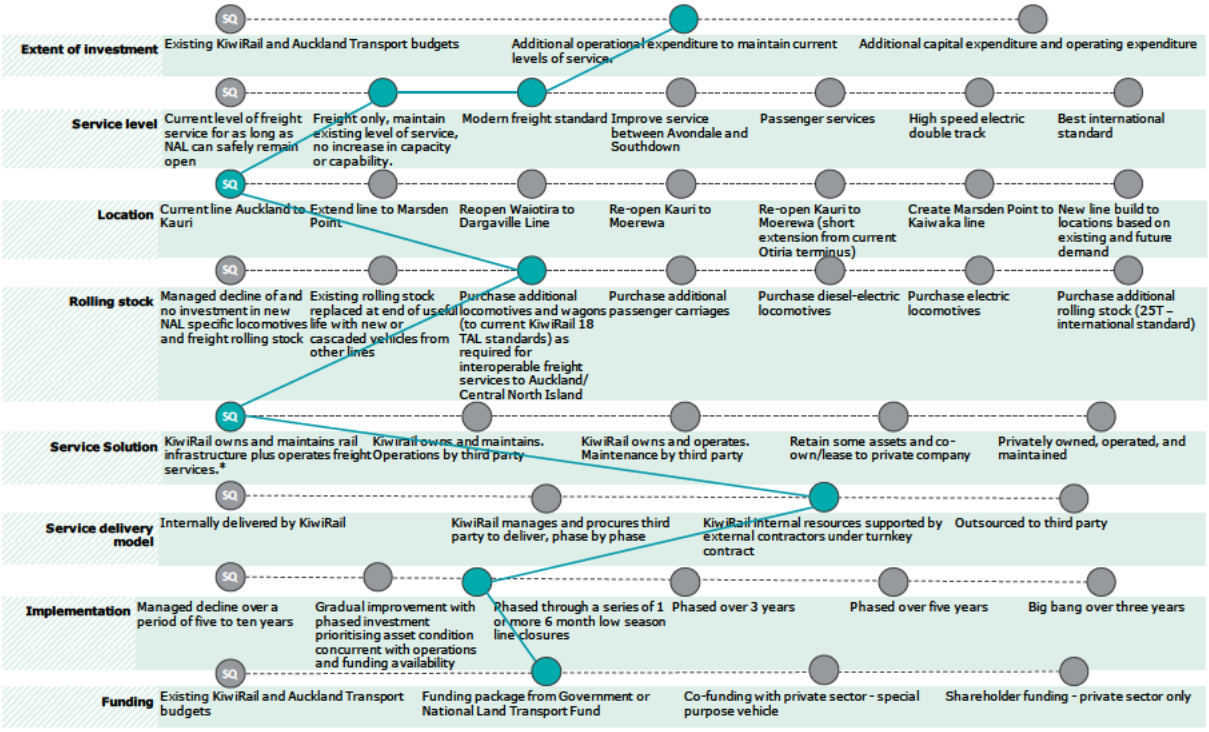
Status quo (base case): Managed decline

Table 64. Identifying the Status Quo



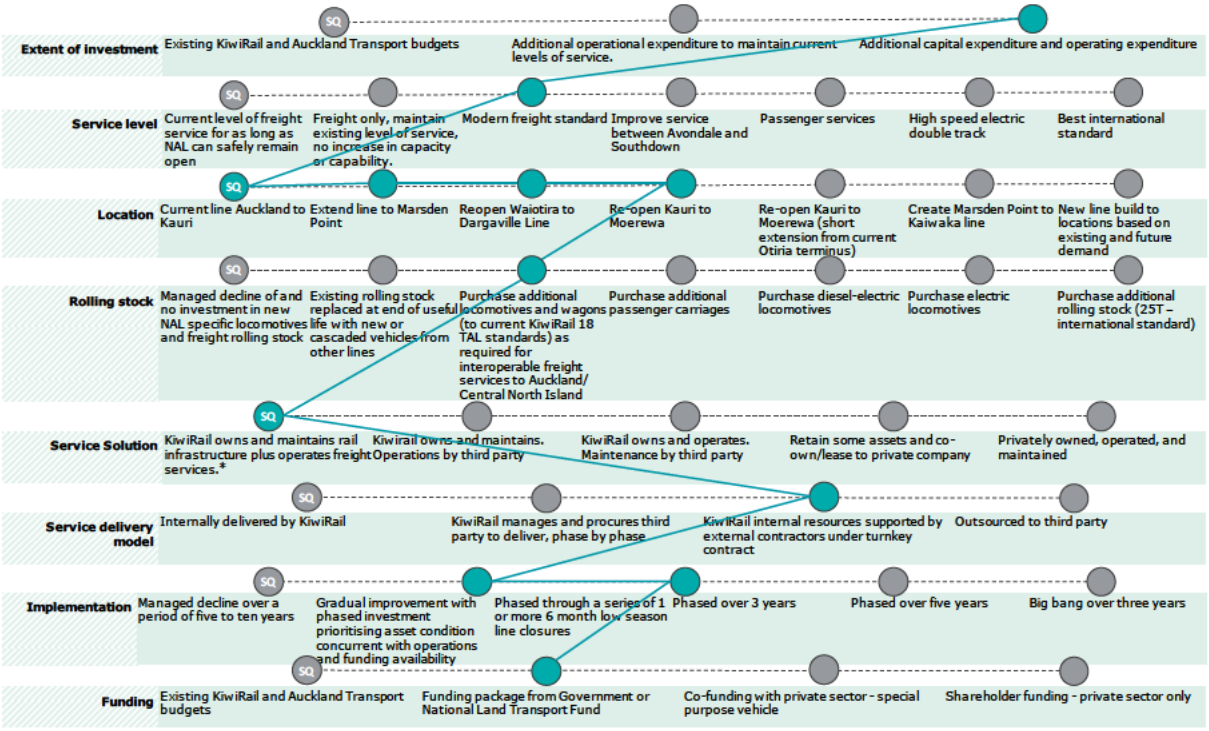
Option five: Inter-operable rail between Northland, Auckland and the Central North Island

Table 65. Interoperable rail between Northland, Auckland and the Central North Island



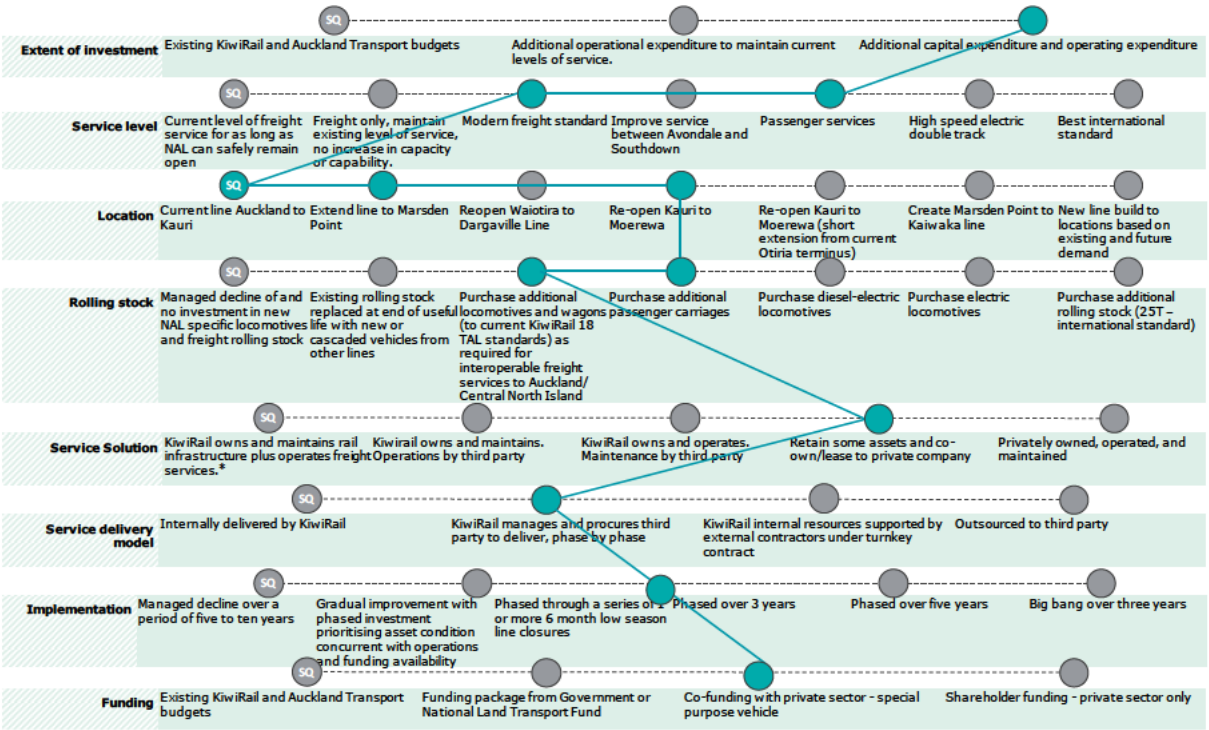
Option seven: Integrated Northland transport systems

Table 66. Integrated Northland Transport Systems.



Option nine: Supporting tourism growth in Northland

Table 67. Supporting tourism growth in Northland



Appendix R Finance Costs

Table 68. Annual cost breakdown from FY19 – FY58

Cost Breakdown (000s) FY19 - FY28

	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	Total
Capex	232,801	389,324	289,382	59,707	6,205	6,464	6,120	8,368	9,811	6,963	1,014,946
Opex	-	-	-	8,939	32,377	34,413	36,436	37,260	38,093	38,962	226,480
Total	232,801	389,324	289,382	68,646	38,582	40,877	42,556	45,628	47,704	45,925	1,241,426

Cost Breakdown (000s) FY29 - FY38

	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	FY37	FY38	Total
Capex	7,600	6,340	13,280	6,653	7,984	8,215	10,167	20,973	9,830	10,118	101,159
Opex	39,838	42,130	43,510	44,498	45,499	54,271	55,487	56,731	58,017	60,939	500,921
Total	47,438	48,470	56,790	51,151	53,483	62,487	65,653	77,703	67,847	71,057	602,079

Cost Breakdown (000s) FY39 - FY48

	FY39	FY40	FY41	FY42	FY43	FY44	FY45	FY46	FY47	FY48	Total
Capex	10,338	10,568	0,800	11,116	11,362	3,524	3,619	3,841	3,942	4,048	73,156
Opex	62,307	63,720	65,161	68,380	69,932	71,515	73,142	77,279	79,028	80,826	711,290
Total	72,645	74,287	75,961	79,496	81,294	75,039	76,761	81,119	82,970	84,874	784,446

Cost Breakdown (000s) FY49 - 58

	FY49	FY50	FY51	FY52	FY53	FY54	FY55	FY56	FY57	FY58	Total
Capex	4,255	4,367	4,486	4,704	4,832	4,967	5,205	5,344	5,541	5,801	49,503
Opex	84,697	86,619	88,602	92,759	94,885	97,068	101,560	103,882	107,002	111,868	968,941
Total	88,952	90,986	93,088	97,464	99,717	102,035	106,766	109,226	112,543	117,669	1018,444

Appendix S Hui notes from the Ministry of Transport

Ministry of Transport
TE MANATŪ WAKA

Ministry of Transport input into Northland Auckland Line (NAL) business case on hui

1. The Terms of Reference for the NAL business case state that it should identify "the views of local government, Iwi and Northland Inc." The consultants and the Ministry of Transport (the Ministry) agreed in November 2018 that the Ministry would lead this aspect of the business case process.

2. The Ministry, with support from KiwiRail, organised and undertook engagement with Iwi Māori during three hui at:

   - Otiria Marae, Moerewa – 6 March 2019
   - Whangārei Terenga Paraoa Marae, Whangārei – 7 March 2019
   - Te Hana Te Ao Marama Marae, Te Hana – 8 March 2019.

3. As detailed in earlier the business case, rail played a significant part of Northland's development during the early to mid 20th century. Not only did it connect the region with the rest of the country and the outside world, but the railways also served as an important employer, where it once had approximately 22,000 workers across the country during rail's golden age. At the hui, many local Maori recalled the important role that the railways played in their whanau and hapu as a means of improving their economic wellbeing while offering admirable and skilled jobs to the region. Many local Maori also recalled their fond memories of travelling on the Northland Express (also known as the Opua Express) which was a long distance passenger service that ran from Auckland via Whangarei to Opua in the Bay of Islands between 1925 and 1956.

4. These positive memories of the railways are also somewhat bittersweet. Many whanau and hapu still remember that significant amounts of land were acquired using the broad powers under the Public Works Act to construct the railways between the late 19th century and early 20th century. This frequently occurred without consultation or their consent, negatively impacting on their way of life, physically dividing up land, limiting their access to waterways and undermining their views of kaitiakitanga (guardianship of the environment). The message was made clear at the three hui – if investment is to be made to upgrade the NAL, the Crown needs to take a measured approach and treat Maori as partners throughout the process. There was also a strong desire to be approached on a whanau/hapu level to address any specific issues or interests they may have. KiwiRail and the Crown committed to building a relationship with local Maori to address their specific interests if investment is made.

5. While there was a strong message of historical pain and a sense of wrongdoing by the Crown, local Maori also acknowledged that rail presented a unique opportunity to improve Northland's regional economic development. There was a strong feeling that Northland was a "forgotten region", and had been neglected from Government investment in its transport system. In this sense, the possibility of investment in the NAL was widely understood as an opportunity that could breathe life into many local communities as it once did many years ago. Given this, many remarked that the Government should just "get on with it". There was wide ranging support for a rail connection to Northport, which is one of only two ports in New Zealand which are not rail enabled (Port Nelson being the other). The relocation of the rail enabled Port of Whangarei in April 2007 to Northport was one of the key factors which saw rail freight in Northland drop 66% between 2000 and 2008.

6. Many local Maori were also interested in the employment opportunities which could arise if the investment was made. Northland's unemployment is higher than the national average and the railways once employed many Northlanders. Many agreed at the hui that employment opportunities could be greatly supported by the potential tourism services that the business case is examining.

7. A range of views were also expressed by individuals representing their whanau or hapu. These views included:

- Northland requires a range of transport investments, particularly on State Highway 1, 10 and 11. Severe flooding still affect these roads which can greatly impact on the ability of locals to get around Northland safely. Given that rail can only transport a portion of the freight in Northland, roading improvements also need serious consideration for network resilience and safety reasons.

- There was a strong message from a select number of hapu/whanau who will not support reinstatement going past Otiria station due to ongoing land issues with the Crown.

- There was expressed interest for a rail line to transport large volumes of waste to a gasification plant in Marsden Point (this was also mentioned at Te Hana). Many felt that this would have a positive impact not only on the environment, but also in terms of supporting local businesses and creating more jobs. This proposition has been raised to KiwiRail in the past.

- Many of the current tourist services operated by KiwiRail are out of reach for locals to enjoy.

- The business case should consider how commuter rail can support Auckland's satellite suburbs (Warkworth or even Wellsford) for people who are pushed out of Auckland's housing market but travel to Auckland. These would be similar to interregional services such as the Wairarapa Line, Capital Connection or the Hamilton-Auckland service currently being developed.

Erin Wynne
Manager Rail and Freight