

# Rail & Mass Transit Services

Rapid Transit Strategic Framework for discussion

September 2020

# Introduction

## The need for a Rapid Transit Strategic Framework

- The GPS signals a significant step change of investment in Rapid Transit to make up for under investment in meeting the challenges of a growing population, congestion and environmental concerns.
- Rapid Transit plays a vital role in delivering mode-shift, reducing congestion and shaping our growing cities and regions.
- The 2018 Ministerial direction supported by the GPS saw the Agency's role expanded to plan, fund, design, supervise, construct and maintain rapid transit.
- To fulfil our responsibilities successfully requires a dedicated rapid transit strategic framework.
- This presentation sets out why the development of a specific rapid transit strategic framework is important and what this means for Waka Kotahi.
- This framework has been developed following comprehensive consultation across the breadth of Waka Kotahi



# Waka Kotahi's rapid transit Functions

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# Our function

Waka Kotahi's function is to deliver on the GPS, plan and deliver rapid transport and to enable strategic trade-offs on investment decisions to be made at a systems level.

Minister of Transport issued a direction in May 2018 on our rapid transit role:



**Plan**



**Fund**



**Design**



**Supervise**



**Construct**



**Maintain**

- Together with our partners, we have been progressing rapid transit projects in the growth centres, with a large focus on ALR (including LGWM).
- Progress has been on an individual project basis.
- A strategy is needed to provide consistency, bring projects together to deliver better overall outcomes and to enable strategic trade-offs to be made.

The GPS gives us guidance:

## Better travel options

Providing people with better transport options to access social and economic opportunities is one of the four strategic priorities set out in the draft GPS.

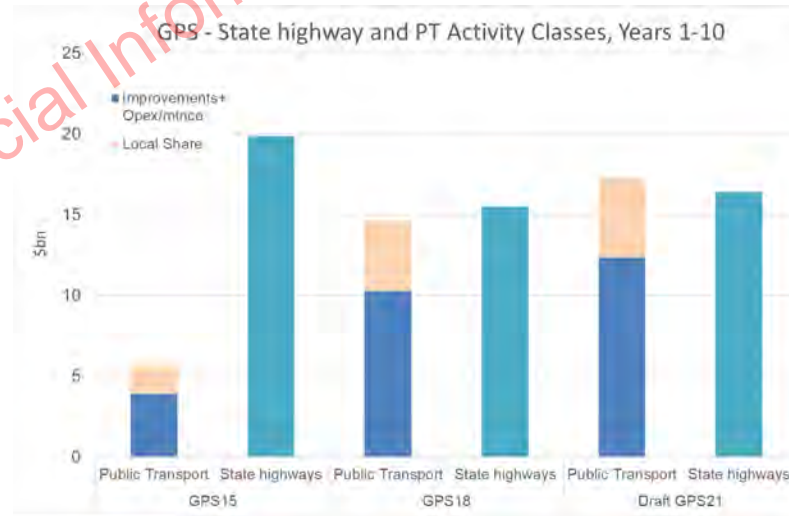
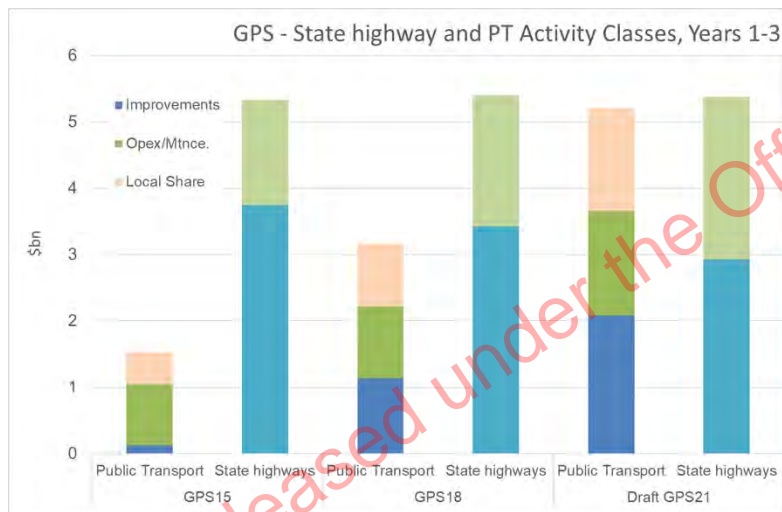
## Transform urban mobility

In line with the draft GPS, the Transport Agency will play a more proactive role in accelerating mode shift across New Zealand.



# Priorities

Investment has progressively increased into public transport while state highways has remained constant, with an ever- growing proportion focused on on-going maintenance over improvements.



# What is rapid transit and why is it important

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# Definition

Rapid transit is a form of public transport generally defined by its **high-speed, high-frequency, high-capacity**, and (most importantly) its **separation from congestion**. It plays an important role in **shaping urban form**.



























































We need consistency  
in our language:

Rapid transit replaces all other  
terms like 'mass transit' and  
'mass rapid transit'

# Modes

Rapid transit incorporates an ever-expanding range of transport modes.

- At one end of the spectrum, traditional buses can deliver rapid transit using Bus Rapid Transit infrastructure.
- At the other end of the spectrum, high speed rail delivers extremely fast inter-city travel.
- The capacity each mode provides is a combination of vehicle type, vehicle configuration, service frequency and infrastructure.

Vehicle	Capacity
Standard Bus 	 55
High capacity bus (double decker) 	  100
Advanced Bus 	   200
Single Light Rail 	   225
Double Light Rail 	       450
Triple Light Rail 	         675
Single EMU 	    375
Double EMU 	         750
Triple EMU 	         1,115



Bus Rapid Transit



Trackless Tram



Light Rail



Tram Train



'Heavy' Rail



Metro Rail



Intercity Rail



# Characteristics

The minimum necessary characteristics of rapid transit depend on the nature of the corridor and vary in their importance for urban and intercity travel.

## Speed

Must be competitive with other modes of transport, and be faster during congested periods. For intercity travel speed is a much more critical factor, directly impacting usage and appeal.

## Frequency of service

Urban area services will operate at least every 10 minutes all day (e.g. 7am-7pm). Intercity travel must provide access during peak periods but can operate a much reduced off-peak timetable.

## Transport network integration

Seamless integration with the supporting public transport network and other access networks (eg walk, cycle, park and ride). Rapid transit is the backbone of the public transport network.

## Separation / right-of-way

Operational separation plus intersection priority is required. Complete physical separation (grade or barrier) is desirable to enable fast, reliable and safe operation.

## Customer experience

Rapid transit networks are highly legible, with consistent branding and presentation. The system is easy to use and interact with. High quality vehicles are utilised.

## Reliability (variation in travel times)

Very high levels of reliability.

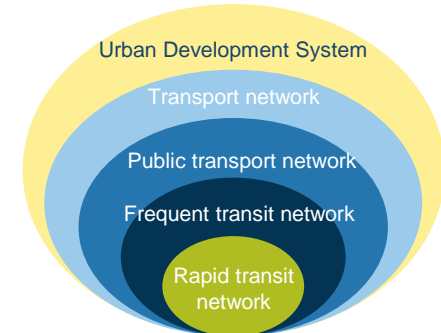
## Appropriate capability

As the backbone of the public transport network, appropriate levels of capacity need to be provided for the high demand rapid transit services, with sufficient 'future-proofing' for forecast growth.

## Urban integration

Rapid transit needs to integrate with urban development opportunities, providing efficient connections to the city centre and between key activity or other metropolitan centres.

The NPS on Urban Development requires and enables the ability of rapid transit to shape urban form.



# National importance



Support economic prosperity



Transform urban mobility, provide better travel options and reduce congestion



Tackle climate change



Provide inclusive access, improving wellbeing and social equality



Complement investment in high productivity city centres and important places



Speed, cost, capacity and congestion free drives efficiencies in the system.



Improve urban form and enable people and places to thrive



Accelerate mode shift



Improve safety to significantly reduce harms



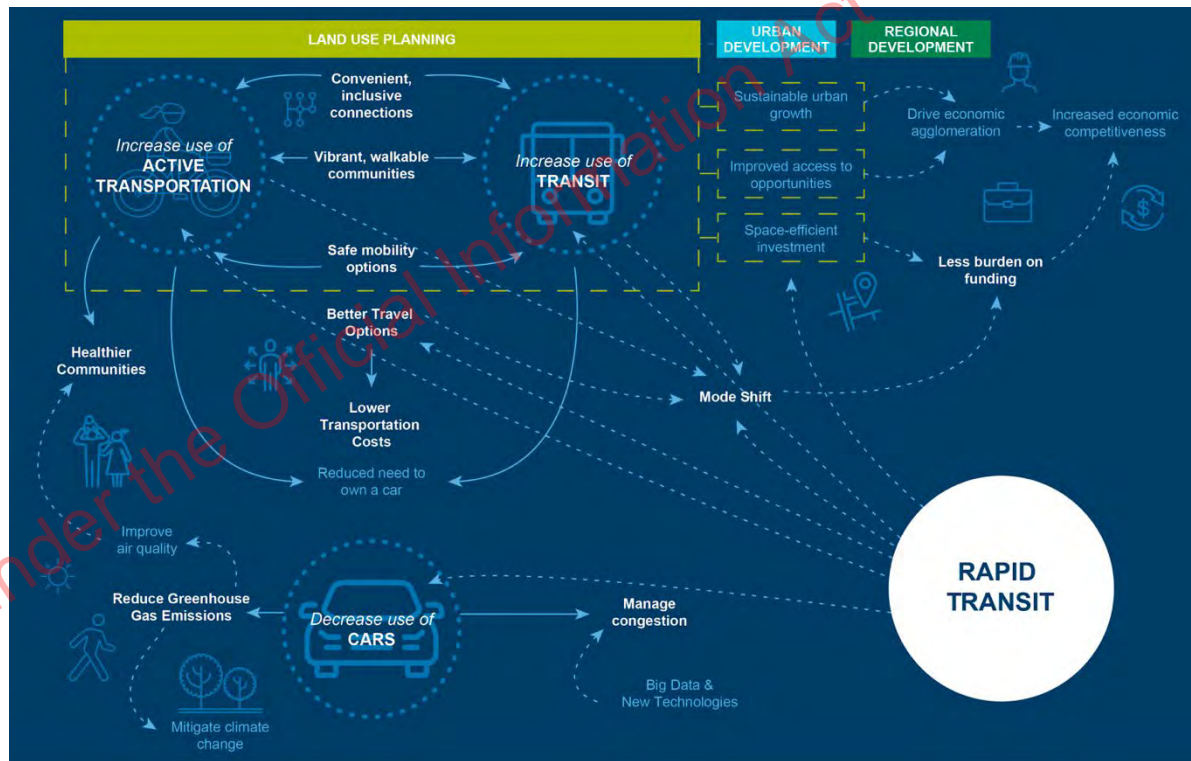
Improve transport system resilience and support TDM



Provide better travel choices for intercity travel, supporting regional development

# The eco-system

Rapid transit must co-exist in, and support, a much wider system.



# How important is Rapid Transit in leading international cities and is it successful in New Zealand?

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# Successful cities with rapid transit networks at their heart

## London

- TfL manages all PT modes, roading and cycling infrastructure management
- Integrated ticketing with Oyster and credit cards
- Rapid Transit modes carry over 65% of all PT demand
- Investment in digital technology for customer service, maintenance, operational capacity and reliability improves attractiveness of service.
- Transport, land use and economic development are integrated at the mayoral level so land use and transport integration is high and TfL supports delivery of wider projects e.g. London Olympics and Nine Elms
- Multimodal rapid transit network planning allows for best-fit solutions for different areas

	London	Auckland
Population	8.9 million	1.6 million
Metro Area	1,572 km <sup>2</sup>	1,086 km <sup>2</sup>
PT patronage	4.0 billion	103 million
PT mode share	37%	9%





# Successful cities with rapid transit networks at their heart

## Canary Wharf, Docklands Light Rail and Jubilee Line Extension

### Docklands Light Rail

- DLR opened 1987 - 13km and 15 stations - now 38km with 45 stations and capacity of around 25,000 people / hour

### Jubilee Line Extension

- Jubilee Line Underground extension opened in 1999 with capacity of around 60,000 people per hour

### Development Enabled

- Together DLR and JLE have enabled creation of 200,000 new jobs and over 80,000 new dwellings

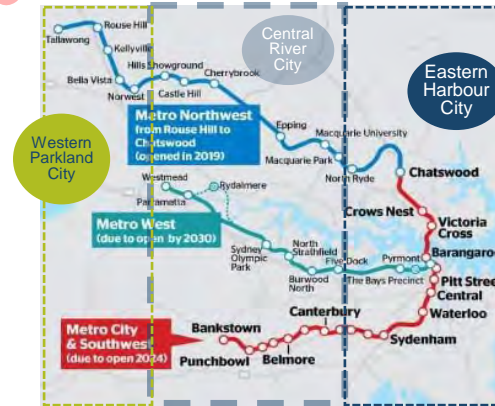


# Successful cities with rapid transit networks at their heart

## Sydney

- 55% of all journeys on RTN networks
- TfNSW manages all PT modes and strategic roads
- Integrated ticketing with Opal and credit cards
- Vision of a metropolis of three cities, where people can *access the jobs, education and services they need within 30 minutes by public or active transport*
- Strong customer focus *“Placing the customer at the centre of everything we do is at the heart of our transport service and infrastructure decisions.”*
- Strategy with digital foundations *“Customers will have unprecedented input into service planning enabled by digital platforms that connect customer needs to service provision.”*

	Sydney	Auckland
Population	5.3 million	1.6 million
Metro Area	1,687 km <sup>2</sup>	1,086 km <sup>2</sup>
PT patronage	750 million	103 million
PT mode share	26%	9%

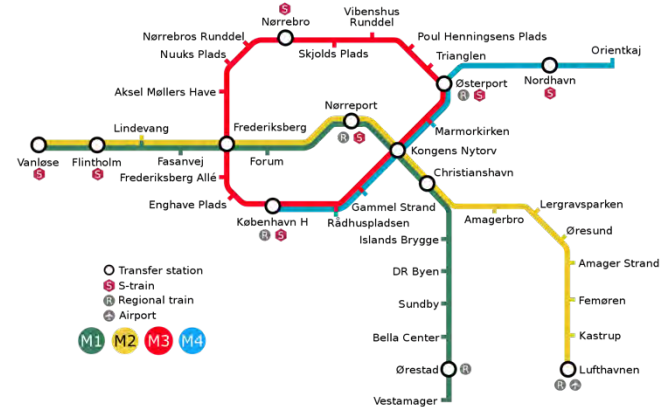


# Successful cities with rapid transit networks at their heart

## Copenhagen

- Land use around stations integrated into construction with high quality public squares built around stations to encourage development
- 24/7 turn up and go operations due to automated system
- Bike parking provided at stations to improve last mile connectivity
- Smaller trains allow for faster boarding and higher frequencies
- High quality security and inclusive design allows all users to feel safe and satisfied.

	Copenhagen	Auckland
Population	1.8 million	1.6 million
Metro Area	88.25 km <sup>2</sup>	1,086 km <sup>2</sup>
PT patronage	397.6 million	103 million
PT mode share	27%	9%

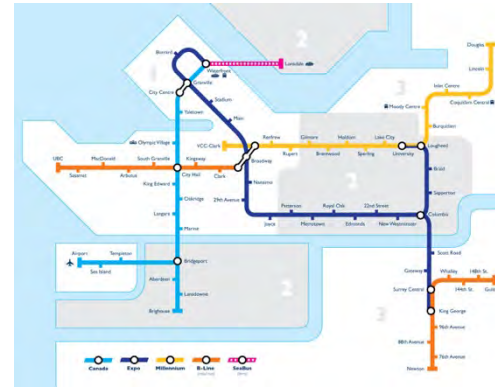


# Successful cities with rapid transit networks at their heart

## Vancouver

- Frequent, turn up and go due to driverless nature and grade separation
- Land Use integration has prioritized intensification and TODs around stations which creates two-way flow and less peaking
- Integrated fare system with other modes of transport
- Transport network has a main spine of metro, with feeder bus services connecting with stations. Almost half of trips involve a transfer.

	Vancouver	Auckland
Population	2.2 million	1.6 million
Metro Area	876 km <sup>2</sup>	1,086 km <sup>2</sup>
PT patronage	451 million	103 million
PT modeshare	20%	9%



# Successful cities with rapid transit networks at their heart

## Seattle

- King County Metro and Sound Transit plan and deliver commuter rail, light rail, and regional express buses within the greater Puget Sound region.
- RTN Networks carry over 40% of all passenger transport demand
- Orca card integrated ticketing.
- Downtown Seattle transit tunnel built in 1987 to relieve bus congestion along surface streets – subsequently retrofitted to accommodate light rail.
- Rapid Transit integrated with urban development through financial contributions to create diverse, vibrant and mixed-income communities around rapid transit stations

	Seattle	Auckland
Population	3.1 million	1.6 million
Metro Area	2,616 km <sup>2</sup>	1,086 km <sup>2</sup>
PT patronage	226.8 million	103 million
PT modeshare	23%	9%





# Successful regions with rapid transit networks at their heart

## Randstad, Netherlands and Rhine-Ruhr, Germany.

Both regions have been able to benefit from agglomeration around key urban centres. This has led to improved economic productivity, which is in part facilitated through utilisation of rapid transit systems providing access into and between these urban centres.

### Agglomeration Benefits

- **Matching** - Ability to recruit from a deep pool of workers with relevant skills
- **Learning** - The ability to exchange ideas and information
- **Sharing** - The ability to share inputs, supply chains and infrastructure

### Randstad, Netherlands

Gross Value Added per worker (2013)	Difference to national productivity
£ 62,000	+5.3%

#### Geography of jobs

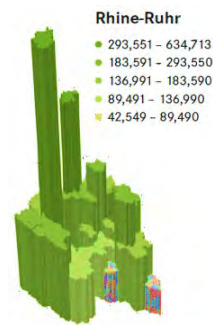


- Economy is concentrated in two largest cities (Amsterdam and Rotterdam).
- These cities accounted for 10% of land but 34% of all jobs, and were the two most productive areas in Randstad.
- To facilitate the necessary access, rapid transit networks are used, including RandstadRail an interconnected system of metro, tram-train and bus lines.
- A high speed rail system is used to connect the key urban centres.

### Rhine-Ruhr, Germany

Gross Value Added per worker (2013)	Difference to national productivity
£ 56,000	+8.7%

#### Geography of jobs



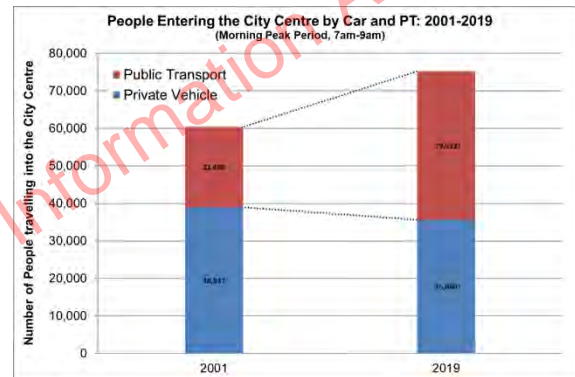
- Economy is concentrated in two largest cities (Cologne and Düsseldorf).
- These cities accounted for 7% of land but 22% of all jobs, and were two of the three most productive areas in the region.
- Rhine-Ruhr utilises an interconnected light rail network (Stadtbahn) to facilitate transport in and between urban centres.
- Leading to higher rail mode share in the region (2012 data):

Source: Building the Northern Powerhouse: Lessons from the Rhine-Ruhr and Randstad (Jun-2016)

# Auckland

The investment in Auckland's rapid transit is driving public transport patronage growth and mode shift

- Since 2006, significant investment in rapid transit has led to outstanding passenger growth; from 5m to 30m annual passengers – 10% to 30% of all public transport boardings.
- Patronage on the RTN has grown at 12% per annum over the last decade.
- Around 40% of all passenger kilometres are on Auckland's Rapid Transit Network (3 commuter lines and the Northern Busway).
- Almost 60% of all people travelling to the City Centre over the Harbour Bridge use the Northern Busway compared to just over 40% by car.
- Over 85% of growth in trips to the city centre has been on the rapid transit network.
- Rapid transit has been instrumental in achieving mode shift, providing an attractive alternative to urban car travel and shaping urban form.



# Auckland

## Rapid transit is shaping urban form and development in Auckland – Smales Farm Private Plan Change.

- The Northern Busway opened in 2008.
- A catalyst for Smales Farm development: two office blocks were built to leverage the Smales Farm Station.
- The award winning B:Hive building and amenity improvements opened in 2018.
- The Smales Farm Private Plan Change enables 1,400 new apartments, 8 tower blocks up to 30 levels and over 5,000 new jobs.



# What are the challenges with our current approach to planning and delivering rapid transit?

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# Inconsistency and fragmentation

ATAP 2018-28 included \$8.4 billion for developing Auckland's Rapid Transit Network s 9(2)(g)(i)

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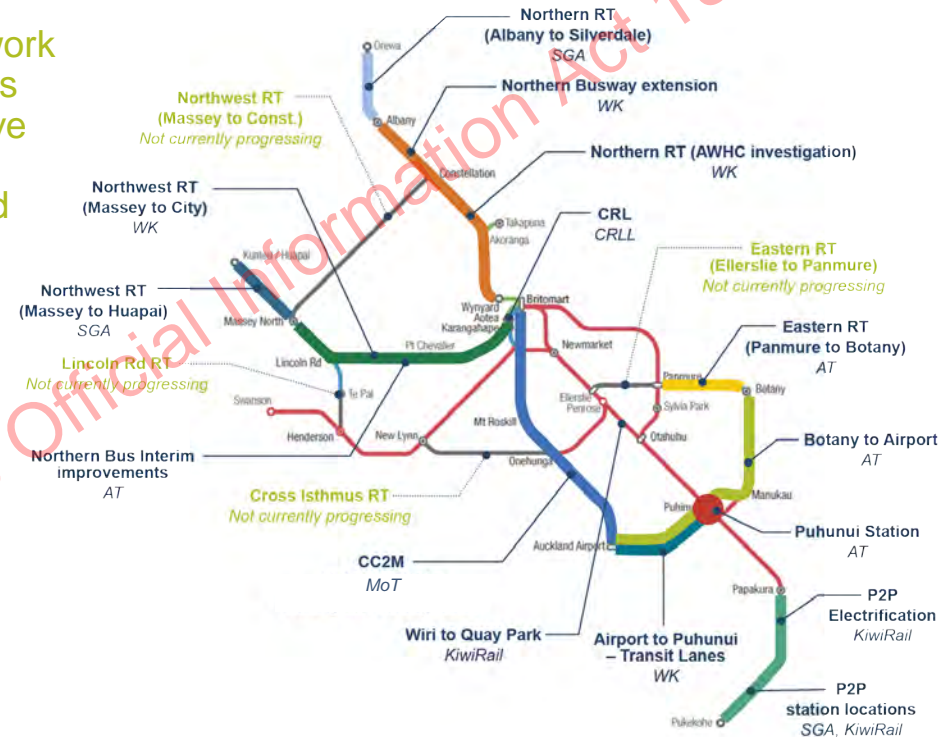


Ministry of Transport  
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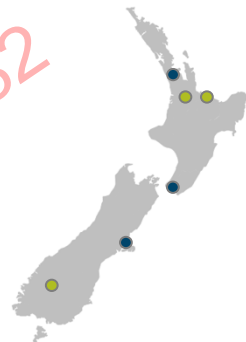
# Integration

An integrated rapid transit strategic framework with a prioritised programme and clear roles and responsibilities for delivering it, will drive value for money, accelerated delivery and better mode-share, urban development and accessibility outcomes



# Unity

We have been progressing rapid transit projects on an individual project basis, with a strategy needed to provide consistency and to unify projects.



## METROPOLITAN AREAS

### Auckland

**Established rapid transit** - commuter rail network and Northern Busway.

**Busway development** - Northern Busway extension, new Eastern Busway and proposed Airport to Botany Busway.

**Rail development** - City Rail Link, Third Main (Wiri to Quay Park), Electrification to Pukekohe and other network improvements.

**New rapid transit network** - proposed light rail network (CC2M, North, Northwest).

### Wellington

**Established rapid transit** - current rail network, from Wellington city into the Hutt Valley, Wairarapa and Kapiti regions.

**New rapid transit network** - Let's Get Wellington Moving initiative includes scope to develop new rapid transit system initially from Wellington central station to Airport

### Christchurch

**Proposed rapid transit** - Current business case development for rapid transit in the Christchurch area.

## GROWTH CENTRES

### Hamilton/Waikato

**Proposed rapid transit** - potential development of a new rapid transit system for Hamilton City with potential to use existing rail lines with connections to the airport and Cambridge.

**Rail development** - Papakura-Pokeno Corridor, involving possible further development of the existing Auckland Southern Rail line.

### Tauranga

**Potential rapid transit** - Planning to investigate creation of a new rapid transit system to meet current and expected demand and shape growth.

### Queenstown

**New rapid transit network** - Frankton to Queenstown - indicative business case completed identifying bus based rapid transit along the corridor as a key transport project for the region, with initial funding provided. Detailed business case under development.

## INTERCITY

### Hamilton to Auckland

Passenger service began in Aug-20, providing access to the Auckland rapid transit network, with further development planned including additional Northern Waikato stations and improved connectivity to Auckland Airport.

Initial investigation in Rapid Rail in Hamilton to Auckland corridor completed. Cabinet approved next stage of more detailed investigation.

### Tauranga

Investigations into the development of a new central Tauranga train station connecting to existing lines to allow for quick transportation in and out of Tauranga.

### Palmerston North to Wellington

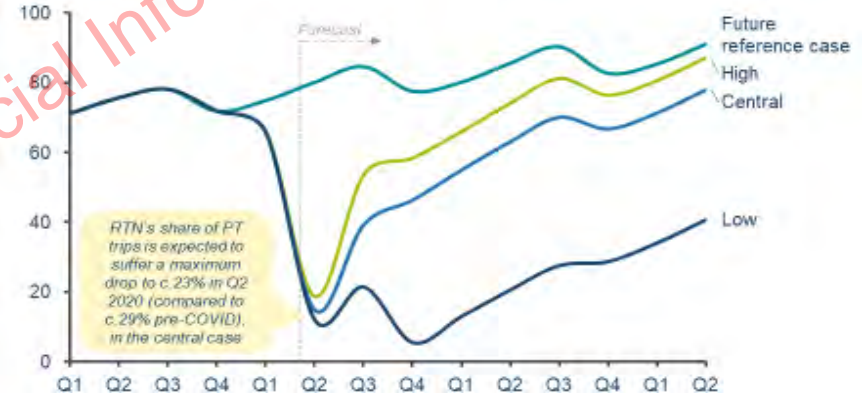
Development of existing rail corridor including purchase of new rolling stock and service frequency improvements, with potential electrification to Palmerston North from Waikanae.

# COVID-19 Impact

COVID-19 has significantly impacted Rapid Transit demand but patronage recovery is strong. An integrated, prioritised rapid transit programme is essential to ensuring social, economic and environmental recovery from COVID

- Public transport patronage across New Zealand has dropped dramatically due to COVID-19 (by over 90%).
- Waka Kotahi has examined the impact of COVID-19 and determined future growth scenarios with University College London, LEK, and PwC, partnering with AT and LGWM, and with the support of Christchurch and Queenstown councils.
- Rapid transit recovery is expected to rebound quickly. This trend can be seen in other international jurisdictions where rapid transit is a core part of the extended transport network.
- The COVID-19 pandemic has not changed the long-term value of rapid transit. A review of international comparators shows that there is no viable alternative to replace rapid transit that is equally effective to provide spatially-efficient, environmentally sustainable travel and support growth.

Average weekday RTN person trips, by scenario  
(2019 – 2022F)  
Thousands of trips



# Digital

- Transport in general and Rapid Transit in particular is predicated on the ability to understand the network and user behaviour in real-time. We cannot do this without fast and continuous data, that is both of good quality, and standardised nationally or joined-up results
- To interface big data from many modes and sources, we must understand it centrally and in context. This requires the creation of a national 'Digital Twin' for New Zealand. The digital version of the physical infrastructure, that allows us to view and manage that network virtually.
- In cities, we need to think of transport within it's broader urban context and take the Digital Twin one step further to model Smart Cities. The ability to see all transports modes and their connection.
- To do any of these things we need the equivalent digital foundational infrastructure. We need 5G, IoT sensors, digital twin data systems, and the predictive/modelling capabilities to leverage AI/ML to both manage networks in real-time but to model and predict what may happen in different scenarios for planning, decision-making, an to respond to emergency events

# Our opportunity to deliver on our rapid transit functions

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# Our new role

Our role has expanded to reflect additional responsibility for leading rapid transit development.

Historical role	
	Funder/approver
	Participants/stakeholder in planning processes
	Stakeholder in business case development
	Infrastructure delivery agent
	Safety regulator

Current role	
	Funder/approver
	Leading integrated planning processes
	Leading business case development
	Leading infrastructure delivery agent
	Safety regulator

## Waka Kotahi to lead rapid transit development

Together with our partners including responsibility to plan, fund, design, supervise, construct and maintain

## Consult with stakeholders and communities

To understand network development decisions and ensure positive place-making outcomes are articulated

## Innovation and research

Foster and promote rapid transit innovation and research with industry

# What we will develop



## Clear roles and responsibilities

Waka Kotahi and our partners are clear on our collective roles, and we collaborate to deliver effectively and efficiently



## Improved input to multi-modal and spatial planning

Play a key role in providing rapid transit input to multi-modal and spatial planning initiatives



## Co-ordinated rapid transit network planning

Develop integrated rapid transit network plans for the metropolitan centres, growth cities and intercity corridors



## National level rapid transit policy, standards & guidance

Align rapid transit networks to provide consistent levels of service



## Streamlined rapid transit project development

Lead Rapid Transit business case development



## Integrated, prioritised Rapid Transit Programmes

Prepare integrated delivery programmes for each metropolitan centre, growth city and intercity corridor.



## Rapid transit digital twin

Develop a digital framework for creating a digital version of the physical infrastructure and services to enable viewing and managing the network virtually



## Delivering the NPS on urban development rapid transit requirements

Integrate rapid transit network plans with NPS-UD requirements for compact urban development around existing and planned rapid transit stops



## Continuing to develop

Further develop Waka Kotahi's capability resulting in less dependency on consultants.

## OUTCOMES

- Invest in rapid transit capability and leadership
- Prioritise metropolitan areas, growth city and inter-city rapid transit requirements
- Deploy capability and leadership
- Lead development of integrated rapid transit network plans and investment programmes with government and regional partners

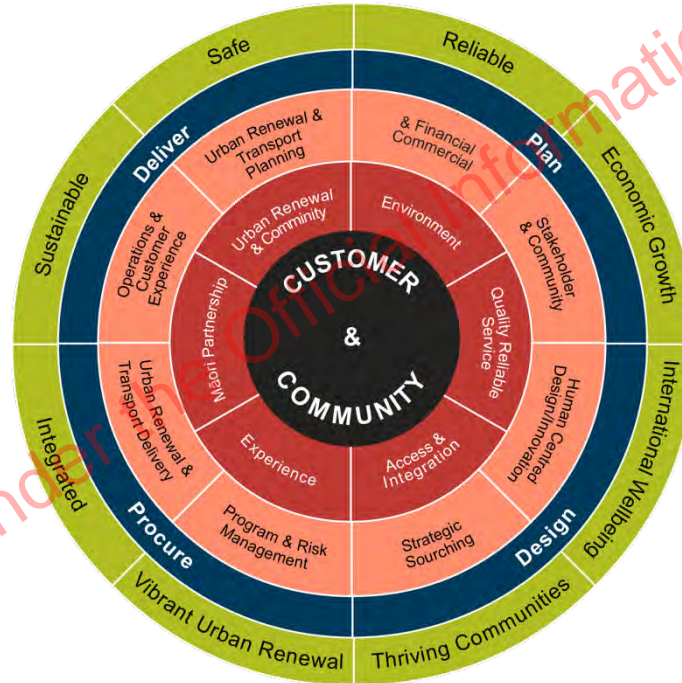
# Indicative work programme

WHERE	WHAT	WHEN*	\$*
Auckland	Lead completion of RTN investment programme. Key input for ATAP Lead delivery of RT projects in Auckland in partnership with AT	Mid 2021	\$2m \$8.5bn
Wellington	Lead WK input to LGWM RT project Lead development of GW RTN Plan and investment programme together with regional partners	Preferred corridor and mode –March '21 Delivery 2027/28	\$2.1bn \$1.5m
Christchurch	Lead RT Network plan and investment programme in partnership with regional partners	Mid 2021 2030-2040	\$1m \$400m
Queenstown	Lead RT Network plan and investment programme in partnership with regional partners Lead delivery of Rapid Transit network with regional partners	Mid 2021 2021-2025	\$1m \$400
Hamilton to Auckland	Together with MoT, lead development of H2A investment programme in partnership with growth councils to deliver the shared spatial intent for the Hamilton-Auckland [H2A] Corridor	End 2021	\$5m
Tauranga	Lead development of RTN network Plan in partnership with UFTI partners to deliver UFTI outcomes	Third quarter 2021	\$3m

\* To be confirmed by Business Cases

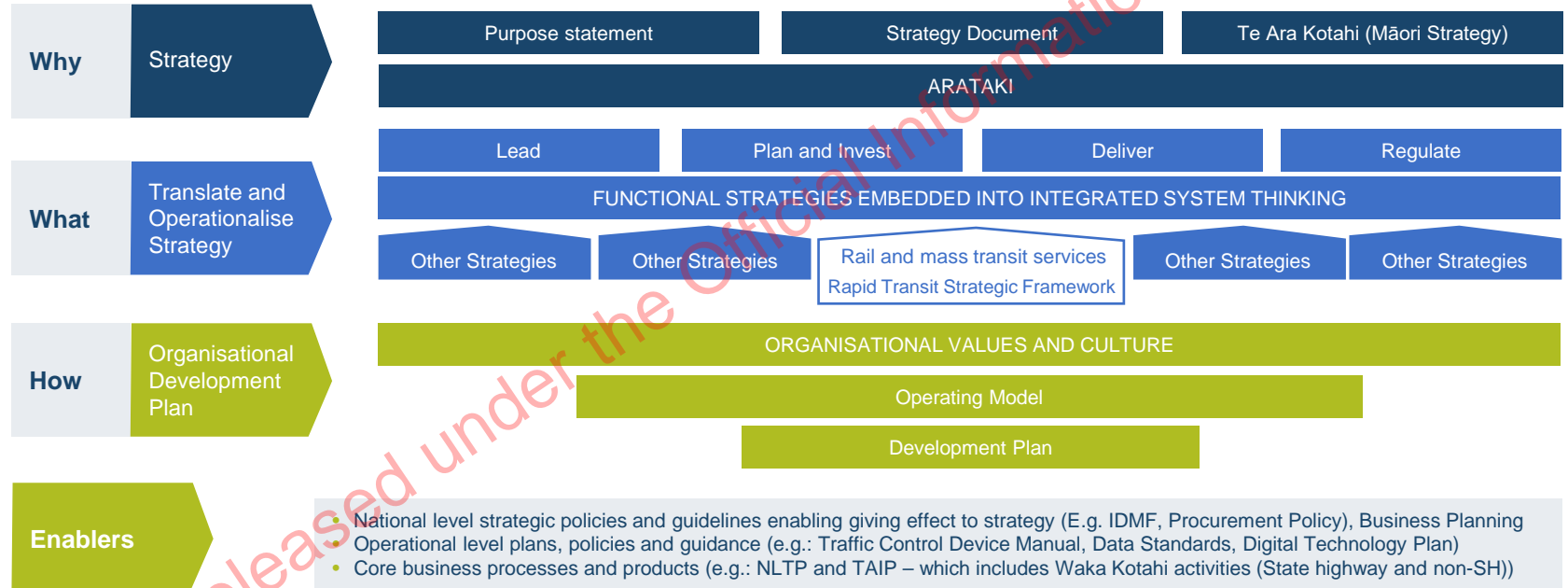
# How we will deliver

A new operating model, partnering with Approved Organisations, Kianga Ora and Councils



# Link to organisational strategy

Where Rapid Transit functions sit will be determined by the organisational strategy and operating model.



# What Next

Over the next six months.

- Co-design with partners a long-term vision for rapid transit
- Complete a resourcing plan for the Rapid Transit Centre of excellence
- Lead the design of Rapid Transit Networks with our Central and Local Government partners to help meet GPS mode share directives and any future mode share targets for metropolitan centres, growth cities and intercity corridors.
- Inform long-term spatial plans and urban development strategies to support increased urban development and density around rapid transit networks in line with the National Policy Statement on Urban Development

