PLANNING AUCKLAND'S FUTURE INTEGRATED TRANSPORT SYSTEM

This paper has been peer reviewed

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AUTHOR CONTRIBUTION STATEMENT

Each author has made a contribution to this paper and the work behind it.

ABSTRACT

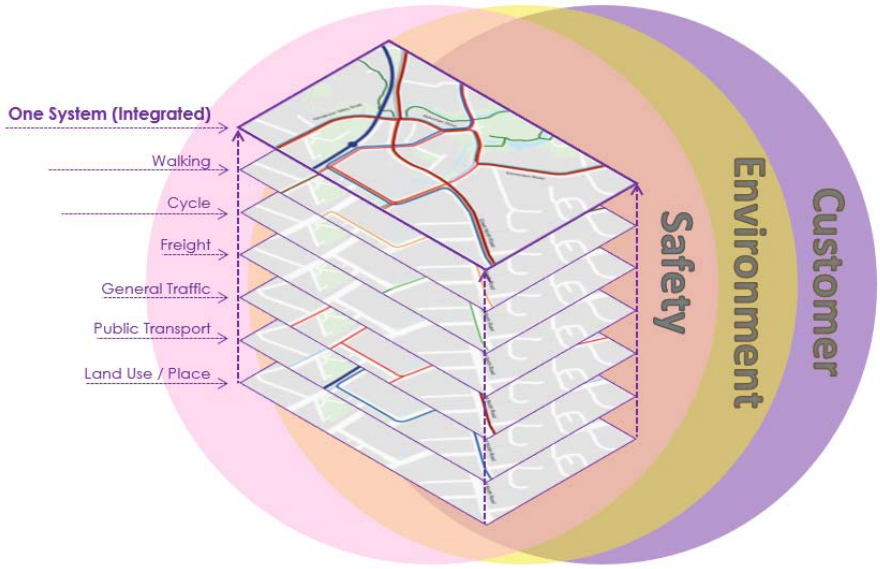
The purpose of this paper is to inform the transport and planning industry about Future Connect, which is Auckland's long-term network plan for the future integrated transport system. This paper outlines how it has been developed and takes a look at how it is guiding planning and investment across Auckland. It also outlines lessons for others who progress a similar exercise.

Future Connect is a system planning tool that surfaces the critical system needs. It is a 10-year vision (eventually building towards 30 years), which sets out Strategic Networks for each transport mode (i.e. public transport, general traffic, freight, cycling/micromobility and walking). It detects the deficiencies in these networks expected in the next decade and identifies Focus Areas for further investigation. Future Connect is data driven, and the information is helping to tell better investment stories in terms of where investment is important, and where there may be gaps.

Why we need an Integrated Network Plan. A single plan is needed to cover all transport modes, which will support integrated transport planning and operations across all modes, and provide a core planning reference. Ultimately, this reference will prioritise investment towards AT's core objectives and contribute to better value for money outcomes. While Future Connect is not a solutions tool, it will guide system planning to better connect people, places, goods and services; accelerate better travel choices; and support growth.

Addressing environmental and safety problems is a fundamental responsibility of transport system planning. Environmental and safety issues have been brought to the forefront through Future Connect. The data related to these issues has been analysed through Future Connect, and the core objectives underpinning this plan give mandate to the rest of the business to address them. The result will mean that projects will incorporate environmental and safety issues as core parts of their strategic mandates.

Why this matters for the transport community. Future Connect outlines Auckland's system view through a publicly accessible mapping portal. This is informing strategic decision-making, and provides planners with better guidance and data that will deliver better outcomes for strategies, plans, business cases and, ultimately, results on the ground for our customers.



WHAT IS FUTURE CONNECT?

Auckland Transport (AT), in collaboration with partners and stakeholders, has developed Future Connect, a 10-year network plan and system planning tool (building towards a 30-year outlook) for Auckland's integrated transport system.

Future Connect includes three key outputs:

1. **Strategic Networks** – The most important links for the movement of people, goods and services for each mode of transport.
2. **Deficiency & Opportunity Mapping** – A link-based analysis outlining the most significant problems and opportunities on the Strategic Networks expected over the next 10 years.
3. **Indicative Focus Areas** – Multi-modal problems and opportunities located on the Strategic Networks that require further investigation.

The main deliverable for Future Connect is a GIS-based Mapping Portal where all key outputs can be viewed.

Future Connect has been developed to provide strategic guidance for the Regional Land Transport Plan (RLTP) investment programme, and both plans come together as Auckland's integrated transport plan. Future Connect identifies the problems and opportunities facing the transport system and the RLTP details the 10-year investment plan to address these problems and opportunities. The integrated transport plan is underpinned by a common set of objectives.

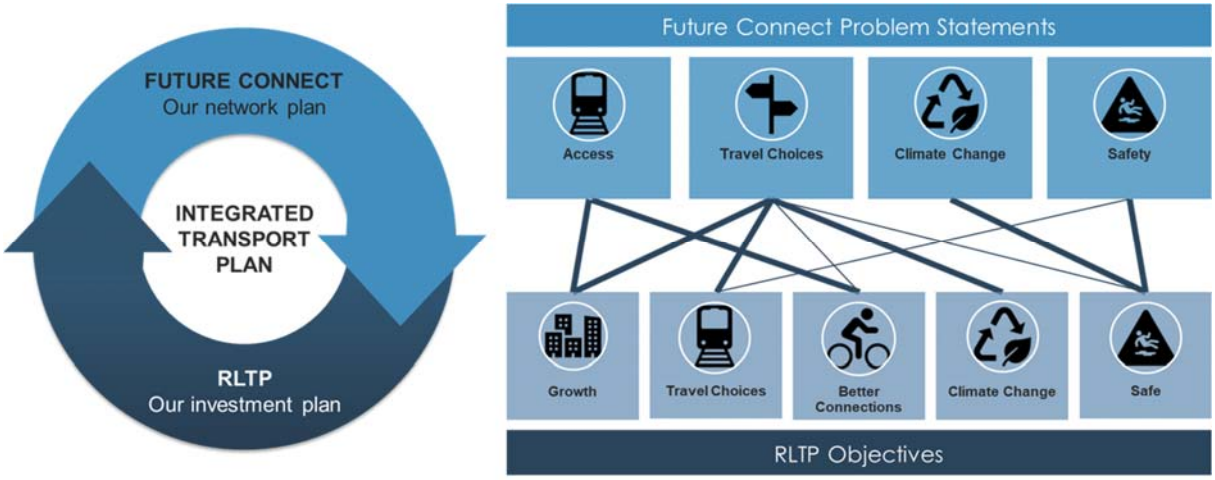


Figure 1: Integrated transport plan problems and objectives

WHERE DOES IT FIT IN?

Strategic alignment

Future Connect builds on and adds more detail to the Auckland Plan[1] and the Auckland Transport Alignment Project (ATAP).[2]

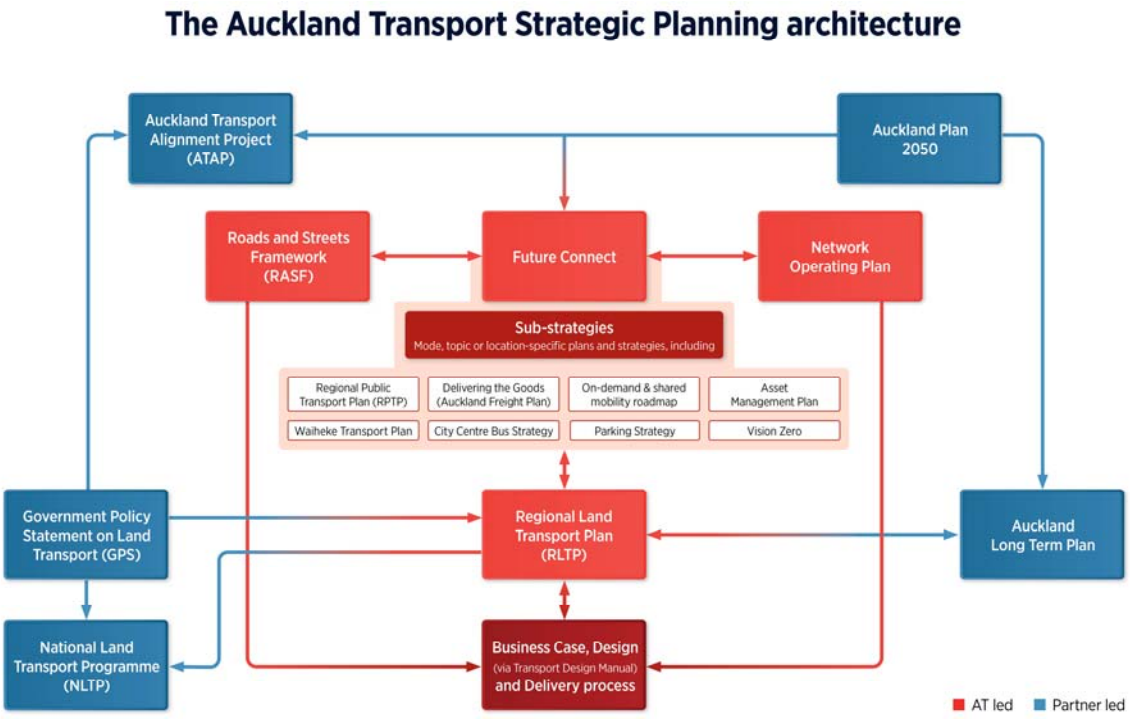


Figure 2: Strategic planning architecture

The Auckland Plan is the Auckland Council document that provides the united vision for Auckland. It seeks integrated outcomes for the region over the long term, including strategic directions for transport. These directions guide Future Connect, including the Strategic Objectives, that have been designed to align with the Auckland Plan.

ATAP is a planning document developed with Council and Government partners. In this document, different investment solutions are developed to address Auckland's transport problems. The RLTP then outlines the preferred package, which is the agreed investment programme for transport in Auckland over the next 10 years. Future Connect was initially guided by the challenges and vision set out by ATAP in April 2018. The subsequent ATAP Update was in turn guided by the outcomes and objectives of Future Connect, including the strategic assessment of problems facing the transport system.

[1] Auckland Council (2018). Auckland Plan 2050.
[2] Auckland Transport, et al. (2018). Auckland Transport Alignment Project.

WHAT IS THE PURPOSE OF FUTURE CONNECT AND WHY DO WE NEED IT?

The purpose of Future Connect is to provide an integrated and strategically aligned network plan for Auckland's transport system to enable better planning and investment. Ultimately, Future Connect articulates where we are heading and why projects are needed.

All modes have a role in the movement of people and goods, so Future Connect applies a 'system view' to achieve better integration between the Strategic Networks. No one mode is more important than any other at a network level.

Future Connect brings all modes together into a single plan for the first time. This will help with the achievement of AT's strategic objectives, including accelerating better travel choices and decarbonising transport for Aucklanders. Planning for all modes will allow AT and partners to make better use of existing infrastructure without the need to resort to more costly solutions such as new roads. Using Future Connect, more programmes and projects will be able to take a multi-modal approach similar to that done by the AT Connected Communities programme, which aims to deliver integrated improvements for bus priority, safety, cycling and walking along a number of the region's key arterials. There are also 'dig once' opportunities if the renewals programme is aligned with Strategic Network enhancements.

How Future Connect will contribute to decarbonisation, climate change reduction and a safer system

Plans such as Auckland's Climate Plan and Vision Zero have established climate change and safety as a fundamental responsibility for transport system planning, and key problems for Future Connect to explore. As such, Future Connect identifies objectives to reduce emissions (climate change) and eliminate harm to people (safety). Through Future Connect, AT analysed and mapped data related to climate change and safety in order to outline the scale and extent of these problems across the transport system.

KEY OUTPUTS AND METHODOLOGY

Strategic Networks

The most vital links in each modal network come together to formulate the Strategic Networks, which are defined as:

- The most critical links for movement of people, goods and services, to be managed as part of an integrated multi-modal network
- Key connections with important regional activity and a high volume of users linking sub regions and key centres with other parts of New Zealand
- The backbone of the transport system providing safe, efficient and reliable movement of people, goods and services across the region
- Providing easy whole-of-trip journeys for customers.

Strategic Networks have been established for Public Transport, General Traffic, Freight, Cycle & Micromobility and Walking (see multi-layered approach outlined in the figure below).

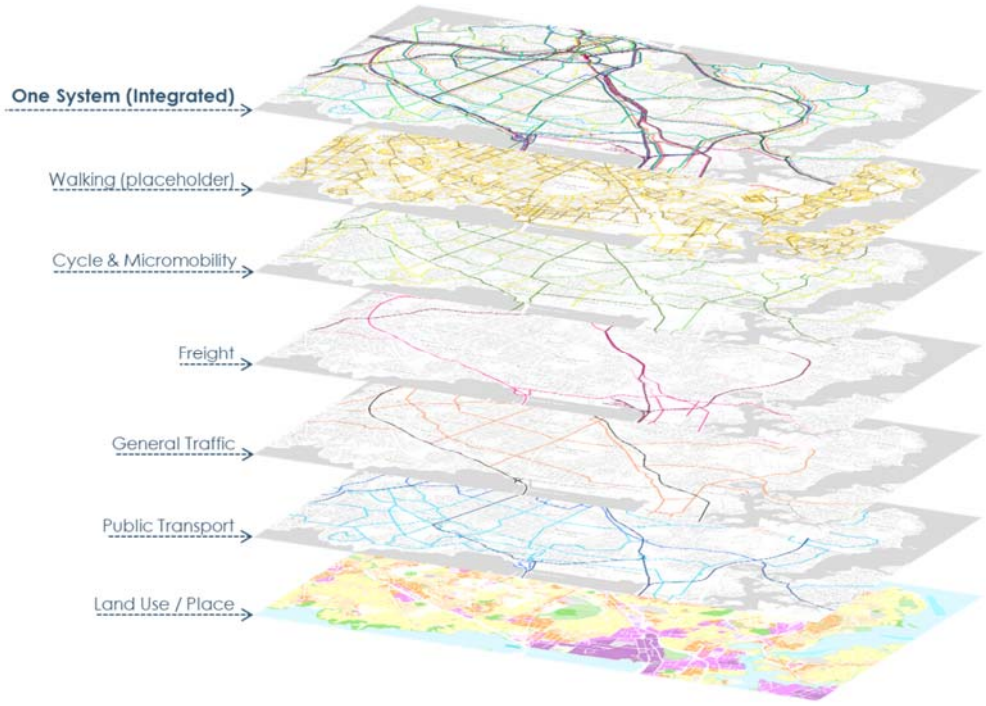


Figure 3: Future Connect Strategic Networks

The Strategic Networks do not necessarily indicate where dedicated infrastructure exists or will be delivered. The Strategic Networks are intended to be a planning tool, which outlines where modal priority and higher levels of service are needed (and may not exist today). There are also complementary tools used by AT to guide network planning, network operations and design decisions (i.e. Roads and Streets Framework; Network Operating Plan; and Urban Street and Road Design Guide[3]).

The Strategic Networks are defined for two time periods: Current and First Decade. The Current Strategic Networks outline the network as it operates today. The First Decade Strategic Network (10-year horizon) takes into account expected land use changes, such as greenfield and brownfield growth, and approved or funded infrastructure/services. The next phase of Future Connect will set a 30-year vision for the Auckland's transport system (i.e. Second and Third Decades).

Developing the Strategic Networks

The Strategic Networks were developed by bringing together existing mode-specific network plans (e.g. Regional Public Transport Plan[4]). Each of these modal networks had different hierarchies to indicate the importance of each link. To provide consistency between each of the modal Strategic Networks, a three-level strategic hierarchy was established (i.e. Primary, Secondary and Tertiary), which makes it easier to compare modal priorities across each of the Strategic Networks and to integrate the transport system. The figure below outlines the origins of the Strategic Networks and strategic hierarchy of each.

[3] Auckland Transport (2019). Urban Street and Road Design Guide.
[4] Auckland Transport (2019). Regional Public Transport Plan 2018-2028.

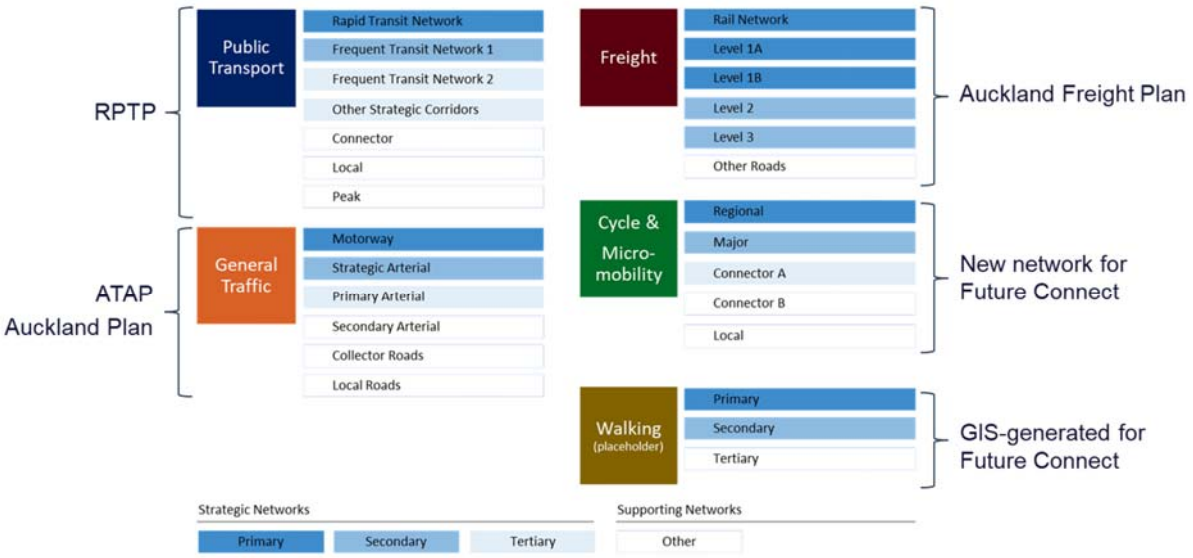


Figure 4: Strategic Networks hierarchy and origins

The Cycle & Micromobility and Walking Strategic Networks were conceived as part of Future Connect. The Cycle & Micromobility Strategic Network was developed in collaboration with Bike Auckland (a key stakeholder). The Walking Strategic Network (a placeholder) was generated through a GIS driven methodology that considers the main pedestrian attractors.

The Strategic Networks will remain up-to-date through an agreed process to assess and approve changes as the transport system evolves.

Deficiency & Opportunity Mapping

To understand the most critical problems and opportunities affecting the regional transport system, Future Connect uses data to identify Indicative Focus Areas on the Strategic Network. The methodology used for this investigation is evidence based, makes use of key indicators that build on the Future Connect problem statements, and follows a repeatable process that allows for future updates.

Developing the Deficiency & Opportunity Mapping

Deficiencies and data have been mapped on the First Decade Strategic Networks to provide an understanding of the problems and opportunities we are expecting to see on Auckland's transport system over the next decade. The investigation looks at all modes, and also the climate change and safety problems, which span all of the Strategic Networks (see section below).

Future Connect uses 20 Deficiency & Opportunity Indicators, based on the problem statements, to assess the extent of problems across each of the Strategic Networks.

For each indicator, certain criteria dictate if a deficiency or opportunity scored low, medium or high. These scores were then ranked according to their strategic hierarchy level. The results surface the most critical problems on the network for each mode, as well as climate change and safety. The following three steps were taken to find the top ranked deficiencies and opportunities (see Figures 5 and 6).

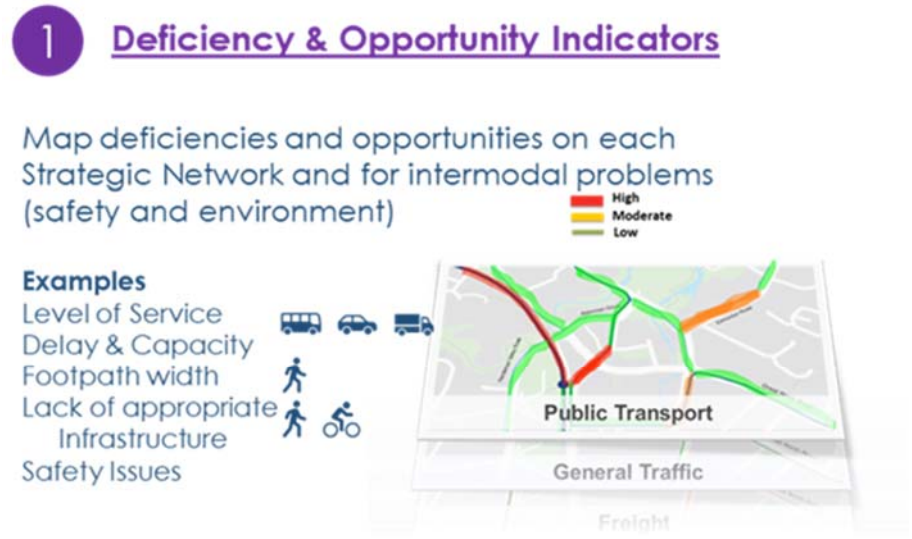


Figure 5: Deficiency & Opportunity Mapping methodology

Figure 6: Top Ranked Deficiencies and Opportunities

Mapping the climate change and safety problems

The following table outlines the Future Connect Climate Change and Safety Problems, and the associated Deficiency & Opportunity Mapping Indicators.

Problem	Deficiency & Opportunity Mapping (First Decade)
Climate Change: Emissions and other consequences of transport are harming the environment and contributing to the transport system becoming increasingly susceptible to the impact of climate change	**Stormwater run-off:** Strategic Network links where high vehicle volumes, forecast for 2031, discharge pollutants into stormwater sensitive areas
	Coastal inundation threat areas: Strategic Network links where there is a coastal inundation threat due to probability of storm events and 1m sea level rise.
Safety: The transport system has become increasingly harmful and does not support better health outcomes	Urban KiwiRAP **collective risk** corridors: Safety risk allocated to a corridor based on the number of deaths and serious injuries in the last 5 years.
	Active Road user aggregated corridor risk level: A measure of relative risk to active road users. Higher classification where network presents higher risk to people using active travel modes based on the number of DSIs in the past 5 years.
	Difference between posted speed and safe & **appropriate speeds:** Where the difference between the posted speed and the Waka Kotahi recommended 'safe and appropriate speed' flags a risk.

Table 1: Future Connect Climate Change and Safety Problems and associated Deficiency & Opportunity Mapping Indicators

Decarbonising by guiding mode shift

Future Connect also supports decarbonisation by identifying and mapping the barriers to competitive travel options across the transport system (i.e. parts of the Walking, Cycle and Public Transport Strategic Networks that are insufficient or underperforming and therefore hindering mode shift), for example:

- **Public Transport** – Poor travel speeds and time reliability
- **Cycle & Micromobility** – Lack of safe and appropriate facility
- **Walking** – Inadequate footpath width or no footpath

Indicative Focus Areas

Indicative Focus Areas have been created by aggregating the ranked deficiencies and opportunities for each mode/problem on the Strategic Networks. Areas or corridors with high ranking deficiencies and opportunities for two or more modes/problems were ringfenced to become Indicative Focus Areas for further investigation that could lead to future projects. The figure below outlines the resulting Indicative Focus Areas.

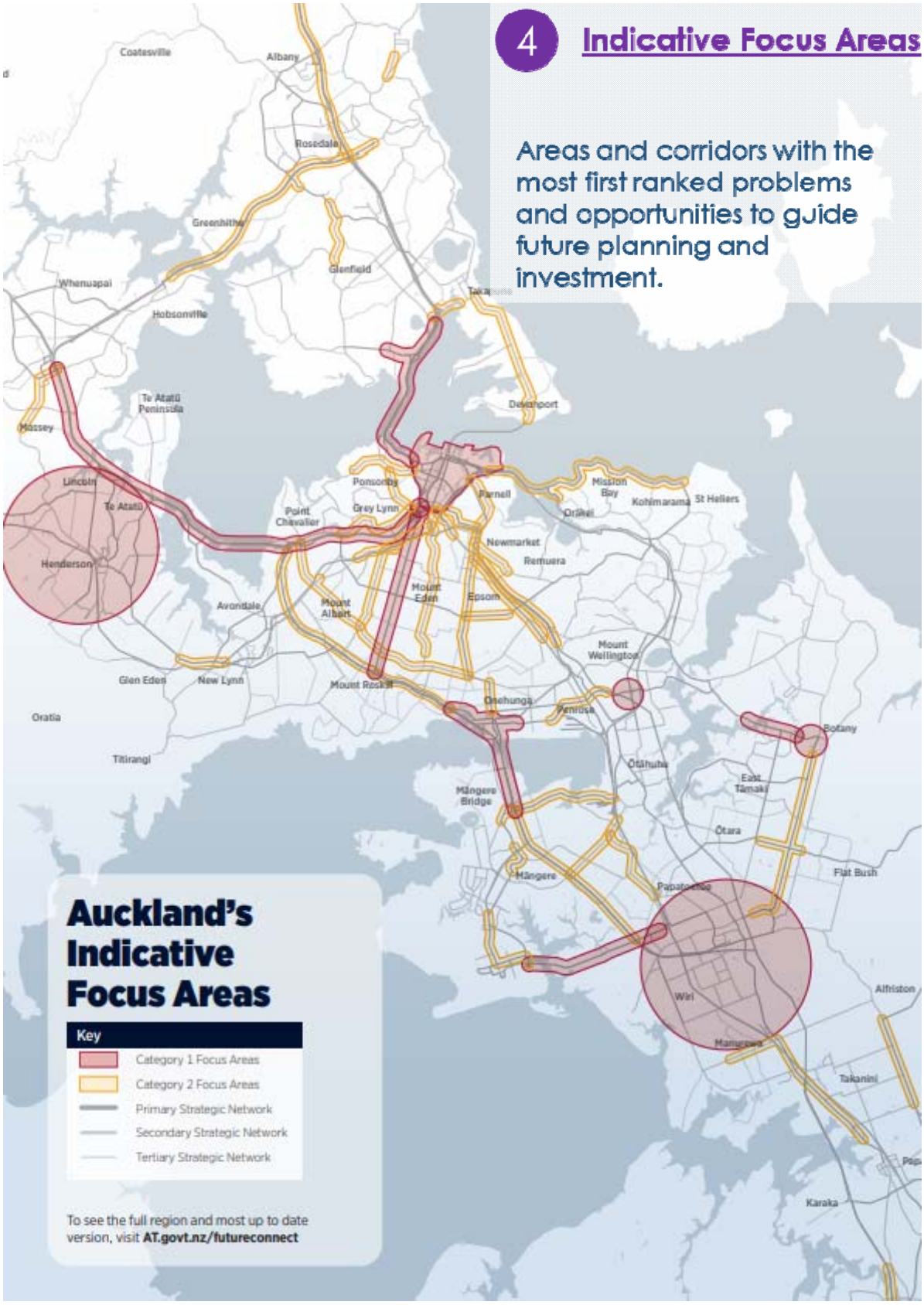


Figure 7: Indicative Focus Area methodology

HOW FUTURE CONNECT WILL GUIDE WHAT WE DO

Future Connect delivers a strategic planning function that will help support planning and investment with partners and stakeholders, and provide strategic guidance to the RLTP process.

The Strategic Networks provide a core planning reference across all modes. They are being used to guide plans, strategies, programmes and projects throughout the full project lifecycle. Some examples of how Future Connect is being used are outlined below.

Planning

Future Connect and the Roads and Streets Framework (RASF)[5] are AT's two system planning tools. Both tools help sharpen the output of the other tool. The RASF provides bottom-up guidance for the development of individual roads and streets. It also ensures the importance of 'place' is incorporated into Future Connect's Strategic Network planning. Future Connect follows a top-down approach for the full transport system. Its Strategic Networks are used when setting modal priorities for a road or street during a RASF assessment.

In addition, Future Connect guides land use integration and spatial planning with stakeholders (e.g. Panuku Development Auckland) and developers. The Strategic Networks are supported through:

- spatial vision setting (e.g. Area/Centre Plans, Masterplans)
- growth and development planning (e.g. Crown, private, Plan Changes, Consents)

Investment and delivery

The RLTP's prioritisation and investment programme takes into account Future Connect's key outputs, and other factors such as available funding, value for money objectives, and the maintenance and renewal programme, amongst others.

Future Connect is also important for key AT RLTP programmes, such as Supporting Growth[6] and Connected Communities. These need to support/modify the Strategic Networks through their investigations, or define new networks in greenfield areas.

Future Connect also provides guidance for infrastructure programmes required to support the Strategic Networks, such as prioritisation of new transit lanes or footpaths.

Operations and maintenance

The Auckland Network Operating Plan (ANOP) is used to put the Future Connect strategy into effect. It takes the strategic guidance and identified issues and applies short term solutions which align with long term strategy. This process is similar to the SmartRoads[7] tool, which provides an interactive planning environment to visualise road use priorities and operation gaps to support recommended improvements to the network.

The Auckland Transport Operations Centre (ATOC)[8] is guided by the Strategic Networks in the same way (i.e. how we should operate the network today), which supports network operational decision-making and solutions (e.g. event management).

Future Connect also guides development of the short-term network optimisation programme, which targets investment at making the most of the existing network.

[5] Auckland Transport (2020). Roads and Streets Framework.
[6] The Supporting Growth programme is a collaboration between Waka Kotahi and AT to carry out the detailed investigations needed for business cases to confirm the preferred transport networks in growth areas.
[7] VicRoads (2011). SmartRoads Connecting Communities.
[8] A joint venture with Auckland Transport and Waka Kotahi responsible for the operation of the road network.

Lastly, the Strategic Networks will improve asset management by helping prioritise projects and informing the required levels of service.

LESSONS LEARNT

The Future Connect approach to integrated network planning is recommended for other regions to use as it is customisable to the local context. The following are lessons learnt for the industry:

- Establish a multi-disciplinary team to build the system planning tool as it is a significant undertaking and requires specialists across many areas, including a GIS specialist.
- The GIS component is time intensive to develop. Once completed, it is easy to use and update.
- Allow time for lots of internal engagement and co-design the outputs with specialists and champions that will ultimately use the tool (e.g. network management).
- Keep a record of data that would be helpful for future versions. The tool is limited to good region-wide data, but there will always be scope to build and improve the data that goes into it. For example, the current version of Future Connect does not include emissions mapping as the data was not available on a link-by-link basis at the start of the project.
- Ensure that all modes are included. When we started there was no Cycle & Micromobility Strategic Network or Walking Strategic Network. It was critical that all modes were included, so they were developed. The result of developing these is that projects will be provided encouragement to incorporate walking and cycling infrastructure where funding allows (or does not preclude infrastructure to be implemented in the future).
- Utilise the business case approach to develop the system planning tool. The Future Connect Strategic Case has been useful for agreeing problems and objectives with partners, which guided development of Future Connect. The plan is also providing strategic guidance for the RLTP, by providing context for the investment story, and informing project prioritisation and investment programming. The intention is also to minimise the foundation Strategic Case work required for new business cases that come out of the RLTP programme (i.e. business cases will no longer have to start from the beginning with a blank Strategic Case).
- Make it a living plan, not 'set and forget'. By making it GIS based, amendments as needed are easy and it will not suffer time damage – ensuring people can rely on it.

CONCLUSION

AT published the draft Future Connect Mapping Portal and reports in March 2021 on the AT website alongside the draft 2021-31 RLTP for public comment. Future Connect is already proving to be useful and the Strategic Networks are being applied in relevant plans and strategies. The overall response from all parts of AT, partners and stakeholders has been positive as the tool is data driven and supports planning and investment.

Future Connect has embedded climate change as both a key problem and objective for the transport system. As such, Future Connect outlines the scale of the problem and the key outputs will support AT's decarbonisation efforts.

The next phase of Future Connect will commence shortly, which will plan for the Second and Third Decades, setting a truly long-term vision for the transport network, aimed at achieving the ambitions of the Auckland Plan.

REFERENCES

Auckland Council (2018). Auckland Plan 2050.

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