FUTURE CONNECT 2023

Auckland Transport's Network Plan

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Part A

About Future Connect

PART A: ABOUT FUTURE CONNECT

The Auckland region is the largest urban area in New Zealand. The city's continued growth and complex topography poses significant challenges to transport, and will continue to do so into the future. For AT and its partners, informed and evidence-based decision-making is vital to the planning and delivery of interventions to the transport system.

Our network plan, Future Connect, supports this decision-making process by outlining the foundations of Auckland's transport system, as well as the key issues, opportunities and focus areas of this system. It provides the following key elements as guidance:

- An online mapping portal that is used as a planning tool to assesses problems and opportunities on Auckland's strategic modal networks.
    - This report outlines the methodology used to generate the outputs included in this mapping portal.
- A set of documents outlining the foundations of Auckland's transport system, including:
    - Auckland Region Transport Strategic Case (2021) - A strategic assessment of the 'big picture' problems facing Auckland's transport system and setting out the context and investment story;
    - Strategic Networks Report – A document outlining the building blocks of Auckland's transport system: a definition of the modal networks and planning principles we use.

Future Connect was first developed in 2020 and released to the public in 2021.

The first deliverable, the GIS planning tool, has now been updated with a major new version, now covering the period 2024 to 2034. This report covers the technical details of this update, including the scope, methodology and outputs.

There have been minor changes to the Strategic Networks Report in response to changes to the network hierarchy. The Strategic Case document has not been part of this update.

1. Approach to this update

Future Connect needs to be kept up to date to reflect AT's latest thinking on a regular basis, so it remains a useful tool in an ever-changing system. There are two mechanisms we use to accomplish this:

- **Strategic Network Change Management Process** – incorporates minor changes to the strategic networks based on the latest thinking, and completed every six months (approximately). This process aims to keep strategic networks aligned with the latest thinking (for more information about this, please refer to the Future Connect Strategic Networks Report);
- **Future Connect Major Review** - A full review in anticipation of a new RLTP being developed, or if needed for other urgent reasons. The full review process refreshes not just the Networks, but also the deficiency analysis (including full reviews of data, assumptions and criteria used), and Focus Areas. It also shifts the timeframe ahead three years.

This report documents a major review, which was initiated in anticipation of the 2024-2034 RLTP. This update is referred to as Future Connect 2023.

1.1. Scope of update

Future Connect 2023 is not just a refresh of the networks and analysis, but a continuation of the development of Future Connect, aimed at improving the maturity and usefulness of the tool. The scope for this update was to:

- Work with users of Future Connect to review the tool, to identify, prioritise and implement improvements opportunities across the platform.
- Update the Current and First Decade Strategic and Supporting Networks to reflect the most recent plan for each mode, including any expansions to the network.
- Review and update the deficiency analysis with improved data and indicators, and make adjustments to methodology if desirable.
- Develop a 'community needs' analysis on top of existing network deficiency mapping. This includes indicators related to equity, as developed through the Draft Auckland Transport Equity Framework (ATEF).
- Continue to engage with wider AT/Council/Waka Kotahi to make outputs more relevant and usable, with a particular focus on Investment Planning (AT) to better assist RLTP prioritisation.

Changes to the Future Connect Strategic Case are not in the scope of this update.

1.2. Objectives

There are a range of objectives that the project team is looking to achieve with this update. The goal is for Future Connect 2023 to:

- Provide improved guidance for subsequent strategies and plans, and the 2024 RLTP in particular.

- Look beyond just the needs of the network, and also consider community needs.
- Improve the mapping portal so guidance is easier to understand.
- Remain aligned with partners and stakeholders to ensure it is consistent with the plans of others.
- Establish a more robust documentation process in place to keep Future Connect up to date.

1.3. Process

Development of this update began in July 2022, and has gone through several phases before its completion. The process is outlined in the below chart.

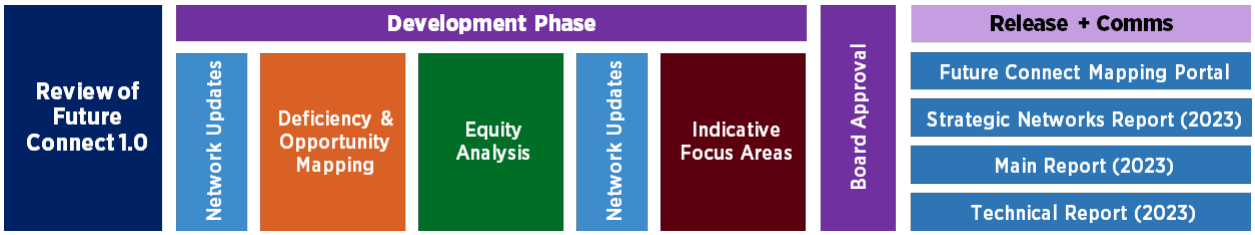


Figure 1-1: Phasing for Future Connect Updates

Review

During this initial phase, the project team met with frequent users of the tool, both inside and outside of Auckland Transport, in order to identify what works well, what doesn't, and what needs clarification. The main issues that were identified are:

- Need for a transport equity analysis, through alignment with the draft Auckland Transport Equity Framework (ATEF).
- An updated network analysis, with new data, indicators and deficiency and opportunity aspects separated from one another to avoid confusion between the two.
- An updated Strategic Network for walking. The original network was generated using GIS analysis, which was in need of improvements and updates.
- Full inclusion of the Walking Strategic Network in the network deficiency analysis.
- Enable 'Current' Deficiencies so users can see difference between current and future state of the network.
- Include contextual maps in the mapping platform (points of interest, etc).
- Consider outputs of the Rapid Transit Station Study, conducted by Auckland Transport.

This report outlines these changes, but also includes the elements of Future Connect that have not changed, so that this report gives a complete overview of the project.

Development

Following the review, the project team developed Future Connect 2023, considering the above changes and objectives. After a review of the Strategic Networks, the team updated the Deficiency and Opportunity network analysis, designed and performed a new equity analysis, updated the networks a final time before completing the analysis, and compiling a map of Focus Areas that outline key challenges.

2. Purpose and Scope of Future Connect

The purpose, scope and objectives of Future Connect have remained the same in this updated version of Future Connect.

2.1. What is Future Connect?

Future Connect is a system planning tool that provides a network plan for Auckland's integrated transport system, as well as an analysis of this system, to guide integrated transport and land use planning. Future Connect will ultimately be a long-term plan (up to 30 years) for Auckland's future integrated transport system, but currently outlines the current and 10-year horizon.

2.2. Purpose and Scope

The purpose of Future Connect is to have a single point of reference for the network needs of the Auckland transport system and provide clarity on what is important for each road and street in the network, where things could be better and where we should focus our efforts.

It provides:

- a consistent starting point to guide and streamline planning throughout a typical project lifecycle, including investigation, design, delivery, operations and maintenance,
- a shared evidence base for investigations,
- guidance for strategies and plans, including RLTP prioritisation.

Future Connect delivers the following key outputs for the next 10 years:

- Strategic Networks - defines each strategic modal network and outlines the most important links for movement of people, goods and services.
- Analysis - highlights the most significant problems and opportunities by investigating Strategic Networks, communities and RTN stations
- Indicative Focus Areas – summarises the deficiency analysis, highlighting the key regional challenges that Auckland is facing.

Future Connect does <u>not</u>:

- identify problems or opportunities on supporting (non-strategic) links of the modal networks (e.g. connector public transport (PT) routes or local roads)
- explore possible design solutions, evaluate projects or allocate funding (this is the role of the RLTP and further business case work)
- incorporate supporting links that are particularly important at a local level. These streets will need further investigation by using the Roads and Streets Framework (RASF).

Outputs are easily accessible through the Future Connect Mapping Portal – an online Geographic Information Systems (GIS) platform.

Future Connect's methodology is shaped by:

- a robust, evidence-based and repeatable process to rank the most significant problems and opportunities on the Strategic Networks,
- inclusion of the most important datasets or key proxies for the successful operation of all Strategic Networks, and assessment of safety, equity, and environmental issues,
- Auckland Forecasting Centre (AFC)'s modelling run (September 2021) incorporating Auckland Council's land use scenario (version 11.6) and assumptions based on the 2021-2031 Regional Land Transport Plan,
- consideration of partner, stakeholder and Subject Matter Expert (SME) feedback on key outputs,

2.3. Strategic context and objectives

The Auckland Plan 2050 seeks integrated outcomes for the region over the long term, including three strategic directions for transport which guide Future Connect. These strategic directions are addressed in the following ways:

i. Better connect people, places, goods and services – through an integrated all mode system approach, including freight networks;
ii. Increase genuine travel choices for a healthy, vibrant and equitable Auckland – by integrating all the travel modes, highlighting travel deficiencies across space so that they can be remedied and encouraging mode shift to public transport, walking and cycling;
iii. Maximise safety and environmental protection – through surfacing the worst vulnerabilities and negative consequences of the transport system.

Figure 2.1 provides an overview of how Future Connect and strategic policy documents interact and align with investment programmes in Auckland.

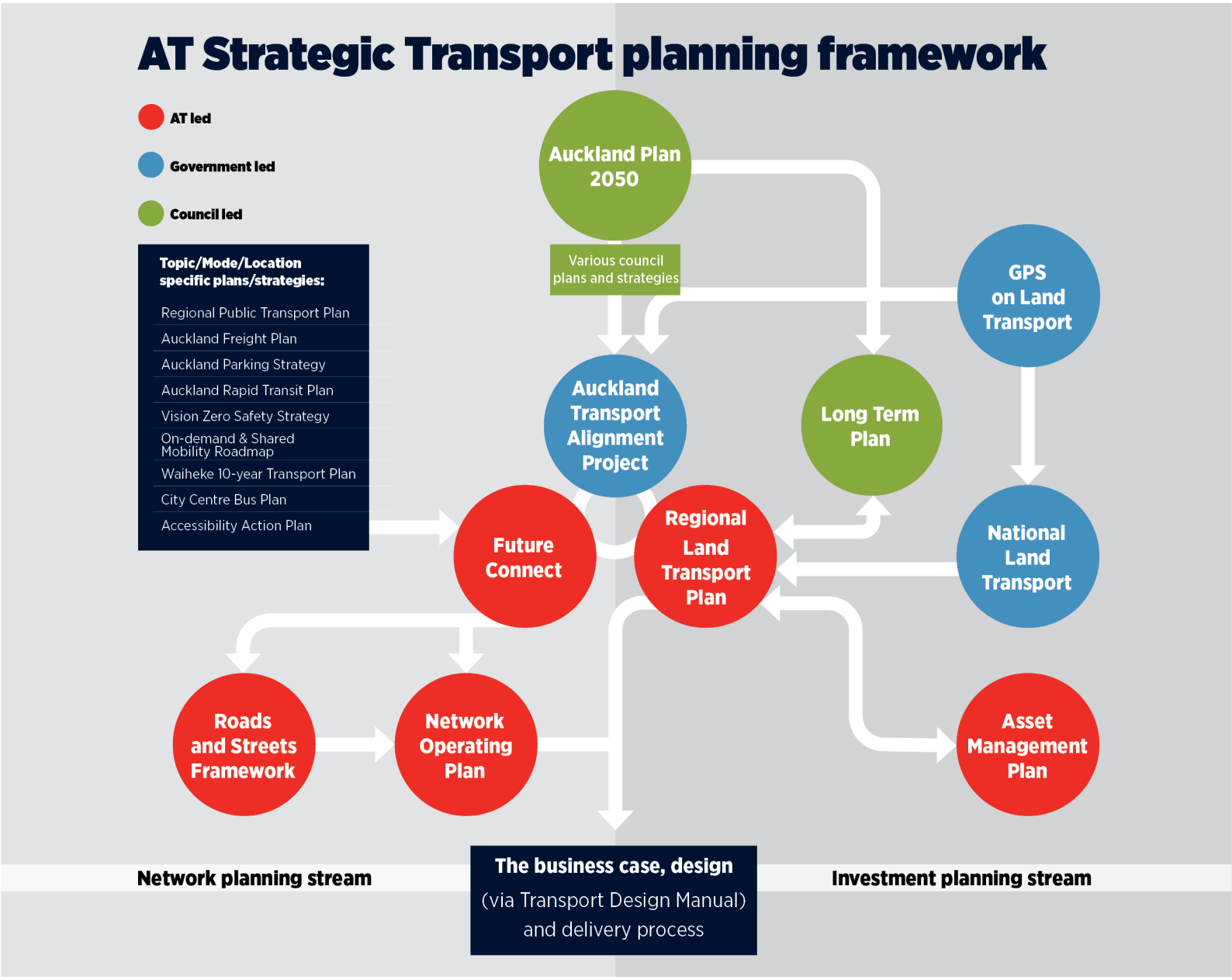


Figure 2-1: Future Connect's relationship with strategic policy and investment programmes

2.4. How Future Connect will guide what we do

Future Connect is not just guidance for the RLTP, but delivers a network plan that is used throughout the full AT project lifecycles, as well as by partners and stakeholders involved in Auckland's development.

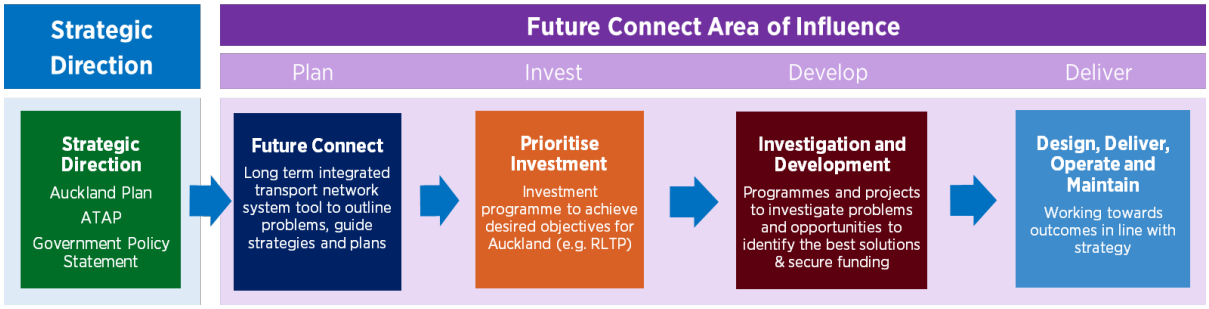


Figure 2-2: Future Connect and the Project Lifecycle

Future Connect provides a useful and up-to-date reference point to understand the Strategic Networks and their key deficiencies and opportunities. This informs strategic decisions and co-ordinated multi-modal service delivery, both within AT and by our stakeholders.

The following table outlines some examples of the use of Future Connect.

PLAN	INVEST & DELIVER	OPERATE & MAINTAIN
Roads and Streets Framework RASF assesses the strategic significance of movement and place function. Future Connect's Strategic Networks are an input for RASF assessments	**Supporting Growth** Alignment of Strategic Networks or define new networks in greenfield areas	**Network Operating Plan (NOP)** The NOP reflects changes to the current Strategic Networks and RASF, which details the significance of each mode by location and therefore what should be prioritised
Land Use Integration & Spatial Planning with Partners 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)	**Partners contribute to outcomes** Stakeholders can help deliver parts of our networks when they act in certain communities, such as Eke Panuku building a bike path in a centre they're revitalising.	**Auckland Transport Operations Centre** The current Strategic Networks guide network operational decision-making and solutions (e.g. event management)

Table 2-1: Future Connect's interface with key Auckland Transport work streams

Part B

An Integrated Transport System

PART B: AN INTEGRATED TRANSPORT SYSTEM

Auckland's transport system faces significant challenges – it has to support and shape land use development, meet customer needs, enable the movement of people and goods, and minimise system's negative impact on the environment, well-being and safety.

This chapter discusses how the transport system became the way it is today, how we define our networks, and how we expect these to change in the future.

3. A brief history of Auckland's transport system

The urban form of the Auckland region is shaped by a discontinuous topography and many waterways that disrupt easy transport connections between areas. Auckland has seen periods of rapid expansion, especially post-World War II, with:

- the urban area expanding beyond the central isthmus,
- the removal of the tram network,
- construction of motorway extensions, and
- the growth of peripheral settlements.

Transport networks have developed to support a growing urban Auckland and inter-regional links. This system has a number of challenges:

- **Gaps induced by the natural landscape**. Transport networks must operate across a complex topography with significant waterways, especially between sub-regions,
- **Dispersed travel patterns** related to the low-density, spread out urban form,
- **A few key roads being often the only travel option between areas and therefore carrying large volumes. This is an issue as:**
    - They are essential corridors without much (or any) resilience, so if they are unusable there are significant impacts
    - The roads are under increasing pressure, but without the ability to widen to accommodate this growth in demand
    - They are usually strategically important for multiple modes, competing for space.

Auckland has, over time, developed a series of modal networks to different stages of maturity, consisting of:

- a motorway network with most major links in place,
- a local road network that is developing as the city grows, carrying the bulk of trips,
- a freight network, but with minimal freight priority,
- a growing public transport network underpinned by strong investment over the last decade, including implementation of the New Bus Network,
- increasing investment on the Rapid Transit Network (RTN) such as the City Rail Link (CRL) that will improve PT capacity and reach,
- recent cycling infrastructure improvements forming the beginnings of a Cycle and Micromobility network,
- renewed interest in the importance of walking and door to door journeys.

4. Achieving better transport system integration

As the city comes to grips with increasingly complex and changeable travel demands, Auckland needs a multi-modal transport system that is safe, sustainable and responds to customer needs. This requires better ways of planning, that treat all modes as being part of a single integrated system. Future Connect plays a key role in achieving this 'System Planning' approach.

4.1. A System of Networks

The System Planning Principles within Future Connect have been defined as follows:

- **Each mode has a role to play and no mode is any more important than any other at a network level**. Each mode makes a contribution and needs to be leveraged to make the best use of the existing system,
- **There are dependencies** between the operation of different modal networks, and the impacts on safety, the environment, and the customer. Through integrated planning, there are opportunities to reconcile competing interests and priorities,
- **Major corridors often have many purposes**. A recognition that major roads often serve many modes,
- **Modal priority on a link relates to movement and place**. Differences in modal priority occur on individual roads / corridors and relate to the strategic role of that road / corridor and the local place function. Application of the value of place and adjoining land uses to Strategic Network priority is achieved through a RASF assessment,
- **Time has influence on modal priority.** Time of day, day of the week and time of year may impact the desired road use priority, depending on travel demand, adjacent land use and activity,
- **Transition to a multi-nodal urban model**. Auckland over the long term will continue to have a strong City Centre with a regionally significant role, but metropolitan centres will play an increasingly important role. These centres and other local centres require a well-connected transport system to serve their growth in business and employment, civic services, and residential options over time.

The application of these principles should enable better integrated planning; one of the most efficient means of managing the demand for movement, and a priority approach – as indicated below. However, we are also dealing with deficiencies that are the consequence of geography, past planning decisions, and poor land-use and transport integration. The deficiency analysis that Future Connect conducts highlights areas where issues can't be resolved through network planning alone.

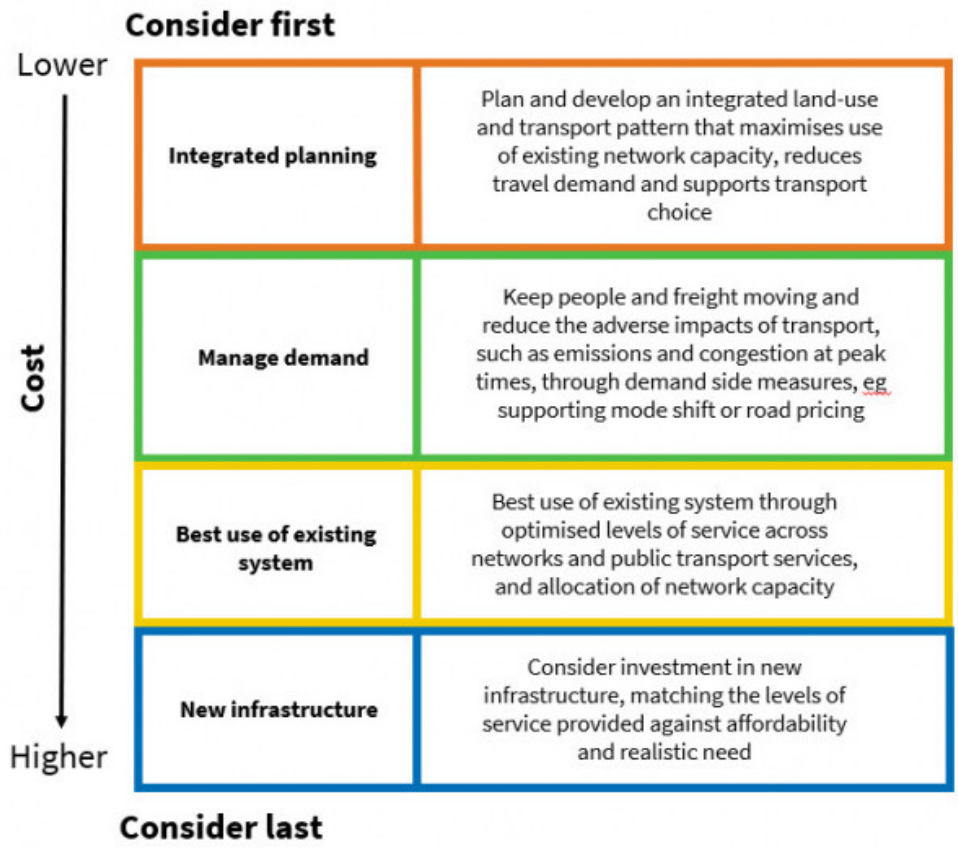


Figure 4-1: Intervention Hierarchy. Source: nzta.govt.nz

4.2. Other System Planning Tools

Future Connect is not the only system planning tool AT has developed to ensure the integration of planning, land use, operations, customer neds, and design.

Where Future Connect's provides a top-down view of the system, the Roads and Streets Framework[1] takes the Future Connect Networks, and interrogates these from the bottom up, considering place (a function of land use) in order to assign modal priorities to each mode. These modal priorities are compiled in "RASF Mandates" that provide direction to projects. Each AT Business Case requires a RASF mandate to be completed.

Future Connect's Current Strategic Networks also inform the Auckland Network Operating Plan (ANOP). The ANOP manages current network operations, and seeks to optimise LOS for strategic modes at key pinch points and/or during specific times of day. Please refer to the strategic document map in section 2.5 to see how these documents work together.

[1] The Roads and Streets Framework can be found here at.govt.nz/about-us/transport-plans-strategies/roads-and-streets-framework

5. Auckland's Strategic Networks

Future Connect defines Strategic Networks for each mode of transport. These networks are displayed together in the Future Connect Mapping Portal.

The Strategic Network and its routes 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.

The network for each mode will have its own hierarchy, each with many levels to it. Some of these levels meet the Strategic Network definitions, where other levels have been labelled 'Supporting Networks'. The following image outlines the strategic vs supporting layers for each mode.

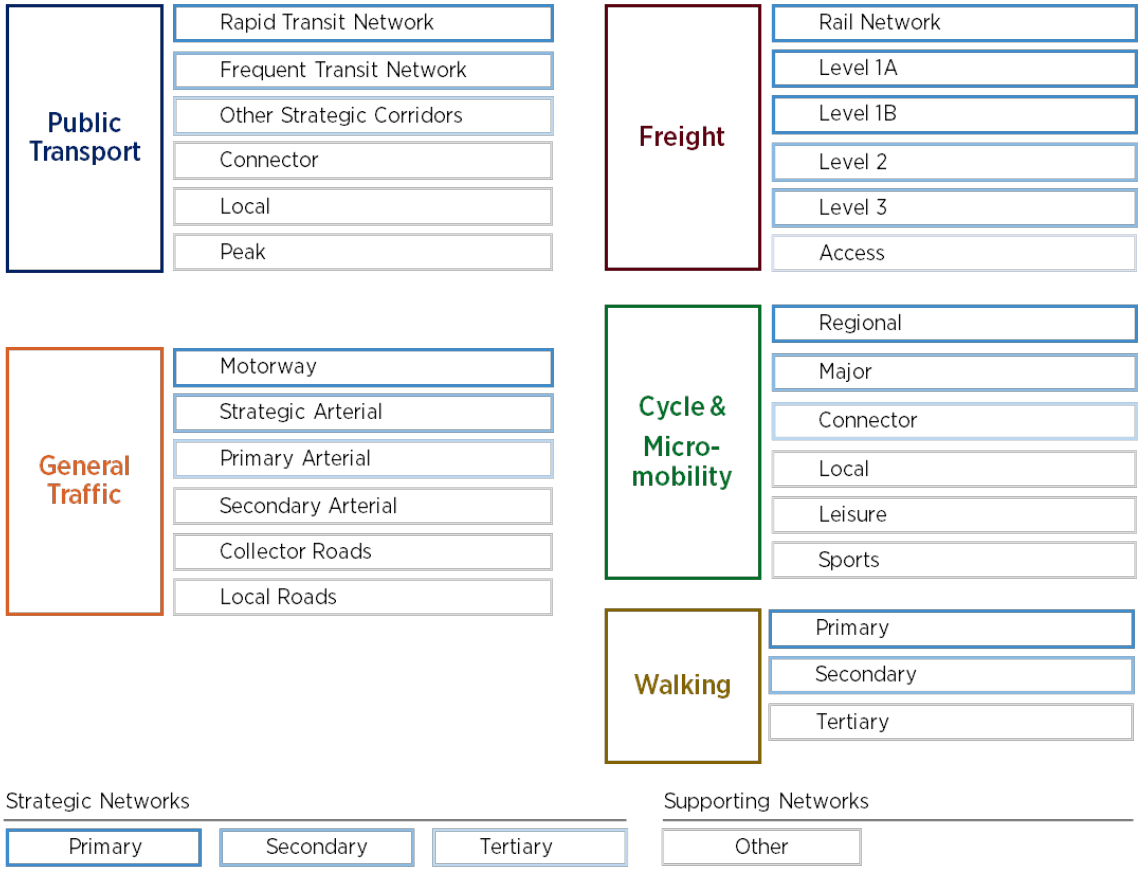


Figure 5-1: Consistent modal networks hierarchy levels

For a full overview of the Strategic Networks, please refer to the Future Connect Strategic Networks Report, which can be found at at.govt.nz/futureconnect.

6. Planning for the next decade

Land use changes anticipated over the next 10 years are a significant driver of the requirements of the regional transport system by 2034. This section provides an indication of the location of major land use change, the sequencing of that change, and the transport responses needed to support that change.

Integrated planning, as the first step in the intervention hierarchy, can assist in managing the challenges of the transport impacts of both private and public sector development planned over the next decade.

6.1. Land use changes

The following map shows the significant land use changes anticipated over the next 10 to 30 years in Auckland. Although the exact sequencing of these sites is subject to change and is dependent on multiple public and private actors, the map provides an indication of the location of significant growth across the Auckland Region over the longer term. This growth will have a significant impact on the Transport System.

Future Connect has assumed the impact of land use change in these areas on the generation of future modal trips based on AFC's modelling – refer to Section 7.4.1.

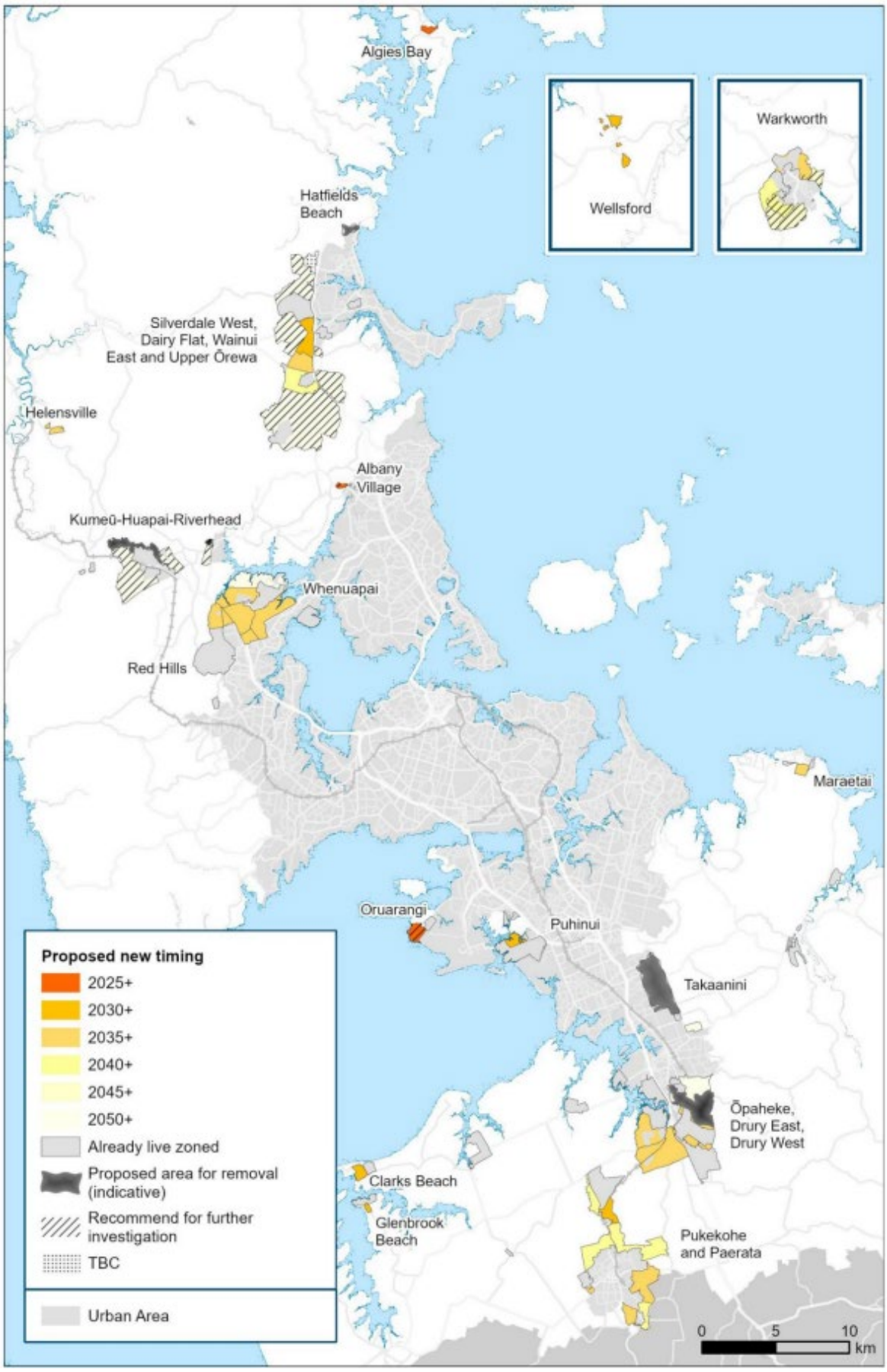


Figure 6-1: Draft Future Urban Areas (2023), Auckland Council

6.2. Transport network changes

Over the next decade Auckland's Strategic Networks will need to respond to the growth challenge and meet the needs of an evolving region. Ultimately, the Strategic Networks influence where and when significant urban growth can occur, especially in future urban areas.

Broadly speaking, changes to the Strategic Networks in the next ten years happen due to:

- New infrastructure supporting a higher movement function;
- New public transport services or changes to existing services;
- Reclassification of existing network links (up or down) in response to land use changes.

Table 6-1 quantifies the anticipated changes to the Strategic Networks from Current to First Decade horizon.

	Current Length (Km)	First Decade Length (Km)	% Change
Public Transport			
Rapid Transit Network	147	192	31%
Frequent Transit Network	299	440	47%
Other Strategic PT Corridors	10	15	50%
Total	456	648	42%
General Traffic			
Motorway	177	177	0.0%
Strategic Arterial	155	144	-8%
Primary Arterial	361	392	9%
Total	694	713	3%
Freight			
Level 1A	241	239	-0.5%
Level 1B	194	194	0.0%
Level 2	100	100	0.0%
Level 3	283	288	1.6%
Total	819	822	0.4%
Freight - Rail network	220	-	-
Cycle and Micromobility			
Regional	236	237	0%
Major	549	586	7%
Connector	267	276	3%
Total	1,052	1,099	4%
Walking			
Primary	929	-	-
Secondary	2,402	-	-
Tertiary (non-strategic)	2,102	-	-
Total	5,433	-	-

Table 6-1: Current versus First Decade Strategic Network change (quantified)[2]

[2] Note that network length does not represent actual carriageway length as digital networks have been simplified along centre lines for the sake of measurement. Also note that the Walking network length is not directly comparable with other networks at this stage.

Notable changes in the First Decade Strategic Networks can be summarised as follows:

- **Public Transport:** the most significant Strategic Network increase (40%), largely driven by increases in the frequent and rapid transit network. Projects and services contributing to this growth include (but not limited to):
    - City Rail Link
    - Panmure to Botany Eastern Busway
    - North-western and Airport to Botany interim bus improvements
    - City Centre bus improvements
    - Southern Rail stations (Drury, Drury West and Paerata)

- **General Traffic**: Only a small increase of 3% is expected:
    - New arterials supporting future urban areas (e.g. Matakana Link Road, Penlink)
    - Corridor improvements (e.g. Huapai to Kumeu, SH20B Improvements)

- **Freight:** a very minor increase (>1%) with only a small change in supporting growth areas. Although not quantified in the table above, the rail-based freight network is expected to include a series of upgrades over the next 10 years. These upgrades relate to capacity improvements to parts of the Wiri to Quay Park corridor.

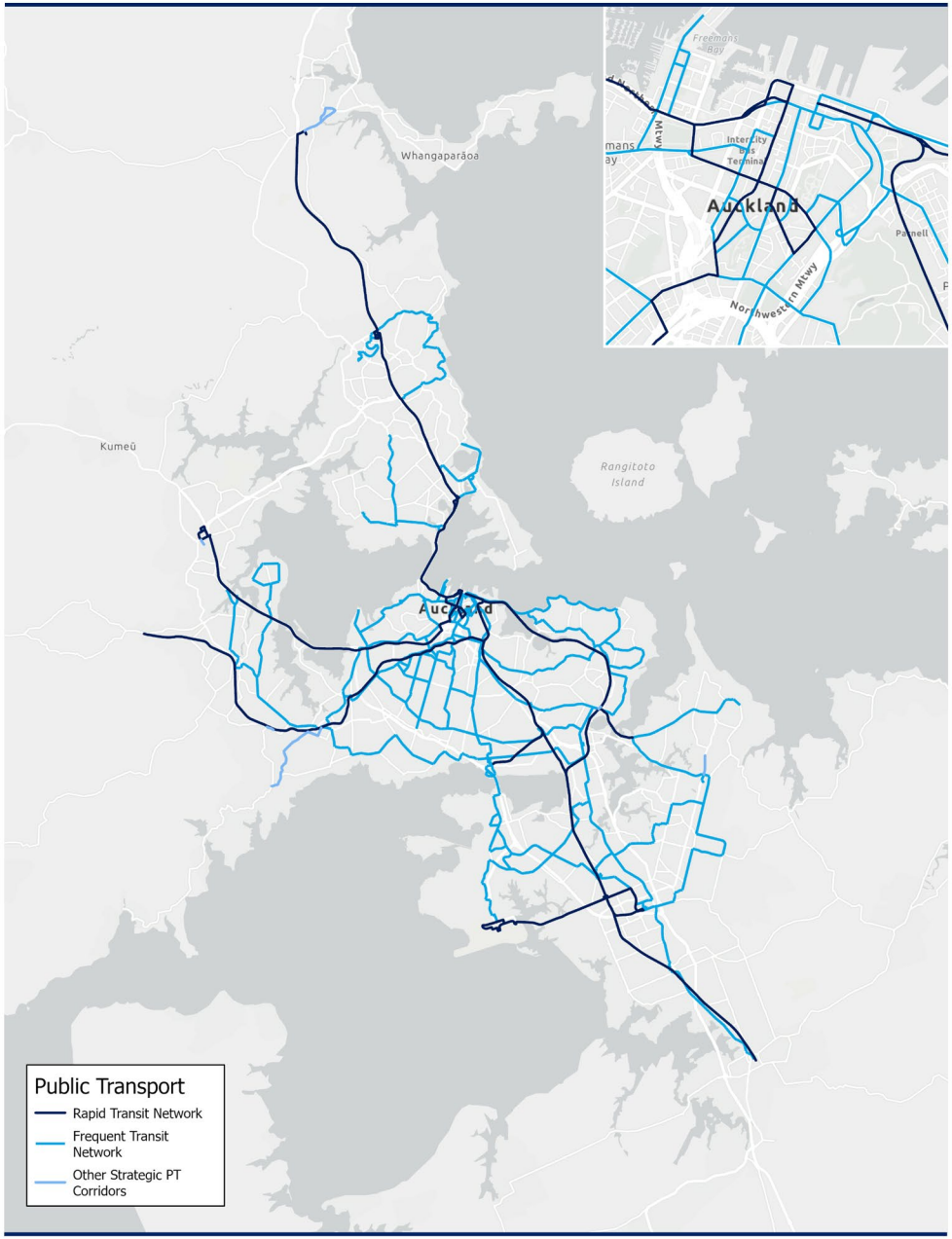
- **Cycle & Micromobility:** the Cycle & Micromobility Strategic Network indicates the strategic intent over the long term. A moderate increase in the future strategic network of 4% is shown in the north and south of Auckland. This identifies additional areas where growth is planned.

- The **Walking** network has been generated by a GIS methodology that considers main pedestrian attractors. It is the same for the current and first decade horizons. In reality, the walking network is expected to expand and change due to new urban developments both in greenfield and brownfield areas, as well as in response to new attractors and upzoning around RTN Stations.

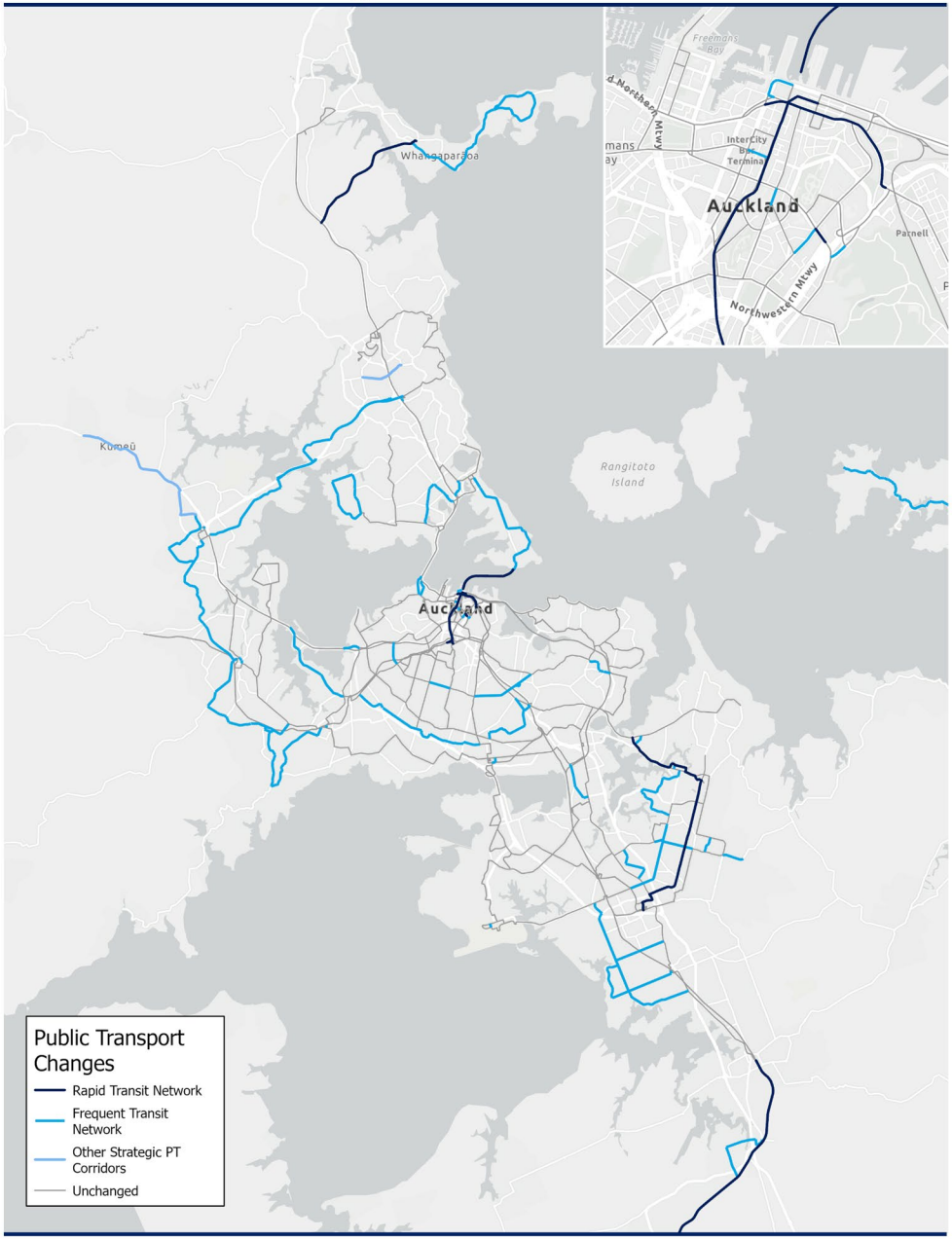
The following pages show maps of the current networks and the changes expected over the first decade for each mode.

Public Transport Strategic Networks

Current Network

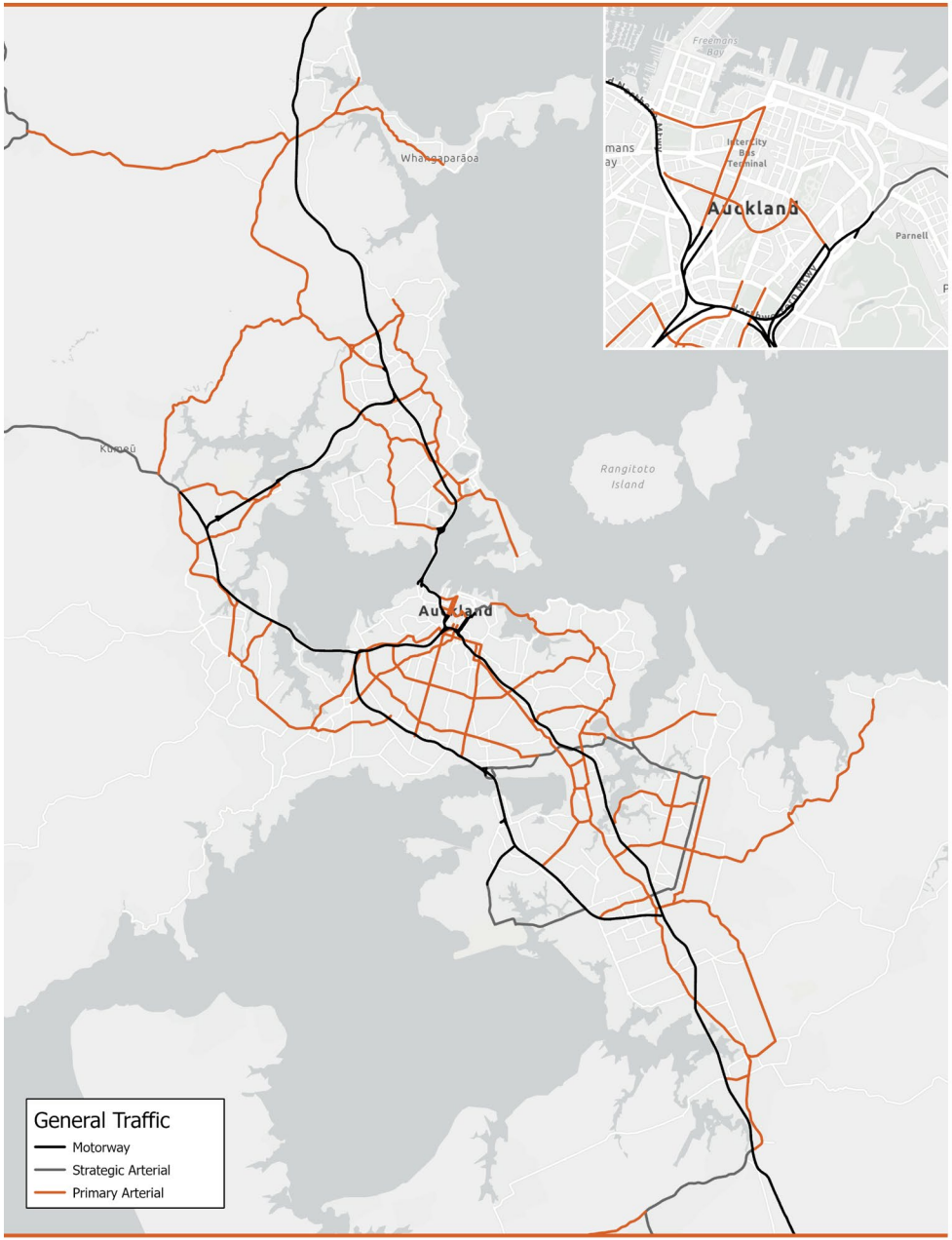


First Decade Network Changes

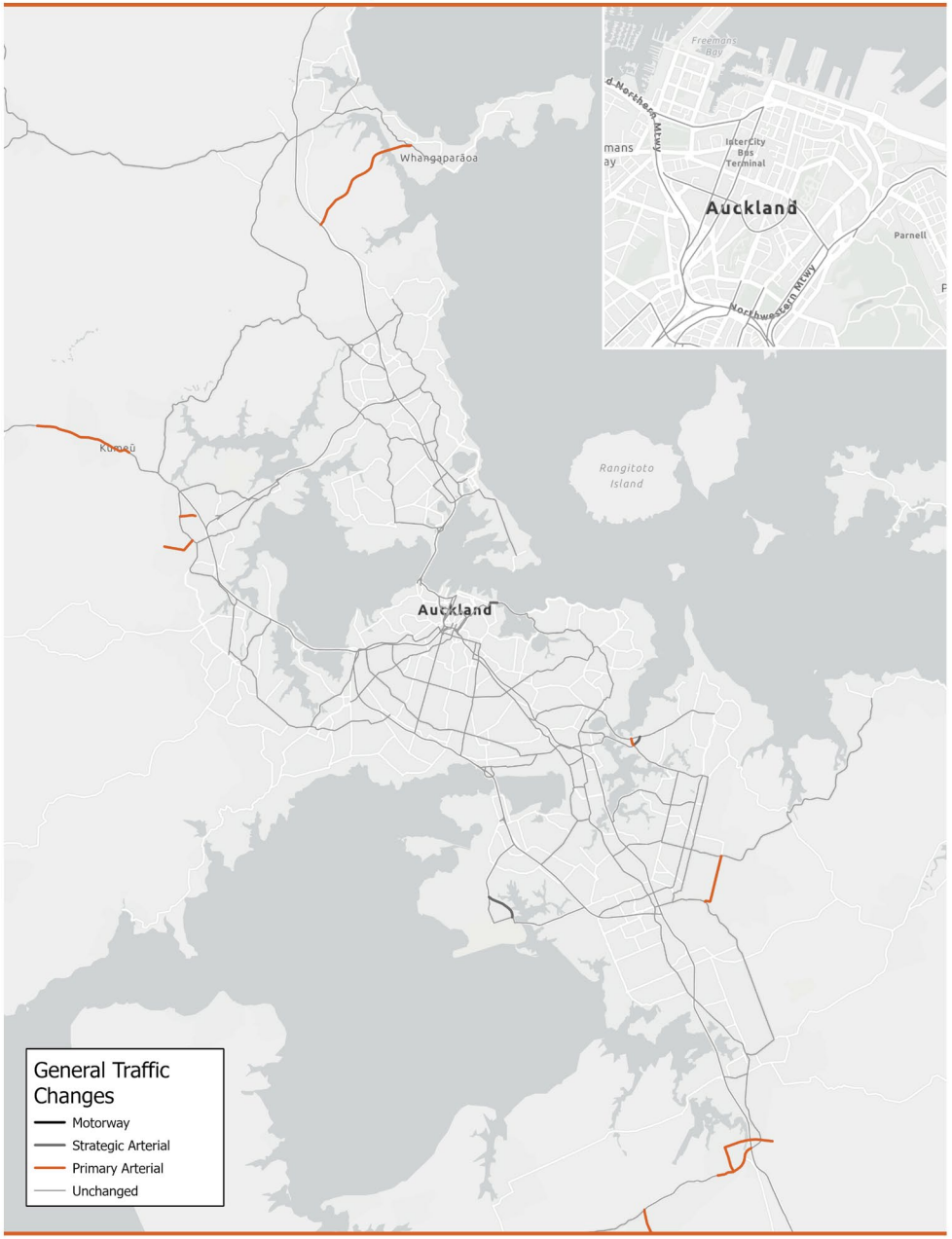


General Traffic Strategic Network

Current Network

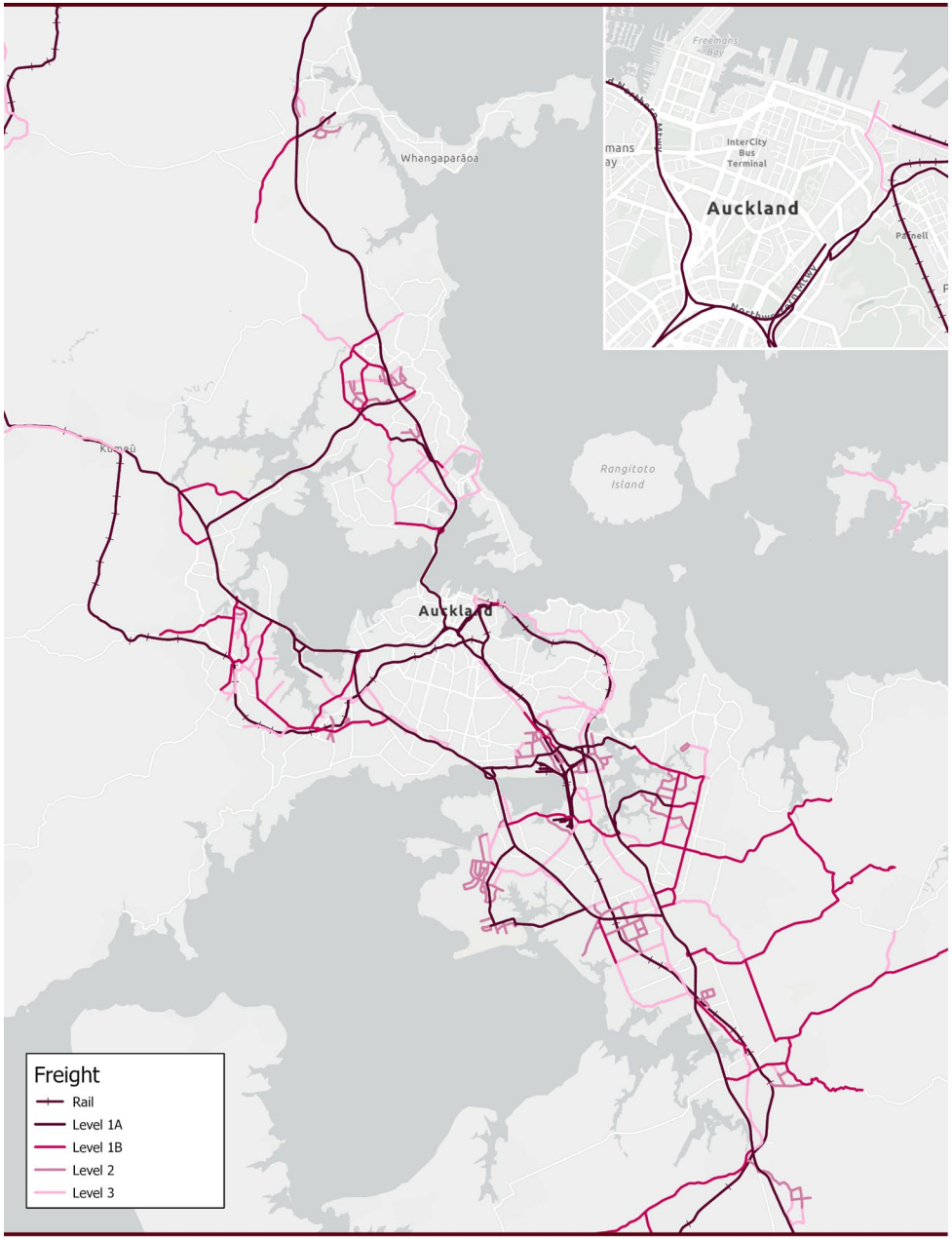


First Decade Network Changes



Freight Strategic Network

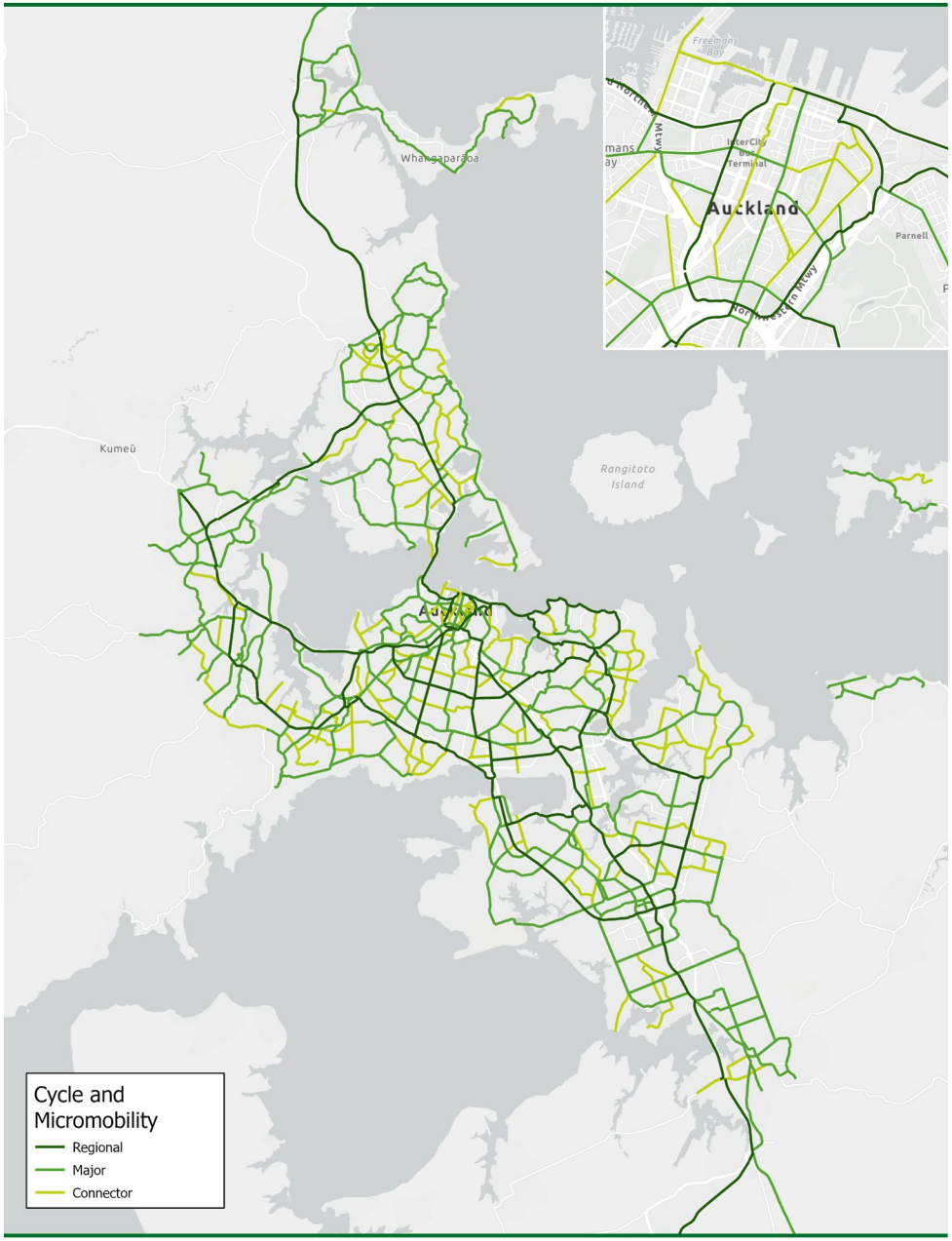
Current Network



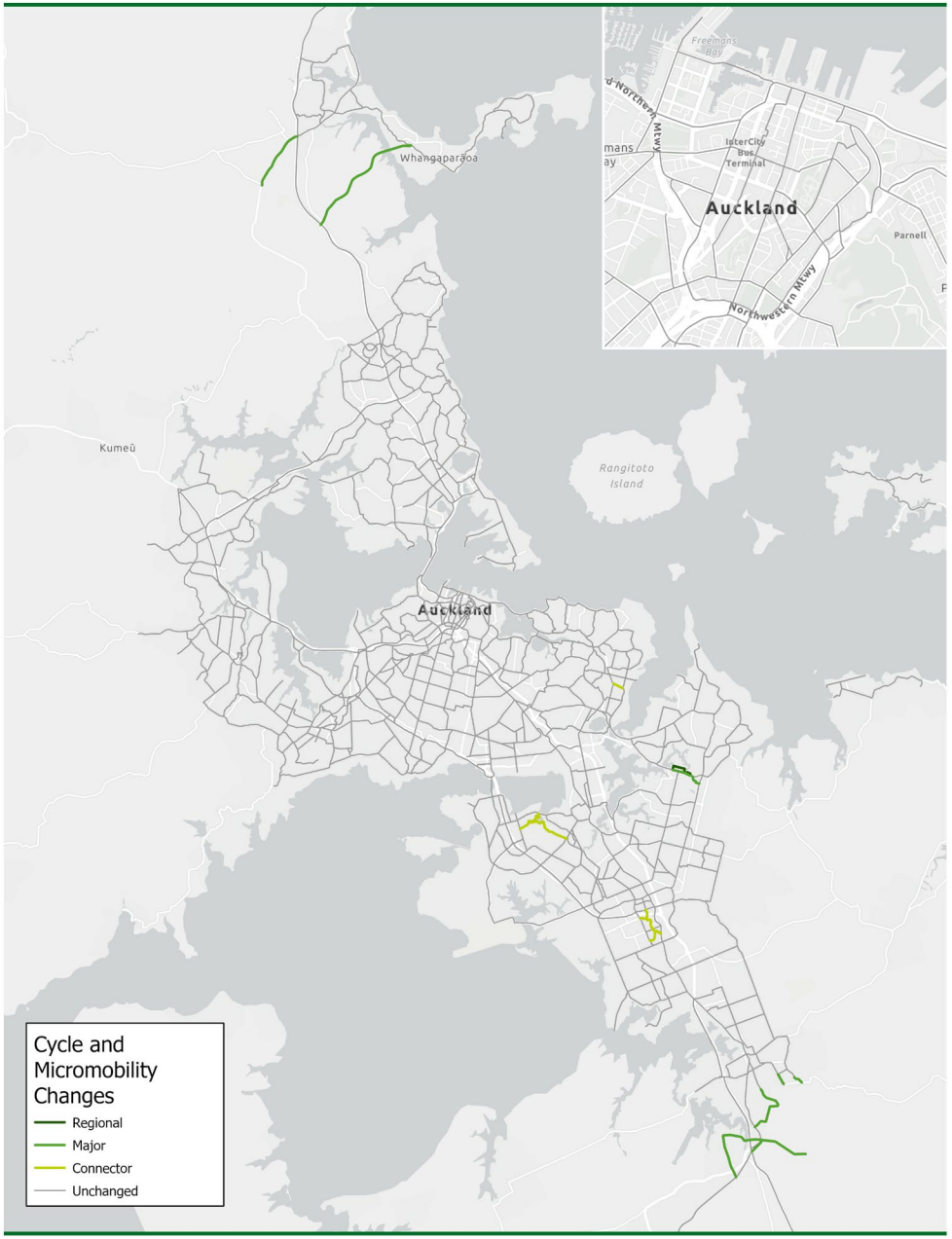
First Decade Network Changes

Cycle and Micromobility Strategic Network

Current Network

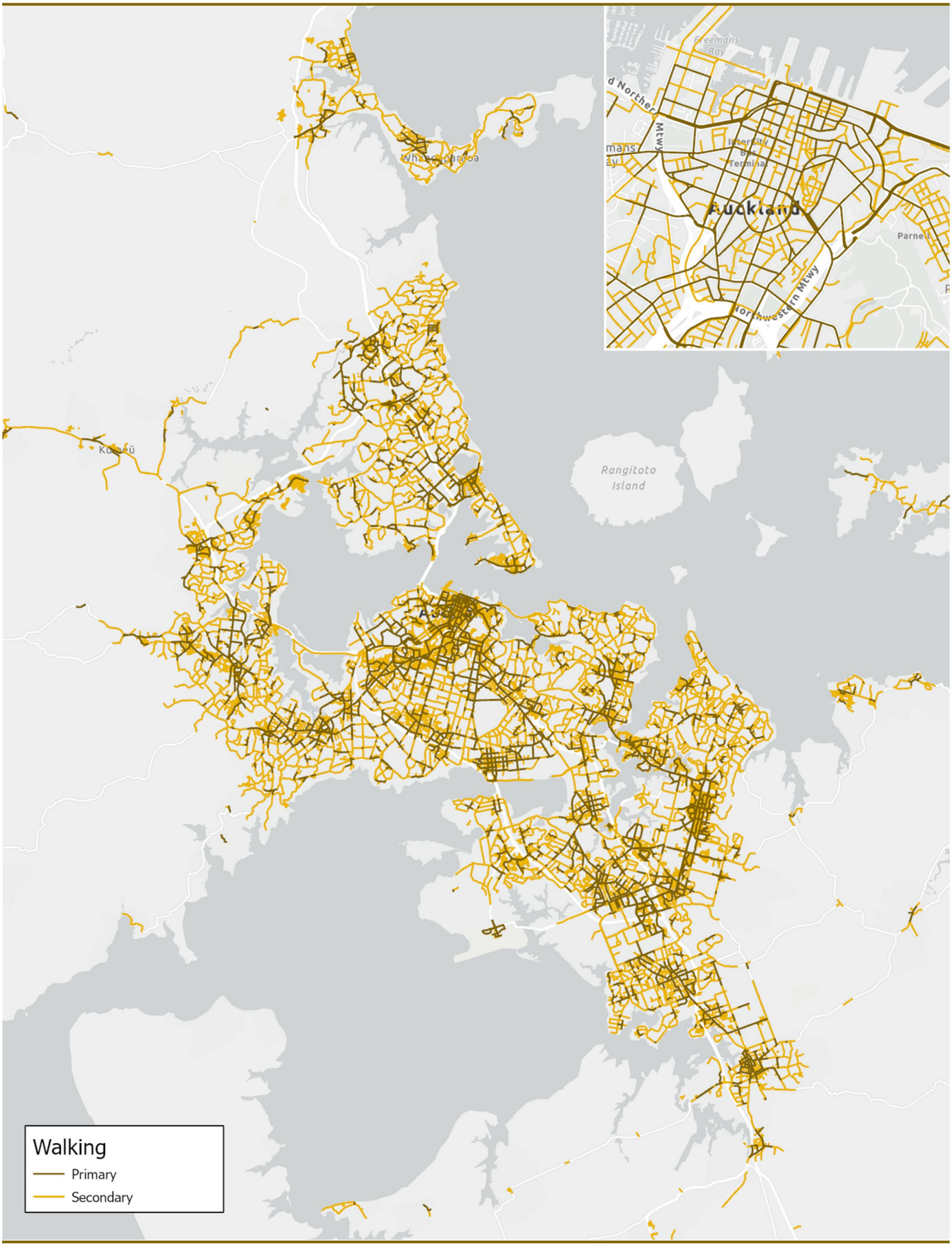


First Decade Network Changes



Walking Strategic Network

Current & First Decade Network



6.3. First Decade Integrated Strategic Networks

All the Strategic Networks in the main urban areas for the first decade are shown in an integrated map below (Figure 6.2 below). Due to the significant coverage of the Walking Strategic Network, it has not been shown in the integrated map below. The walking network can be viewed in the online Mapping Portal.

This map shows that there are often multiple Strategic Networks present on the same corridor, as flagged earlier. This highlights the need for adopting an integrated approach to transport planning, resolving any conflicting modal priorities that may be present.

This map also shows the geographical distribution of the Strategic Networks, and where these are denser or where there are gaps. As expected, there seems to be a direct correlation between the location of centres and the density of the Strategic Networks. This is especially visible around east Auckland with only a handful of centres and generally less dense Strategic Networks.

Strategic Networks

First Decade (2034)

Primary Links only

Key

- Public transport
- General traffic
- Freight
- Cycle and micromobility
- Lower order Strategic Network links
- City and metropolitan centres

To see the full region and most up to date version, visit **AT.govt.nz/futureconnect**

Part C

Transport System Analysis

PART C: Transport System Analysis

To understand the most significant problems and opportunities affecting the regional transport system, Future Connect includes multiple analyses of the region and its Strategic Networks. Together, these analyses are used to highlight the most important deficiencies and opportunities across the region, and shape a map of indicative Focus Areas.

This section of the report outlines the methodology and key outputs developed to identify these Focus Areas. The analysis is GIS based, and all outputs are displayed on maps that can be accessed in the Future Connect Mapping Portal. They are also printed throughout this chapter. The main components of the analysis are:

- **Deficiency Mapping** (Improved):
    - Deficiencies for the Current and First Decade Strategic Networks, covering all modes and two intermodal problems (safety and the environment).
    - Indicators show where the issues exist now, and where things get worse in the future.
    - Deficiencies are ranked using network hierarchy and severity of the deficiency.
- **Opportunity Mapping** (Improved):
    - Opportunities indicate areas identified as being most suitable for proactive improvements.
- **Equity Analysis** (New):
    - Applies the principles set out in the draft Auckland Transport Equity Framework, and aims to locate vulnerable communities experiencing poor transport outcomes.
    - It measures outcomes across three domains: Local Access, Regional Access and Transport Disbenefits.
- **Auckland Rapid Transit Study Outputs** (New):
    - This study has assessed all Rapid Transit and Ferry Stations in Auckland.
    - The most deficient stations are highlighted in Future Connect.

While the Deficiency and Opportunity Mapping were present in in the 2020 Future Connect, the Equity Analysis and Rapid Transit Study are new components. The team has also made improvements to the Deficiency and Opportunity analysis compared to the 2020 Future Connect. More on those changes are highlighted on the following pages.

7. Deficiency Analysis

The deficiency analysis surfaces issues for each mode of transport, as well as two intermodal problems (safety and the environment) through a repeatable data driven GIS based process. The project team has collaborated with various Subject Matter Experts in the business to establish this methodology, and to obtain all the data that is used for the analysis.

By aligning with these experts, Future Connect Deficiency outputs provide a shared evidence base for future investigations, and overarching guidance for the multitude of activities that AT and its stakeholders undertake.

7.1. Definition

Deficiencies have been defined as: Corridors where our customers or the environment experience outcomes that fall short of AT's strategic objectives, either now or in the future.

7.2. What's New in Future Connect 2023?

We've made improvements to the methodology that was set out in the 2020 version of Future Connect.

- Opportunities are now mapped separately. The 2020 Future Connect treated deficiency and opportunity indicators the same, which made it difficult to assess if a link was flagging up due to actual issues, or because it was identified as fit for proactive improvements.
- Ranking matrices are now better aligned with how the networks are used; considering not just the strategic importance, but also volumes (either modelled or observed) as an indication of the amount of people impacted by a deficiency.
- The Walking Strategic Network is now also part of this analysis.
- Multiple indicators now use better data, more current data, and/or have been redefined to better capture the main issues on the network.

7.3. Methodology Overview

The methodology follows some simple steps.

- With help from Subject Matter Experts, one or more deficiency indicators are defined for each mode or problem.
- Moderate and high deficiency criteria are defined for each indicator.
- The worst score of any indicator for a certain mode at a certain location is assigned to that location.
- The deficiency is then ranked based on its position in the network hierarchy. For intermodal problems, the ranking only relates to the severity of the deficiency.

The precise indicators, criteria, ranking and outputs is detailed at the end of this chapter.

7.4. Establishing the indicators

The Deficiency Mapping for Future Connect 2020 was built on our strategic objectives, and a series of problem statements defined by the project team. Together with SMEs for each mode

and problem, the team aligned the problems with already existing data, or data that could be created within the timeline of the project.

For Future Connect 2023, the indicators have been updated to reflect the latest thinking, by aligning better with recent business cases, such as the Cycle and Micromobility Programme Business Case, Walking Programme Business Case and the Environment Action Plan.

The updated indicators also consider newer and better data, for example by including the recently acquired TomTom traffic speed data, AFC data reflecting the latest assumptions, and better data about our walking network. A detailed list of indicators is included in Appendix A.

7.4.1. Regarding forecast indicators

The Deficiency Analysis covers the current network, but also flags where problems are expected to become worse in the next decade. This future state analysis uses data from the AFC, which assumes the full impact of the 2021-31 RLTP.

It is important to understand that when switching from the *current deficiencies* to the *first decade deficiencies* map in the mapping portal, Future Connect shows what is bad now, and where things get worse *despite* investment. It does not consider what gets better. This is by design, as the first decade deficiencies aim to give an overview of where investment is most needed over the next 10 years.

7.4.2. Regarding intermodal deficiencies

The Environmental and Safety problems relate to negative consequences or vulnerabilities of the transport system as a whole. These are assessed separate from the modal networks, as they often impact, or are impacted by, multiple modes of transport.

The most critical environmental deficiency indicator is the amount of harmful emissions generated by the transport system. These emissions cannot be mapped geographically and are therefore not included in the deficiency mapping.

7.5. Deficiency Analysis Outputs

The following pages outline the deficiency mapping process for each mode and problem, including:

- a summary of the indicators, and the thresholds used to define high/medium severity;
- the ranking matrix which combines the severity of the deficiency with the network hierarchy;
- a map showing the First Decade Deficiency Ranking; and
- a description of key findings.

Although the following pages provide an overview, detailed maps can be found in the Future Connect Mapping Portal, and a detailed list of indicators is included in Appendix A.

Public Transport Deficiencies

Indicators, criteria and ranking

1. **Morning & afternoon peak bus travel speed Level of Service (Current)**
   The AM or PM peak median bus travel speed relative to the posted speed limit; used to map where buses are going at speeds much below the limit.
2. **Morning & afternoon peak bus travel time reliability Level of Service (Current)**
   The AM or PM peak travel time relative to typical travel time; used to map where bus travel times are most inconsistent, making it difficult to plan trips.
3. **Morning peak PT patronage/capacity ratio change (Forecast)**
   Patronage relative to capacity (crowding) is getting worse over time; used to map where trains and buses may be getting too full over time.
4. **Rail level crossings (Current)**
   Intersecting Strategic Networks cause capacity and safety constraints.

High deficiency criteria

1. AM or PM Speed LOS F (<30%); or
2. AM or PM travel time reliability LOS F (>100%); or
3. AM Peak over capacity (≥85%) in AM peak (2018) and worsening in 2031; or
4. Level crossings intersect with freight or general traffic strategic network

Moderate deficiency criteria

1. AM or PM Speed LOS E (≥30% & <40%); or
2. AM or PM travel time reliability LOS E (≥70% & <100%); or
3. AM Peak under capacity (<85%) in 2018 to over capacity (≥85%) in 2031; or
4. Level crossings intersect with PT, Cycle or Walking strategic network

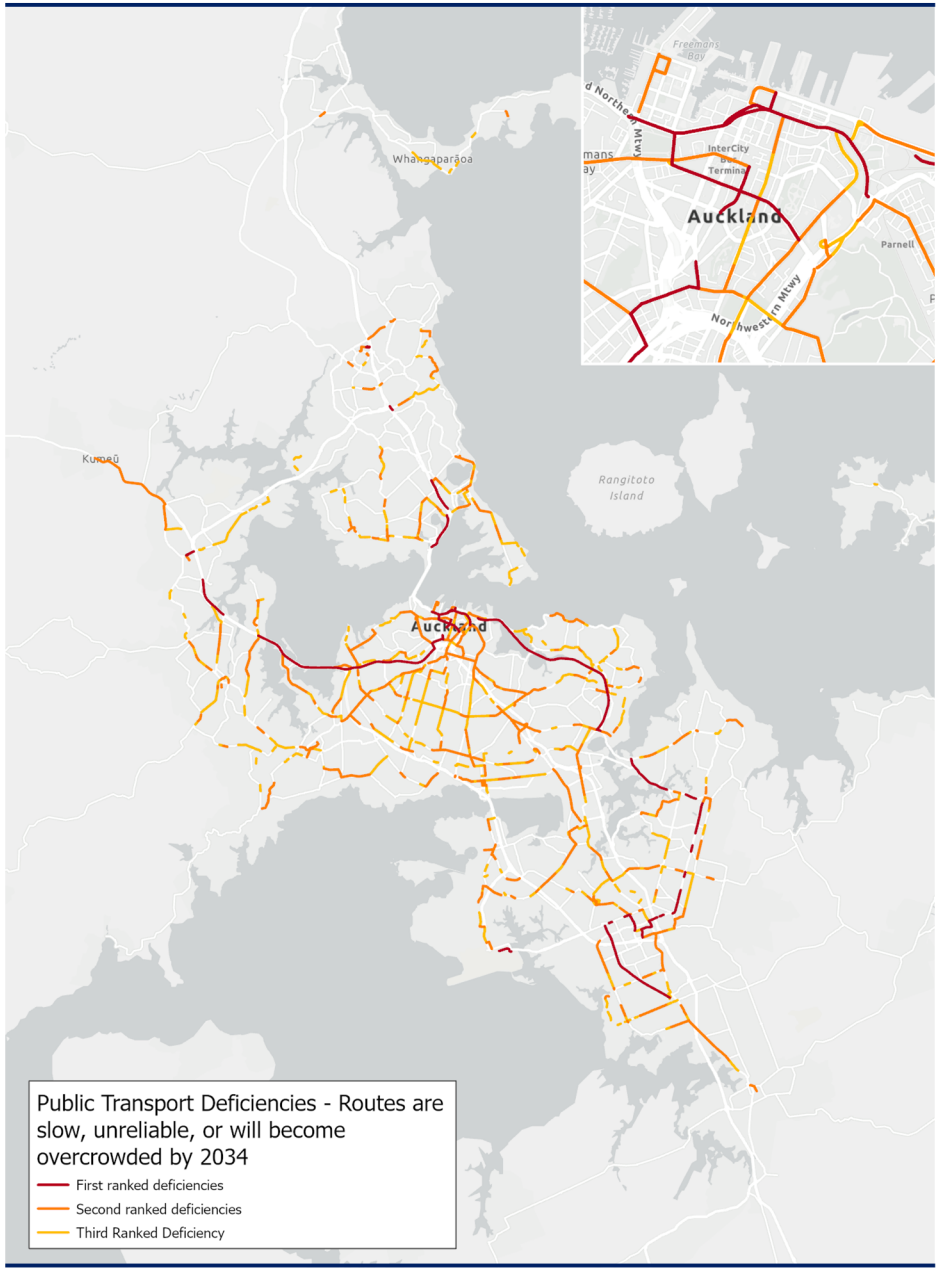
	Moderate	High
Rapid Transit	1	1
Frequent Transit	3	2
Other Strategic	3	2

1	8%
2	22%
3	19%

Key Findings

Top ranked deficiencies and opportunities: Sections of the Northern Express service that are not physically separated from general traffic; the Eastern Line; unconstructed sections of the Eastern Busway and Airport to Botany that are deficient in terms of current infrastructure, illustrating the need to invest. The North-Western Busway is flagging up for similar reasons, although this situation may need reassessment after its opening.

Ranked Deficiencies – First Decade



Cycle and Micromobility Deficiencies

Indicators, criteria and ranking

1. Safe and appropriate facility type (Current)

Lack of safe and appropriate cycle facilities (as defined by the Transport Design Manual) on the Cycle and Micromobility Strategic Network

High

1. No facilities on Cycle and Micromobility Strategic Network

Moderate

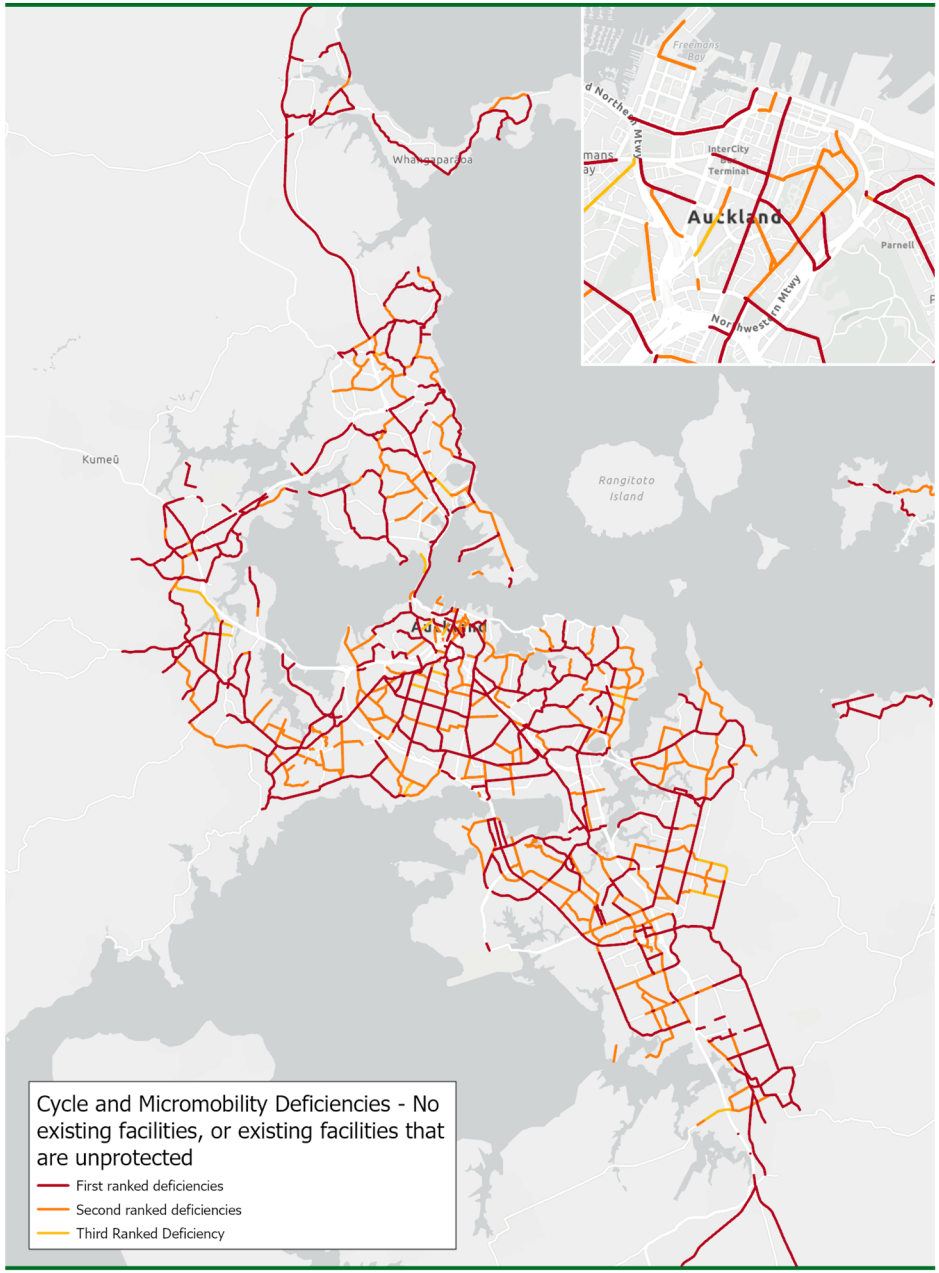
1. Unprotected on-road facilities and traffic calmed streets that are on the Cycle and Micromobility Strategic Network.

Regional	2	1	1	53%
Major	2	1	2	28%
Connector	3	2	3	2%
	Moderate	High		

Key Findings

As the cycle network is dense and lacks the maturity of other networks, most of the network is highlighted. The Opportunity Indicators for the CAM network (shown later in this report) are aligned with the Cycle and Micromobility Programme Business Case (2022) and provide further insight into where improvements are most beneficial.

Ranked Deficiencies



Walking Deficiencies

Indicators, criteria and ranking

1. **Footpath Width (Current)**
   The width of the footpath on any side of the road compared to standards set out in the Transport Design Manual.

2. **Crossing Opportunities (Current)**
   High volume roads without safe and appropriate pedestrian crossings (signalised or zebra crossings) that require cars to stop for people crossing the road.

High

1. On one or both sides of the road: no footpath, or significantly below TDM standard (<1.2 m; or <1.6m at key destinations); or

2. Crossing with Pedestrian Priority is 400 metres of more away, and the amount of daily traffic exceeds 6000 vehicles.

Moderate

1. On one or both sides of the road: footpath below standard (<1.8 m; or <2.4m at key destination); or

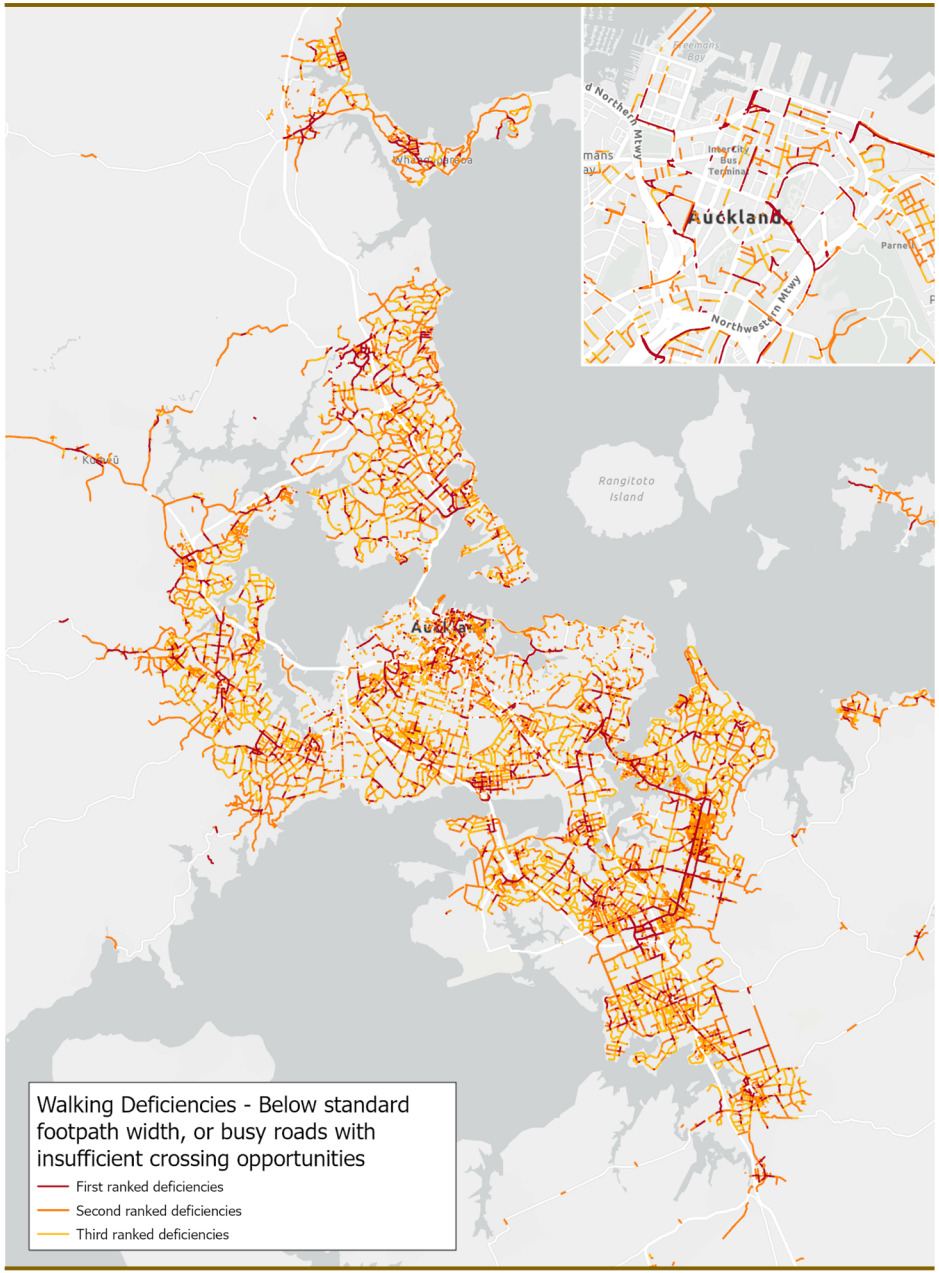
2. Crossing with Pedestrian Priority is >200 and <400 metres away, and the amount of daily traffic exceeds 6000 vehicles.

	Moderate	High		
Primary	2	1	1	11%
Secondary	3	2	2	33%
			3	27%

Key Findings

High and moderate deficiencies affect: a large number of urban/metro/local centres and arterials scattered throughout the wider Auckland region.

Ranked Deficiencies



Freight Deficiencies

Indicators, criteria and ranking

1. **Speed Level of Service (Current)**
   The median travel speed relative to the posted speed limit; used to map where freight is moving at speeds much below the speed limit.

2. **Morning peak volume/capacity (V/C) ratio where proportion of heavy vehicles ≥ 10% (Forecast)**
   Traffic volume relative to a road's capacity is getting worse between now and 2031; used to map which freight routes are becoming busier in the future.

High

1. Interpeak speed LOS D/E/F (<50%); or
2. Over capacity (≥85% V/C) in 2018 and worsening in 2031; or

Moderate

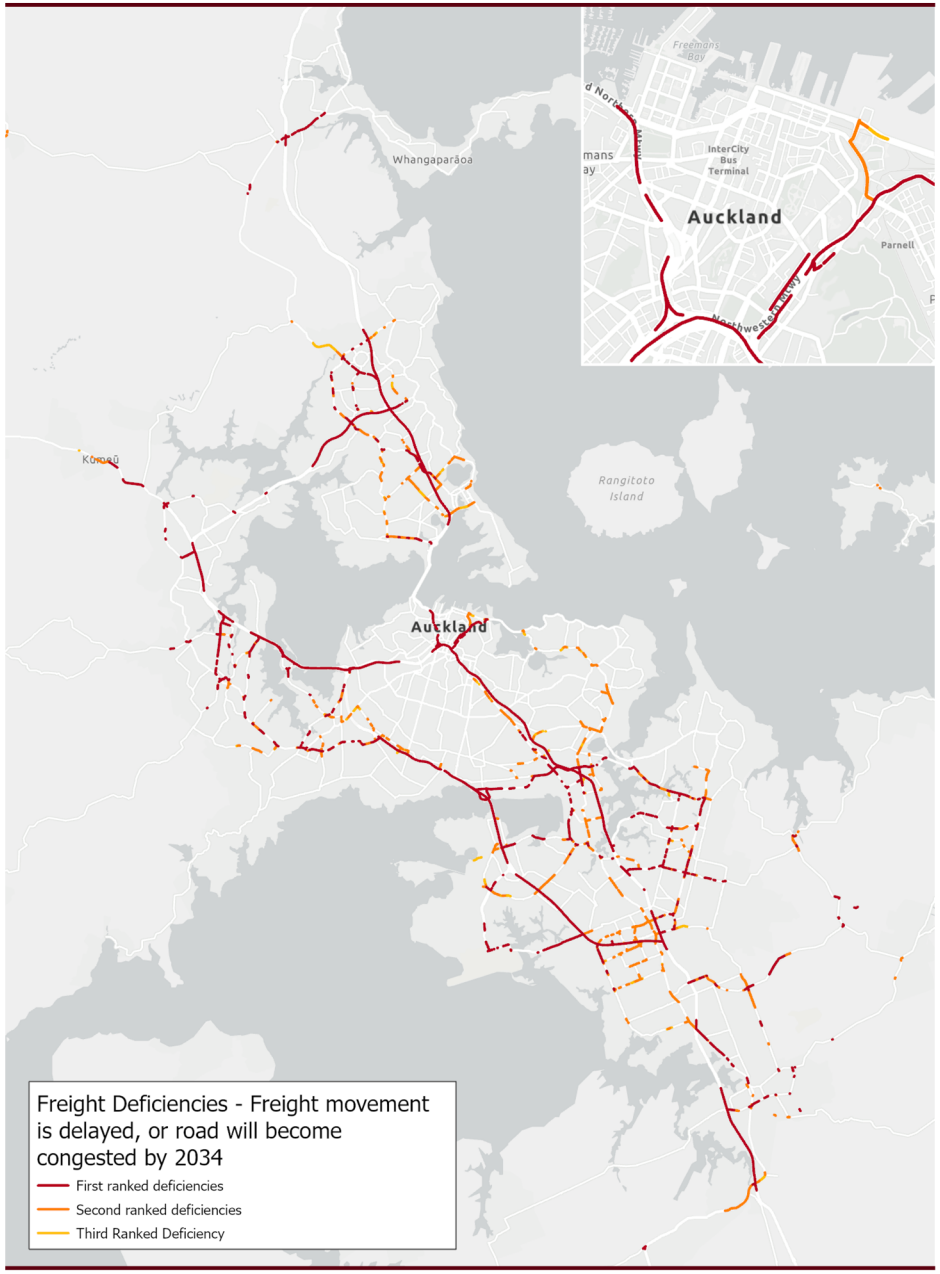
1. AM Peak speed LOS E/F (<40%); or
2. Under capacity (<85% V/C) in 2018 to over capacity (≥ 85% V/C) in 2031; or

	Moderate	High		
Rail and Level 1A	1	1	1	14%
Level 1B	2	1	2	7%
Level 2 and 3	3	2	3	1%

Key Findings

First and second ranked deficiencies and opportunities: constrained access to key freight centres including Port/City Centre, Airport, North Harbour, and Southdown (Otahuhu/Onehunga) and Wiri Intermodal freight hubs.
Deficiencies also affect freight movement supporting current and future industrial and growth areas, including Brookby Road, Whitford Park Road, Te Irigangi Drive and around Westgate.

Ranked Deficiencies – First Decade



General Traffic Deficiencies

Indicators, criteria and ranking

1A. Morning and afternoon peak speed Level of Service (Current)
The AM or PM peak median travel speed relative to the posted speed limit; used to map where cars are traveling at speeds much below the speed limit.

1B. Morning and afternoon productivity Level of Service (Current)
The amount of people travelling down a road in private vehicles and buses during the AM or PM peak hour relative to the target productivity; used to map how efficiently a road is used for moving people around.

2. Morning and afternoon peak travel time reliability Level of Service (Current)
The AM & PM peak travel time relative to typical travel time; used to map where travel times are most inconsistent, making it difficult to plan trips.

3. Morning peak volume/capacity (V/C) ratio change (Forecast)
Traffic volume relative to the road's capacity is getting worse over time.

High

1. Both measures LOS F or one LOS E and other F (AM or PM); or
2. AM or PM travel time reliability LOS F (>100% of typical travel time); or
3. Over capacity (z≥85% V/C) in 2018 and worsening in 2031

Moderate

1. Productivity LOS D or E and Speed LOS E or F; or
2. AM or PM travel time reliability LOS E (≥70% & <100% of typical travel time); or
3. Under capacity (<85% V/C) in 2018 to over capacity (≥85% V/C) in 2031

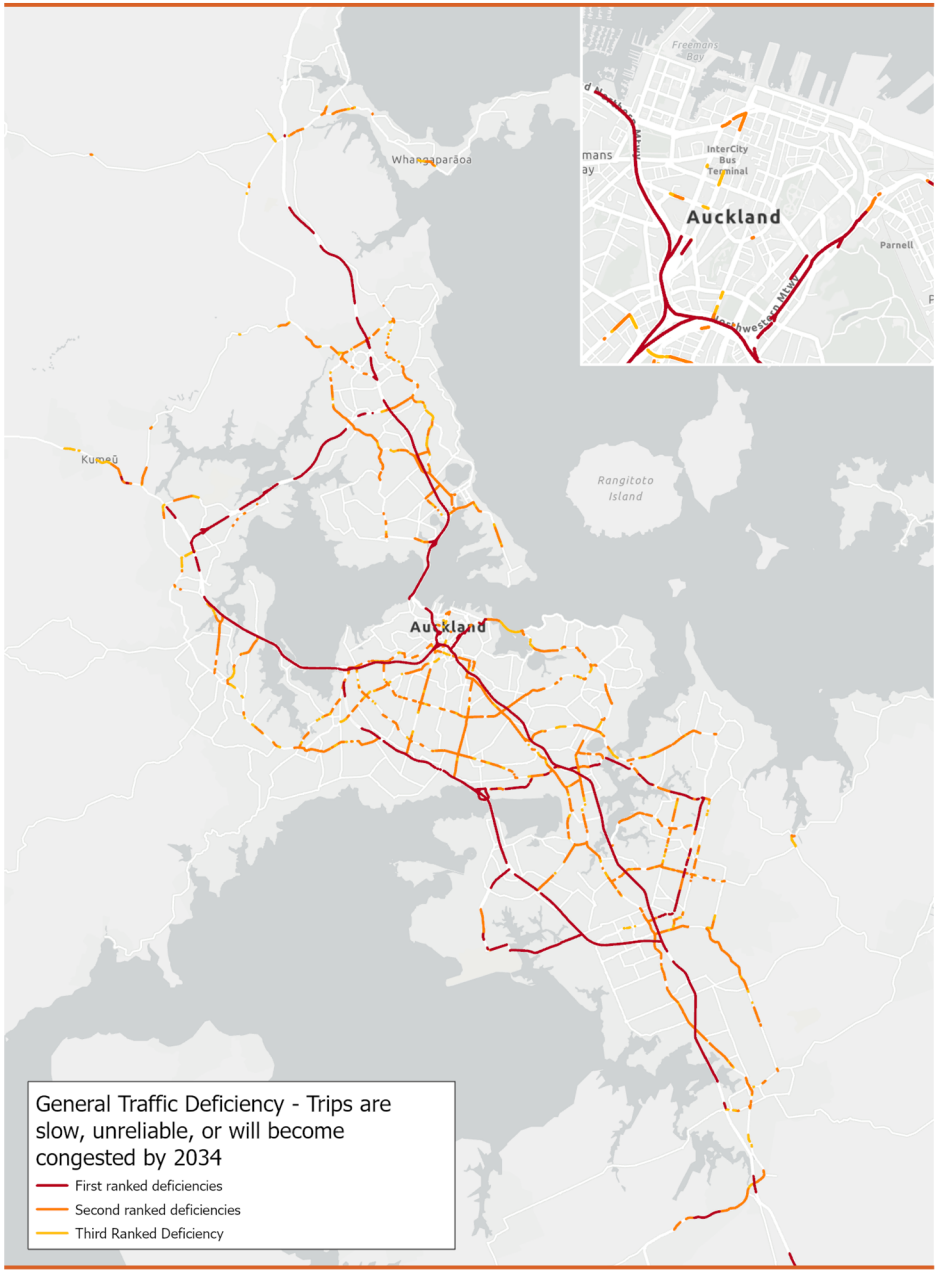
	Moderate	High		
Motorway	1	1	1	18%
Strategic Arterial	2	1	2	17%
Primary Arterial	3	2	3	6%

Key Findings

First ranked deficiencies and opportunities: Motorway network, Te Irirangi Drive, Ti Rakau Drive, and the Nielson Street.

Second ranked deficiencies and opportunities: Key arterials such as Great North Road, New North Road, Edmonton Road, Great South Road, Remuera Road, Lake Road, Wairau Road and Taharoto Road.

Ranked Deficiencies – First Decade



Safety Deficiencies

Indicators, criteria and ranking

1. **Urban KiwiRAP collective risk corridors (Current)**
   Safety risk allocated to a corridor based on the number of deaths and serious injuries in the last 5 years.
2. **Active Road User aggregated corridor risk level (Current)**
   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.

High

1. High and Medium-High risk corridors; or
2. Active Road User Corridor Risk High or Medium-High

Moderate

1. Medium risk corridors; or
2. Active Road User Corridor Risk Medium

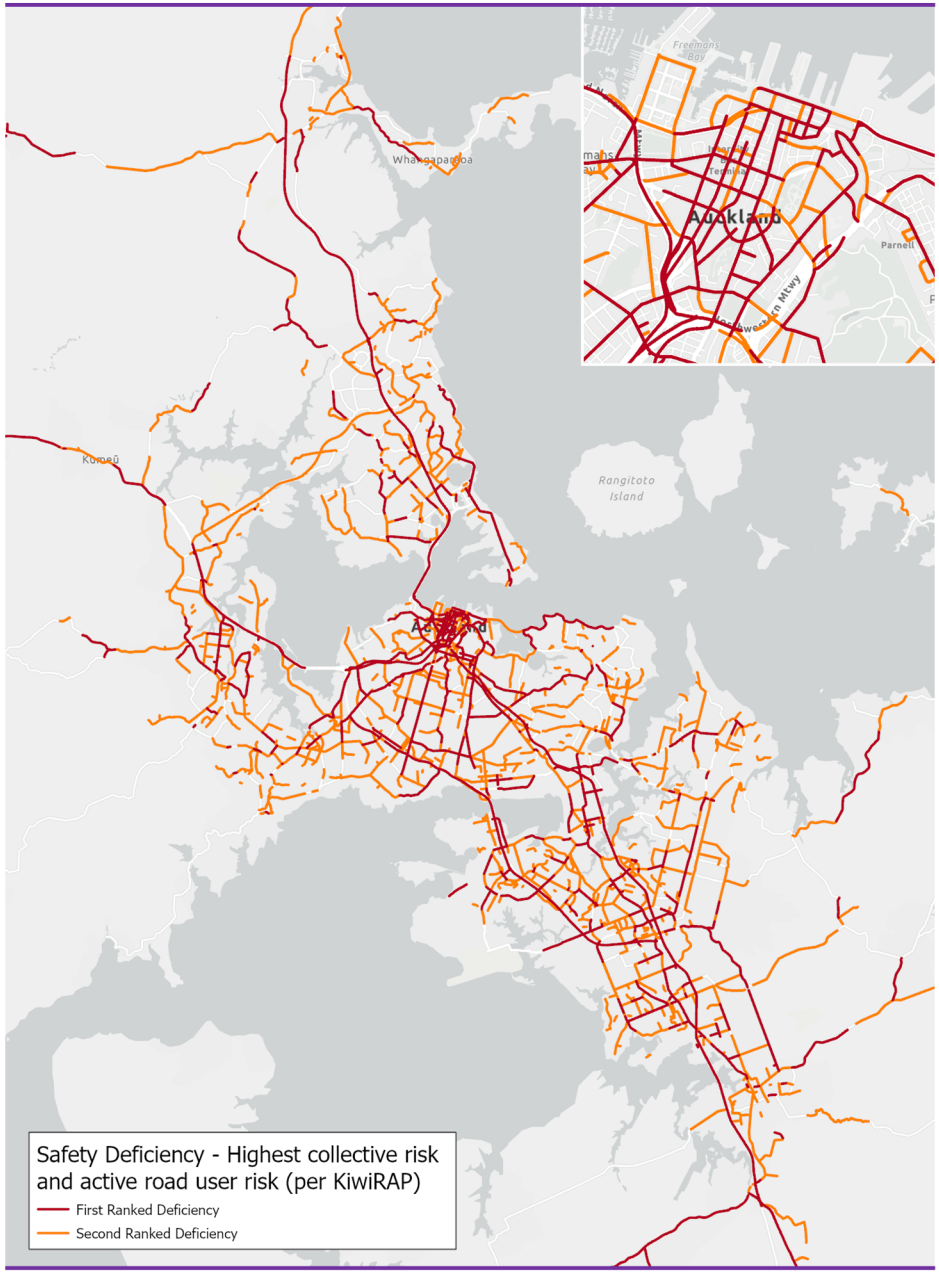
Any Strategic Mode	2	1	1	24%
	Moderate	High	2	27%

Key Findings

First ranked deficiencies and opportunities affect primary mixed-use urban arterials and related centres, particularly the city centre – areas with numerous conflicts between vehicles and vulnerable road users.

Second ranked deficiencies and opportunities affect many connecting corridors. All of these have a high number of deaths or serious injuries per annum relative to other similar road types in the region.

Ranked Deficiencies



Environment Deficiencies

Indicators, criteria and ranking

1. **Stormwater run-off (Current)**
   Strategic Network links where high vehicle volumes discharge pollutants without appropriate treatment devices being in place.

2. **Coastal Erosion and Flooding (Current/Forecast)**
   Strategic Network links in areas with an increasing risk of flooding and erosion due to the impact of climate change and changing weather patterns.

High

1. 30% of busiest local roads (ADT> 25,000) with stream crossings or very high ADT (>35,000); State Highways without TP10 treatment.
2. Links within 1% AEP and 1 Meter Sea Level Rise areas, or Coastal Instability and Erosion areas

Moderate

1. All other 'busy local roads' (ADT > 25,000); or
2. Links within 1%AEP Floodplains

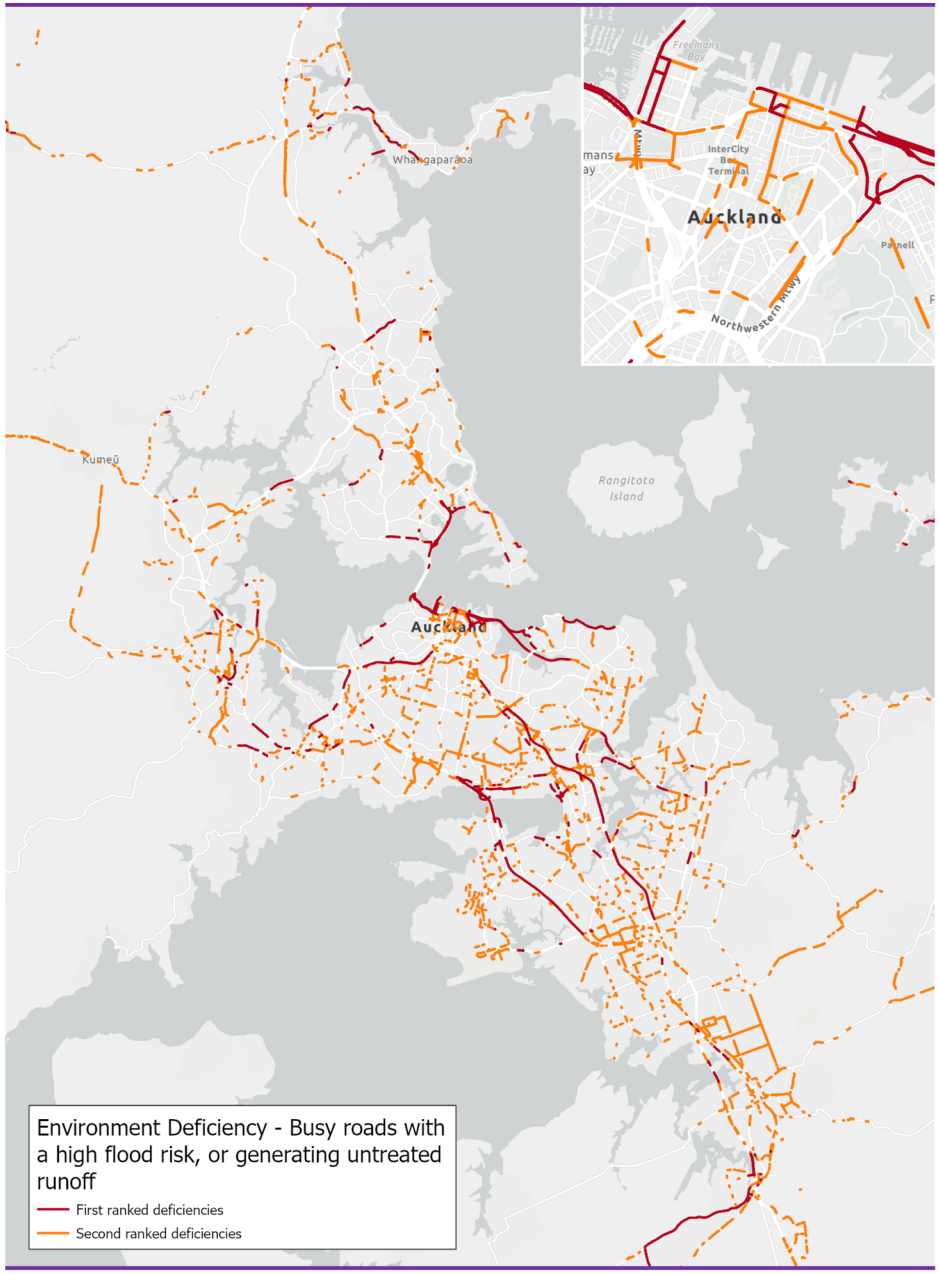
CAM, PT, F, GT	2	1	1	8%
	Moderate	High	2	22%

Key Findings

First ranked deficiencies affect the City Centre waterfront, Tamaki Drive, the Eastern Railway Line, Northern Motorway, roads and railways around the Māngere Inlet, the Upper Harbour Highway, and local roads and Motorways around Manukau, Albany, Rosedale.

Second ranked deficiencies affect many roads around the region, mainly due to them intersecting with floodplains. This flags the need for more investigation into the impact of changing weather patterns on our roads.

Ranked Deficiencies



Multimodal deficiency map

Methodology

The 'Multimodal deficiency map' combines the ranking for all modes into a single, integrated overview of the network.

This map is calculated following methodology that is different from Future Connect 1.0; where this map showed the count of all the Rank 1 problems in each corridor. This emphasized issues on the highest order networks, while ignoring the (still very disruptive) Rank 2 and 3 problems.

Future Connect 2.0 calculates a 'Multimodal Deficiency Score' that considers all ranking outcomes. Corridors with a high score could have a few modes high-ranking issues, or many with smaller ones.

For each mode and problem, rankings are converted using the below table, and then added together to create a total score for each link.

Rank	Score
1	1
2	0.5
3	0.25

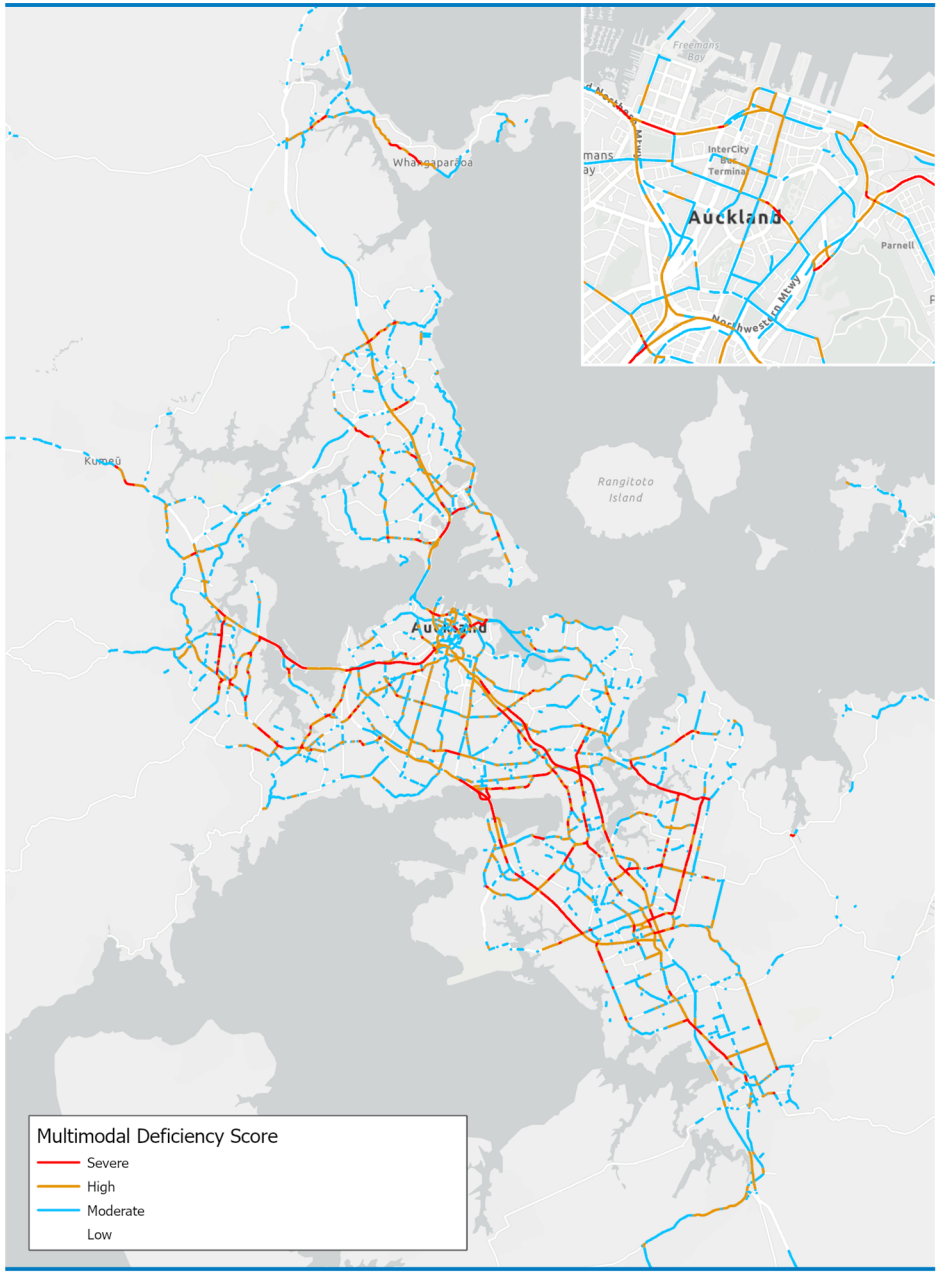
Total Score	Significance	Percentage of Strategic Network
≥ 4 and ≤ 6.5	Severe	3.5%
≥ 3, < 4	High	8.6%
≥ 2, < 3	Moderate	21.2%
<2	Low	51.8%
0	None	14.8%

Key Findings

Severe and High deficiencies: Most notably emerging RTN Corridors, as well as parts of SH20 and SH1. Local roads that stand out are Lincoln Road, Great South Road, Mount Wellington Highway, Neilson Street, Great North Road and Whangaparoa Road.

High and Moderate deficiencies: most of the city's main roads have at last some deficiencies, with Dominion Road, Great North Road, New North Road, Manukau Road, Mill Road and Mount Albert Road flagging as having high multimodal deficiencies.

Multimodal deficiency score



8. Opportunities

As with the Deficiency Indicators, the opportunity indicators have been designed in collaboration with Subject Matter Experts throughout Auckland Transport and Partner Agencies.

In the previous Future Connect, Opportunities were included in the Deficiency Analysis as if they were the same. In this version, they have been kept separate. This makes it easier to see why corridors are being flagged by Future Connect.

8.1. Definition

Opportunities have been defined as corridors where proactive improvement initiatives would likely achieve the highest impacts on customer experience, environment, or other strategic outcomes.

Opportunities do not necessarily indicate a problem with the operation of that mode. Instead, they indicate there is projected demand that investments can help facilitate and leverage off.

8.2. Opportunity Analysis Outputs

The following pages outline opportunity indicators and maps for:

- Walking
- Cycling & Micromobility
- Public Transport
- Freight
- Environment

Safety problems have no opportunity indicators at this stage. A reliable safety indicator was not available at the time of the analysis.

No opportunity indicators have been defined for General Traffic. As this network is the most mature, proactive improvements to General Traffic are made indirectly through a focus on the opportunities within other modes. A shift to more space- and energy- efficient modes should, over time, reduce reliance on private motor vehicles, freeing up capacity on the roads.

Although no *opportunities* for General Traffic investment have been identified within Future Connect, current and forecast *deficiencies* are still included as issues in need of resolution. The NOP, and various other work programmes are actively reacting to existing and expected deficiencies on the General Traffic Strategic Network.

Cycle and Micromobility Opportunities

Indicators

The CAM Opportunity Indicators are based on two indicators from the Cycle and Micromobility Programme Business Case (2021)

1. **Connections to existing/funded network**
   Links on the CAM network that currently do not have facilities but are connecting into existing or future (planned) facilities.
2. **Multiple destinations**
   A network link is in the catchment of more than one key destinations (Metro and Town Centres, Schools, RTN Stations and the Regional Cycle Network as a destination in its own right)

High

1. Network link feeding into existing protected facilities
2. Links in the catchment of 3 or 4 key destinations

Moderate

1. Network link feeding into existing unprotected facilities, or committed facilities (funded in 2021 RLTP)
2. Links in the catchment of two key destinations

How scores are combined

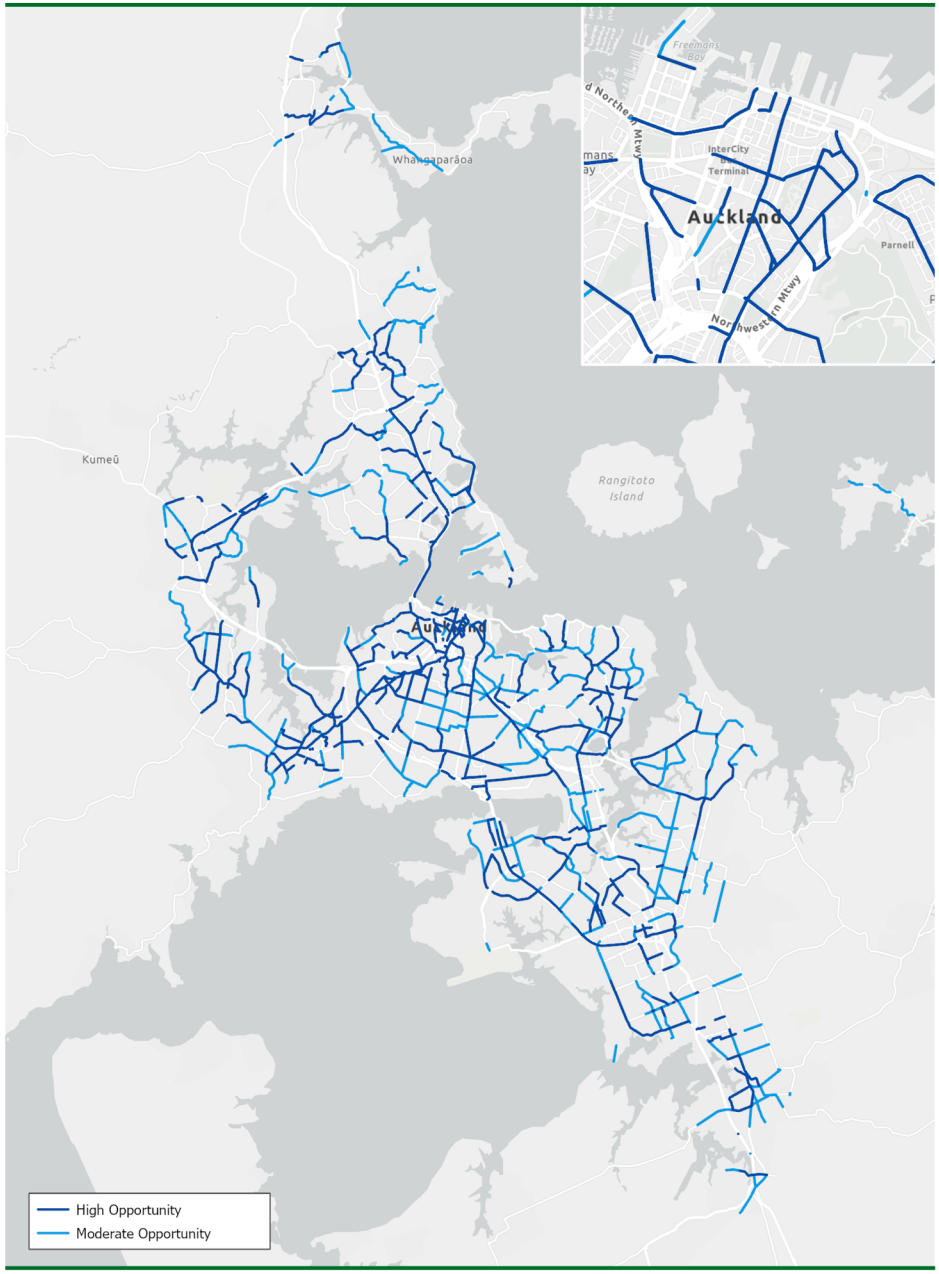
Criteria	Categorisation	Cam PBC Scoring
Connections to existing/funded network	Yes - Existing (Protected)	5
	Yes - Committed (Funded)	4
	Yes - Existing (Unprotected)	3
	Yes - Planned (Unfunded)	1
	No	0
Multiple destinations	3 or 4 key destinations	5
	2 key destinations	3
	1 key destination	1

High: Total Score of 8/9/10

Moderate: Total score of 5/6/7

Note: the CAM PBC applies a further lens to also consider deliverability and safety deficiencies, and further prioritise projects for delivery.

Combined Opportunities



Public Transport Opportunities

Corridors on the network identified as most suitable for increased services

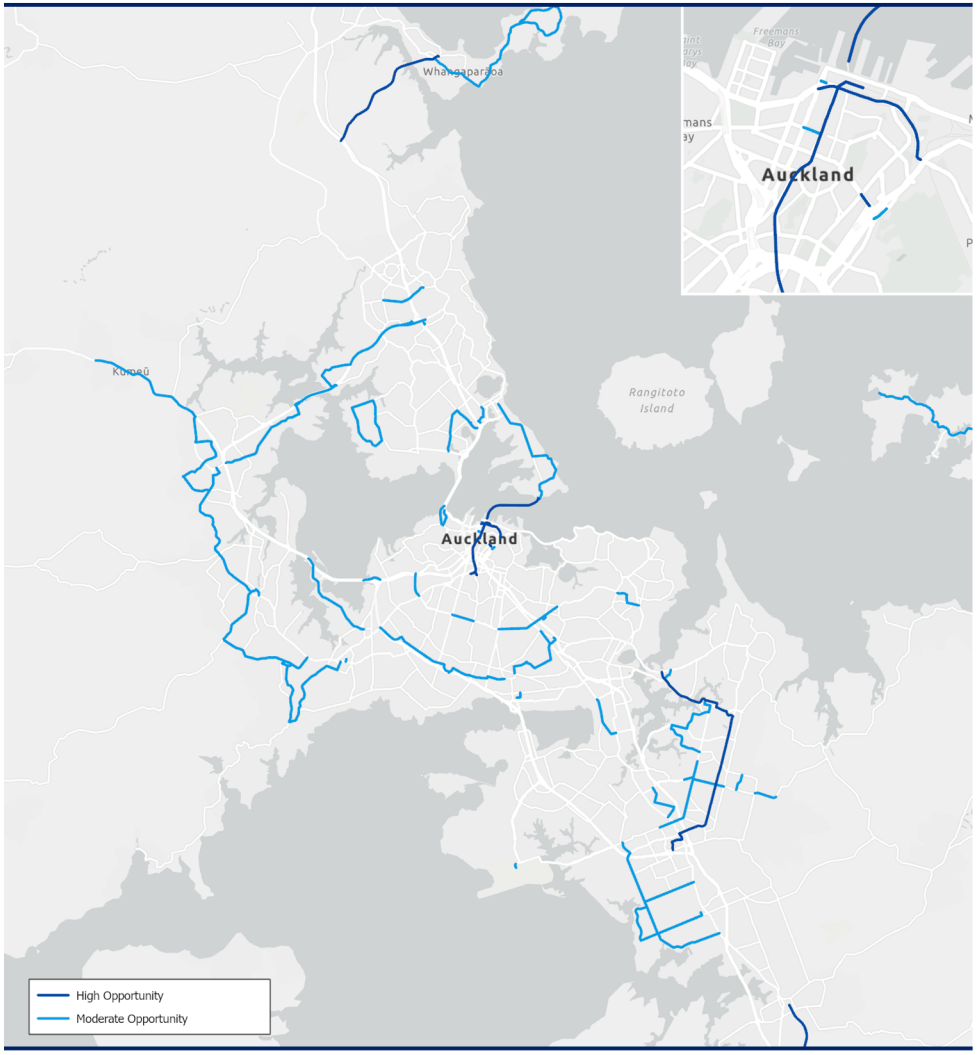
Opportunities for proactive consideration of PT on corridors identified through network planning as being most suitable for new or improved PT services.

High

New planned RTN Services

Moderate

Any corridor with planned new or higher order strategic PT services



Freight Opportunities

Heavy Vehicle Volume Increases (2018 vs 2031)

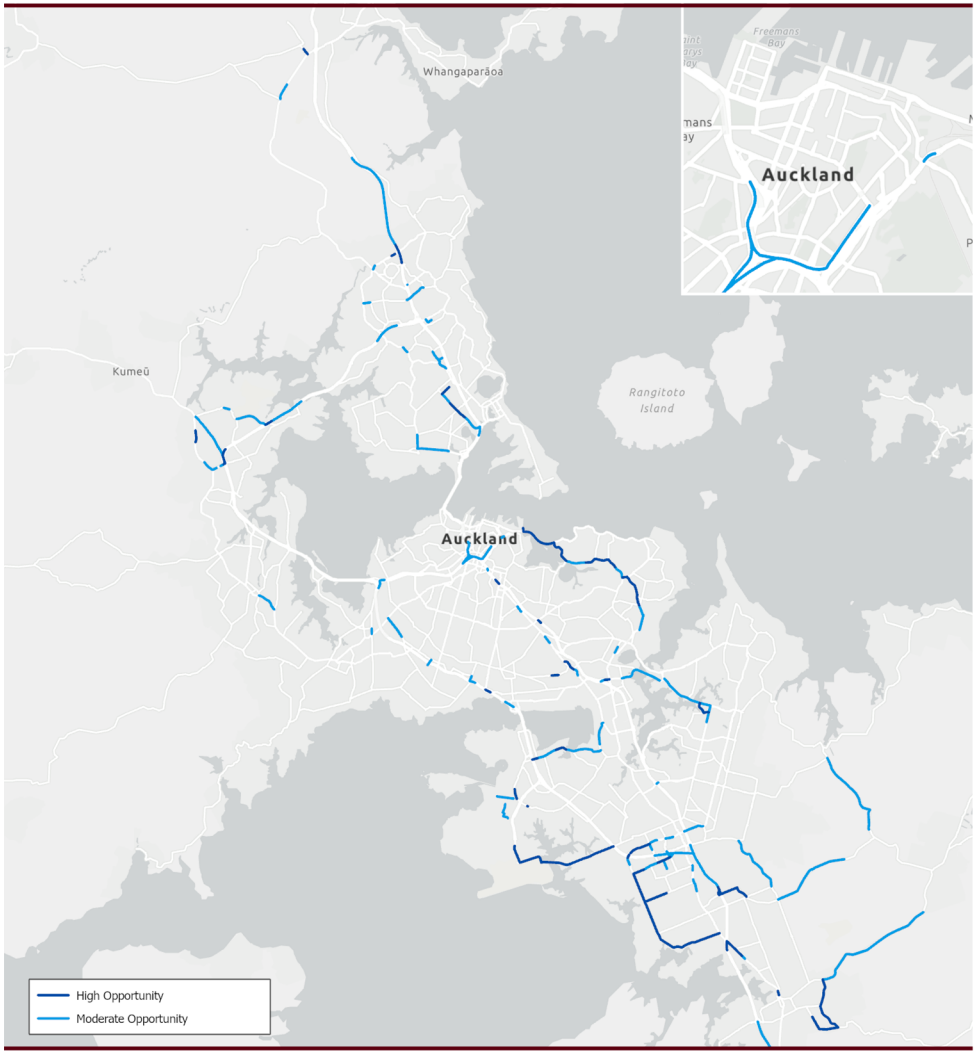
Using forecast data to map emerging freight corridors in need of proactive management.

High

Freight links in the top decile for relative and absolute growth.

Moderate

Freight links in the second highest decile for relative and absolute growth.



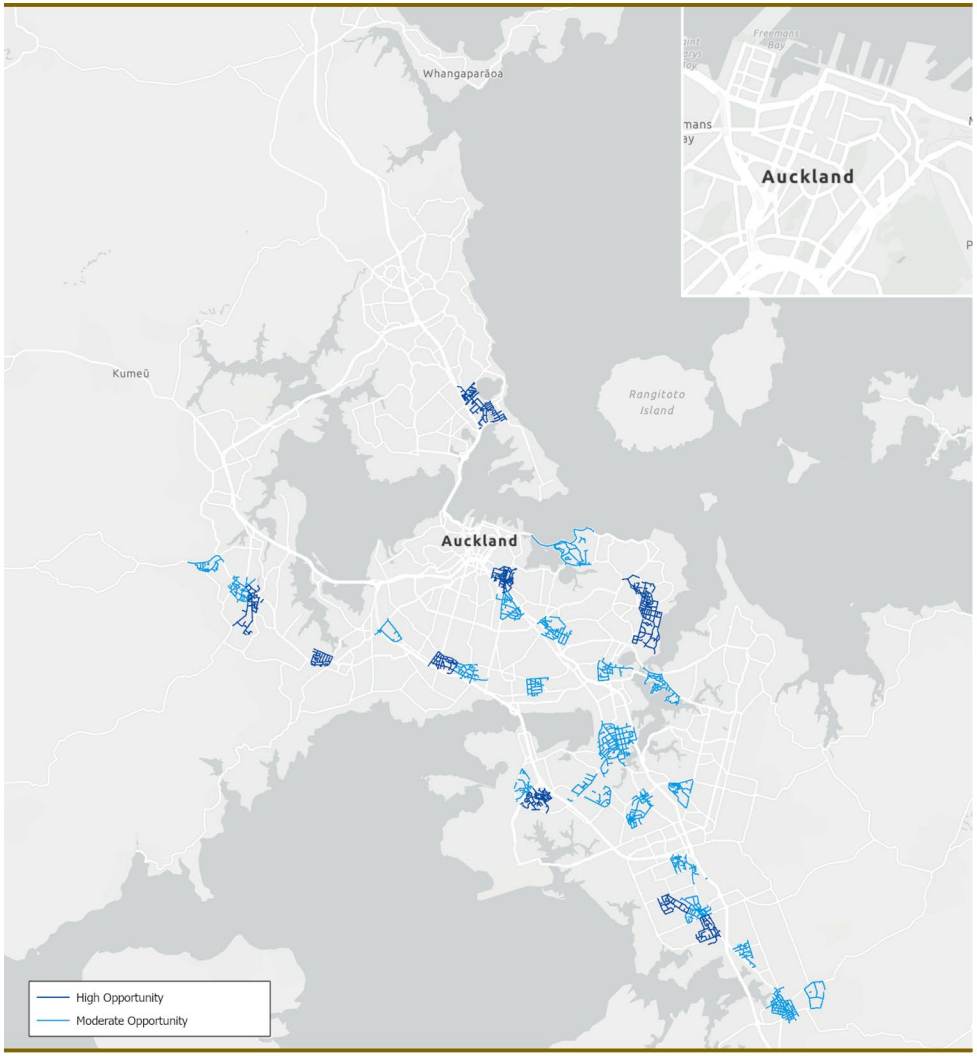
Walking Opportunities

Walking Priority Intervention Areas

Roads where interventions would have the greatest impact based on social and transport system impacts, according to the Walking Programme Business Case.

High
The 11 Top Investment Areas identified in the walking PBC.

Moderate
The Walking PBC Longlist (areas ranked 11-31)



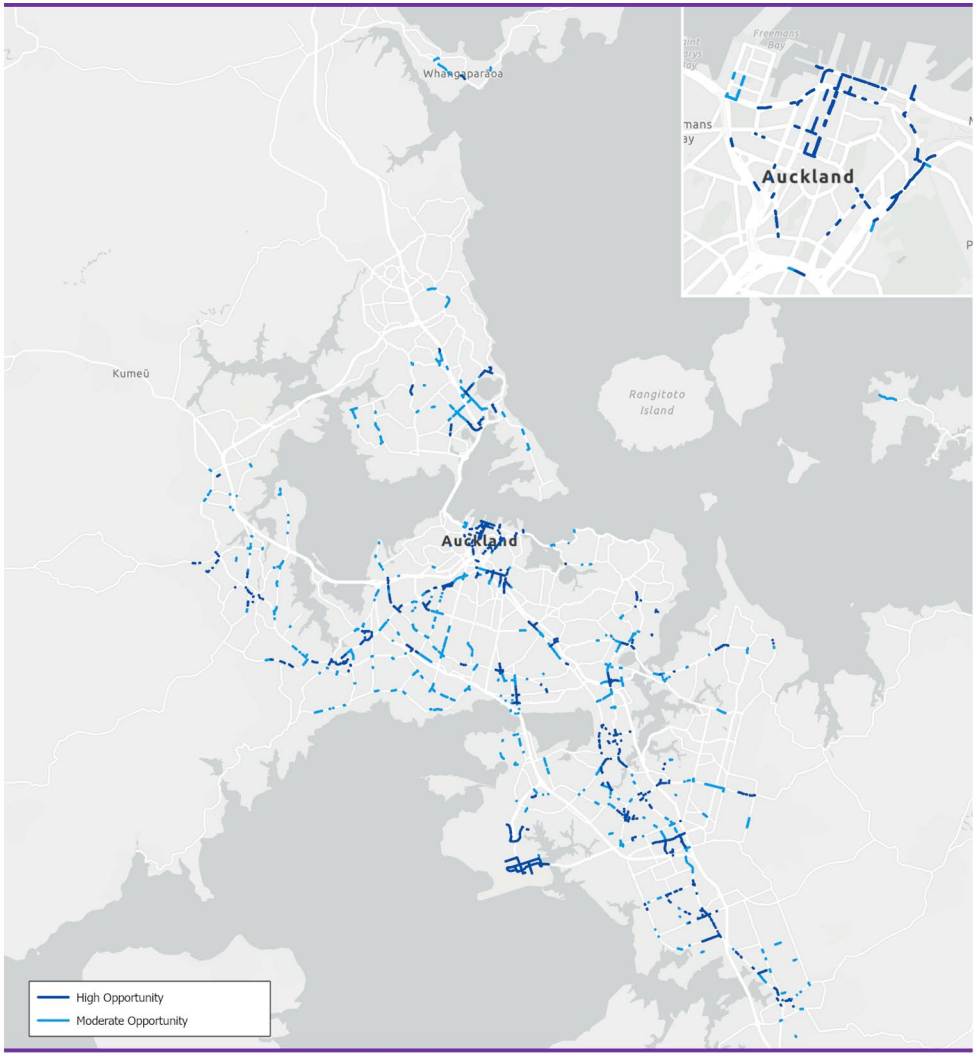
Environment Opportunities

Street tree planting priority

Corridors where improvements to the natural environment will benefit people *and* environment the most, based on heat vulnerability index and place value.

High
Moderate or high heat vulnerability & high place value (P3); or high heat vulnerability on Primary Walking and Regional/Major CAM Network.

Moderate
Moderate heat vulnerability and moderate place value (P2)



9. Equity Analysis

This equity analysis is a new addition to Future Connect, and makes the leap from a corridor-based analysis, to an analysis that also surfaces community needs in different areas across the region.

9.1. Context

In recent years, there has been a growing interest from partner agencies to explore variation in equity and inclusive access. In response, AT has been working on the draft Auckland Transport Equity Framework (ATEF) to develop a clear stance on Transport Equity for the region. The ATEF has identified several key problems relating to equity that projects should aim to address:

1. The transport system does not provide effective and or affordable access to essential services or opportunities for people living in some areas of high socio-economic deprivation.
2. The transport system does not consistently provide for the essential physical access needs of all people, particularly people with disabilities, caregivers of young children and older Aucklanders.
3. The transport system does not consistently provide for the personal safety needs of everyone (particularly high-risk groups, such as: women, girls, LGBTQI people, older and younger people and some minority ethnic groups).
4. The transport system exposes people living in some areas of high deprivation to unacceptable transport-derived harms (air and noise pollution, safety risk, severance)

Future Connect is the first project to apply the Draft ATEF and investigate equity problems across the region.

9.2. Focus of the Future Connect Equity Analysis

As Future Connect is GIS-based, this analysis is focused on the locational aspects of transport equity. This will mostly relate to ATEF Problem 1 and Problem 4: the outcomes which are related to where you live.

Although Problems 2 and 3 do have some locational aspects, there are some key factors that make them different:

- Data Availability - Analysis would require (for example) highly detailed data about bus stop design and amenity that is not available at a region-wide scale.
- Locational vs System issues - Problems 2 and 3 are system wide: issues could occur at the origin, destination, transfer stops, or while being on trains and buses. This means only part of the story can be told in GIS. Impacted populations also live more or less evenly distributed across the region. Their needs should be assessed and addressed system wide.

For these reasons, Future Connect limits itself to investigate the equitable distribution of access to essential services and opportunities, as well as the adverse impacts associated with the transportation network, where people live.

9.3. Domains of transport equity

Future Connect investigates equity across three domains, relating to ATEF problems 1 and 4, as outlined in the following figure.

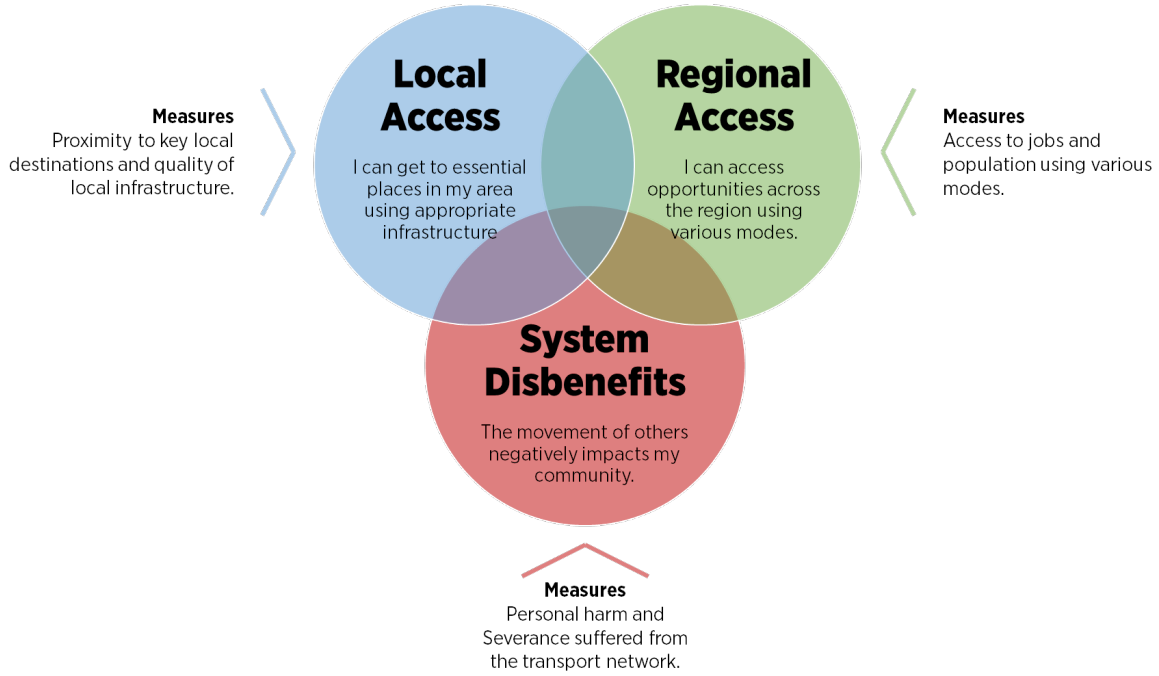


Figure 9-1: The three domains of equity investigated by Future Connect

Across each domain, we've identified multiple measures to work out the distribution of Local Access, Regional Access and System Disbenefits across the region. Measures consider topics like:

- the distance to the nearest bus stop;
- the quality of footpaths in local communities; or
- the percent of jobs accessible in a 45 minute PT trip.

The measures are described in detail in section 9.7, which shows the outcomes across each domain, and can also be found in Appendix B.

The ATEF directs us to find already vulnerable communities, that also experience poor transport outcomes. For these people, it may be more difficult to overcome transport barriers. In the case of this analysis, we have used the NZDep index of social deprivation[3] to measure where vulnerable populations are located. We've then overlaid these with transport outcomes to highlight where vulnerable populations are impacted by poor outcomes across one or more domains, as illustrated in the image below.

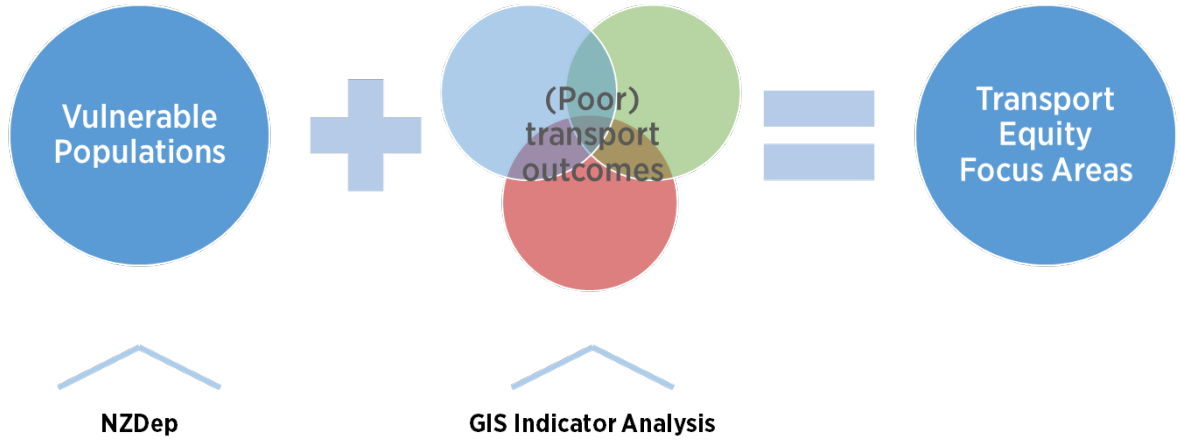


Figure 9-2: narrowing down where poor outcomes matter the most

NZDep data can easily be replaced with other demographical data if needed.

9.4. Urban vs Rural Outcomes

People in urban areas have different travel needs and behaviours from people living more remotely. For example, urban populations are more likely to walk to a bus stop to access the PT network, while rural residents are likely to drive to the nearest Park and Ride.

Because of these differences, it would not be appropriate to hold rural and urban areas to the same standard, or even measure the same things. For this reason, we've used slightly different measures for urban and rural areas; particularly in the domain of Local Access.

Within the urban area, walking, cycling and public transport outcomes are considered more heavily. Not only because these behaviours are aligned with some of AT's system planning objectives, but also because these trips don't require car ownership. In the realm of equity, access to a vehicle can be a barrier; so we want to ensure that free and cheap alternatives to the car are available in urban locations, where these modes are most feasible. However, for rural locations, we understand people are likely to need to drive due to the drastically different land use and greater distances between destinations, so different measures are used.

Rural and Urban Areas are defined through analysis of the Auckland Unitary Plan, as well as recent satellite imagery, using the following criteria:

[3] www.otago.ac.nz/wellington/departments/publichealth/research/hirp/otago020194.html

- Contiguous Urban Area
    - Excluding the following zones: Large Lot; Future Urban; Rural / Coastal Settlements.
    - Live-zoned but undeveloped land removed.
- Peripheral Towns
    - Must have a local centre or higher order; centre must be developed, not live-zoned.
    - Excluding the following zones: Large Lot; Future Urban; Rural / Coastal Settlements.
    - Live-zoned but undeveloped land removed.
- **Waiheke** (which has no zoning)
    - Following Auckland Council Urban/Rural Boundary.

Below is a graphical representation of the urban and rural areas based on the criteria above.

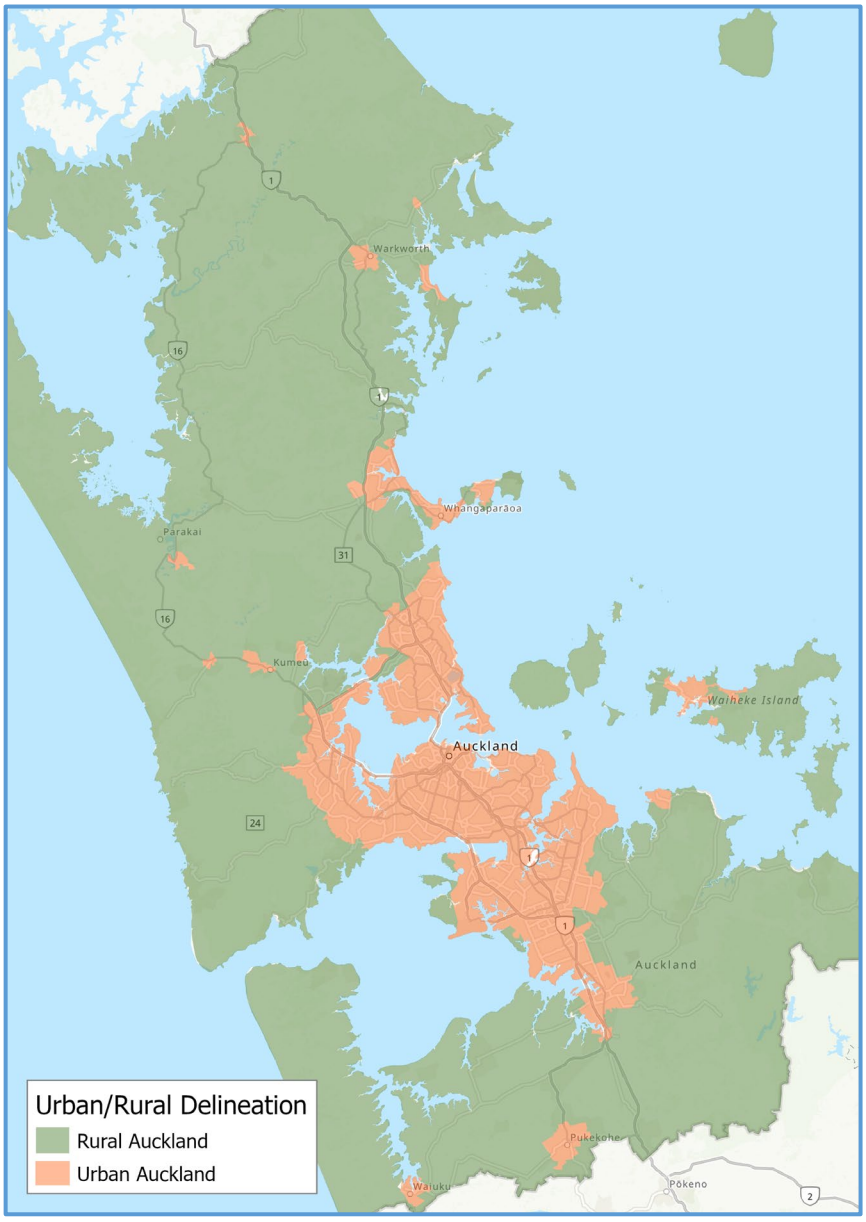


Figure 9-3: Rural/Urban delineation used for the Equity Analysis

9.5. GIS Methodology

The base layer used for this analysis is the new Stats NZ population grid[4] (pictured to the side), which provides a representation of the population distribution across New Zealand, using 250x250 metre cells.

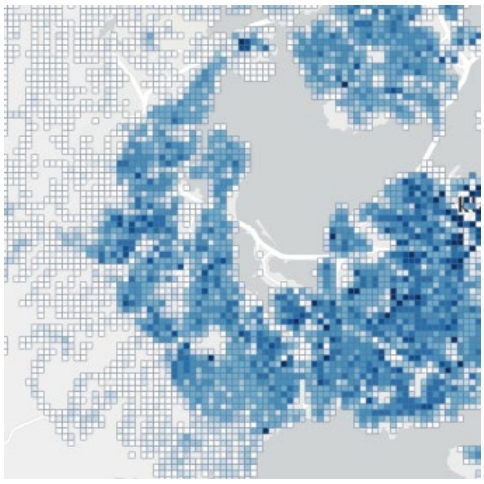


Figure 9-4: Example of the StatsNZ Population Grid

For this analysis, we have focused solely on the approximately 23,000 cells in that are in Auckland and are inhabited; as the analysis is focused on people and what they experience at their place of residence.

The indicators are calculated to produce a unique result for each of the 23,000 cells. To do that, we use the centrepoint of the cells as a starting point for the analysis.

Generally speaking, three strategies for calculating outcomes have been used:

- For indicators measuring properties of the local community (such as the footpath quality), the GIS model generates a certain catchment (for example a walking catchment area) around each centrepoint, and then calculates the percentage of the roads in that area meeting certain criteria. For example: the percentage of footpaths that are too narrow in a 1.5 km catchment around the centrepoint of each cell in the grid.
- For indicators measuring the distance to local amenities, the GIS model calculates the distance from each centrepoint to the nearest amenity (For example, the distance from the centrepoint to the nearest PT stop on the strategic transport network).
- In other instances (where using AFC, Census or Noise Contour data), the GIS model calculates the average value for that cell in the grid.

9.6. Population weighted ranking

Unlike the deficiency analysis, the equity analysis has no defined criteria that determine whether specific outcomes are acceptable or not. Instead, we compare all the outcomes against each other, and generate decile scores. This is similar to how Social Deprivation Indices are calculated: even if things improve, there will still be differences in the outcomes people experience and a need to identify which communities are most in need.

We also need to account for the huge differences in population density across the region. For example, about 60% of the cells lie in rural areas, but less than 9% of the population resides here. If the analysis were to simply make comparisons between areas, without considering population, this would skew the results in an unfair way, to either rural or urban densities (depending on the measure). As a result, granularity in the final result is lost. Therefore, we have applied a population weighted percentage ranking to each of the indicators.

[4] https://maps-by-statsnz.hub.arcgis.com

In simple terms, this means that someone living in an area with a score of 1 belongs to the 10% of Aucklanders experiencing the worst outcomes, and 90% of people have it better. Conversely, if your neighbourhood has a score of 10, you belong to the group of Aucklanders that has it better than 90% of the population.

This population ranking has been achieved by taking the GIS outputs and processing them as follows:

- Sort the list of outcomes in ascending order.
- Calculate cumulative population: For each item in the list, add up the population of that item, as well as all the previous items.
- Calculate the percentile rank: Divide the cumulative population for each outcome by the total population and multiply by 10.

9.7. Equity Analysis Detailed Analysis and Findings

The following pages contain a detailed description of measures used and outcomes for each of the three domains that have been investigated. A more detailed list of all the indicators is included in Appendix B.

Local Access – Aucklanders can get places in their community using appropriate infrastructure

Indicators

Urban

1. **Distance to key destinations – People can get places without driving or PT**
   Distance to the nearest GP, Pharmacy, Early Childhood Education Primary School, Park or Dairy/Supermarket. Distances beyond 1.5 km get the worst score.
2. **Distance to nearest strategic PT Stop – People have access to the PT Network**
   Distance to the nearest strategic public transport stop (FTN Bus Stop or Station). Distances beyond 1.5 km get the worst score.
3. **Footpath quality in area – People can easily walk to local destinations**
   The percentage of urban roads in a 1.5 km catchment that have a high deficiency for footpath width (aligned with footpath width deficiency indicator)
4. **Bike path quality in area – People can easily cycle to local destinations**
   The percentage of urban roads in a 3 km catchment that have a high deficiency for cycling (aligned with CAM deficiency indicator). If there is no CAM network, the area gets the lowest score.

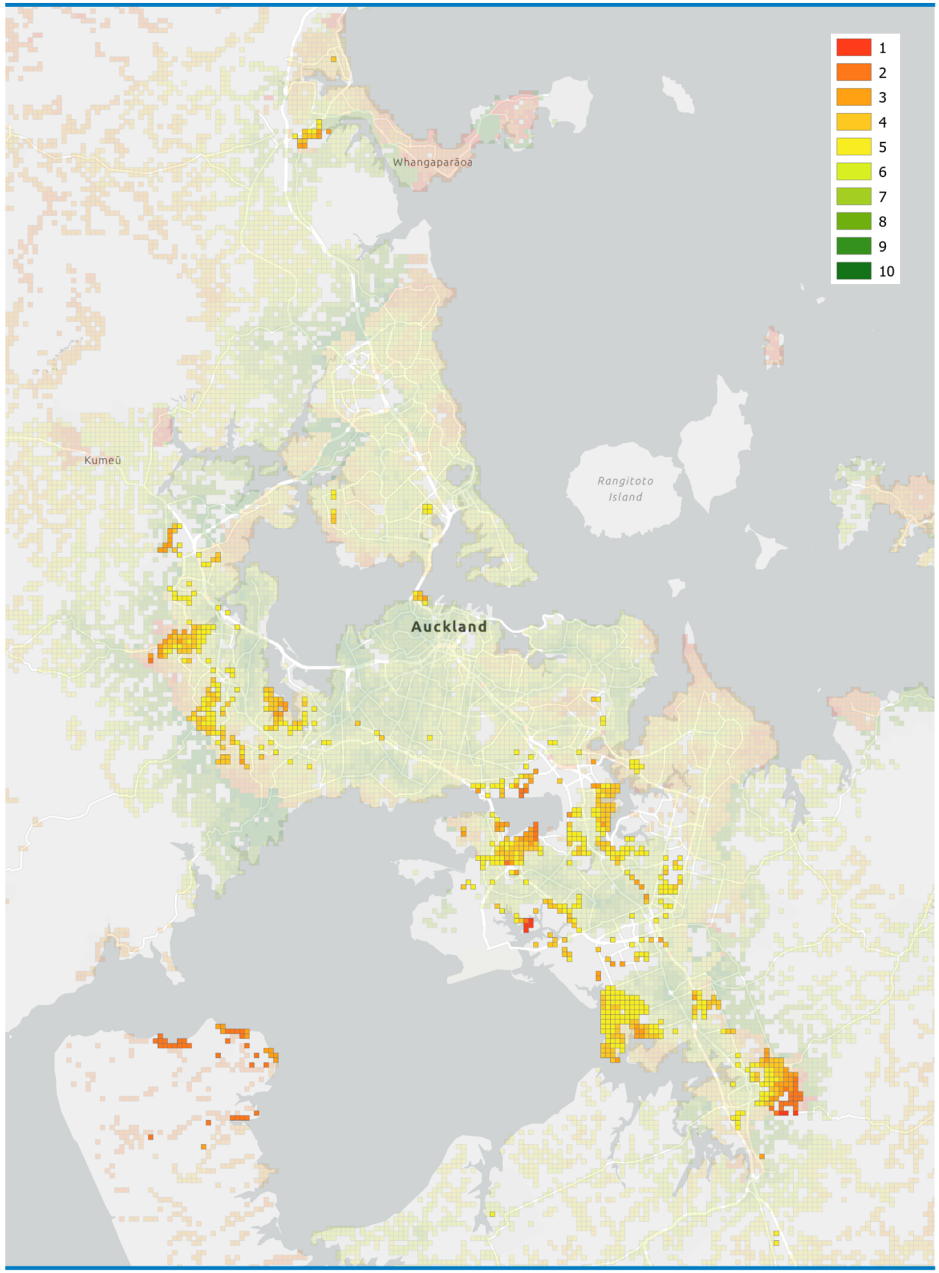
Rural

1. **Distance to key destinations – People can get places without driving too long**
   Distance to the nearest GP, Pharmacy, Early Childhood Education Primary School, Park or Dairy/Supermarket. Not capped at a distance
2. **Distance to nearest Park and Ride – People have access to the PT Network**
   Distance to the nearest Park & Ride Facility.
3. **Unsealed Roads – People can easily drive to key destinations**
   The percentage of roads in a 11 km catchment (average 85th percentile trip length for indicators 1 and 2) that is unsealed.

Key Findings

Although only few areas score bad across *all* measures, Ranui, Henderson, Glendene, Favona, Otahuhu, Manurewa, Red Hill and parts of Pukekohe come out as having poor local access. In general, rural locations closest to the city come out favourable, as does the central isthmus area.

Average Scores - Score five or less & NZDep 8 or more highlighted



Regional Access – Access to social and economic opportunity across the region

Indicators

1. **Percentage of the region's jobs accessible within 30 minutes by car**
   Uses Auckland Forecast Centre modelling outputs to calculate access to the labour market by car, as a measure for economic opportunity.

2. **Percentage of the region's jobs accessible within 45 minutes by PT**
   Uses Auckland Forecast Centre modelling outputs to calculate access to the labour market by Public Transport, as a measure for economic opportunity.

3. **Percentage of the region's population accessible within 30 minutes by car**
   Uses Auckland Forecast Centre modelling outputs to calculate access to the regions people by car, as a measure for social opportunity.

4. **Percentage of the region's population accessible within 45 minutes by PT**
   Uses Auckland Forecast Centre modelling outputs to calculate access to the regions people by PT, as a measure for social opportunity.

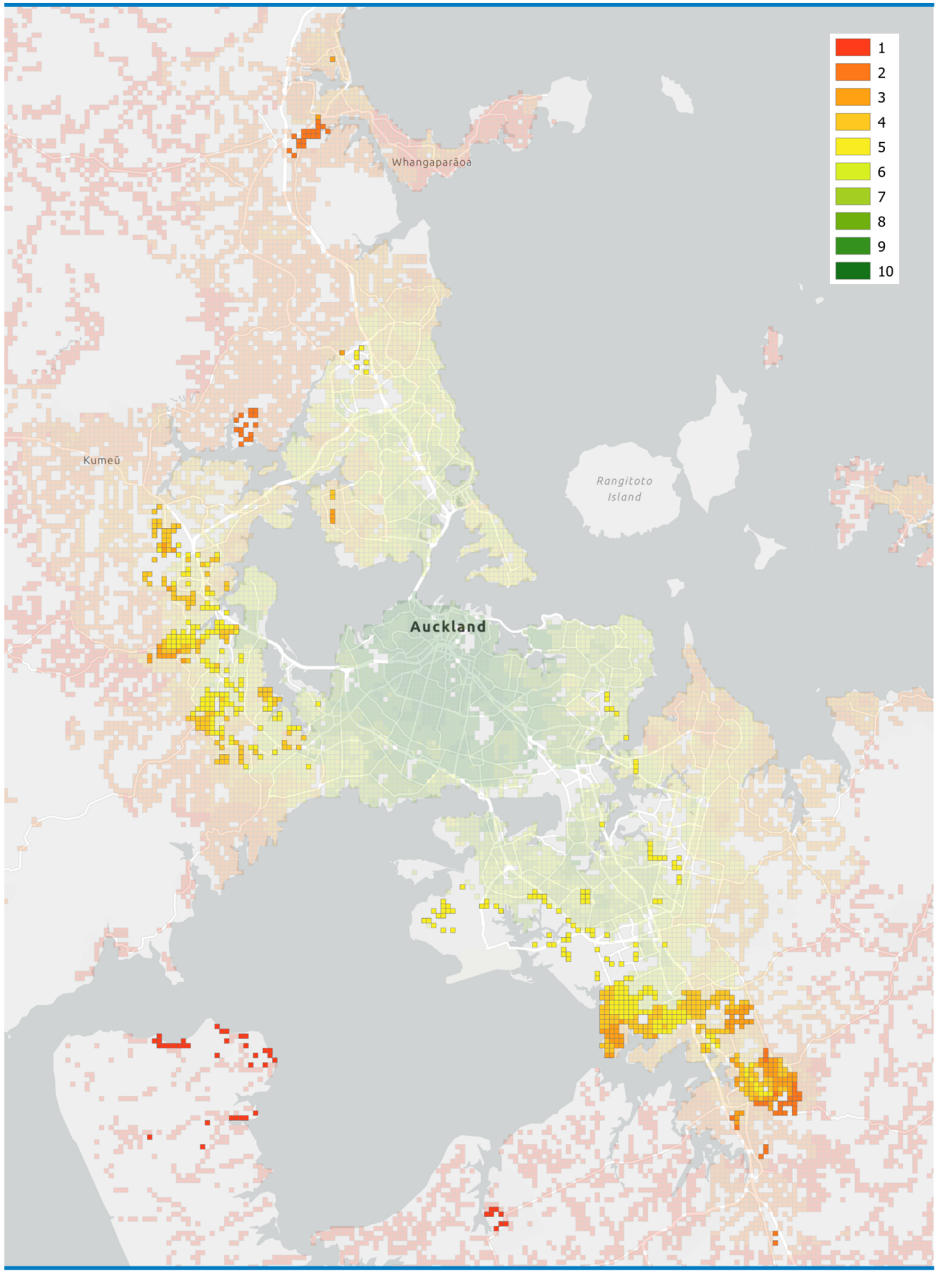
5. **Urban Only: People commuting by bike**
   Uses Census 2018 data to compare bicycle mode share across the city, as a proxy for jobs accessible by bike in the urban area.

Key Findings

Not unsurprisingly, access to jobs and people decreases as the distance from employment centres increases. The west and the far south come out as having particularly poor access compared to other Aucklanders, as do settlements like Drury and Wellsford.

Rurally, settlements around the Manukau Harbour and Kaipara Coast come out as having poor access to the region; often relying on unsealed roads to get around.

Average Scores - Score five or less & NZDep 8 or more highlighted



Transport Network Disbenefits – The movement of others impacts my community

Indicators, criteria and ranking

1. **Urban KiwiRAP Collective Risk Corridors – movement in community makes local trips unsafe**
   Percentage of roads in a 1.5 km catchment with high or medium high Collective Corridor Risk.
2. **Urban KiwiRAP Active Road User Risk – movement in community makes local trips unsafe**
   Percentage of roads in a 1.5 km catchment with high or medium high Active Road User Risk

3. **Infrastructure Severance - movement of others makes local trips indirect**
   The percentage of urban roads in a 1.5 km catchment that have a high deficiency for pedestrian crossings (aligned with pedestrian crossing deficiency indicator)
4. **Community Severance – where roads and railways divide communities**
   The percentage of urban roads in a 1.5 km catchment that are either busier than 6000 vehicles per day, 4 lanes, motorways or railways.

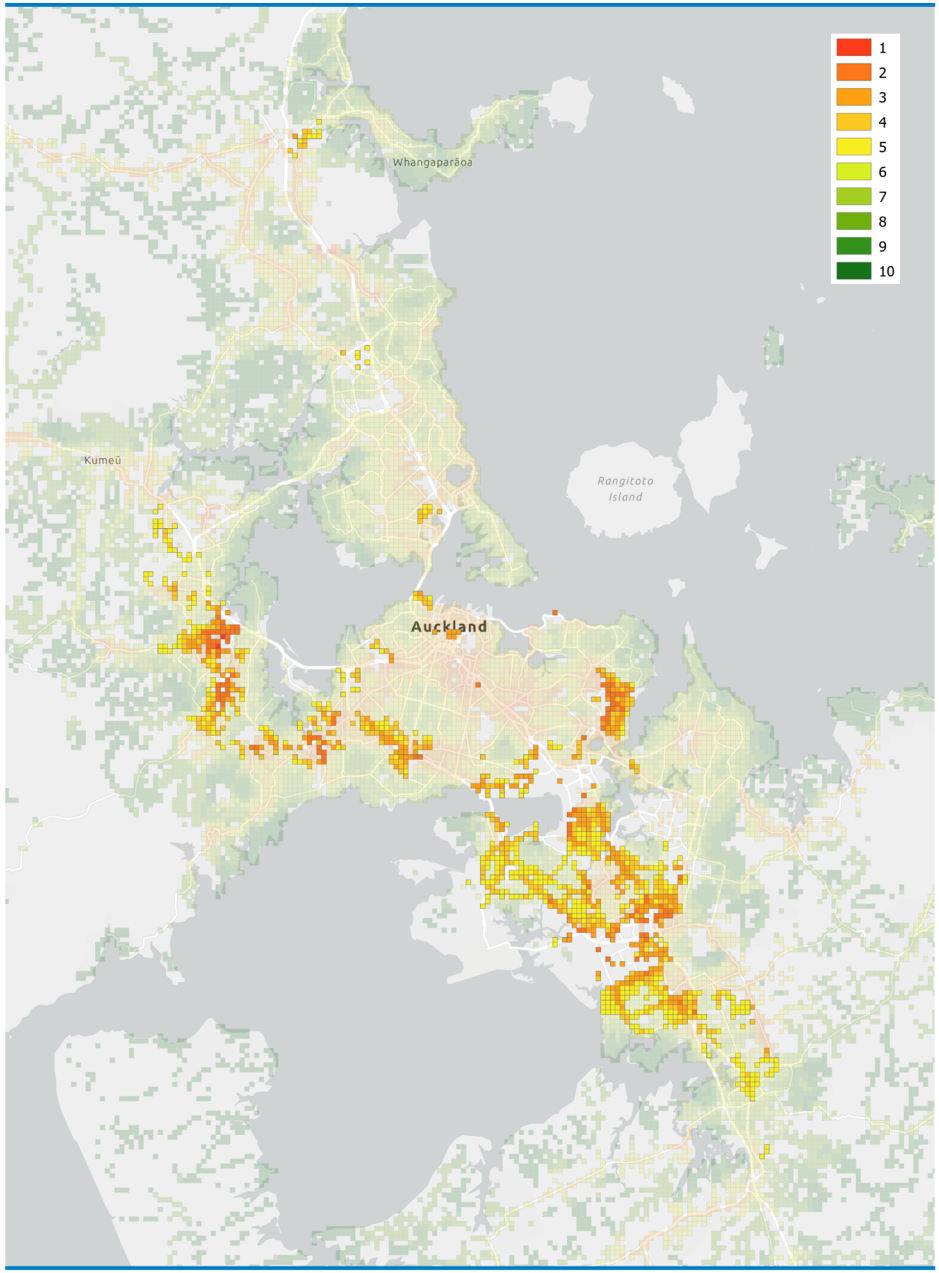
5. **Road Noise - movement of others disturbs local residents**
   Average exposure to road noise in direct vicinity to property.

Key Findings

People living in denser areas experience significantly more disbenefits than people living in suburban or rural environments. Visitors from around the region will travel through and/or to these areas on their way to work and school, or for recreational purposes, impacting the communities they travel through.

Much of the west and south, but also East Tamaki and Mt Roskill flag up as areas of particular concern.

Average Scores - Score five or less & NZDep 8 or more highlighted



Equity – Focus Areas

Shaping Equity Focus Areas

The purpose of this analysis was to find out vulnerable groups of people experiencing poor transport outcomes, since people living in high deprivation conditions may lack the means to overcome the barriers put up by the transport system. We've mapped these areas across the three domains discussed on the previous pages. These maps have highlighted areas with a deprivation index of 8 and higher, that have average scores of 5 or less, to figure out where people are most impacted.

Of course we also want to understand where people experience poor outcomes across more than one of the domains. The map to the right provides a (generalised) overview of these overlaps. This map also distinguishes between Rural and Urban locations, to highlight the different population densities and travel behaviours one may see between the two geographies.

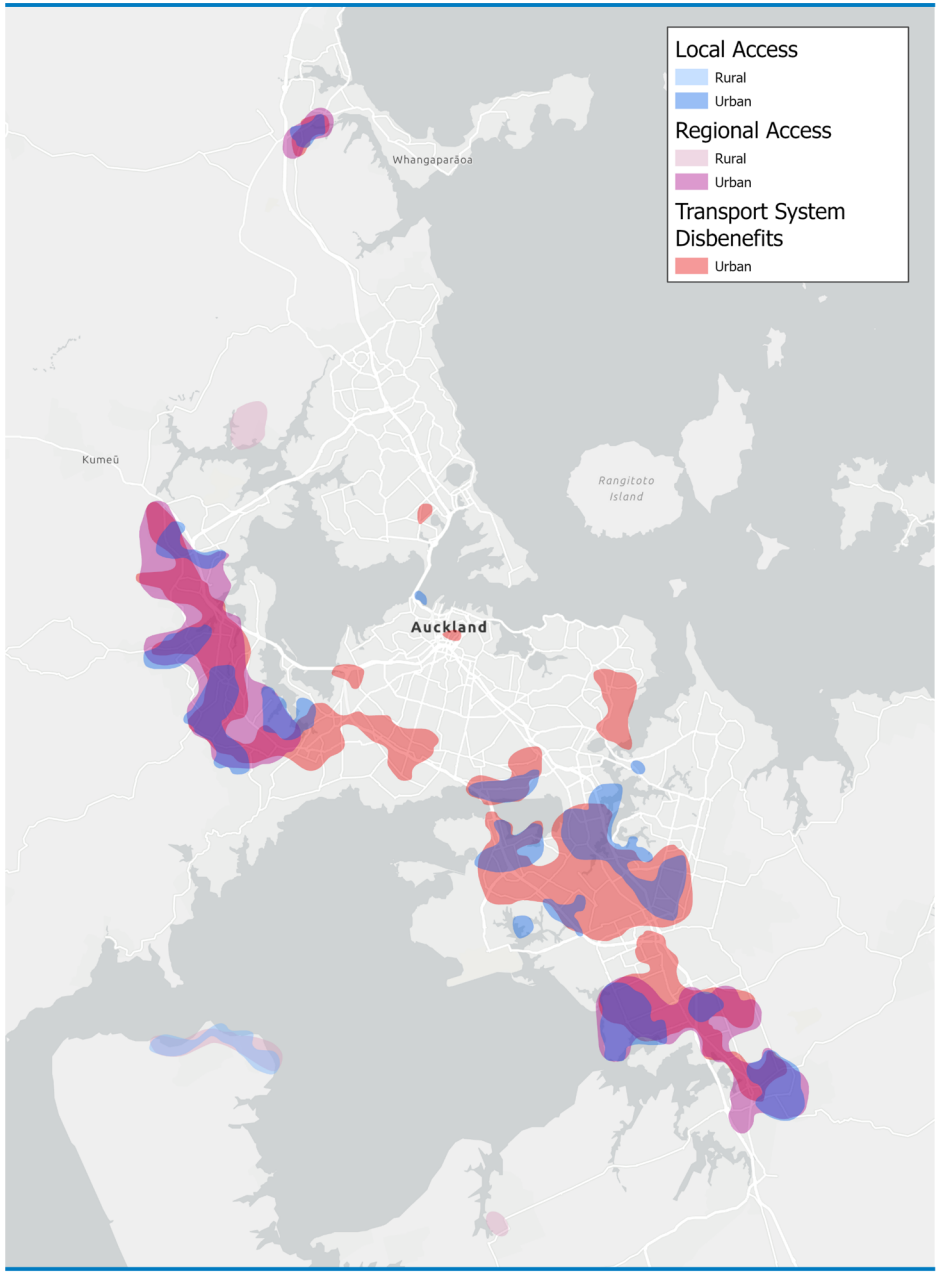
A full map is available on the Future Connect Mapping Portal.

Key Findings

In the west and the south, we see poor outcomes across all three domains. Here, people are not able to easily walk/cycle to local destinations because they're too far away and/or there is poor infrastructure provision. This means people rely on the car for day-to-day tasks. People in these areas have poor access to regional opportunity using most modes of transport; while also receiving a large portion of system disbenefits.

Closer to the city, the access to regional opportunities become less of an issue, but high disbenefits and poor access to local destinations remain a key issue for many high deprivation areas.

High Deprivation / Poor outcome areas



9.8. Further uses and limitations of the equity analysis

The outputs of the equity analysis contain a wealth of information that can be used in a variety of different ways. Maps can be produced for each of the individual measures, or subsets of measures can be combined to highlight issues more related to a particular project.

The deprivation index can also be switched out with other population indicators, such as age, income or ethnicity.

The data should always be used with caution. GIS outputs are good at highlighting trends across the region, but they are the result of an automated process that should be verified when using the data to make statements about very small areas.

Finally, when equity is important in a project, always consider the two problems not included in this analysis: mobility needs, and personal safety. These problems are major hurdles for a significant proportion of people, and their needs must also be considered.

10. Auckland Rapid Transit Network Study

10.1. About the Rapid Transit Network Study

Completed in 2022, the Rapid Transit Network (RTN) Study analyses each RTN station and its surrounding built environment. The study analyses current performance and identifies priorities for improvement. It includes eight groups of variables spread across three themes – transport access (by walking, cycling, public transport, and car), land use (proximity, density, and land use diversity) and station experience. Stations are grouped into 'typologies' which determine the scores they should ideally achieve for each of the eight variable groups. The ideal typology scores are then compared to the current score and future score (based on planned investments) to identify performance gaps.

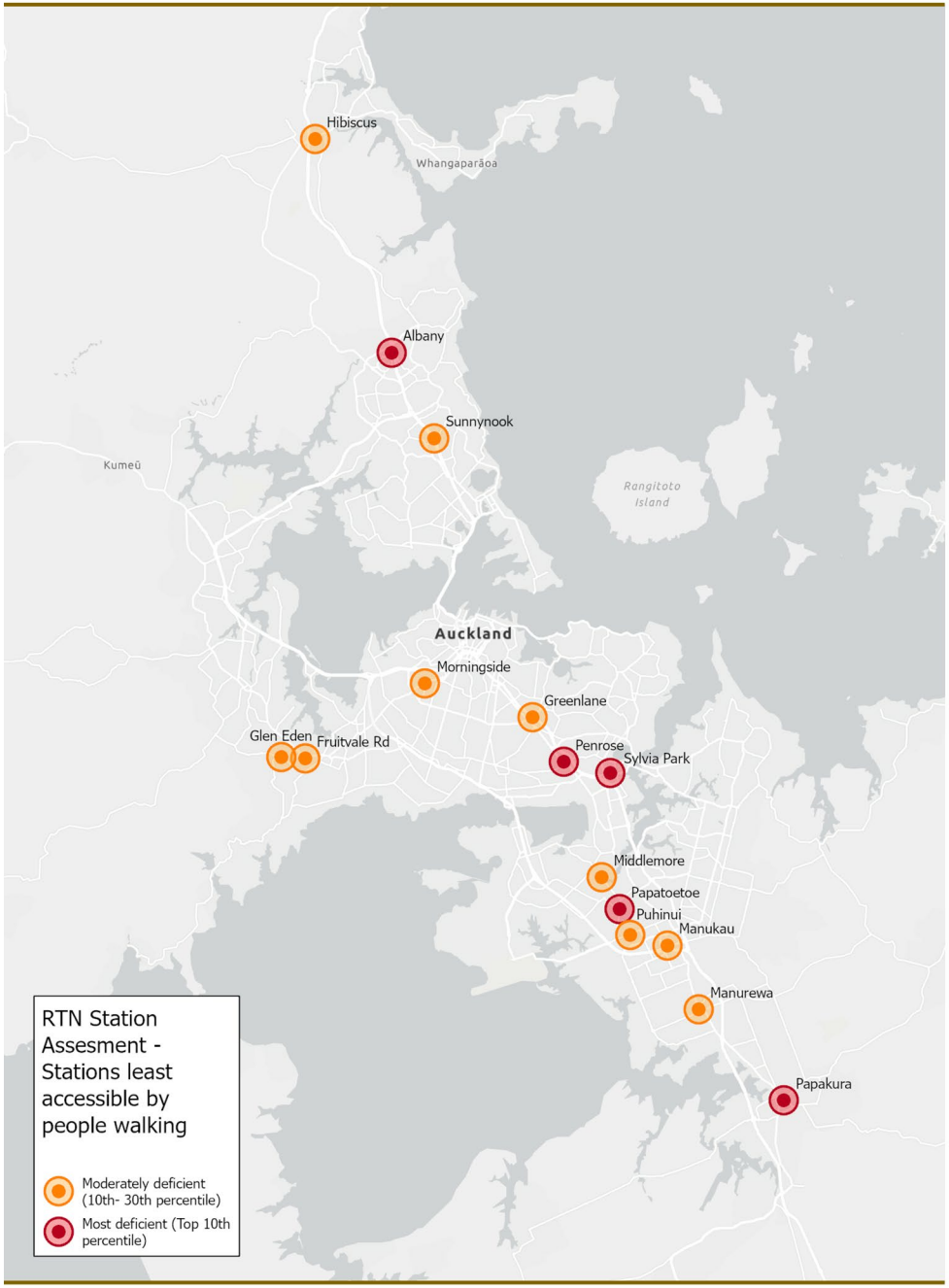
10.2. How we've used the Rapid Transit Network Study in Future Connect

The RTN Study's transport access variable group is most aligned to Future Connect's scope as a transport system planning tool. Our analysis incorporated the RTN Study's 'walking' and 'cycling/micromobility' scores to better understand which RTN stations are most in need of access improvements. The difference between current scores and typology (ideal) scores were calculated and ranked to identify the most deficient stations for both categories.

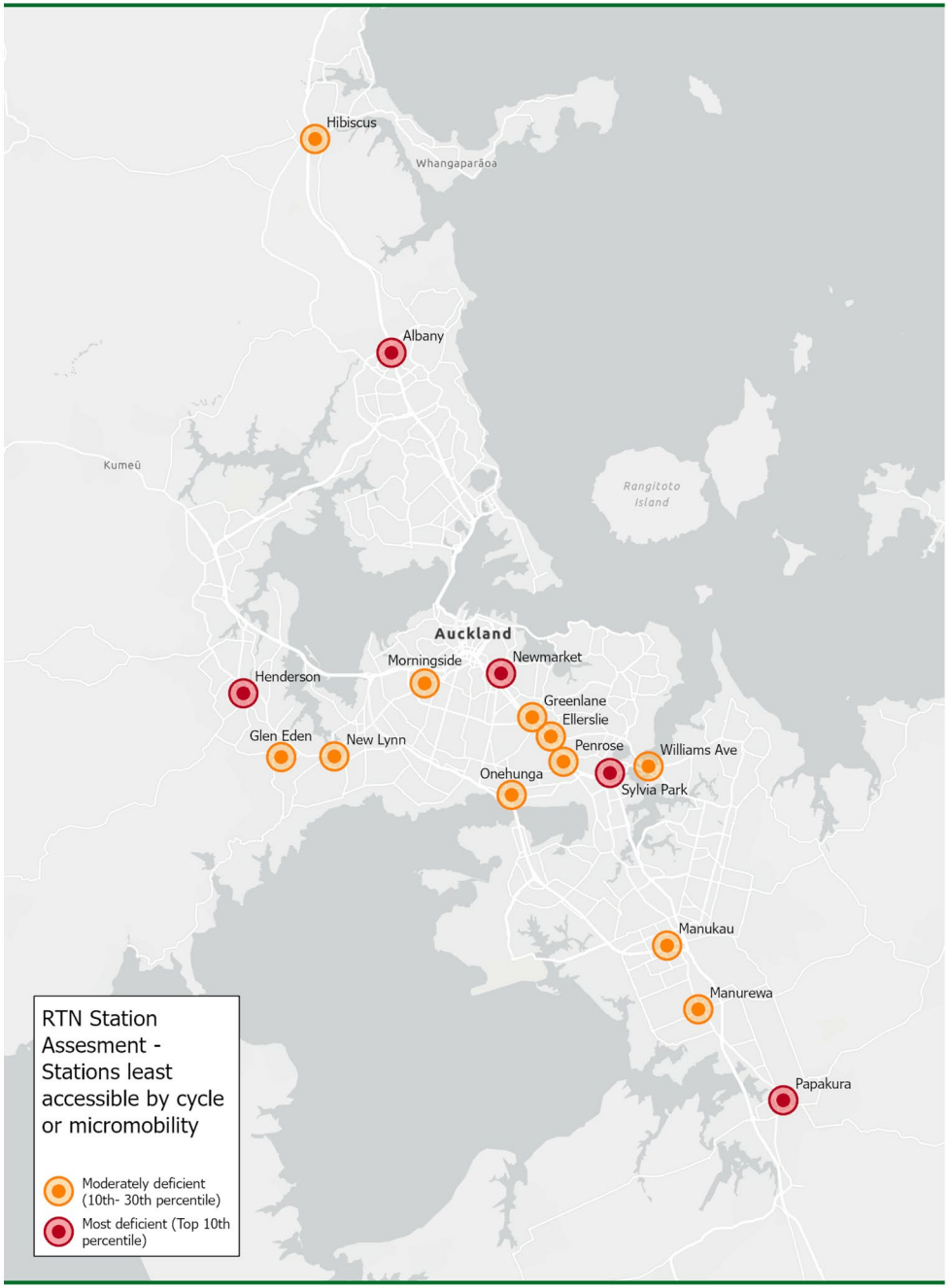
10.3. Outcomes

The following maps display RTN stations identified as most deficient for access on foot and by cycling/micromobility. Stations shown in red are the most deficient (top 10th percentile), while stations shown in yellow are moderately deficient (10th to 30th percentile).

RTN Study - Walking



RTN Study – Cycle and Micromobility



Part D

Focus Areas

PART D: Focus Areas

As outlined, Future Connect has determined Auckland's most important transport corridors, found their issues and opportunities, considered how well RTN Stations operate (by analysing the Rapid Transit Study), and researched how transport outcomes are distributed across the region.

This has produced a lot of data that can be used for a variety of purposes, but what does it say about Auckland's key challenges over the next 10 years?

The Future Connect Indicative Focus Areas, outlined on the following pages, bring everything together by highlighting the region's main challenges.

11. Principles

The previous section of Future Connect has been heavily driven by data. The Focus Areas apply an additional layer of thinking, by investigating this data through a set of principles that allow conscious assessment of the data and what it is showing us. These principles are:

- Where appropriate, unlink the problem from the corridor and focus on movement patterns instead. A deficiency is not necessarily resolved through improving that particular corridor; this could also be done by improving travel options elsewhere.
- Refer to the Future Connect Integration Principles. These principles (see table below) were drafted during the first edition of Future Connect, and consider the main network planning principles applied to keep Auckland moving.
- Look beyond the corridor and highlight communities with unmet needs. This involves incorporating the equity analysis in the list of key challenges.
- Consider the land use and regional context – an industrial road and urban arterial may have the same deficiency score, but they are vastly different.

Themes	Future Connect Integration principles
Manage effects on the environment	• Avoid, remedy or mitigate any adverse effects on the environment, • Adapt to a changing climate and respond to the microclimatic factors of each area, • Provide a transport system that supports more sustainable modes to enable reductions in emissions.
Safe network	• Provide a safe and secure transport network, free from death and serious injury for all users, • Provide a safe and convenient network of routes accessible to people of all ages, abilities and backgrounds, • Provide greater attention to modal networks for vulnerable users to avoid conflict, particularly where there is expected to be an increase in the movement function of a corridor and an increase in vulnerable users.
Connect nodes	• Provide connection between the common destinations that link people to people, goods, services and opportunities, • Support inter-regional connectivity
Connect modes	• Provide for travel options and the ability to connect easily at interchanges, including changing between modes.
Provide access	• Provide direct and efficient access to centres and key destinations.
Integrate land use and transport	• Enable a compact urban form through land use integration, • Support land use with complementary networks resulting in effective movement of people and goods, • Enable convenient and direct public transport, walking and cycling access to centres.
Modal priority	• When a corridor is part of a strategic network, this must be considered in the modal priority assessment. • Use RASF to identify modal priorities and potential conflicts in a corridor.

Themes	Future Connect Integration principles
Mode shift	• Provide quality active mode and dedicated public transport routes to enable mode shift away from private car use, • Prioritise sustainable modes where needed to provide an improved throughput across the network .
Place function as well as movement	• Enable the reflection of place value as well as movement in corridors.

Through the application of these principles, we have surfaced a number of Focus Area categories that make up our Focus Area map.

12. Description of Focus Area categories

12.1. Deficient Regional Movement Patterns

The region's key employment destinations are found in Albany, the City Centre & nearby suburbs, the west (Westgate, Massey and Henderson), Penrose, East Tamaki, Manukau/Wiri, and Auckland Airport. However, the equity analysis has demonstrated not everyone is able to access the same number of jobs. The deficiency map also shows large numbers of deficient corridors between areas with poor access (in the south and west) and these major employment hubs. People moving between these areas often lack travel choices, and predominantly rely on motorways that:

- are heavily congested and getting worse;
- harm people – motorways are some of the highest risk roads;
- harm the planet – besides the emissions aspect, Future Connect has often mapped significant stormwater runoff issues; or
- have traffic impacting the efficient movement of freight.

The key movement patterns that are most critical and deficient are highlighted on the Focus Area Map. These are major problems to solve, and likely to require planning and investment at a national level.

12.2. Major Destinations with complex transport interconnections

These are key destinations, such as Town/Metro Centres and major industrial areas, where the regional and local transport networks interchange with one another. In these areas, we often see clusters of deficient roads, as networks of various modes are interfacing and interchanging with one another. Beyond these immediate transport challenges, these nodes often have a high place value, meaning that there is also significant interaction with the land-within these areas, placing higher requirements on the design of improvements to streets.

12.3. Multimodal Streets with space and safety constraints

Key local corridors that have multimodal demand, with deficiencies for multiple modes and often safety. Future Connect recognises three types of these corridors:

- **Urban Streets** – These traverse diverse and well-established land uses, including centres and residential land. These older roads were built a long time ago, and after the removal of the tram system, they were converted to arterials mostly used by cars/parking. In today's multimodal plan, this means that due to space constraints and the relative dominance of the motor vehicle, there are often many deficiencies for multiple modes and problems.
- **Industrial Roads -** These corridors connect industrial/big box land uses and have a significant Strategic Freight Network role (Level 1 or 2); but are also important to various other modes.
- **Urbanising Roads** - These are roads with emerging importance, as they connect growth areas to the city. These roads are former rural roads with rapid development happening

alongside them. This often means a need for significant works to the corridor, to cater for additional modes of transport and higher volumes of people movement.

12.4. Transport Deprivation Areas

High Deprivation communities with poor outcomes across two or three of the domains considered by the equity analysis. People in these areas face some of the most significant disadvantage in the region.

13. Focus Areas – Conceptual Map

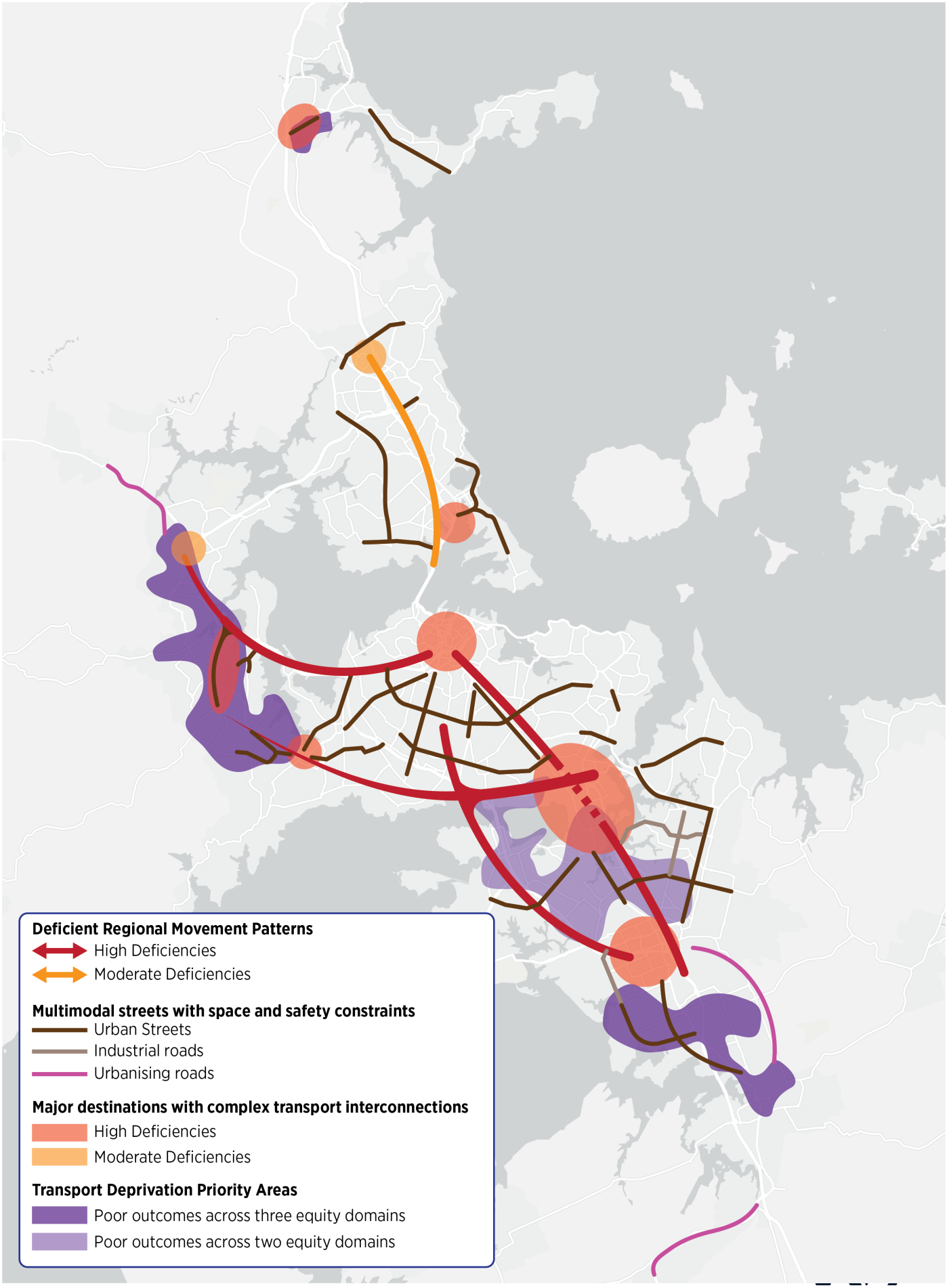


Figure 13-1: Future Connect Focus Areas

14. Summary

In September 2021, the first version of Future Connect was launched to the public. After several years of use, this 2023 update to Future Connect has seen all key outputs updated and improved, marking a significant evolution to the analysis of Auckland's transport system (and therefore Aucklanders).

This analysis, summarised in our indicative Focus Areas, will first and foremost inform the development of the 2024-2034 RLTP, by helping guide project prioritisation. If no projects are investigating these areas yet, further plans will need to be developed.

The Focus Areas, and the extensive evidence behind them, are made available in the Future Connect Mapping Portal, as we want everyone to work with this data. For more information about Future Connect, including the Mapping Portal access, visit AT.govt.nz/FutureConnect.

Next steps

Future Connect provides a snapshot of the current network, and a desired future state. None of these are ever fixed. The system is always evolving as new infrastructure gets delivered, and future plans can change for a wide range of reasons.

Future Connect will be updated as these changes occur. Major updates are scheduled every three years, to coincide with our three-yearly RLTP planning cycle. Between these major updates, the Strategic Networks will always be kept up to date in our online Mapping Portal.

Appendix A: Deficiency & Opportunity Indicators

Mode / Problem	ILM Problem Indicator	Indicator	Def/ Opp	Decade	Period	High	Moderate	Data Source	Team Source
General Traffic	Access	Travel Speed & Productivity	Deficiency	Current	AM&PM	Both LOS F, or one E and other F	Productivity LOS D or E and Speed LOS E or F	TomTom - Nov 19	OPP (AT)
	Access	Travel Time Reliability	Deficiency	Current	AM&PM	LOS F	LOS E	TomTom - Nov 19	OPP (AT)
	Access	V/C ratio change 2018 vs 2031	Deficiency	Future	AM	Over capacity (>=85%) in 2018 and gets worse in 2031	Under capacity (<85%) in 2018 to over capacity (>=85%) in 2031	AFC - 2021-31 RLTP MSM model outputs - v11.6 land use	AFC (AT)
Freight	Access	Travel speed	Deficiency	Current	AM / IP	Interpeak LOS D or worse	AM Peak LOS E/F	TomTom - Nov 19	OPP (AT)
	Access	V/C ratio change 2018 vs 2031 (where %HCV>=10%)	Deficiency	Future	AM / IP	Over capacity (>=85%) in 2018 and worsen in 2031	Under capacity (<85%) in 2018 to over capacity (>=85%) in 2031	AFC - 2021-31 RLTP MSM model outputs - v11.6 land use	AFC (AT)
	Access	HCV Volumnes change 2018 vs 2031	Opportunity	Future	IP	Significant absolute and relative volume increases from 2018 to 2031 (above 90th percentile)	Moderate absolute and relative volume increases from 2018 to 2031 (between 80th and 90th percentile)	AFC - 2021-31 RLTP MSM model outputs - v11.6 land use	AFC (AT)
Public Transport	Access + Travel Options	Travel Speed	Deficiency	Current	AM&PM	LOS F	LOS E	Smartrak - November 19	OPP (AT)
	Access + Travel Options	Travel Time Reliability	Deficiency	Current	AM&PM	LOS F	LOS E	Smartrak - November 19	OPP (AT)
	Access + Travel Options	V/C ratio change 2018 vs 2031	Deficiency	Future	AM	Over capacity (>=85%) in 2018 and worsen in 2031	Under capacity (<85%) in 2018 to over capacity (>=85%) in 2031	2021-31 RLTP MSM model outputs - v11.6 land use	AFC (AT)
	Access + Travel Options	PT Service Level Increases	Opportunity	Future	-	Planned new RTN Corridors	Corridors with new or higher-level Strategic PT Routes	INP Network Classification	AFC (AT)
	Access + Travel Options	Level Crossings (rail)	Deficiency	Current	-	Where they intersect General Traffic and Freight strategic networks (including some secondary arterials)	Where they intersect Public Transport strategic networks (bus routes), cycle and walking strategic networks	ALCAM	INP (AT)
Cycle & Micromobility	Travel Options	Safe and appropriate facility - Current deficiencies	Deficiency	Current	-	No facilities	Unprotected facilities on high volume / speed roads	Auckland Cycleway Map + Moderation	AT GIS database
	Travel Options	Corridors most suitable for new facilities, through expansion of the network or by connecting to key destinations.	Opportunity	Future	-	Feeding into existing facilities or connecting to multiple key destinations	Feeding into planned facilities or connecting to key destination	GIS Analysis	AT GIS database
Safety	Safety	Collective Risk Corridors	Deficiency	Current	-	High & Medium High	Medium	KiwiRAP (2016-2020) – AT GIS	Safety Team
	Safety + Travel Options	Active Road User Aggregated Corridor Risk Level	Deficiency	Current	-	High & Medium High	Medium	KiwiRAP (2016-2020) – AT GIS	Safety Team
Environment	Environment	Stormwater run-off	Deficiency	Current	-	30% of busiest local roads (ADT> 25,000) with priority due to stream crossings or very high ADT (>35,000) + State Highways without TP10 treatment.	All other 'busy local roads' (ADT > 25,000)	Unitary Plan layer + ATAP2 MSM model outputs	Auckland Council/AFC
	Environment	Coastal Erosion and Flooding	Deficiency	Current / Future	-	Links within 1%AEP + 1 Meter Sea Level Rise areas, or Coastal Instability and Erosion areas	Links >50 meters within 1% AEP floodplains	Unitary Plan Floodplains, 1% AEP + 1m SLR, Coastal erosion	Auckland Council
	Environment	Street Tree Coverage	Opportunity	Current / Future	-	Links with moderate to high heat vulnerability and high place value (P3), Or links with high heat vulnerability on the higher order walking and cycling networks.	Network links with moderate heat vulnerability and moderate place value (P2)	AC HVI and AT Place value	INP (AT)
Walking	Travel Options	Foothpath width	Deficiency	Current	-	No footpath or footpath width significantly below TDM Standard (<1.2 Metres or <1.8 Metres at key destinations)	Footpath width below TDM Standard (<1.8 Metres or <2.4 Metres at key destinations)	RAMM	Asset Team
	Safety + Travel Options	Pedestrian Severance	Deficiency	Current	-	Priority Crossing >400 metres away (LOS E/F) where average daily traffic > 6000	Priority Crossing >200 metres away (LOS D) where average daily traffic > 6000	MegaMaps	NZTA
	Travel Options	Walking Priority Investment Areas identified by Walking PBC	Opportunity	Current/ Future		Top 11 Walking Investment Areas	Top 12-31 Walking Investment Areas	Walking PBC	Active Modes Planning (AT)

Appendix B: Deficiency & Opportunity Indicators

Dimension	Measure	Detail	Data Source
Local access Ability to get to local amenities using appropriate infrastructure	**Urban**		
	Distance to nearest essential services	Distance from the centre of each cell to the nearest GP, Pharmacy, ECE, Primary School, Park and Food Store (Includes Supermarkets and Dairies), capped at 1.5 km (exceeding 1.5 km get the worst scores)	MOE School Register and Open Street Maps
	Distance to nearest strategic PT stop	Distance from the centre of each cell to the nearest strategic PT Stop, capped at 1.5 km (exceeding 1.5 km get the worst scores)	AT - Remix
	Bike Path Quality in area	The percentage of the Strategic CAM network in a 3km service area around the centre of each grid cell that has a high CAM deficiency (meaning no facilities on the strategic network, or painted lanes)	AT - Future Connect
	Footpath Quality (width) in area	The percentage of all urban roads in a 1.5 km service area around the centre of each grid cell that have a high footpath width deficiency (meaning no footpaths or a footpath <1.2 metres on one or both sides of the road)	AT - RAMM
	Rural		
	Distance to nearest essential services	Distance from the centre of each cell to the nearest GP, Pharmacy, ECE, Primary School, Park and Food Store (Includes Supermarkets and Dairies), not capped.	MOE School Register and Open Street Maps
	Distance to nearest Park and Ride	Distance from the centre of each cell to the nearest strategic park and ride, not capped.	AT - Remix
	Percentage of unsealed roads in area	Percentage of the roads in an 11km service area around the centre of each grid cell that is unsealed. 11KM is the 85th percentile trip length for rural areas.	AT - RAMM
Regional access Ability to access opportunity (jobs and people) across the region	Jobs accessible by PT (45 min)	The percentage of the region's jobs that can be accessed by PT in 45 minutes	AT – Auckland Forecast Centre
	Jobs accessible by Car (30 min)	The percentage of the region's jobs that can be accessed by Car in 30 minutes	AT – Auckland Forecast Centre
	Population accessible by Car (30 min)	The percentage of the region's people that can be accessed by PT in 45 min	AT – Auckland Forecast Centre
	Population accessible by PT (45 min)	The percentage of the region's people that can be accessed by Car in 30 min	AT – Auckland Forecast Centre
	Urban Only: people commuting by bike	Bike commuting mode share in urban areas(determined by overlaying grid with Census 3B SA1 area data)	Stats NZ
Disbenefits The movement of others through/to my community impacts the place I live	Personal Road Safety Risk	Percentage of all roads within a 1.5km catchment around the centre of each grid cell that are high or medium high Personal Risk (KiwiRAP)	AT – Urban KiwiRAP
	Active Road User Risk	Percentage of all roads within a 1.5km catchment around the centre of each grid cell that are high or medium high Active Road User Risk (KiwiRAP)	AT – Urban KiwiRAP
	Infrastructure Severance	Percentage of all roads within a 1.5km catchment around the centre of each grid cell that has a high deficiency for footpath crossing distance (Priority Crossing >200 metres away (LOS D/E/F) where average daily traffic > 6000)	RAMM/MegaMaps/Future Connect
	Community Severance	Percentage of all corridors within a 1.5km catchment around the centre of each grid cell that are either: >6000 ADT, 4 lanes, a railway or a motorway.	RAMM/MegaMaps/Future Connect
	Exposure to road noise	Average exposure to road noise across each grid cell in dB(A)	Waka Kotahi Benefits Realisation Framework

Appendix C: Terms and Conditions

The following important disclaimers apply to information available through Future Connect:

1. Future Connect is a 10-year network plan and system planning tool. The purpose is to provide strategic guidance for network planning and investment. It should not be used for other purposes without further consideration.
2. The Future Connect key outputs (i.e. Strategic Networks, Analysis and Indicative Focus Areas) should always be independently reviewed and interpreted in the context set out in the Future Connect Main Report, and in these disclaimers.
3. While Auckland Transport makes every reasonable effort to provide information of a quality that best meets the purposes of this publication, the information is provided on an 'as-is' basis. Information can become rapidly out-of-date. Some information has also been sourced from external parties, which has only been subjected to limited verification by Auckland Transport. Auckland Transport does not provide any warranty regarding the accuracy and completeness of the information. More information about the data sources can be found in the Future Connect Report.
4. Future Connect identifies the **Strategic Networks** for each mode, which provides the context for further decisions about modal priorities across the transport system. Some Strategic Networks may overlap, and it may not be possible to provide for all the modes' planned level of service within the space available.
5. The Strategic Networks are built on certain assumptions regarding the current and future transport networks. All Strategic Networks are subject to change due to a variety of reasons, including further investigation, engagement, statutory approvals, changes to timing of implementation, and funding of services or project delivery. Strategic Networks are kept up to date in the Future Connect Mapping Portal, although delays to publication may occur.
6. The **Deficiency and Opportunity Mapping** provides a review of the Strategic Networks only, and has been created using a data snapshot of historic and forecast data. However, it does not represent 'live' network information and cannot be used to assess the current (month to month) operation of the network. Deficiency and Opportunity Mapping are updated once every three years, in alignment with the RLTP planning cycle.
7. **Forecast modelling data** is based on assumptions regarding land use change, population / employment change and project delivery that may be subject to change at any time. More information about these assumptions can be found in the Future Connect Main Report.
8. The key outputs of Future Connect have been developed to help guide funding and implementation decisions, but it is not an investment plan – that is the role of the RLTP. The Strategic Networks and the ranking of deficiencies and opportunities are not an indication of solution type, project prioritisation, implementation order, or funding allocation (unless committed).
9. Any map / plan is illustrative only. Whilst due care has been taken, AT gives no warranty as to the accuracy and completeness of information in these maps/plans and accepts no liability for any error, omission or use of the information.
10. The Deficiency Indicators used for the Deficiency and Opportunity Mapping (available as background layers) are derived from data provided by: Sensium, TomTom, Smartrak,

Auckland Forecast Centre, Auckland Council, Road Assessment and Maintenance Management (RAMM), Urban KiwiRAP, Open Street Maps, Stats.NZ, and Waka Kotahi.

GLOSSARY

A4E	Access for everyone
AFC	Auckland Forecasting Centre
ANOP	Auckland Network Operating Plan
ALCAM	Australian Level Crossings Assessment Model
AT	Auckland Transport
ATAP	Auckland Transport Alignment Project
ATEF	Auckland Transport Equity Framework
CCMP	City Centre Masterplan
CRL	City Rail Link
DSI	Death and Serious Injury
FTN	Frequent Transit Network
GIS	Geographic Information Systems
GPS	Government Policy Statement
HCV	Heavy Commercial Vehicle
ILM	Investment Logic Map
LEV	Low Emission Vehicle
LINZ	Land Information New Zealand
LOS	Level of Service
NZTA	Waka Kotahi (New Zealand Transport Agency)
PBC	Programme Business Case
PT	Public Transport
RAMM	Road Assessment and Maintenance Management
RASF	Roads and Streets Framework
RMA	Resource Management Act
RLTP	Regional Land Transport Plan
RTN	Rapid Transit Network
SGA	Supporting Growth Alliance
SH	State Highway
SME	Subject Matter Expert
TDM	Transport Design Manual
UCP	Urban Cycleways Programme
V/C	Volume / capacity