Auckland Transport

Time of Use Charging

Options Assessment and Policy Framework Report - Appendices

Reference: TOU-EYARP-IAXX-RPT-000005_v4_202507_OAPF Report

4 | 10 July 2025

AT contract number 781-24-657-PS

Appendix A: Network Impacts Summary

Metrics in the following table is measured for the entire Auckland region.

	Criteria	Metric		Baseline	1a	1b	1c	2a	2b	2c	3a	3b	3c	3d	3e
Congestion & Reliability	Length of congested network	Peak (AM / PM) proportion of motorway road kms congested	AM	20.1%	21.2%	20.1%	21.6%	20.8%	20.9%	23.7%	11.8%	18.5%	18.9%	21.7%	18.5%
			PM	28.1%	26.7%	25.5%	27.1%	24.4%	25.1%	25.9%	14.1%	22.6%	23.1%	27.8%	23.4%
		Peak (AM / PM) proportion of arterial road kms congested	AM	10.9%	10.3%	10.3%	9.9%	9.5%	9.5%	9.4%	11.7%	11.1%	10.4%	10.6%	11.5%
			PM	11.3%	10.9%	11.1%	10.7%	10.0%	9.9%	10.1%	12.4%	12.1%	11.7%	11.3%	12.0%
		Peak (AM / PM) proportion of local / collector road kms congested	AM	2.6%	2.4%	2.5%	2.6%	2.0%	2.1%	2.1%	2.8%	2.8%	2.6%	2.5%	2.8%
			PM	2.9%	2.7%	2.7%	2.6%	2.3%	2.3%	2.4%	3.2%	3.1%	2.9%	2.8%	2.9%
	Mode shift	Daily no. of car person trips		4,824,369	4,800,431	4,800,340	4,797,741	4,787,869	4,784,198	4,785,839	4,828,657	4,819,961	4,803,713	4,820,288	4,820,251
		Daily no. of PT trips		433,509	441,858	443,059	444,903	458,506	459,114	449,237	441,646	439,400	444,078	437,460	435,672
Accessibility & Productivity	Impacted population	No. of vehicle trips charged	AM		18,980	29,613	30,651	105,578	89,008	47,286	100,024	45,353	53,247	2,190	34,798
			PM		17,895	32,967	28,163	107,597	89,722	46,265	104,011	44,841	52,829	2,444	40,544
	Accessibility to Economic Opportunities (Journey Time)	No. of jobs within 30 minutes by car	AM	261,386	276,220	280,158	277,766	305,375	286,856	278,603	304,712	291,809	294,970	253,133	263,278
		No. of jobs within 45 minutes by PT	AM	99,897	102,284	102,687	102,557	104,345	103,661	103,633	100,771	101,002	102,174	100,939	99,701
	Accessibility to Economic Opportunities (Generalised Cost)	No. of jobs within 30 minutes GC-equivalent minutes by car	AM	117,036	118,759	116,234	114,247	96,466	97,535	113,066	96,438	108,388	108,923	114,310	110,467
		No. of jobs within 45 GC-equivalent minutes by PT	AM	6,022	6,182	6,099	6,222	6,277	6,306	6,252	5,968	5,979	6,225	6,080	6,000
	Accessibility to Amenities	% of population who can access metro centres within 30 minutes by car	AM	93.6%	93.8%	93.8%	93.8%	93.8%	93.8%	93.8%	93.6%	93.8%	93.8%	93.6%	94.1%
		% of population who can access metro centres within 45 minutes by PT	AM	77.8%	78.0%	78.0%	78.0%	77.9%	78.0%	78.0%	78.4%	77.8%	77.9%	77.8%	77.7%
Through-put	Peak spreading	No. of trips made during AM and PM peak periods		1,656,133	1,650,419	1,649,042	1,644,884	1,619,670	1,617,437	1,637,509	1,641,691	1,648,943	1,644,636	1,649,790	1,647,984
	Total travel time	Peak (AM / PM) person hours travelled	AM	308,778	303,746	301,485	302,217	296,032	298,937	299,905	295,512	301,077	299,211	308,171	303,655
			PM	276,530	274,954	271,933	273,251	264,628	268,248	270,846	263,567	270,166	269,153	276,976	269,939
	Network efficiency	Peak (AM / PM) average car trip speed (kph)	AM	34.2	35.0	35.3	35.3	36.2	35.7	35.6	35.9	35.3	35.6	34.2	34.5
			PM	35.7	36.0	36.4	36.2	37.3	36.7	36.5	37.7	36.4	36.7	35.5	36.3

Appendix B

Auckland Transport

Time of Use Charging Study

Pricing Policy Discussion Paper

Reference: TOU-EYARP-IAXX-RPT-000005_v3_202412_Pricing Policy Discussion Paper

3 | 13 December 2024

This report has been authored by EY and Arup, to support the development of Time of Use (ToU) options. It represents a 'point in time view' which will need to be further refined and interrogated as the project progresses.

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.
AT contract number 781-24-657-PS

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Executive Summary

In the context of increasing congestion, and constraints (both practical and financial) on the ability to provide additional road capacity, Time of Use (ToU) charging has a potential role to play in better connecting people, places, goods, and services across Auckland by maximising the productivity of the city's road network.

This report represents a point in time understanding of the pricing component of a ToU scheme for Auckland, building on the work and findings of The Congestion Question (TCQ). Initial analysis and findings relating to Pricing should be further developed alongside the design of an emerging preferred scheme option.

The role of pricing

Pricing is the lever that Time of Use schemes use to alter travel behaviour, encouraging drivers to consider alternative modes, routes, times, and destinations to reduce travel demand at the busiest times of day and locations.

The elements of a Time of Use scheme

A ToU scheme is made up of four distinct elements. The first and most powerful lever to achieve the primary objective and avoid undesirable impacts is the design of the core scheme (the selection of charging location and charging tariff). Next, complementary measures are used to mitigate impacts and enhance benefits, while targeted mitigation is deployed only when problematic issues cannot otherwise be avoided or mitigated.

This policy paper addresses the policy considerations around one of these elements – Pricing – which, alongside charging location, represents one half of the 'core' of a ToU scheme. The implications of various Charging Location options are considered at length in the Option Assessment and Policy Framework report. Separate policy discussion papers consider Complementary Measures and Targeted Mitigation.

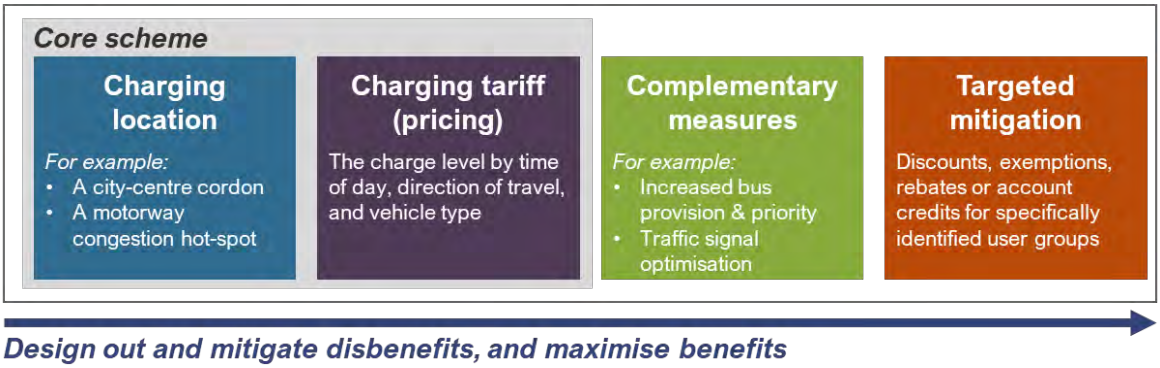


Figure 1: Elements of a Time of Use charging scheme

Time of Use charging for Auckland

Auckland Transport's primary objective for ToU charging, which represents the central goal that drives what the project seeks to achieve, is to manage travel demand to achieve an improvement in road network performance. This objective is underpinned by three Core Policy Principles of Effectiveness, Fairness, and Simplicity, representing the critical success factors which will be fundamental to scheme design.

Together, the Core Policy Principles and Primary Objective guide all aspects of scheme design.

Approach to this policy discussion paper

In common with the policy discussion papers on complementary and mitigation measures, this paper begins with a brief explanation of the role of this element of a Time of Use scheme in securing an outcome that meets the Primary Objective in a way that is Effective, Fair, and Simple.

It explores the ways that different urban road pricing schemes around the world have approached pricing, the reasons for the different approaches they have adopted, and the implications for Auckland in considering the development of its own pricing tariff for the Time of Use scheme.

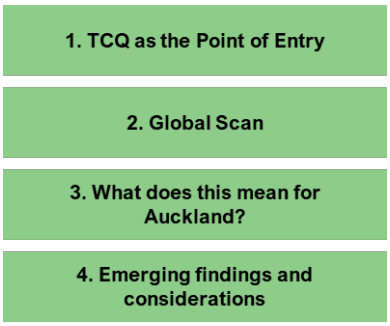


Figure 2: Common approach to the policy papers

Elements of a charging tariff

While the definition of a specific ToU tariff is a superficially simple concept, the prices imposed through ToU charging may in fact vary in a wide variety of ways.

Some of the most common dimensions by which the charge is varied are set out below. The top row are those aspects which are primarily driven by traffic conditions and the road network context and bear on the effectiveness of the scheme. The bottom row are aspects which are primarily driven by other considerations, such as fairness and simplicity (though in practice the distinctions are not always completely clear-cut).

Driven primarily by effectiveness considerations and charging location	The time of day	The day of the week	The type of vehicle being driven	The direction in which the vehicle is being driven on a particular road
Driven primarily by other considerations (fairness, simplicity)	The mechanism by which charges are paid	How many times the vehicle drives on a charged road within a given span of time (capping)		

Emerging findings and considerations based on this review

Pricing bears directly on all three Core Policy Principles and connects directly to several of the scheme's nine Supporting Policy Principles (those with the clearest links are picked out in bold below).

Effective	Fair	Simple
Charges must be set in a way that reflects the specific context on the roads where charges are imposed and the different so as to balance decongestion, diversion, and other effects.	A charge that is excessively high might risk unfair impacts on those least able to avoid or afford the charge – at the very least, it would likely increase the requirement for complementary or mitigation measures to address those risks.	A complex tariff that is hard to understand, interpret, or rationalise will undermine simplicity.

1. **Be flexible in time, location, and pricing to achieve target congestion levels**
2. **Target travel in congested conditions**
3. **Target locations and routes where users have viable alternatives and discourage discretionary trips**
4. **Vary for different vehicle types according to the contribution they make to congestion**
5. **Improve accessibility for most people and businesses**
6. Be technologically achievable, adaptable, cost effective, and efficient
7. Avoid mitigations that undermine the efficacy of the scheme
8. Support ability to spatially extend and modify the scheme
9. **Avoid unwanted consequences, e.g. significant fiscal costs for vulnerable communities, diversions, community severance.**

Emerging findings

- The role of pricing: Pricing is a critical component of scheme design which will impact a scheme's effectiveness, fairness, and simplicity – ultimately there is a balancing act between achieving the best congestion reduction outcomes and not charging more than is necessary to do so.
- Dimensions of a tariff: Charges may vary depending on time of day, day of week, direction of travel, and vehicle used, but there is no 'right' answer.
- Context is everything: Global evidence shows that there is no one perfect approach, because different variables must be flexed to meet the objectives. Setting appropriate charges must be informed by specific context at the charging locations identified, and context specific nuances such as user groups, traffic conditions etc, supported by modelling, analysis, and assessment.

Additionally, different locations in Auckland may well have a different 'optimal' tariff.

- Charge levels: Despite the importance of context, all things being equal, higher charges are likely to be needed at busier times of day/week, and potentially in the 'shoulder' periods around those times to avoid passing the problem to another time of day.
- Vehicle type: Consideration of higher charges for bigger vehicles requires careful consideration to minimise the risk of unintended consequences.
- Objectives: Being clear on the specific objectives of charging in terms of the outcome desired is important. Defining the area of benefit (and the area over which potential disbenefits are assessed) will be key to support effective monitoring.
- Monitoring and review: Charges will likely need to be reviewed over time. Preserving flexibility over when and how this is done will be beneficial – this could be supported by a framework of governance giving reassurance over the process by which this would be undertaken.

1. Introduction

The primary objective of the Time of Use (ToU) charging scheme is to manage travel demand to achieve an improvement in road network performance. The application of a financial cost to road transport journeys sits at the very core of how the project would achieve this.

In the same way as consumer demand for goods and services typically falls as price increases, an additional financial price increment is the fundamental mechanism by which ToU charging schemes (and similar congestion charging schemes) reduce the demand for road use. This in turn leads to their beneficial impacts on congestion and road network performance.

The policy approach to pricing is therefore central to the ongoing ability of the Time of Use project to achieve its policy aims.

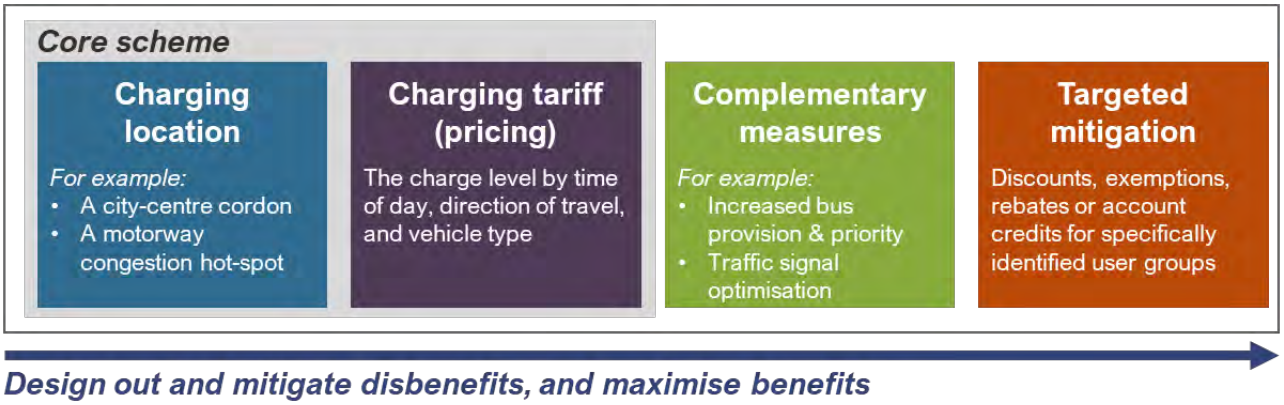
1.1 The elements of a Time of Use scheme

A Time of Use charging scheme is made up of four distinct elements:

1. A Charging location: The road or roads over which charges apply.
2. A Charging tariff (pricing): The prices that users are charged to use those roads and the basis on which those charges are determined.
3. Complementary measures: Ancillary investments or adjustments to other aspects of the transport network that help to respond to the first-order impacts of the scheme and enhance its benefits.
4. Targeted mitigation: Specific adjustments to the overarching scheme tariff that reduce or avoid otherwise problematic or undesirable impacts that cannot otherwise be avoided.

The diagram below illustrates how these four components of a ToU scheme work together to optimise benefits aligned to the scheme's primary objective, avoid problematic impacts, and mitigate residual disbenefits, in a broadly sequential manner.

Figure 3: Elements of a Time of Use charging scheme



1.2 How pricing works in concert with complementary measures and mitigation measures

As an aspect of core scheme design, Pricing is one of the key means by which the effectiveness of a Time of Use scheme can be managed and optimised, while also addressing the requirement for fairness and simplicity.

Beyond the scope of this paper, separate papers are addressing the development of a package of Complementary Measures that could enhance scheme benefits and mitigate negative impacts, and

exploring the role of Mitigation Measures in avoiding impacts on specific user groups and vehicle types.

Collectively, this system will ensure that a Time of Use scheme is effective, fair, and simple.

1.3 The Policy Framework

Pricing should in the first instance support and enhance the primary objective of the Policy Framework (Figure 4):

- To manage travel demand to achieve an improvement in road network performance by:
  - reducing congestion,
  - increasing throughput of people and goods, and
  - improving reliability of the road network.

Secondly, pricing should support the realisation of the Policy Framework's core principles of **effectiveness**, **fairness**, and **simplicity**, to ensure all road users are not negatively impacted by and have the opportunity to benefit from the scheme as much as possible..

Component	Purpose	ToU Policy Framework
Primary Objective	The central goal that drives what we're trying to achieve	To manage travel demand to achieve an improvement in road network performance by: • reducing congestion • increasing throughput of people and goods • improving reliability of the road network.
Core Policy Principles	The critical success factors which will be fundamental to scheme design	1. **Effective:** Improve network performance. 2. **Fair:** Minimise and mitigate adverse social impacts and ensure benefits and costs are fairly distributed across users. 3. **Simple:** Be understandable and avoid complexity.
Supporting Policy Principles	These will guide the development of the scheme design	1. Be flexible in time, location and pricing to achieve target congestion levels. 2. Target travel in congested conditions. 3. Target locations and routes where users have viable alternatives and discourage lower value discretionary trips. 4. Vary for different vehicle types according to the contribution they make to congestion. 5. Improves accessibility for most people and businesses. 6. Be technologically achievable, adaptable, cost effective, and efficient. 7. Avoid mitigations that undermine the efficacy of the scheme. 8. Support ability to spatially extend and modify the scheme. 9. Avoids unwanted consequences, e.g. significant fiscal costs for vulnerable communities, diversions, community severance.
Secondary Outcomes	These are not objectives being sought and do not shape scheme design but are expected to occur as a result of time of use charging. They will be tracked and measured.	1. Share of travel by public transport, walking and cycling 2. Carbon emissions reduction 3. Net revenue 4. Improved air and water quality
Assessment Criteria	Provides a framework to consistently assess options, aligned to the intent of the policy framework	

Figure 4: Auckland ToU Policy Framework

1.3.1 Key considerations around pricing

Pricing connects directly to several of the scheme's nine Supporting Policy Principles (those with the clearest links are picked out in bold below):

1. **Be flexible in time, location, and pricing to achieve target congestion levels**
2. **Target travel in congested conditions**
3. **Target locations and routes where users have viable alternatives and discourage discretionary trips**
4. **Vary for different vehicle types according to the contribution they make to congestion**

5. Improve accessibility for most people and businesses
6. Be technologically achievable, adaptable, cost effective, and efficient
7. Avoid mitigations that undermine the efficacy of the scheme
8. Support ability to spatially extend and modify the scheme
9. Avoid unwanted consequences, e.g. significant fiscal costs for vulnerable communities, diversions, community severance.

2. Scope

2.1 Purpose of this paper

This paper examines the role that pricing would play in a potential ToU charging scheme in Auckland and explores the factors that must be taken into account to set appropriate charges. Through this the paper demonstrates that in order to remain effective and acceptable, it is essential that the scheme operator retains control and freedom to set prices that appropriately respond to evolving circumstances.

The ToU project is still considering and assessing a wide range of scheme options and potential charging locations, all of which have so far been modelled with a single charging assumption. As such this paper does not seek to comment on the merits of individual pricing regimes. Instead it considers the issues in concept in order to support the development of an appropriate overall approach.

2.2 Relationship with the Policy Framework

The objective and principles of the Policy Framework have shaped the approach to considering pricing in this paper.

The Policy Framework informs all elements of scheme design, and its relationship to tariff design could be considered in the following way:

Core Principles	What does this mean for pricing?	Scheme design considerations (Secondary Principles)	Potential responses to design out/mitigate disbenefits and enhance benefits
Effective: Improve network performance	Charges must be set in a way that reflects the specific context on the roads where charges are imposed and the different so as to balance decongestion, diversion, and other effects.	Be flexible in time, location, and pricing to achieve target congestion levels. Target travel in congested conditions.	Ensure pricing can respond to changing behaviour and travel demand patterns over time.
Fair: Minimise and mitigate adverse social impacts and ensure benefits and costs are fairly distributed across users.	Charges should be set as low as possible while still realising the scheme objective. A charge that is excessively high might risk unfair impacts on those least able to avoid or afford the charge. At the very least, it would likely increase the requirement for complementary or mitigation measures to address those risks.	Target locations and routes where users have viable alternatives and discourage lower value discretionary trips Avoid unwanted consequences, e.g. significant fiscal costs for vulnerable communities, diversions, community severance.	Complement scheme with interventions such as public transport to improve access to viable alternatives. If needed, target mitigations at particular user groups (discounts, exemptions, credits, rebates) to avoiding significant financial disbenefits.
Simple: Be understandable and avoid complexity.	A complex tariff that is hard to understand, interpret, or rationalise will undermine simplicity.	Vary for different vehicle types according to the contribution they make to congestion.	Adopt the simplest tariff that can deliver the desired effects and benefits. Consider 'contribution to congestion' in a broad sense, accounting for vehicle trips avoided.

2.2.1 How pricing relates to simplicity and fairness

From a user-facing perspective, the approach to pricing and the revenue the scheme may generate is connected to both the Simplicity and Fairness principles adopted by the ToU project.

International experience has revealed the importance of a series of key principles, that require:

1. Prices to be clearly signalled and not arbitrary (users know what they will be charged before they proceed),
2. Prices will be set in accordance with the achievement of a specific goal,
3. Information gathered for the purposes of levying charges will not be used for any other purpose (basic tax principles) – for example the Time of Use system will not report information on expired registrations or warrants of fitness, and
4. Scheme revenues will go to a clearly stated purpose.

In addition, in the context of the use of revenues, there are outstanding questions to be answered (beyond the scope of this paper) as to whether a scheme focused explicitly on congestion reduction:

1. Must cover all its costs over the long-term?
    a. It is assumed that any scheme may run at a loss for the first few years as it repays its design and capital costs – there is also a related question as to how complementary measures funded from scheme revenues might be treated in this context).
2. Is permitted to have positive net revenues, given that the policy intent appears to be to disallow schemes that delivering strong net revenue performance?

Scheme design will be strongly influenced by these questions. At minimum, a scheme should be expected to pay for itself, with a positive net revenue expected. Conversely, there might be a question as to whether the scheme was generating so much revenue, even at a congestion-optimising price, the regulator could potentially take the view that it is instead a revenue-focused scheme.

Fundamentally, any requirement for a scheme to "balance" its income and expenditure would lead to sub-optimal design drivers.

2.2.2 Social licence

While detailed social licence considerations for ToU charging are outside the scope of this paper, the important connection between pricing and social licence warrants some discussion and should always be a part of the consideration of setting and varying charges.

Since urban congestion pricing schemes principally manifest as a *pricing policy with which people must comply*, rather than as a piece of infrastructure or other physical intervention, the charges they impose are an extremely important factor in influencing the public and stakeholder response.

There are three basic reasons for this:

1. First and foremost, the charge itself is likely to be seen as an unwelcome new burden by at least some Aucklanders, which (all other things being equal) would imply that lower charges are likely to be more acceptable.
2. Equally importantly, it reflects the fact that an appropriately configured charge is the core mechanism by which the positive benefits of the charge will be achieved. This tends to imply that a very low charge would likely not in fact be regarded very positively since it is unlikely to be very effective.
3. Furthermore, a pricing tariff that is highly complex may provoke confusion and raise social license risk, even if it appears that nuancing the charging tariff in that way would optimally deliver on the scheme's traffic network performance objectives.

For the scheme to be acceptably effective in achieving its objectives, while also being perceived as sufficiently fair and simple to understand, it is critical that prices are set in a way that appropriately balances the various impacts of the scheme.

3. Tariffs: defining the dimensions of 'price'

3.1 Understanding a tariff

While the definition of a specific ToU tariff is a superficially simple concept, the prices imposed through ToU charging may in fact vary in a wide variety of ways.

When prices for the Time of Use scheme are set, any and all of these dimensions may be considered, and the price faced by an individual user for an individual journey reflects the cumulative effect of each of these dimensions.

What is a ToU tariff?

Broadly, the price for an individual journey by an individual driver will be established in what is known as a 'tariff'. This allows the multiple different pricing variables to be consolidated into a clear definition of what a particular journey will cost.

Some of the most common dimensions by which the charge is varied are set out below. The top row are those aspects which are primarily driven by traffic conditions and the road network context and bear on the effectiveness of the scheme. The bottom row are aspects which are primarily driven by other considerations, such as fairness and simplicity (though in practice the distinctions are not always completely clear-cut).

Driven primarily by effectiveness considerations and charging location	The time of day	The day of the week	The type of vehicle being driven	The direction in which the vehicle is being driven on a particular road
Driven primarily by other considerations (fairness, simplicity)	The mechanism by which charges are paid	How many times the vehicle drives on a charged road within a given span of time (capping)		

This paper primarily focuses on the factors set out in the first row.

3.1.1 Global scan

In cities around the world, different congestion charging schemes have taken different approaches to developing and refining tariffs, varying the different dimensions a charge to achieve different impacts.

The table overleaf provides a snapshot of the approaches taken in five charging schemes from London, Singapore, and Sweden.

Each varies their charging approach in different ways to realise the respective objectives of the schemes, in the specific contexts within which they operate. It is immediately apparent that different schemes have taken dramatically different approaches to the setting of a charging tariff:

- Some, typified by London's Congestion Charge, are extremely simple. In this scenario, the charge simplify varies according to whether the scheme is operating or not. If it is operating, one driver pays precisely the same as another, regardless of the time, direction, vehicle, or any other factor,
- At the other end of the spectrum, some scheme tariffs are relatively nuanced, varying by three or more factors.

While all of these schemes seek to manage vehicle demand in one way or another, the different approaches to tariff-design reflect the different priorities, objectives, conditions, and contexts that each city has. Since these will always differ from city to city, there is no 'optimal' approach, nor any one-size-fits-all solution.

3.1.2 Global snapshot of approaches to pricing for congestion charging schemes

Scheme	*Time of day (within operating hours)*	*Day of week*	*Direction of travel*	*Road used (among charged roads)*	*Type of vehicle*	Pricing structure	Reviewed	Capping?	Scheme objectives	Comment
London Congestion Charge	No	No (but scheme operates different times on different days)	N/A	No	No	Flat-rate all day weekdays for all vehicle types, 12pm-6pm weekends	Operator's discretion (no set interval)	Yes, one charge daily	Reduce congestion across the centre of the city	While congestion varies somewhat over the course of the day in central London, it is sufficiently consistent that the objective of reducing congestion can be effectively delivered with a simple, flat-rate charge.
London Silvertown Tunnel	Yes	No	Yes	No	Yes	Charges vary by time of day, day of week, direction of travel, vehicle type	At 12 months post-scheme-opening, thereafter no set interval	No	Manage demand to a specific flow level on two road tunnels and raise revenue	Traffic flows across the river in this location in east London are highly 'tidal'. There is a significant concern over the possible displacement of traffic from these crossings to other crossings if charges are too high/drawing in traffic from other crossings if charges are too low. This balancing act requires a fairly sophisticated charging tariff that varies to reflect the different trade-offs at different times of day/directions of travel for different vehicle types.
Singapore ERP	Yes	No	Mixed	Yes	Yes	Charges vary by time of day, day of week, direction of travel, vehicle type	Quarterly and adjusted during school holidays	No	Manage demand to a specific flow level on key roads	Singapore's highly sophisticated charging system has helped to maintain travel speeds on expressways and arterial roads since 1975. The system is highly dynamic with charges varying in half hourly blocks and by vehicle type.
Stockholm Congestion Tax	Yes	Yes	No	No	No	Charges vary by time of day and season of the year	Last increased in 2016 – no set review interval	Yes	Reduce congestion, increase accessibility and improve the environment	Stockholm's congestion charging system has maintained around 20% traffic reductions since implementation – with traffic levels dropping across the day in response to the pricing approach.
Gothenburg Congestion Tax	Yes	Yes	No	No	No	Charges vary by time of day and season of the year	No set review interval	Yes – single charge rule within 60min	Reduce congestion and raise capital of infrastructure development	While trips are charged throughout the day Gothenburg's congestion charge targets peak period trips with a higher tariff than interpeak trips. This has resulted in a reduction in vehicle travel (approx. 13%) at peak periods.

4. Exploring these dimensions in the Auckland context

This chapter considers the relevance of the various dimensions of tariff variability from the global scan to the Auckland context.

It takes as its overarching principle that since the goal of the ToU charging shceme is to improve network performance, the performance of the road network should be a core input to decisions around pricing.

The following four sections consider how travel conditions in Auckland vary in relation to the dimensions of demand-related tariff design identified above in the global scan:

- Time of day and day of the week
- Road used
- Direction of travel
- Vehicle type

Within each of these sections, implications are drawn out for potential tariff design for an Auckland ToU scheme.

There are currently several schemes under consideration for Auckland, including different possible charging locations. The balance of contextual factors (traffic patterns, alternative travel options, vehicle mix, etc) are likely to differ from one charging location to the next. As a result, the optimal approach for each might require a different balance of tariff dimensions.

The only effective way to identify the appropriate tariff is through further traffic modelling and assessment of different charging tariffs and levels. This will allow the potential impacts to be explored in detail, taking account of traffic conditions, alternative routes, and other factors to arrive at an overall estimate.

This would need to be explored carefully in further work as the field of options under consideration narrows.

4.1 Time of the day and day of the week

Many of the charges described in the global scan vary by time of day, while some also vary by the day of the month or other temporal considerations (e.g. season of the year).

In common with cities everywhere around the world, conditions on Auckland's road network are highly dynamic. Traffic levels often fluctuate, changing from one hour to the next across the day, from day to day across the week, and across weeks in the year. They are also likely to vary at different points in the year – traffic is significantly lower during school holidays, to give an obvious example.

This is important because when the level of traffic demand is within the capacity of the road network (and the individual roads and junctions which makeup the network), there is little to no congestion, as all vehicles can be accommodated with ease.

When the level of traffic demand exceeds that capacity, queues build rapidly with each extra vehicle, and all users of the road network experience slower journeys.

The table below shows the average duration of an illustrative 10km road journey in Auckland's urban area across a single week and throughout the day.

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
12:00 AM	12 min 20 s	11 min 30 s	11 min 40 s	11 min 50 s	12 min	12 min	12 min 20 s
	12 min 20 s	11 min 20 s	11 min 30 s	11 min 40 s	11 min 50 s	11 min 40 s	12 min 10 s
02:00 AM	12 min 10 s	11 min 20 s	11 min 20 s	11 min 20 s	11 min 30 s	11 min 30 s	12 min
	11 min 50 s	11 min	11 min	11 min	11 min 10 s	11 min	11 min 40 s
04:00 AM	11 min 20 s	10 min 10 s	10 min 10 s	10 min 20 s	10 min 20 s	10 min 20 s	11 min
	10 min 30 s	10 min	10 min 10 s	10 min 10 s	10 min 10 s	10 min 10 s	10 min 20 s
06:00 AM	10 min 20 s	12 min 50 s	13 min 30 s	13 min 30 s	13 min 20 s	12 min 20 s	10 min 20 s
	10 min 30 s	16 min 50 s	18 min	18 min	17 min 20 s	15 min 10 s	10 min 50 s
08:00 AM	11 min 10 s	18 min 30 s	20 min 20 s	20 min 20 s	19 min 30 s	16 min 40 s	11 min 40 s
	11 min 50 s	14 min	15 min 40 s	16 min	15 min 20 s	14 min	12 min 40 s
10:00 AM	12 min 40 s	13 min	13 min 40 s	14 min 10 s	14 min	13 min 50 s	13 min 40 s
	13 min 10 s	13 min 10 s	13 min 40 s	14 min	14 min	14 min 20 s	14 min 40 s
12:00 PM	13 min 50 s	13 min 30 s	14 min 10 s	14 min 20 s	14 min 30 s	15 min	15 min 20 s
	13 min 40 s	13 min 30 s	14 min 10 s	14 min 10 s	14 min 20 s	15 min	15 min 10 s
02:00 PM	13 min 20 s	14 min	15 min	15 min 10 s	15 min 30 s	16 min 20 s	14 min 50 s
	13 min 10 s	16 min 20 s	17 min 40 s	18 min 10 s	18 min 30 s	19 min 50 s	14 min 20 s
04:00 PM	12 min 50 s	17 min 30 s	19 min 30 s	20 min 10 s	20 min 20 s	20 min 20 s	13 min 50 s
	12 min 50 s	18 min 10 s	21 min	21 min 40 s	21 min 30 s	19 min	13 min 50 s
06:00 PM	12 min 30 s	14 min 20 s	16 min 20 s	17 min 10 s	17 min	15 min 40 s	13 min 40 s
	12 min 10 s	12 min 40 s	13 min 10 s	13 min 30 s	13 min 30 s	13 min 40 s	13 min 10 s
08:00 PM	12 min 10 s	12 min 30 s	12 min 50 s	13 min	13 min	13 min 20 s	13 min
	12 min 10 s	12 min 20 s	12 min 40 s	12 min 50 s	12 min 50 s	13 min	12 min 40 s
10:00 PM	12 min	12 min 10 s	12 min 40 s	12 min 40 s	12 min 40 s	12 min 40 s	12 min 40 s
	11 min 40 s	12 min	12 min 10 s	12 min 20 s	12 min 20 s	12 min 30 s	12 min 30 s

Figure 5: Average duration of illustrative 10km road journey in Auckland's urban area across a single week (Source: TomTom traffic index https://www.tomtom.com/traffic-index/auckland-traffic/[1])

In the early hours of the morning, this journey can be completed in 10 minutes, or just over, representing an effective maximum speed for the trip of around 60km/h.

At other times the same journey would take substantially longer – up to a maximum of 21 minutes 40 seconds (28km/h). The slowest journeys are recorded on weekdays between 0630 and 0830 and between 1600 and 1800.

Several sub-patterns are evident within the data. For example:

- Journey times vary far less across the day on Saturdays and Sundays than they do during the 'typical working week',
- Journey times are longer, on the whole, during weekdays than they are at weekends,
- Journey times are longer on weekday afternoons than they are on weekday mornings, and longer in the midweek than they are on Mondays or Fridays.

[1] Travel times and speeds are based on trip data anonymously collected from drivers within the larger metropolitan area ("metro") throughout the complete road network — including fast roads and highways crossing this area.

- Journey times are slower in the 'interpeak' period from 0830 to 1430 than they are overnight, and
- Journey times are often at their very quickest just before the ramp-up to the morning peak on weekdays (even to the point that they may be marginally quicker at these times than they are at the same time on weekends).

All of these patterns are driven by the way in which demand for road travel varies. In turn this is driven by the myriad reasons for which people travel – commuting, taking children to school, transporting goods, visiting friends, travelling for business, or shopping, to name a few. Some of these trips are highly time-and-and location specific.

When the aggregate demand for travel substantially exceeds the capacity of the road network average journey times can roughly double from the theoretical minimum, and perhaps 30% longer than during the interpeak period, when the network might be described as operating 'within capacity'.

This is how congestion manifests.

Implications for tariff design: At the busiest times, achieving a good level of network performance might require encouraging a fairly significant proportion of the traffic to change their journey. This might in turn require a fairly high charge to be set, especially in locations where the alternatives are relatively unattractive, to ensure that the cost outweighs the benefit of the journey for a large number of people.

At less busy but still congested times, when shifting only a small number of people away from the road would be sufficient to bring demand back under the capacity of the network, a smaller charge might be appropriate.

At times where there is no congestion it might not appear appropriate to impose charges. This does not mean that charges should only be applied at times which are currently busy. For example, imposing charges at the peaks would likely encourage some drivers to shift their travel to other times of day, potentially even to the extent that previously uncongested times become congested.

There could therefore be a case for charging the 'shoulder' periods outside the current peaks, and potentially at other times of day where the risk of moving congestion from one period to another is apparent.

4.2 The road being used

In Singapore, for example, the charges applying vary depending on which road a vehicle is travelling on. This reflects the different levels of demand for use of those roads and how much congestion they experience, and the corresponding level of demand shift required to improve traffic flow.

Congestion levels clearly vary widely across Auckland, as shown by the snapshot below showing traffic conditions typical for a Monday morning. Some roads appear to operate with minimal delays, while others are exhibiting substantial congestion[2].

[2] This demonstrates the spatial variability of congestion rather than the overall intensity.

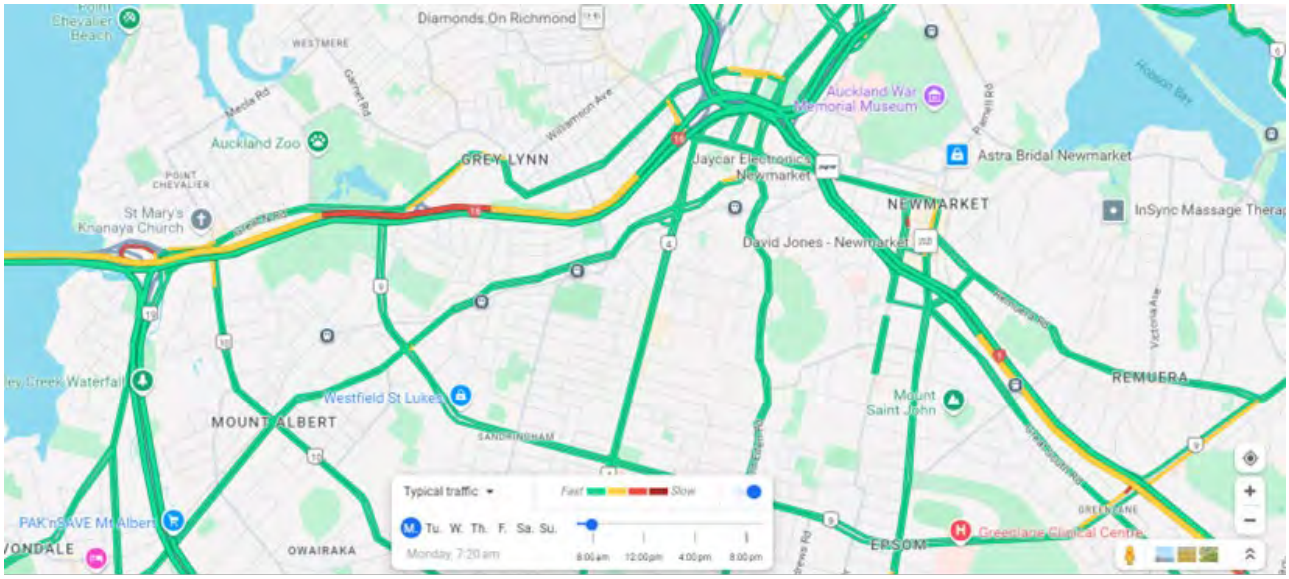


Figure 6: Typical traffic conditions at 7.20am on a Monday morning

Implications for tariff design: AT's secondary policy principles make clear that ToU charges should 'target travel in congested conditions'. While this aspect of scheme design is more concerned with charging location, which is being assessed through the options assessment work outside this paper, it is worth noting here that this may not simplistically equate to 'charging the specific roads that are congested'.

Some of the charging location options currently under consideration certainly do this, but the nature of traffic in cities is such that charges applied in one location can lead to improvements in network performance elsewhere (due to their impact on the entire journeys drivers make). Charges introduced in central London, for example, led to reductions in traffic on approaching roads.

In Auckland, modelling of the central city options has demonstrated their ability to deliver reductions in traffic on some of the roads leading to and from the charged cordon. However, they have also shown increases in traffic on others, so it is not a completely clear picture.

Nevertheless, where traffic levels are well within the capacity of the network, it could be challenging to articulate a rationale for imposing charges. It is possible that charges in such conditions could lead to perverse outcomes such as the diversion of traffic from well-functioning roads onto roads which are less suitable (from motorways to local roads, for example).

The clearest case for introducing charges would be in locations where traffic levels regularly exceed the capacity of the network and where local decongestion would bring a general benefit to those that are paying. The case is especially strong in locations where charges in that location could also bring wider benefits across the network.

Additionally, since circumstances across the roads of Auckland vary considerably, roads in one area are likely to require different 'optimal charge times', as well as different optimal charge levels, in order to maintain a well-functioning network overall.

This means that the optimal charging tariff for one location might well differ from the optimal tariff in another.

4.3 The direction a vehicle is travelling in

A more granular examination of patterns of congestion on Auckland's roads reveals that in many cases, roads which are operating well within capacity in one direction at a given time of day may be exhibiting substantial congestion on lanes running in the opposite direction.

For instance, comparing the Monday morning plot above in Figure 6, at 07:20, with the plot below in Figure 7 representing a Monday evening at 17:00 shows many such differences.

State Highway 16, for example, exhibits congestion in the eastbound direction in the morning peak, likely reflecting the flow of travel demand towards jobs and services in the central city.

Meanwhile, in the evening peak the same road is free-flowing eastbound, but congestion is apparent in the westbound direction – as people travel back to their origins. Similar asymmetry can be seen on other major roads shown on the plots. The purpose here is to show how the same road can be congested in one direction at one time of day and not congested in the other, rather than to highlight the intensity of congestion overall, although areas of high congestion are evident.

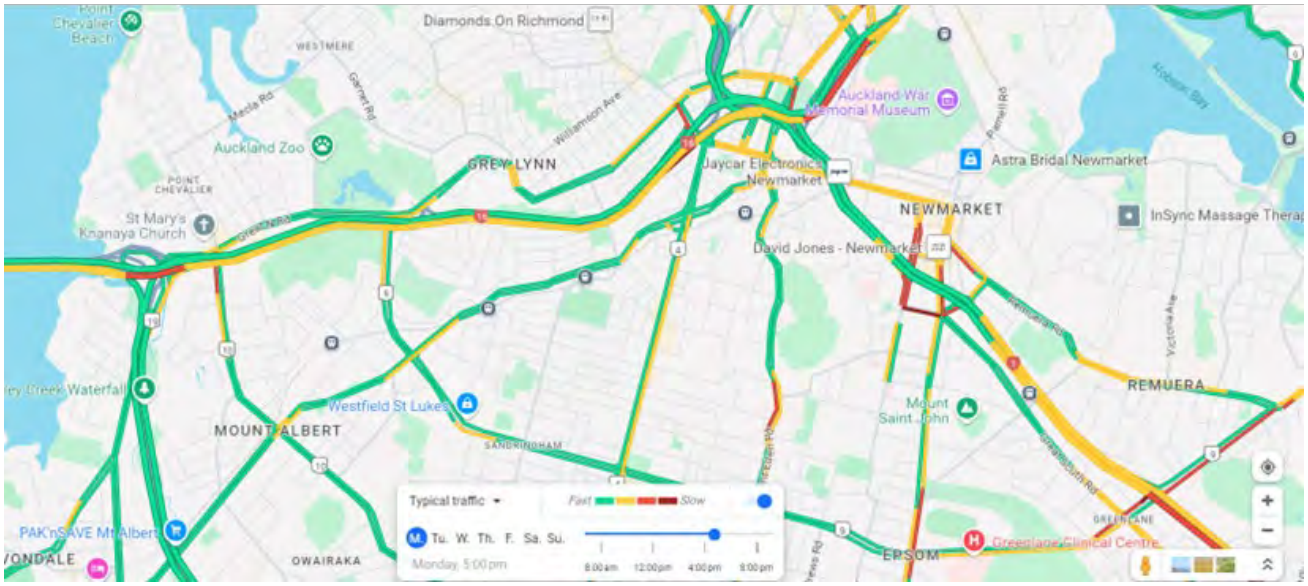


Figure 7: Typical traffic conditions at 5pm on a Monday evening.

This 'tidal' pattern is seen on roads around the world, and often reflects the clustering of sites of employment and other major trip attractors, leading to highly asymmetric patterns of travel demand. This pattern is the underlying reason for the proposed 'directional' charging schemes on the Blackwall and Silvertown river crossings in London [see Appendix B]. Here activities are clustered north of the river, drawing thousands of trips in the morning peak, which then return in the evening.

By contrast, there may be roads which are congested in both directions, reflecting the fact that travel demand relative to capacity peaks at the same times regardless of the direction of travel.

Implications for tariff design: This suggests that depending on the choice of charging location, it might be appropriate to have charges which vary by time of day and direction of travel. Where traffic exhibits highly 'tidal' patterns, a charge that varies by direction of travel might be important to avoid displacing traffic when congestion levels are low, and to ensure sufficient demand management effect when they are greater. This would need to be balanced against considerations of fairness and simplicity.

4.4 The type of vehicle being driven

Different vehicles contribute in different ways to the level of congestion on the road network. Firstly, there is the simple fact that larger vehicles like buses, lorries, and coaches physically take up more space on the roads and at junctions than cars or motorcycles.

The behaviour of some vehicle types also tends to make their individual congestion impact greater. For example, buses must stop frequently to pick up and set down passengers – when they do, they may impede other vehicles.

Some of these effects are difficult to quantify precisely, but they often are approximated in traffic modelling through the use of 'Passenger Car Unit' (PCU) values. This applies a congestion 'weight' of one PCU to a standard passenger car, a higher PCU value to larger vehicles, and a lower PCU value to smaller vehicles like motorcycles.

In the Auckland Forecasting Centre's Macro Strategic Model, vehicles are allocated a similar value known as an 'auto equivalent'. In this model, cars, motorcycles, vans, and heavy goods vehicles have an auto equivalent value of 1, while buses have an auto equivalent value of 3.

As noted in the global scan, some user charging schemes seek to reflect these different contributions to network performance through graduated charges. However, it is notable that not all such schemes choose to do so. This is perhaps due favouring simplicity and policy clarity over precision, or reflecting a view that any differences in the congestion impact of individual vehicle types is relatively modest in practice in the areas to which they apply.

Implications for tariff design: Some schemes in the global scan appear to have taken the view that larger, less agile vehicles such as buses, coaches, or heavy goods vehicles, which are individually more congesting than a car should be charged more.

However, there are further nuances to this decision. A bus, for example, has an auto equivalent value three times greater than a car – but if it is even half full, it might be directly avoiding twenty or more private cars being driven on the network, with an overall smaller 'congestion footprint'. Additionally, while privately operated buses where buses are running to a schedule set by AT itself, the case for influencing their behaviour is unclear.

Conversely, while they are small, and able to weave through traffic, motorcycles clustered at the front of a signalised junction may accelerate away at different rates, dispersing along the road ahead in a way that reduces opportunities for vehicles on side roads to enter the main carriageway. This may contribute to congestion on those side roads. Their congestion impact could therefore be higher than it appears, especially if their numbers were to increase.

The approach to charging different vehicle types should consider the ToU Policy Framework's secondary principle – ' Vary for different vehicle types according to the contribution they make to congestion'. Care will be needed to fully consider the implications of varying charges by vehicle type and avoid perverse outcomes when setting charges.

In addition, consideration should be given to the role targeted mitigations could play when charging different vehicle types. For example, the potential to provide exemptions for emergency vehicles.

5. Other pricing considerations

5.1 How much do we need to charge?

This paper considers the principles of charging – while detailed consideration of the setting of specific charge levels lies outside its scope, it is worth touching on the way that optimal charges are identified.

As noted above, charging works by altering the balance of decisions made by people considering making a journey, encouraging them to consider whether they would be better off altering one or more characteristics of their journey to avoid the charge.

In practice the sensitivity of travel demand to the imposition of charges is estimated through the use of 'price elasticities' at the population level. The elasticity of travel demand with respect to price reflects the extent to which overall travel demand will fall relative to a given charge level.

Price elasticities have been estimated for travel in various locations around the world. The work undertaken for TCQ collated examples from Stockholm, Gothenburg, London, Milan, and Singapore:

Location	Base costs	Peak Elasticity	All charged time
Stockholm	Fuel cost x 1.2[a]	-0.67 (-0.28)[b]	-1.57 (-2.49)[b]
Gothenburg	Fuel cost x 1.2	-0.53 (-0.16)[b]	-1.18 (-0.85)[b]
London	Fuel cost		-0.47
	Fuel + parking		-0.72
	Fuel + cost of time		-0.68
Milan: Petrol Euro 1 & 2	Zero		-0.66
Petrol Euro 0, Diesel	Zero		-0.44
Singapore	Previous toll price	-0.106	

[a] This is the per kilometre rate as applied by Swedish tax authorities for allowable expenses.
[b] Figures in brackets are long run elasticities, when differentiated from short run
Source: Börjesson (2017); Evans (2008); Croci and Ravazzi (2016); Olszewski and Xie (2005)

Figure 8: Price elasticity estimates for travel in various locations from The Congestion Question

The elasticity of total demand for travel to the imposition of charges reflects a wide range of different sensitivity levels at the level of individual travellers. Some travellers may be highly insensitive to charging, for example the very wealthy or those undertaking trips which are to varying degrees 'essential'. Those on lower incomes, those with more flexibility to reroute or retime their journey, or to change their mode of travel, may be significantly more sensitive to charges.

TCQ identified a range of elasticities to assess likely demand responses for Auckland households in different income brackets and with different numbers of vehicles. This produced a range of -0.54 for higher-income car-owning households through to -0.65 to low-income car-owning households.

Household type	Low Income	Medium Income	High Income
All households with no vehicles	-0.44	-0.41	-0.37
1 or 2 person households with 1+ vehicles	-0.65	-0.60	-0.54
3 person households with 1+ vehicles	-0.65	-0.60	-0.54
4 or more person households with 1+ vehicles	-0.65	-0.60	-0.54

Figure 9: Road pricing elasticities relating to demand responses for Auckland households from The Congestion Question work

This means that travel demand from lower income households is expected to be somewhat more sensitive to the introduction of pricing than higher income households, and by extension that more of them would change their behaviour to avoid the charge.

Trips undertaken for commercial purposes – such as freight, or travel undertaken in the course of work – are typically very insensitive to price. This is due to the value of the trip (the benefit it brings) generally being very high, and therefore greatly outweighing the imposition of the relatively modest charges that can easily influence other segments to change their behaviour. This is how charges tend to support economic activity – by securing more efficient travel conditions for the trips which have the highest economic value.

Work beyond the scope of this paper is needed to inform an up-to-date understanding of likely elasticities of demand with respect to the introduction of Time of Use charges.

A note on location

It is worth noting at this point that the same elasticity assumptions could give rise to different optimal charging tariffs in different charging locations in Auckland. As a simple example, where alternative options, such as neighbouring roads, offer a very similar journey time to the charged road, even a very low charge might result in considerable diversion of drivers, even including relatively price-insensitive drivers.

Conversely, where the time and convenience costs of diverting or switching mode are high, then a higher charge might be needed to have any effect.

5.2 What is the appropriate target objective for Time of Use charging?

The setting of specific targets is outside the scope of this paper. However, it is worth considering how a general objective could be framed.

The current direction is to target a specific 'Level of Service' on Auckland's roads.

Level of Service is a term used to describe the performance of individual roads in terms of how efficiently vehicles can move along them. As traffic levels build, the Level of Service that can be delivered by the road reduces – vehicles impede one another and (especially important in urban road networks) form queues at junctions.

Singapore targets Level of Service on the motorways and arterial roads covered by the Electronic Road Pricing system employed there. The Metropolitan Transport Authority is responsible for adjusting the scheme's charges to keep traffic flowing within the desired service level range on the charged links.

More work is needed to establish an appropriate means of monitoring Level of Service on roads that might be subject to Time of Use charging in Auckland, and how and for what purposes it might be reported.

However, it is worth noting that these could become important considerations when the requirement to demonstrate the real-world effectiveness of the project arises, and potentially in cases where the charging tariff is being reviewed.

5.3 Monitoring of charging impacts and benefits

The extensive monitoring programme supporting the central London Congestion Charge offers a good example of willingness to openly explore and explain – in both technical and layperson-friendly ways – the impacts of the scheme, whether beneficial or otherwise. This has been an important means of asserting TfL's comprehensive understanding of conditions on the London transport network, as well as a demonstration of good faith and good governance and has helped provide evidence to support changes in the charging tariff.

An important consideration in doing this in Auckland once the option(s) to be taken forward are understood more clearly will be to determine the appropriate size of the study area, since traffic changes might occur away from the charged roads.

In practice, this is likely to be a complex judgement, since traffic diversion onto local roads or indeed alternative major routes potentially some distance away may be difficult to identify and precisely ascribe to the impact of charges.

It will be important in framing the overall case for ToU charging with stakeholders and the public to consider how this and similar issues are likely to be addressed in future monitoring, since they will go to the heart of whether the scheme is regarded as successful once it is operational.

5.4 When should tariffs be reviewed?

As population and economic activity levels change, cities grow and evolve, and the 'real terms' value of money changes, it is typical for congestion charging prices to require review in order to remain effective.

Some schemes in the global scan keep their charging tariffs permanently under review without committing to specific intervals of review, while at the other end of the scale, for example Singapore's ERP scheme, others review prices relatively frequently.

The reality is that prices and potentially tariff structures will require review over time. The question of whether they should be reviewed on a set schedule, or how often they should be reviewed depends on wider considerations around the obligations AT wishes to commit to, since changing charges is typically inherently somewhat political.

At this point in time, subject to any restrictions or requirements imposed by enabling legislation, it would seem preferable for Auckland to seek as much latitude as possible in deciding when, and how frequently, charges should be reviewed.

6. The need for retaining flexibility in pricing

This paper has demonstrated that the level of congestion varies from place to place, from hour to hour, and from one direction to another. The intensity and patterns of congestion can change from year to year, and that the imposition of charges could alter the familiar patterns of morning and evening congestion with a relatively less congested interpeak that we see today.

In this context, it would be helpful to retain flexibility in pricing to ensure a degree of adaptability in meeting the challenges of the day.

6.1 Allowing for adaptability with assurance

An effective framing of this issue might be to provide scheme operators with discretion as to the specific times at which charges may be levied. This should be supported by a clear framework of governance, including the assessment that operators must undertake, to provide assurance to responsible Ministers that the charging tariff will continue to be set appropriately.

There could be benefit in developing an illustrative governance and assessment framework concept to inform discussions over emerging legislation.

6.1.1 Case study: Charging Policies and Procedures, Transport for London (TfL)

The 'Charging Policies and Procedures' document put forward by TfL to support its application to the national government for Development Consent to construct the Silvertown Tunnel provides a useful reference point. In this instance the Charging Powers and Procedures were given legal weight by the making of the Development Consent Order for the tunnel once consent was granted, making it obligatory for TfL to follow them.

The procedures set out a clear process by which charges must be set and varied, including requirements for assessment, consultation, and decision making. Figure 10, taken from the document itself, shows how the process works.

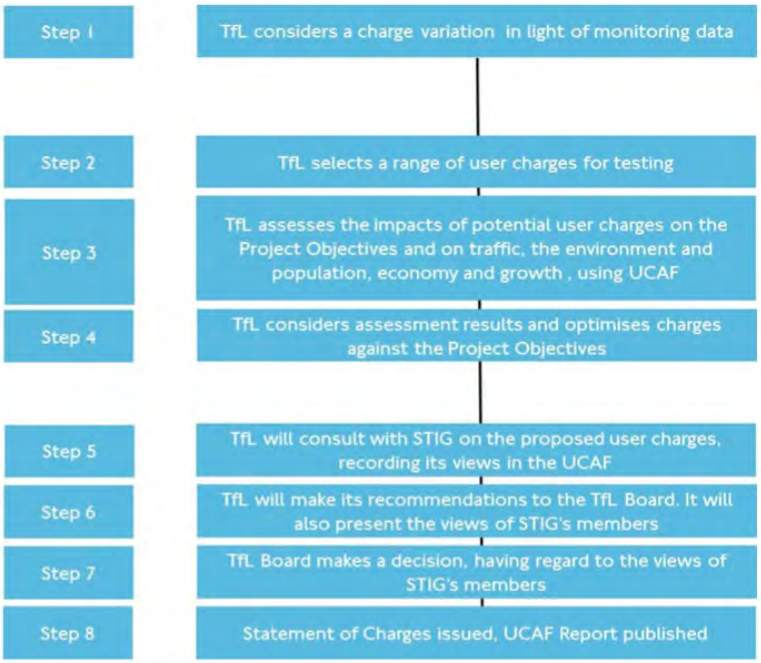


Figure 10: Silvertown Tunnel User Charging Powers and Procedures (Source: Transport for London)

In particular, the procedures make use of a defined User Charging Assessment Framework (abbreviated to UCAF in the figure above) to establish the specific way by which changes to the charge must be assessed against criteria directly connected to the scheme's objectives.

Since the decision to vary charges is subject to consultation and potential judicial review, in practice there is ample scope for national government and affected local authorities to consider and challenge the assessment made by TfL. This provides significant assurance that charges will be set and varied in ways that meet government approval.

7. Emerging findings

The following summarises the key implications from the evidence above.

- The role of pricing: Pricing is a critical component of scheme design which will impact a scheme's effectiveness, fairness, and simplicity while supporting the core objective of a ToU scheme for Auckland (reducing congestion).
- Dimensions of a tariff: Charges may vary depending on time of day, day of week, direction of travel, vehicle used, but there is no 'right' answer.
- Flexible framework: Pricing requires a flexible framework to ensure a degree of adaptability in meeting the challenges of the day.
- Context is everything: Global evidence shows that there is no one perfect approach, because different variables must be flexed to meet the objectives. Setting appropriate charges must be informed by specific context at the charging locations identified, and context specific nuances such as user groups, traffic conditions etc, supported by modelling, analysis, and assessment.

  Additionally, different locations in Auckland may well have a different 'optimal' tariff.
- Charge levels: Despite the importance of context, all things being equal, higher charges are likely to be needed at busier times of day/week, and potentially in the 'shoulder' periods around those times to avoid passing the problem to another time of day.
- Vehicle type: Consideration of higher charges for bigger vehicles requires careful consideration to minimise the risk of unintended consequences.
- Objectives: Being clear on the specific objectives of charging in terms of the outcome desired is important. Defining the area of benefit (and the area over which potential disbenefits are assessed) will be key to support effective monitoring.
- Monitoring and review: Charges will likely need to be reviewed over time. Preserving flexibility over when and how this is done will be beneficial – this could be supported by a framework of governance giving reassurance over the process by which this would be undertaken.

8. Next steps

The following next steps have been developed to provide an indication of the approach which could be taken to further develop pricing alongside scheme design, complementary measures, and mitigations:

1. Develop and test a variety of charging tariff variations for the scheme location options including:
    - Different 'headline' price levels, and
    - Variations on these where prices are adjusted according to time of day, direction of travel, vehicle type etc.
2. Review likely the impacts of a different charging traffs on traffic flow, diversion, congestion, mode shift, time shift etc.
3. Iterate and optimise charging tariff alongside the scheme location - including more detailed and informed consideration of the appropriate mitigations (discounts and exemptions) and complementary measures.

Appendix A: Why Time of Use schemes require pricing

Time of Use schemes work by selectively applying a financial price to journeys which would otherwise be 'free at the point of use'.

This is effective in changing behaviour because, simplistically, the decision to make a journey by a particular mode of travel, at a particular time, on a specific route typically involves a consideration (whether conscious or not) of the balance of three factors:

1. The costs (in terms of time and money) of making the trip in that way,
2. The costs of making a trip by a different mode, time, or route, and
3. The benefit of making it (which very often relates to the purpose of the trip).

Generally, when the time and money cost of making the journey are outweighed by the benefit that making it brings, the person makes the trip in that way.

The increased financial cost of private vehicle journeys resulting from of the imposition of charges through Time of Use and similar congestion pricing schemes tends to reduce aggregate demand for road use (at least at the times and locations where charges apply), by adding to the cost of making the trip in that way, such that for some travellers it outweighs the benefit.

The additional cost encourages individual drivers to consider a trade-off between two broad choices:

1. Avoiding the additional cost by altering their travel in some way (the time they travel, the route they take, their destination, the mode of transport by which they travel, or indeed whether they travel at all).
2. Paying the charge and travelling as they would have if there was no charge in place (in which case they may benefit from improved journey conditions resulting from other drivers reducing pressure on the road network by taking the first choice).

It may go almost without saying that some journeys – for example those undertaken for the purposes of leisure, those where there are a wide range of alternative route or mode options – can more readily be altered than others (trips to work, for example, or bulky time-sensitive deliveries). Meanwhile those making journeys which are less discretionary or flexible are more likely to make the judgement that their best option (or possibly their only feasible option) is to pay the charge and continue to drive.

It is the price signal provided by the imposition of charges that brings about the travel demand change that makes congestion pricing effective.

Appendix B: Example charging tariffs

The proposed charging tariff for the Silvertown and Blackwall Tunnels in London is set out in Figure 11, showing how charges for individual journeys are intended to vary by vehicle type, payment mechanism, day of week, time of day, and direction of travel.

The charging tariff for the Blackwall and Silvertown Tunnels is relatively complex. Charges may vary between £1.50 for small vehicles driven through the tunnels outside peak hours up to £10 for Heavy Goods Vehicles travelling at the busiest times in the 'peak direction' (and in fact £0 before 6am and after 10pm). In total there are at eight different possible charges for an individual journey by an individual vehicle.

Silvertown and Blackwall User Charges – 06:00 to 22:00			
	Charges paid via Auto Pay		Charges paid via other channels
	Standard off-peak charges	Peak charges Mon-Fri only *Northbound 06:00 - 10:00* *Southbound 16:00 - 19:00*	At all times
Motorcycle, moped, motor tricycle	£1.50	£2.50	£2.50
Car and small van	£1.50	£4.00	£4.00
Large van	£2.50	£6.50	£6.50
Heavy Goods Vehicles	£5.00	£10.00	£10.00
Penalty Charge Notice (PCN) for non-payment - £180 (Reduced to £90 if paid within two weeks; maximum one PCN per day)			

Figure 11: A relatively complex tariff: Transport for London Silvertown Tunnel consultation

By contrast, the charging tariff for the central London Congestion Charging scheme is extremely simple. This utilises a single charge applying for all vehicle types whenever the scheme is operational – the charge is only ever £0 or £15, depending only on the time of day and the day of the week:

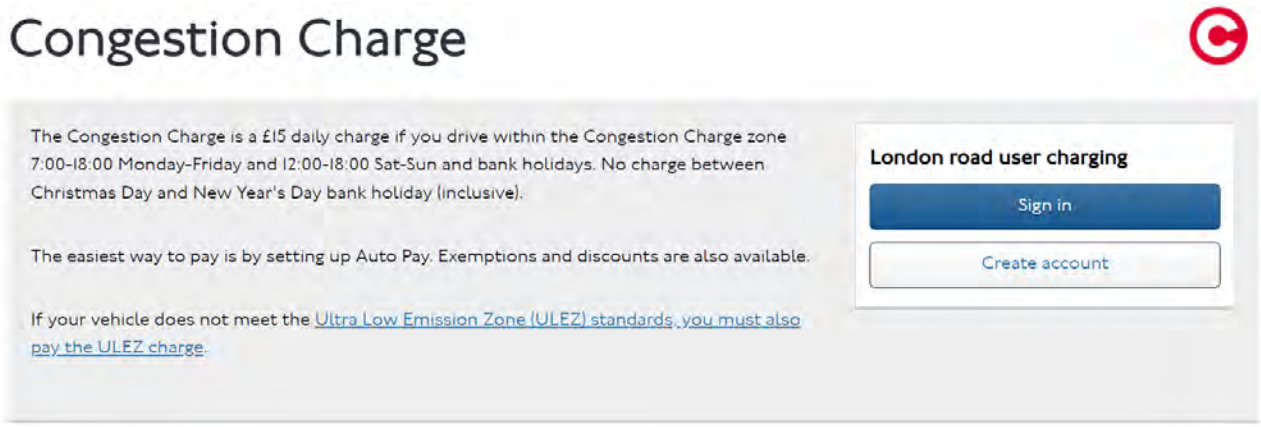


Figure 12: A relatively simple tariff: Transport for London Congestion Charging

While these two example tariffs from London are very different from one another in terms of their complexity, what they have in common is that they have each taken account of the specific traffic conditions on the roads over which they apply.

In central London, where the Congestion Charge applies, roads are typically congested throughout the day during the weeks, and through the afternoons on weekends. Meanwhile, traffic demand to cross the river where the Blackwall and Silvertown Tunnels are located is far more variable.

A tariff example for New Zealand is set out in the table below. The charge for use of the Northern Gateway Toll Road is always $2.60 for vehicles up to 3.5 tonnes, or $5.20 for vehicles over 3.5 tonnes.

Toll charges

	Car, motorcycle, or light commercial vehicle (3.5 tonnes or less)	Heavy vehicle (over 3.5 tonnes)	Caravan or trailer
Northern Gateway Toll Road	$2.60	$5.20	No extra charge
Tauranga Eastern Link Toll Road	$2.30	$5.60	No extra charge
Takitimu Drive Toll Road	$2.10	$5.40	No extra charge

Figure 13: Tariff examples for New Zealand

It is worth noting that the primary objective of the toll on the Northern Gateway Toll Road is to contribute to the implementation and operating cost of the road rather than being linked to congestion impact. However, this still provides a clear rationale to charge heavy goods vehicles a higher charge, since heavier vehicles cause more damage to road surfaces than lighter vehicles, which increases maintenance cost impacts.

They may also be less price-sensitive, which is the reason why heavier vehicles are charged more for the use of the Blackwall and Silvertown Tunnels, where the principal objective is demand management rather than revenue raising.

A far more complex charging tariff is in operation in Singapore. The snapshot overleaf is a partial summary of the different charges applying at different locations around the charged network of the city (not all charging locations are included in this). It is evident that different locations are charged in quite different ways, some with many different time bands throughout the day, some charged only in the evenings, and some with much higher 'maximum' charges than others (noting that these are the charges payable by motorcycles and cars only).

Latest ERP rates in Singapore

The tables below capture the latest weekday highway rates for both cars and motorcycles, as well as the applicable opening hours.

Last updated on 9th January 2024.

Ayer Rajah Expressway (AYE) – Citybound

- Clementi Avenue 6 into AYE (52)
- Clementi Avenue 2 into AYE (53)
- After Jurong Town Hall (74)

Time Period	Current ERP Rates
07:00 – 07:30	S $0.00
07:30 – 07:35	S $1.00
07:35 – 08:30	S $2.00
08:30 – 08:35	S $2.50
08.35 – 08:55	S $3.00
08:55 – 09:00	S $2.50
09:00 – 09:25	S $2.00
09:25 – 09:30	S $1.50
09:30 – 09:55	S $1.00
09:55 – 10:00	S $0.50
10:00 – 17:30	S $0.00
17:30 – 17:35	S $1.50
17:35 – 17:55	S $3.00
17:55 – 18:00	S $2.00
18:00 – 18:25	S $1.00
18:25 – 18:30	S $0.50
18:30 – 22:30	S $0.00

Ayer Rajah Expressway (AYE) – Tuasbound

- After North Buona Vista (41)

Time Period	Current ERP Rates
07:00 – 17:30	S $0.00
17:30 – 17:35	S $1.00
17:35 – 18:25	S $2.00
18:25 –18:30	S $1.50
18.30 – 19:25	S $1.00
19:25 – 19:30	S $0.50
19:30 – 22:30	S $0.00

Ayer Rajah Expressway (AYE)

- Between Portsdown Road and Alexandra Road (36)

Time Period	Current ERP Rates
07:00 – 08:00	S $0.00
08:00 – 08:50	S $0.50
08:05 – 08:30	S $1.00
08:30 –08:35	S $1.50
08.35 – 08:55	S $2.00
08:55 – 09:00	S $1.50
09:00 – 09:25	S $1.00
09:25 – 09:30	S $0.50
09:30 – 22:30	S $0.00

Central Expressway (CTE)

- Between Ang Mo Kio Ave 1 and Braddell Road 35)

Time Period	Current ERP Rates
07:00 – 07:05	S $1.00
07:05 – 08:30	S $2.00
08:30 – 08:35	S $2.50
08:35 – 09:25	S $3.00
09.25 – 09:30	S $2.00
09:30 – 09:55	S $1.00
09:55 – 10:00	S $0.50
10:00 – 22:30	S $0.00

Central Expressway (CTE)

- Northbound between PIE and Braddell Road (46)
- PIE to CTE Northbound before Braddel Road (67)

Time Period	Current ERP Rates
07:00 – 17:30	S $0.00
17:30 – 17:35	S $1.50
17:35 – 18:00	S $3.00
18:00 –18:05	S $3.50
18.05 – 18:25	S $4.00
18:25 – 18:30	S $3.50
18:30 – 18:55	S $3.00
18:55 – 19:00	S $2.50
19:00 – 19:25	S $2.00
19:25 – 19:30	S $1.50
19:30 – 19:55	S $1.00
19:55 – 20:00	S $0.50
20:00 – 22:30	S $0.00

Central Expressway (CTE)

- After Braddell Road (31)
- From Serangoon Road (33)
- From Balestier Slip Road (34)

Time Period	Current ERP Rates
07:00 – 07:30	S $0.00
07:30 – 07:35	S $1.00
07:35 – 08:00	S $2.00
08:00 –08:05	S $2.50
08.05 – 08:30	S $3.00
08:30 – 08:35	S $4.00
08:35 – 08:55	S $5.00
08:55 – 09:00	S $4.50
09:00 – 09:25	S $4.00
09:25 – 09:30	S $3.50
09:30 – 09:55	S $3.00
09:55 – 10:00	S $1.50
10:00 – 22:30	S $0.00

Appendix C: Impact of traffic patterns changing over time

This discussion paper has already outlined the ways in which congestion can vary from place to place, from one road to another, from one hour of the day to the next, and even depending on the direction of travel.

However, there is another very important dimension over which congestion tends to vary – that is, over the span of time (for example, from year to year). Notwithstanding relatively short-term variations (for example, during the Covid-19 pandemic, when travel rates fell dramatically, and congestion fell in turn), the general trend in levels of congestion is that it increases over time.

This is true in Auckland and in other cities around the world, and stems from the general tendency for the population and level of economic and other activity in cities to increase over time. With more people carrying out more activities, the absolute volume of traffic tends to increase, but the capacity of city roads is typically unable to increase in turn, leading to an increasing mismatch between capacity and demand, and – therefore – more congestion.

The total amount of travel by vehicles (vehicle kilometres travelled or VKT) in Auckland increased by 27%, or more than 3 billion kms per annum between 2000 and 2022, with a significant increase taking place between 2012 and 2018, where VKT peaked and then fell sharply during the Covid-19 pandemic. VKT has now resumed an upward trajectory.

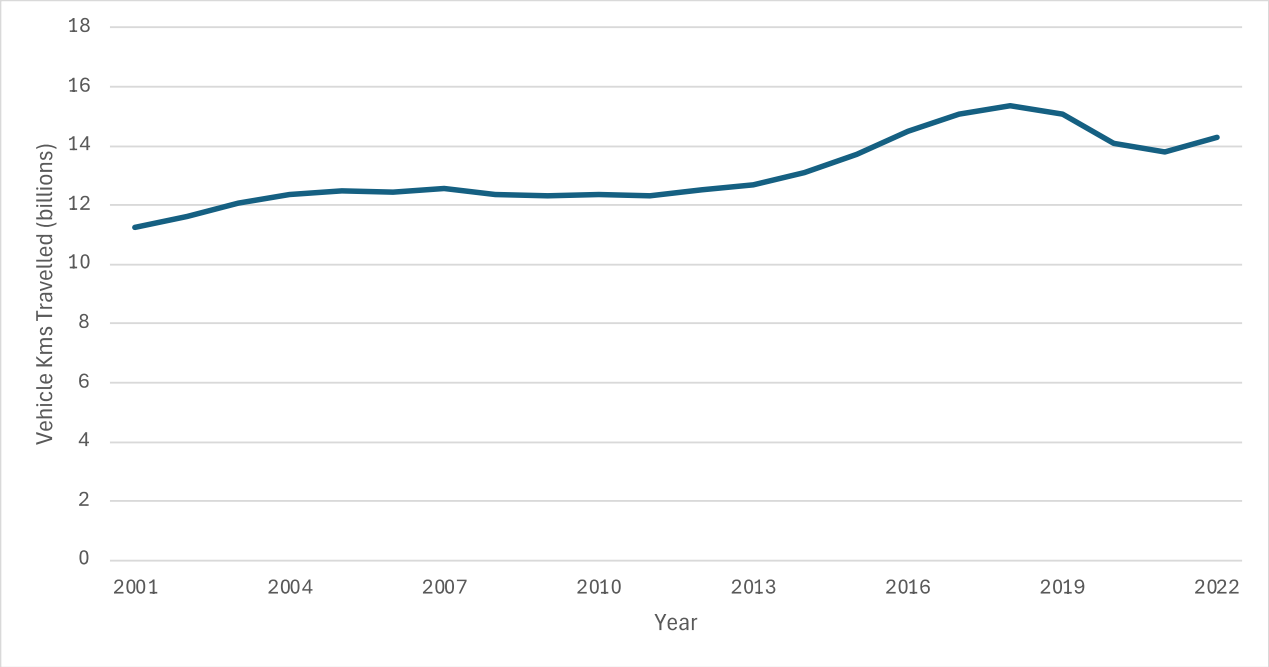


Figure 14: Auckland Annual VKT (2001-2022)

Increases in congestion arising from increased travel over the long-term manifest in three main ways:

1. Increasing intensity of congestion during already-congested periods
2. Increasing duration of congestion, with uncongested periods becoming more congested
3. Increasing area of congestion, with previously less congested areas experiencing more congestion

An important implication which stems from this is that a charging tariff which appears appropriate today may be overtaken by events as time moves on.

For example, if the tariff imposes a zero charge on the weekends, but the weekends become more congested over time, then the charging scheme may not be delivering fully on its objective of maintaining network performance.

This is in fact the specific experience of London, where – after over a decade of operation as a weekday-only scheme – the Central London Congestion Charge was extended to cover the increasingly congested weekend period.

Fundamentally this means that a charging regime which cannot flex over time to accommodate changes in the prevailing circumstances is a direct risk to scheme effectiveness.

Appendix C

Auckland Transport

Time of Use Charging Study

Complementary Measures Discussion Policy Paper

Reference: TOU-EYARP-IAXX-RPT-000005_v3_202412_Complementary Measures Discussion Policy Paper

3 | 13 December 2024

This report has been authored by EY and Arup, to support the development of Time of Use (ToU) options. It represents a 'point in time view' which will need to be further refined and interrogated as the project progresses.

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.
AT contract number 781-24-657-PS

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Executive Summary

In the context of increasing congestion, and constraints (both practical and financial) on the ability to provide additional road capacity, Time of Use (ToU) charging has a potential role to play in better connecting people, places, goods, and services across Auckland by maximising the productivity of the city's road network.

This discussion paper represents a point in time understanding of the complementary measures component of a ToU scheme for Auckland, building on the work and findings of The Congestion Question (TCQ). Initial analysis and findings relating to complementary measures should be further developed alongside the design of an emerging preferred scheme option.

The role of complementary measures

Complementary measures are non-charging interventions that are implemented to **support the realisation of the scheme's primary objective (reducing congestion), address the impacts or enhance the benefits** of a scheme.

The elements of a Time of Use scheme

A ToU scheme is made up of four distinct elements. The first and most powerful lever to achieve the primary objective and avoid undesirable impacts is the design of the core scheme (the selection of charging location and charging tariff). Next, complementary measures are used to mitigate impacts and enhance benefits, while targeted mitigation is deployed only when problematic issues cannot otherwise be avoided or mitigated.

This policy paper addresses the policy considerations around one of these elements – **complementary measures**. Separate policy papers consider Pricing and Targeted Mitigation, while the implications of various Charging Location options are considered at length in the Option Assessment and Policy Framework report.

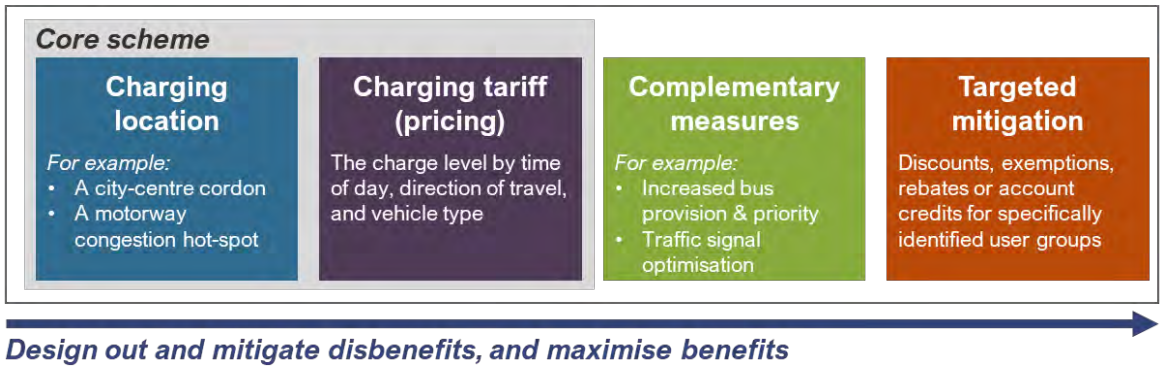

Figure 1: Elements of a Time of Use charging scheme

Time of Use charging for Auckland

Auckland Transport's primary objective for ToU charging, which represents the central goal that drives what the project seeks to achieve, is to manage travel demand to achieve an improvement in road network performance. This objective is underpinned by three Core Policy Principles of Effectiveness, Fairness, and Simplicity representing the critical success factors which will be fundamental to scheme design.

Together, the Core Policy Principles and Primary Objective guide all aspects of scheme design.

Approach to this policy discussion paper

In common with the policy discussion papers on Pricing and Mitigation Measures, this Complementary Measures paper begins with a brief explanation of the role of this element of a Time of Use scheme in securing an outcome that meets the Project Objective in a way that is Effective, Fair, and Simple.

It explores the ways that different urban road pricing schemes around the world have approached complementary measures, the reasons for the different approaches they have adopted, and the implications for Auckland in considering the development of an approach to complementary measures.

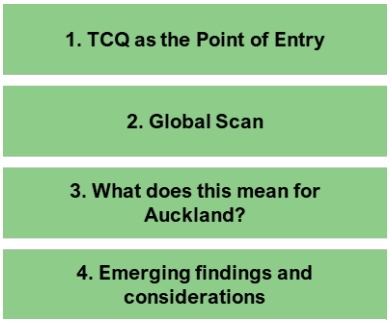

Figure 2: Common approach to the policy papers

Emerging findings and considerations based on this review

Complementary measures bear directly on all three Core Policy Principles and connect directly to several of the scheme's nine Supporting Policy Principles (those with the clearest links are picked out in bold below).

Effective	Fair	Simple
Measures should enhance a scheme's effectiveness in the first instance. Where measures are mitigating scheme impact's they should avoid undermining a scheme's effectiveness.	A complementary measure should enhance a scheme's fairness (e.g. by providing a viable alternative) and mitigate the disbenefits a scheme could have on local residents and businesses.	It should be easy to articulate how a measure is complementing a scheme. If the rationale is complex or challenging to articulate this could undermine a scheme's social licence.

1. **Be flexible in time, location, and pricing to achieve target congestion levels**
2. **Target travel in congested conditions**
3. **Target locations and routes where users have viable alternatives** and discourage discretionary trips
4. Vary for different vehicle types according to the contribution they make to congestion
5. Improve accessibility for most people and businesses
6. Be technologically achievable, adaptable, cost effective, and efficient
7. Avoid mitigations that undermine the efficacy of the scheme
8. **Support ability to spatially extend and modify the scheme**
9. **Avoid unwanted consequences, e.g. significant fiscal costs for vulnerable communities, diversions, community severance.**

Emerging findings

Different complementary measures are likely to better suit different types of schemes

Complementary measures must respond to and enhance scheme design elements including charging location and charging tariff settings. For example, cordon schemes require complementary measures that respond to concentrated geographic impacts, like public transport. In contrast, public transport is unlikely to have a more than minor mitigatory or complementary benefit to a link scheme due to the geographically dispersed impacts this scheme type creates.

In all instances, network optimisation appears to have the potential to enhance a scheme's congestion reduction objective, by supporting the effective and efficient management of the road network.

Viable public transport alternatives are likely to be critical for scheme success from Day One

Both the ToU Policy Framework and global benchmarking have emphasised the criticality of providing viable alternatives alongside any ToU scheme.

In particular, it will be important to have an appropriate public transport response to support behaviour change, in advance of the scheme becoming operational. Further work should be undertaken to understand the amount of revenue generated from the scheme which can be used to invest in complementary measures, considering:

1. Addressing scheme impacts as the priority, and
2. Enhancing scheme effectiveness and efficiency, including for those that pay.

Complementary measures would likely have a key role in a scheme's social licence

The most appropriate complementary measures for a scheme may be those that help to support the case that the scheme has been considerately designed, and that the right infrastructure is in place to support Aucklanders. Early engagement with Local Boards has already demonstrated the importance placed on improving public transport alongside or in advance of implementation of a scheme in Auckland, to ensure Aucklanders are provided with viable transport choices.

It will be important to consider how to approach measures which could undermine a scheme's social licence if not designed and communicated appropriately. For example, the permanent removal of parking spaces for bus lanes that are not need outside of peak periods could potentially negatively impact social licence. However, the same measure deployed during critical periods could potentially complement a scheme without detracting from social licence.

Complementary measures should progress existing strategic direction and priorities

The broad spectrum of measures deployed internationally, and reflected on in this paper, highlight the fact that there is no one 'silver bullet' or 'correct' amount or mix of complementary measures for any given scheme. Instead, global evidence highlights the importance of tailoring the complementary measures response to the specifics of the scheme being promoted.

Nevertheless, measures that are 'badged' as complementary to a scheme typically represent the progression of an existing strategic direction and planned or underway programmes or projects, rather than being entirely bespoke.

In Auckland it will be important to consider what is which programmes or projects already underway could or should be brought forward to complement a scheme.

If there is a temporal aspect to scheme impacts, complementary measures may need to have a correspondingly critical temporal component

Deployment of some measures, particularly kerb zone management, parking management, and road space prioritisation could help to mitigate scheme impacts. However, full-time implementation of such measures could potentially undermine a scheme's social licence if they cannot be shown to be necessary at all times. For example, if a charge is only applied in one direction at a particular period of the day, a complementary measure, such as a clearway, may only be required at or around that time, without necessitating full-time removal of parking.

1. Introduction

This paper presents initial findings relating to the role complementary measures could play in supporting a Time of Use (ToU) scheme.

The broad spectrum of measures deployed internationally, and reflected on in this paper, highlight the fact that there is no one 'silver bullet', 'correct' amount, or ideal mix of complementary measures. The appropriate proposition depends on the details of the core schemes proposed, analysis, and (critically) engagement and consultation.

Beyond the scope of this paper, it will be critical to engage with Subject Matter Experts, stakeholders and the public to understand which of the measures that could meaningfully complement the scene would best meet their needs.

What are complementary measures?

Complementary measures are non-charging interventions that are implemented to **support the realisation of the scheme's primary objective (reducing congestion), address the impacts, or enhance the benefits** of a scheme. For example, providing additional public transport capacity to avoid overcrowding as demand grows or network optimisation to mitigate diversionary impacts.

Complementary measures **work in concert with core scheme elements** (location, pricing) and targeted mitigation measures (such as discounts, exemptions, rebates, credits) to ensure a scheme reduces congestion, whilst being effective, fair, and simple.

1.1 Scope

1.1.1 Purpose of this paper

This discussion paper provides an initial review of a range of potential complementary measures (Figure 3) which could support the implementation of a ToU charging scheme in Auckland. These are based on global precedents and the Auckland context, and the current level of understanding of potential scheme options.

The paper highlights which complementary measures initially appear to have the potential to most significantly complement different scheme options and outlines some high-level recommendations and next steps.

Figure 3: Complementary measures considered for Auckland's ToU scheme

1.2 The Policy Framework

Complementary measures taken forward as part of Auckland's ToU charging scheme should in the first instance support and enhance the primary objective of the Policy Framework (Figure 4):

- To manage travel demand to achieve an improvement in road network performance by:
  - reducing congestion,
  - increasing throughput of people and goods, and
  - improving reliability of the road network.

Secondly, complementary measures should support the realisation of the Policy Framework's core principles of **effectiveness**, **fairness**, and **simplicity**, to ensure all road users are not negatively impacted by and have the opportunity to benefit from the scheme as much as possible. Alignment with

secondary principles, most notably the presence of viable alternatives and not undermining scheme efficacy, should shape the implementation and design of any package of measures.

Component	Purpose	ToU Policy Framework
Primary Objective	The central goal that drives what we're trying to achieve	To manage travel demand to achieve an improvement in road network performance by: • reducing congestion • increasing throughput of people and goods • improving reliability of the road network.
Core Policy Principles	The critical success factors which will be fundamental to scheme design	1. **Effective:** Improve network performance. 2. **Fair:** Minimise and mitigate adverse social impacts and ensure benefits and costs are fairly distributed across users. 3. **Simple:** Be understandable and avoid complexity.
Supporting Policy Principles	These will guide the development of the scheme design	1. Be flexible in time, location and pricing to achieve target congestion levels. 2. Target travel in congested conditions. 3. Target locations and routes where users have viable alternatives and discourage lower value discretionary trips. 4. Vary for different vehicle types according to the contribution they make to congestion. 5. Improves accessibility for most people and businesses. 6. Be technologically achievable, adaptable, cost effective, and efficient. 7. Avoid mitigations that undermine the efficacy of the scheme. 8. Support ability to spatially extend and modify the scheme. 9. Avoids unwanted consequences, e.g. significant fiscal costs for vulnerable communities, diversions, community severance.
Secondary Outcomes	These are not objectives being sought and do not shape scheme design but are expected to occur as a result of time of use charging. They will be tracked and measured.	1. Share of travel by public transport, walking and cycling 2. Carbon emissions reduction 3. Net revenue 4. Improved air and water quality
Assessment Criteria	Provides a framework to consistently assess options, aligned to the intent of the policy framework	

Figure 4: Auckland ToU Policy Framework

1.3 Relationship with core scheme design

The core of a ToU scheme is comprised of two elements: a location and a tariff, both of which have an impact on the most appropriate mix of complementary measures.

1.3.1 Charging location

The choice of a charging location (which might be a defined area, section of route or distinct points) has a critical role to play in achieving the scheme objective of reducing congestion and the complementary response to mitigate impacts and enhance benefits. It will fundamentally shape which parts of the road network are likely to be impacted, the types of trips which would be charged, the presence of (or requirement for) viable alternatives, and the scale of the impact (benefit and disbenefit) a charge might have.

1.3.2 Charging tariff

The ToU study has considered two primary scheme types in terms of charging location:

1. Cordon schemes: In a cordon scheme, charges are payable when crossing a 'boundary' surrounding a defined geographical area. Cordon schemes typically apply to geographic areas which are home to certain attractors, for example a city centre area.
2. Link schemes: In link schemes, charges are payable for use of specific roads or road links on the road network (typically arterials or motorways) rather than extended areas. Vehicles using these links are charged for their journey.

Through the assessment, it has become apparent that there are clear thematic differences between cordon and link schemes, as well as shared areas of interest. These clear distinctions between the two different scheme types are likely to remain fairly consistent regardless of the nuances of the scheme option, but the scale of impact may change.

For example, a city centre cordon would have similar types of characteristics and impacts as city centre + fringes cordon and an Isthmus cordon. However the scale of the area within the cordon, and the number of trips and number and range of individuals impacted, would vary depending on the scale of the cordon. Similarly, an extensive motorway option will have similar characteristics and impacts as a smaller motorway scheme, but the scale of the impacts, and diversity of groups impacted, would vary.

1.4 Role of complementary measures

Complementary measures should respond to and enhance scheme design elements including charging location and charging tariff settings to ensure they support a scheme's objective, address scheme impacts, and enhance scheme benefits.

Typically, cordon schemes require complementary measures that respond to concentrated geographic impacts. For link schemes, some impacts may be harder to mitigate through particular complementary measures than others. For example, it will be challenging to mitigate the impact of a link scheme through public transport.

Complementary measures often have a temporal component which can respond to scheme design. For example, time-restricted access for through-traffic can mitigate the impacts of diversionary traffic on a local area at charged times, but may not be required at all times.

1.4.1 Use of revenue

Complementary measures should generally be paid for by the revenue of a ToU charging scheme. Net revenue generated by the scheme (i.e. revenue not required for the core scheme operations) should be utilised considering the following hierarchy to support the core objective and providing benefit to those who pay:

1. Addressing scheme impacts as the priority, and
2. Enhancing scheme effectiveness and efficiency, including for those that pay.

1.4.2 Alignment with strategic direction

Throughout this paper consideration has been given to both Auckland Council and Auckland Transport strategic direction. As the work to identify a potential ToU charging scheme for Auckland progresses it will be important to gain a more detailed understanding of, and map the relationship with, programmes of work planned or underway in Auckland. It is also important to consider how this project can best align with and complement overarching strategic direction, at both a Local and Central Government level.

All complementary measures considered in this paper are consistent with Auckland's existing strategic direction, with the exception of new or expanded Park and Rides, which would need further consideration in regard to broader land use planning direction if taken forward.

Key strategic documents relating to complementary measures are summarised in Figure 5.

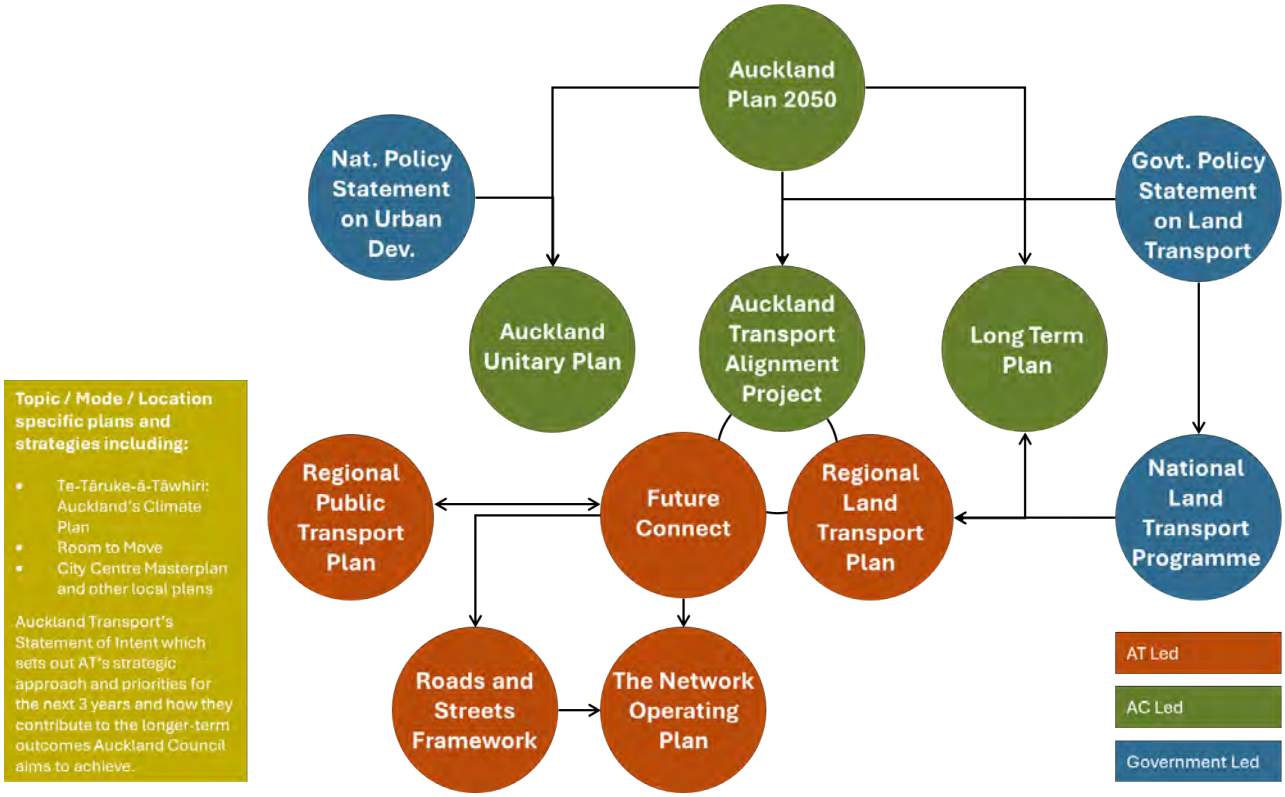

Figure 5: Strategic direction relating to complementary measures considered for Auckland's ToU scheme

1.4.3 Mandate to deliver

All measures considered in this paper are broadly within Auckland Transport and Auckland Council's mandate and ability to deliver. Where applicable, any restrictions or limitations to this are noted in the discussion of the relevant measure.

1.4.4 Social licence

Global evidence has highlighted the importance complementary measures play in securing social licence. The relevance of this in Auckland is already evident. Early engagement with Local Boards has demonstrated the importance placed on improving public transport alongside or in advance implementation of a scheme in Auckland to ensure Aucklanders are provided with equitable transport choice.

The interventions that ultimately get tied to a scheme as specific 'complementary measures' may be those that help to support the case that the scheme has been considerately designed, and that the right supporting infrastructure or services are in place, such as public transport.

It is anticipated that the implementation of any ToU scheme, and associated complementary measures, will be accompanied by a communications campaign. This will be critical to ensure that the public are aware of the changes, how they will be impacted, and the benefits that the scheme will provide – helping to grow a scheme's social licence. It is also anticipated that existing education and information relating to Auckland's transport network and mode choice options will continue, in line with Auckland's established strategic direction.

2. Approach

This discussion paper represents a point in time understanding of the potential for complementary measures to support a Time of Use (ToU) project for Auckland. As such, the findings outlined in this paper represent an initial understanding of the role complementary measures could play, and helps to inform thinking regarding the full breadth of a ToU project as the core scheme options are progressively narrowed and further developed.

More detailed understanding of the opportunities and barriers relating to complementary measures, particularly analysis informed by engagement with SMEs, stakeholders, and the public will be critical to progressing this work through future stages of the project.

2.1.1 Assumptions

This paper has been based on modelling assumptions in a 2026 scenario of Auckland's land use and transport network.

2.1 Overview of approach

An overview of the approach taken to develop this paper, in parallel with the Options Assessment process, is outlined below.

Options Assessment	Complementary Measures Policy Paper	Approach
Stage A Options Assessment (identifying a short list of scheme location options to be taken forward for further analysis	Step 1: TCQ	Review of TCQ as the Point of Entry.
	Step 2: Global Scan	Scan ToU schemes to understand what has been deployed globally to complement a scheme.
	Step 3: Auckland context	Review of local strategic direction and context relating to complementary measures, using global benchmarking findings as precedent.
	Step 4: Menu of Complementary Measures	Development of 'menu' of complementary measures for consideration considering the findings of Step 1 and 2, building on TCQ definition and findings.
Stage B (partial) Options Assessment (gaining greater understanding of the impact on local economy and vulnerable communities for the short list of options)	Step 5: Alignment with Policy Framework	Desktop analysis of how each measure will support the Policy Framework for different scheme types (using short listed options as test cases for each measure). Identification of thematic consistencies across each scheme type, and discussion of the potential impact a measure has for each scheme type in relation to effectiveness, fairness, and simplicity from 1 (minor) to 3 (significant). The definition / degree to which each measure could complement a scheme is articulated in the relevant sections of this document. However, broadly: 1. Minor: This measure would have limited positive impact in complementing the scheme's effectiveness, addressing impacts, or enhancing benefits. 2. Moderate: This measure would have some impact in complementing the

		scheme's effectiveness, addressing impacts, or enhancing benefits. 3. Significant: This measure would greatly complement the scheme's effectiveness, addressing impacts, or enhancing benefits. Consideration of the impact a measure could have on a scheme's social licence and degree of alignment with existing strategic direction.
	Step 6: Workshop with AT and AC SMEs	Workshop to better understand high level feasibility of each complementary measure.
	Step 7: Emerging findings	Outline emerging findings and considerations.

2.2 The Congestion Question as a starting point

This paper draws on the finding and recommendations of The Congestion Question (TCQ) as its starting point. It identifies which TCQ measures should be taken forward, and subsequently outlines additional complementary measures which should be considered through the lens of the scheme objectives, policy principles, and initial stakeholder engagement findings.

TCQ explored four complementary measures, outlined in this section, which were identified through a Multi-Criteria Analysis (MCA) of direct and indirect congestion management options.

As such, some options represent alternatives to congestion pricing, rather than interventions to complement or enhance congestion pricing as defined in this paper and have not been taken forward.

The elements taken forward in this paper are outlined in Table 1 below.

Table 1: Elements of TCQ analysis taken forward in this paper

Element	TCQ Position	Inclusion in this paper
Parking pricing	Considered the impact of pricing publicly owned carparks, including demand-responsive pricing. Notes that impact coverage will be limited to parking space controlled by AT.	Parking pricing is a critical element of parking management which is considered further through Measure 7: Parking management.
Reducing parking supply	Outlines the potential to use planning or regulatory instruments to reduce parking supply.	Reducing parking supply is considered further through Measure 7: Parking management.
Shared mobility	TCQ outlines the role shared mobility schemes can play in reducing single occupancy vehicle trips and making better use of vehicle capacity.	Kerb zone management to enable multi-modal shared mobility hubs and schemes is considered in Measure 4 of this paper.

2.3 Global scan

A global scan of urban demand management charging schemes has identified a number of consistencies in the approach to complementary measures. Notably this the significance of communicating the benefits of investing in expanding access to viable alternatives such as public transport and Park and Rides to support a scheme in many jurisdictions.

The case studies outlined in the following table and throughout this paper, while focused on cities with existing or proposed congestion charging schemes, reflect both measures identified by scheme operators as 'complementary measures' and 'BAU' programmes or projects which have had complementary effect on a scheme.

Global Snapshot of Complementary Measures

Snapshot of complementary measures deployed in international jurisdictions which have considered or implemented Congestion Charging schemes.

	Singapore[1] *	London, United Kingdom[2, 3, 4]	Stockholm, Sweden[5]	New York, USA (postponed indefinitely)[6]	Milan, Italy[7]	Bergen, Norway[8]
Public Transport	Enhancement of existing bus routes (capacity and frequency).	Enhancement of existing and introduction of new bus routes.	Enhancement of existing and introduction of new bus routes.	Proposed increased bus services and improvements to subway stations.	Enhancement of existing and introduction of new routes (bus and metro).	Enhancement of existing public transport services and introduction of new modes including Light Rail).
Active Transport		Invested in walking and cycling to enable mode shift away from cars.	Investment in walking and cycling infrastructure include new cycle lanes and pedestrianisation.	Proposed investment in cycling infrastructure.	Improved walking and cycling infrastructure and	Improved walking and cycling infrastructure.
Park and Ride	15,000 park and ride spaces introduced outside the charged area.		2,800 park and ride spaces introduced outside the charged area.	Proposed suburban park and ride facilities.		Free shuttle bus from Park and Ride facility to city centre ran from 2003-2011 (deemed not financially viable).
On-street Parking Management	Doubled parking fees within the charge area.	Residential parking permits standard across London – managed at a Borough level – including within charged area and around much of the boundary. Funds were made available to support implementation of additional on-street controls to plug 'gaps'.	Paid residential and business parking permits within the charged area and paid on-street short stay parking.	Considered residential parking permits in and around the proposed charge area.		
Road Space Prioritisation	Silver Zones to calm traffic in residential areas including chicanes, extended crossing times for pedestrians etc.	Introduction of Low Traffic Neighbourhoods to reduce car traffic within residential areas.			Introduced pedestrian only areas, new traffic signals, footpath widening etc…	
Network Optimisation	Established HOV+4 lanes. Reduced speed limits within Silver Zones. Bus prioritisation.	Introduced 20mph (30km/hr) speed limits on all roads within the Congestion Charging Zone in 2020. Traffic signal timings on key strategic freight corridors to improve journey times where appropriate. Real Time Optimisation of traffic signals and bus prioritisation.			Introduction of Zone 30 areas (30km/hr zones).	
Kerb Zone Management		Flexible street spaces (including Better Streets) and changes to freight / delivery access over time.			Investment in BikeMi (bike sharing scheme) and 'All you can share' shared mobility scheme' based around fixed stations / hubs.	
Reduced or Free Public Transport				Proposed year-long pilot of reduced fares for some commuter rail trips.		

Day one	Over time

*When considering Singapore, it is important to note that the cost of car ownership, set through the purchase of a Certificate of Entitlement, is approximately $187,000 NZ annually which serves as a key anti-congestion measure[9]. As a result, there are just under 1 million private cars on the road in Singapore, which has a population of around 5.5 million.

[1] https://www.nzta.govt.nz/assets/planning/process/trial-ip-toolkit/docs/road-pricing.pdf
[2] https://content.tfl.gov.uk/annual-report-and-statement-of-accounts-2022-23-acc.pdf
[3] https://content.tfl.gov.uk/freight-servicing-action-plan.pdf
[4] https://content.tfl.gov.uk/better-streets-delivered-2.pdf
[5] https://www.parkingreformatlas.org/parking-reform-cases-1/pricey-residential-permit-parking-in-stockholm
[6] https://www.cbsnews.com/newyork/news/nyc-congestion-pricing-lirr-metro-north-discounts/
[7] Milan's Area C reduces traffic pollution and transforms the city center - C40 Cities
[8] https://www.researchgate.net/publication/372502129_Transforming_a_cordon_toll_ring_to_congestion_charging_scheme_The_impacts_in_the_case_of_Bergen_two_years_on/fulltext/64bdf3e68de7ed28babcf246/Transforming-a-cordon-toll-ring-to-congestion-charging-schem
[9] https://www.bbc.com/news/business-67014420

2.4 Complementary measures considered in this paper

Drawing from TCQ measures with the addition of the measures drawn from global examples, Table 2 outlines the complementary measures which are considered in the following sections of this paper.

Table 2: Menu of complementary measures considered in this paper

Measure	Includes
Public transport	• Increased frequency/capacity of public transport services.

Network optimisation	• Temporal repurposing of road space such as:
	  • Bus lanes,
	  • Peak period clearways,
	  • High Occupancy Vehicle Lanes, and
	• Adaptive traffic signals and other network optimisation mechanisms.

Road space prioritisation	• Temporal or permanent traffic calming devices, and • Temporal or permanent closures of roads to through traffic or certain vehicle types (camera enforced signage or modal filters)
Kerb zone management	• Loading/delivery zone management, • Shared Mobility Hubs, and • Pick Up and Drop Off areas.
Active transport	• Walking infrastructure, and • Cycling infrastructure.
Park and Ride	• Expansion of existing or introduction of new Park and Ride facilities.
Parking management	• Time or use restricted parking, • Parking pricing, • Reducing parking supply, and • Resident and local business only parking.

Subsequent sections of this paper consider the potential applicability of each of these measures in an Auckland context, to a level commensurate with the relatively early stage of development of the scheme options and wider analysis.

3. Measure 1: Public transport

Measure 1 encompasses:

- Increased frequency / capacity of public transport services.

At this stage in the project, analysis has only considered possible responses to increased demand on existing public transport routes. Further analysis should consider the potential for new public transport routes.

Key considerations for Auckland

- The potential for new, enhanced, or amended public transport services/routes should be considered when designing the preferred scheme.
- Greater understanding of demand impacts, and available and required revenue, will be critical to understanding how much investment in public transport is possible and necessary.

3.1 Purpose of the measure

The purpose of Measure 1 is to support and enable increased public transport patronage and provide viable alternatives to private vehicle trips to/from/within a charged area or link.

The availability of suitable alternative modes (with sufficient capacity) to accommodate drivers 'priced off' the road network is a key contributor to both the effectiveness the scheme (since otherwise drivers will be less able or willing to change their behaviour) and its fairness (by ensuring that there are reasonable options available).

Investment in reliable and efficient public transport improvements as part of the implementation of ToU charging has been highlighted as critical by both the 2023 Northern Infrastructure Forum Community Panel, and many of Auckland's Local Boards. It is also likely to be an important consideration in securing political and community acceptance of the scheme. The importance of improving public transport alongside a charging scheme was also highlighted in Auckland Council's submission to Select Committee in 2021.

3.2 Global scan

This section outlines both measures identified by scheme operators as 'complementary measures' and 'BAU' programmes or projects which have had complementary effect on a scheme and could be implemented in Auckland under Auckland Transport and Auckland Council's existing mandate and strategic direction.

3.2.1 Stockholm, Sweden and London, United Kingdom

Public transit improvements were central to the implementation of the Stockholm Congestion Pricing Zone. As part of the pilot programme Stockholm expanded its public transit system by purchasing ~200 additional buses, introducing 16 new bus lines, and expanding existing services[10]. Monitoring and evaluation six months after the pilot began identified a 4.5% increase in patronage[11].

Similar improvements were made in London (300 new buses, new bus routes, and increased frequency of buses), which contributed to a 20% increase in bus kilometres travelled between 2000-2003. This was supported by a freezing of fares which was funded by revenue from the scheme[12]. While some additional capacity was provided to specifically complement the implementation of a charging scheme this investment also represented bringing forward and refinement of existing programmes of work. In London this contributed to creating a highly complementary programme of

[10] https://www.tstc.org/reports/A-WAY-FORWARD-FOR-NEW-YORK-CITY-2017.pdf
[11] https://www.tstc.org/reports/A-WAY-FORWARD-FOR-NEW-YORK-CITY-2017.pdf
[12] https://www.arup.com/insights/two-decades-in-what-can-other-cities-learn-from-the-london-congestion-charge/

improvements, supported by a strong public facing narrative and communications campaign that tied them to the scheme.

3.2.2 Bergen, Norway

Bergen's congestion charging scheme began as a toll ring (city centre cordon) in the 1980s. Toll revenue, and later congestion charging revenue, has been used to fund improvements in public transport. In parallel with the charging scheme expansion Bergen expanded the city's light rail network, as well as undertaking ongoing investment in the bus network, including bus priority and bus lanes[13]. The combined impact of congestion charging, and an enhanced PT network, resulted in a 6% increase in PT patronage between 2016-2017 when the third line of Bergen Light Rail opened[14].

3.3 Auckland context

In comparison to some cities where congestion pricing has been introduced, public transport mode shares in Auckland overall are relatively low and are likely to remain so at a city-average level.

However, there are pockets of much higher mode share, for example trips to the central city. Investment in public transport, particularly buses, is likely to be critical to enabling and supporting the mode shift that (while not the objective of ToU charging) would likely be catalysed by it, and to provide viable alternatives to private vehicle trips.

Local plans for areas that may be impacted by ToU scheme options, such as the City Centre Bus Plan, highlight the important ongoing role buses will play in the public transport network regardless of whether ToU charging is introduced.

Figure 6: RPTP Vision and Goals

Public transport is identified as the primary priority for investment in the Regional Land Transport Plan (RLTP), alongside completing projects already committed to and in progress, and renewals and maintenance of assets.

This is supported by the Regional Public Transport Plan (RPTP) which outlines how public transport will be managed and improved over the next eight years, including planned investment.

City Rail Link (CRL)

CRL will reshape public transport in Auckland and is forecast to carry 54,000 passengers per hour at peak times by 2035[15]. Modelling indicates that ToU has an important role to play in catalysing mode shift onto the rail network but is unlikely to significantly increase rail patronage beyond the significant increase anticipated to be generated by CRL.

Fares

AT currently reviews fare levels at least annually, making adjustments to ensure user contributions keep pace with operating costs to achieve the farebox recovery ratio (FRR) targets consistent with NZTA policy. A weekly fare cap of $50 was introduced in 2024.

[13] https://www.researchgate.net/publication/372502129_Transforming_a_cordon_toll_ring_to_congestion_charging_scheme_The_impacts_in_the_case_of_Bergen_two_years_on/fulltext/64bdf3e68de7ed28babcf246/Transforming-a-cordon-toll-ring-to-congestion-charging-schem

[14] https://www.researchgate.net/publication/372502129_Transforming_a_cordon_toll_ring_to_congestion_charging_scheme_The_impacts_in_the_case_of_Bergen_two_years_on/fulltext/64bdf3e68de7ed28babcf246/Transforming-a-cordon-toll-ring-to-congestion-charging-schem

[15] https://www.cityraillink.co.nz/city-rail-link-faq

3.4 Alignment with the Policy Framework

A high-level of summary of Measure 1's alignment with the Policy Framework is outlined in Table 3, below, in relation to both cordon and link scheme types. Initial assessment of impact is summarised as a score of 1, 2, or 3, with one representing a potential minor positive impact, two a potential moderate positive impact, and three a potential significant positive impact.

Table 3: Measure 1's alignment with the Policy Framework

Scheme Type	Summary	Initial assessment of impact (+ve)
Cordon	Public transport could **significantly contribute to congestion reduction** for cordon options by providing a highly viable alternative to private vehicle trips which have a concentrated geographic origin/destination pattern. Modelling indicates that cordon options create a significant increase in patronage of buses to the city centre – particularly on routes travelling into the city via Symonds Street, a minor increase on rail above the anticipated increase from CRL and a negligible impact on ferry use. Increasing capacity on public transport to support/enable increased demand would have significant impact on scheme effectiveness and fairness and enhance scheme benefits. *Social licence and strategic alignment: Likely to have a significant impact on social licence, as highlighted through early engagement with Local Boards, and is strongly aligned with strategic direction.*	Effective 3 Fair 3 Simple 3
Link	Public transport could have a **minor positive impact on congestion reduction** for link options as it would only enable some minor mode shift, due to the geographic dispersion of trips captured by this scheme type. Modelling indicates that motorway options have a minor impact on patronage of buses on routes that travel parallel to the motorway network, and a negligible increase on rail or ferry patronage. New public transport routes were not considered as part of this initial assessment. Due to the challenges in improving public transport access to geographically dispersed areas this measure is likely to only have a minor impact on scheme fairness, and a moderate impact on simplicity. *Social licence and strategic alignment: Likely to have a significant impact on social licence, as highlighted through early engagement with Local Boards, and is strongly aligned with strategic direction.*	Effective 1 Fair 1 Simple 2

3.5 Initial findings

This measure is likely to best complement a ToU scheme that results in significant increase in public transport patronage to the city centre (cordon schemes) but is less likely to enhance the benefits of a link scheme.

Further detailed analysis should consider the specific public transport interventions which could be implemented, including developing a greater understanding of demand, the opportunity to bring forward or refine existing programmes of work, and the role new public transport routes could play in mitigating the impacts of link options. Further analysis is also required to understand the potential for scheme revenue to fund public transport improvements.

As highlighted by Local Board feedback and previous Auckland Council guidance, this measure is critical to securing a scheme's social licence and should be considered at both peak times and as a response to peak spreading.

4. Measure 2: Network optimisation

Measure 2 includes network optimisation interventions currently utilised in Auckland, as well as global best practice measures.

This includes activities such as:

- Dynamic repurposing of road space including:
  - Bus lanes,
  - Peak period clearways,
  - High Occupancy Vehicle Lanes, and
- Adaptive traffic signals.

Key considerations for Auckland

- Network optimisation appears to have a potential role to play in reducing congestion and enhancing benefits across all scheme types.
- This measure should be considered at both peak times and as a response to peak spreading.

4.1 Purpose of the measure

Measure 2 would enhance the objectives and outcomes of ToU charging by improving efficiency and reliability of all modes on local and strategic roads, as well as providing amenity benefits (particularly in the city centre). This measure would help to ensure that paying users benefit from reduced congestion when charges apply. There is also the potential for the repurposing of road space to improve amenity, particularly in the city centre.

4.2 Global scan

4.2.1 London

TfL manages, optimises, and controls around 6,400 traffic signal sites (including almost 4,000 junctions, 1,500 pedestrian crossings, and over 16,000 traffic detectors) across London. In June 2024 TfL launched a world leading intelligent adaptive traffic signal upgrade that enables optimisation of green time for all street users including pedestrians, cyclists, buses, and cars[16].

The system will improve journey times, traffic flows and responses to incidents, as well as improving data on journey demand and road network patterns that will help TfL optimise the road network. This will allow TfL to mitigate the challenges of the complex, older road layout in the capital, providing resilience and future-proofing its road network management.

4.2.2 Singapore

Singapore uses Intelligent Transport Systems (ITS) to monitor traffic and manage incidents on expressways and road tunnels, while sharing real time traffic information with the public to help motorists make informed travel decisions[17]. This includes a Green Link Determining (GLIDE) system to control traffic signals and allow vehicles to travel from one junction to another with minimal stops (a 'green wave'). This system accounts for both the presence of vehicles at intersections and the activation of pedestrian crossing buttons. Singapore also uses time-limited bus priority schemes to improve the reliability and attractiveness of services, including peak period bus lanes and traffic light signal priority[18].

4.3 Auckland context

Since 2020 Auckland Transport and NZTA have been working together on the Auckland Network Optimisation Programme (ANOP), with a focus on making relatively inexpensive and quick changes to Auckland's roads and paths. This 10-year programme consists of around 215 projects and activities

[16] https://tfl.gov.uk/info-for/media/press-releases/2024/june/tfl-and-yunex-successfully-complete-world-leading-upgrade-to-london-s-traffic-signal-system
[17] https://www.lta.gov.sg/content/ltagov/en/getting_around/driving_in_singapore/intelligent_transport_systems.html
[18] https://landtransportguru.net/bus-priority-schemes/

such as trialling new technology for improvements to intersections, introducing additional bus priority at traffic signals, and implementing new systems for network operators to optimise the network in real time. As a complementary measures Network Optimisation should support the ANOP aspirations and ensure an appropriate Level of Services (LOS). For example, ensuring public transport alternatives meet the desired level of service outlined in ANOP.

While work has begun on the ANOP, including in locations forecast to be impacted by various ToU scheme options, there is potential to accelerate or ramp up this programme of work to achieve considerable benefits efficiently and affordably. As a complementary measure for a time of use scheme, this approach could have significant impact across all scheme options, without requiring large-scale investment in infrastructure.

4.4 Alignment with the Policy Framework

A high level of summary of Measure 2's alignment with the Policy Framework is outlined in Table 4 below in relation to both cordon and link scheme types. Initial assessment of impact is summarised as a score of 1, 2, or 3, with one representing a potential minor positive impact, two a potential moderate positive impact, and three a potential significant positive impact.

Table 4: Measure 2's alignment with the Policy Framework

Scheme Type	Summary	Initial assessment of impact (+ve)
Cordon	Network optimisation could **significantly support congestion reduction for cordon options** by helping to ensure traffic is flowing freely and the existing road space is used more effectively and efficiently. This measure could improve the efficiency and reliability of routes to/from the city centre at charged times of the day through the dynamic repurposing of road space, adaptive traffic signals, or the use of other network optimisation mechanisms outlined as part of the ANOP. This measure would have a significant impact on a scheme's effectiveness and fairness by improving road network efficiency for all users, with only a minor impact on simplicity. *Social licence and strategic alignment: Likely to have a minor impact on social licence but is strongly aligned with strategic direction.*	Effective 3 Fair 3 Simple 1
Link	Network optimisation could **significantly support congestion reduction for motorway options** by helping to ensure traffic is flowing freely and drivers are able to make informed travel decisions. This measure could improve the efficiency and reliability of the motorway network at charged times of the day through real time monitoring, dynamic HOV lanes, and other network optimisation mechanisms outlined as part of the ANOP. This measure would have a significant impact on a scheme's effectiveness and fairness by improving road network efficiency for all users, with only a minor impact on simplicity. *Social licence and strategic alignment: Likely to have a minor impact on social licence but is strongly aligned with strategic direction.*	Effective 3 Fair 3 Simple 1

4.5 Initial findings

This measure is likely to significantly complement both cordon and link ToU schemes, however it would be deployed in different ways to respond to each scheme type.

Further detailed analysis should consider the specific network optimisation interventions which could be implemented (including amenity benefits repurposing of road space could provide location such as the city centre). This should occur alongside developing a greater understanding of the benefits this measure could provide to different groups, and the appropriate timing and duration of implementation (for example, peak period clearways).

5. Measure 3: Road space prioritisation

Measure 3 "Road space prioritisation" is focused on temporal or permanent changes to the local road layout in and around the charged areas including:

- Temporal or permanent traffic calming devices, and
- Temporal or permanent closures of roads to through traffic or certain vehicle types (camera enforced signage or modal filters).

Key considerations for Auckland

- Important to consider road space prioritisation's temporal role in mitigating impacts on local businesses and residents and support social licence without undermining scheme effectiveness.
- Shifts in strategic direction should be considered in designing how and when this measure could be implemented to complement a preferred scheme.

5.1 Purpose of the measure

The purpose of Measure 3 is to:

- mitigate the safety impacts of diversionary on local roads, and
- ensure local businesses and residents can safely move through neighbourhoods around charged points.

5.2 Global scan

This section outlines both measures identified by scheme operators as 'complementary measures' and 'BAU' programmes or projects which have had complementary effect on a scheme and could be implemented in Auckland under Auckland Transport and Auckland Council's existing mandate and strategic direction.

5.2.1 London, United Kingdom

There has been a substantial increase in the temporal and permanent reprioritisation of road space London's Congestion Charging scheme, including the permanent conversion of the northern side of Trafalgar Square from a roadway into a pedestrian and public space. Temporal reprioritisation of road space is a common feature of London's Low Traffic Neighbourhoods (LTN) which have been implemented across London's boroughs since the 1970s.

In addition to temporal modal filters the Waltham Forest LTN uses camera enforcement to restrict vehicle access at defined times of the day. This ensures that private and goods (servicing and delivery) vehicles can move through the area at times when rat-running is unlikely to occur, while allowing buses to access the street at all times. Clear signage is a critical component to any camera enforcement, to ensure layout changes and temporary restrictions are clear.

5.3 Auckland context

Road space prioritisation is already frequently deployed by AT, with Katoa, Ka Ora, Draft Speed Management Plan outlining a number temporary and permanent traffic calming devices as part of the Safety Infrastructure Toolbox[19]. Auckland Transport Roads and Streets Framework, and Urban Street and Road Design Guide also provide tools to better balance modal priority and allocate space to move people and goods efficiently. At a national level, NZTA's Road Space Allocation Toolbox provides guidance on different techniques or approaches that can be deployed. However, both central and local government direction is shifting away from some of the measures outlined in these toolkits and

[19] https://at.govt.nz/media/yn4c5owb/242-katoa-ka-ora-auckland-speed-management-plan-2024-2027.pdf

plans, and any inclusion of road space prioritisation as complementary measure would need to reflect this evolving direction.

A number of Local Boards have already highlighted localised rat-running as a key risk associated with the scheme particularly any potential harm caused to children by increased heavy vehicles movements around schools. It will be critical to ensure that local communities benefit from the implementation of the scheme, and any unintended negative impacts are minimised.

5.4 Alignment with the Policy Framework

A high level of summary of Measure 3's alignment with the Policy Framework is outlined in Table 5 below in relation to both cordon and link scheme types. Initial assessment of impact is summarised as a score of 1, 2, or 3, with one representing a potential minor positive impact, two a potential moderate positive impact, and three a potential significant positive impact.

Table 5: Measure 3 alignment with the Policy Framework

Scheme Type	Summary	Initial assessment of impact (+ve)
Cordon	Road space prioritisation could be **unlikely to have a more than minor impact on how effective a scheme is at reducing congestion.** There is only minor demand or benefit from this measure as modelling does not indicate substantial increased vehicle movements around the charged area, or localised rat running which would require mitigation through road space prioritisation. Could have a minor impact on a scheme's effectiveness and simplicity, and a moderate impact on fairness, as it mitigates impacts on boundary residents. *Social licence and strategic alignment: Dynamic road space prioritisation that improves access and safety for residents and business could support a scheme's social licence. However, there is risk that permanent changes to the road network could have a negative impact on social licence and may be unlikely to receive strong political support due to shifting strategic priorities.*	Effective 1 Fair 2 Simple 1
Link	Road space prioritisation could be **unlikely to have a more than minor impact on how effective a scheme is at reducing congestion** and should be considered on a temporal basis or for specific vehicle types to avoid undermining a scheme's effectiveness. Modelling indicates that motorway options would generate a significant increase in vehicle travel on local roads. Road space prioritisation mechanisms including dynamic vehicle access restrictions could have a significant impact in enhancing amenity and safety outcomes for local residents and businesses with significant impact on a scheme's fairness and a moderate impact on simplicity. *Social licence and strategic alignment: Dynamic road space prioritisation that improves access and safety for residents and business could support a scheme's social licence. However, there is risk that permanent changes to the road network could have a negative impact on social licence and may be unlikely to receive strong political support due to shifting strategic priorities.*	Effective 1 Fair 3 Simple 2

5.5 Initial findings

This measure is likely to best complement a ToU scheme that results in increased vehicle movements around the charged area by mitigating the impacts on existing communities.

Further analysis should consider the specific road space prioritisation interventions which could be implemented, particularly the opportunity to temporally reprioritise road space to mitigate negative impacts around charged points at key times (e.g. start of the school day). It will also be important to consider network wide implications of this measure before implementing place specific interventions, and to avoid / mitigate any unintended outcomes such as vehicles driving the wrong way through one-way streets or making dangerous U-turns to avoid entering a charged area.

6. Measure 4: Kerb zone management

Measure 4 includes temporal kerb zone management interventions which occur in the space between property boundaries and the kerb[20]. This includes:

- Loading/delivery zone management,
- Shared Mobility Hubs including On-demand services, and
- Pick Up and Drop Off areas.

Key considerations for Auckland

- Kerb zone management's temporal role is critical and can help to mitigate impacts on local businesses and support social licence without undermining scheme effectiveness.

6.1 Purpose of the measure

The purpose of Kerb Zone Management is to mitigate impacts and enhance benefits within or around a charged area by ensuring the kerb zone is used for the most appropriate purpose, at the appropriate time. In conjunction with Measure 2: Network optimisation, Measure 4 will support the efficient movement of different modes at different times, enhancing a schemes ability to reduce congestion as well as enhancing benefits for different mode users and local residents, businesses and the community.

6.2 Global scan

This section outlines both measures identified by scheme operators as 'complementary measures' and 'BAU' programmes or projects which have had complementary effect on a scheme and could be implemented in Auckland under Auckland Transport and Auckland Council's existing mandate and strategic direction.

6.2.1 Milan, Italy

Alongside Milan's congestion charging scheme the city introduced an 'All you can share' mobility scheme which offers shared mobility services through centralised 'hubs' in key locations around the city. Beginning in 2013, the scheme now operates more than 2,000 cars, 150 scooters, and 4,600 bikes (1,000 of which are electric)[21]. All modes are available at fixed locations/hubs across the city.

Figure 7: Example of a multi-modal shared mobility hub

The critical mass of vehicles, bikes, and scooters available ensures users have confidence that they will be able to access their desired mode of transport when they need it. This has resulted in an estimated 8-15 cars removed from the street for each available car sharing vehicle – ensuring kerb space is allocated more efficiently and enhancing the benefits of the congestion charging scheme[22].

6.2.2 London, United Kingdom

Freight, servicing, and delivery

Research following the implementation of the London congestion charge zone has discussed the impacts on freight, servicing, and delivery within the charged area. This research highlighted that while there was an initial decrease in inbound goods traffic (around 10%) when the congestion charge was

[20] https://at.govt.nz/media/1988511/kerb-zone-management-framework.pdf

[21] https://www.c40.org/case-studies/cities100-milan-world-s-first-freefloating-ride-sharing-system/#:~:text=Milan%20has%20launched%20the%20world's,%2C%20and%20scooters%20anytime%2C%20anywhere.

[22] https://www.c40.org/case-studies/cities100-milan-world-s-first-freefloating-ride-sharing-system/#:~:text=Milan%20has%20launched%20the%20world's,%2C%20and%20scooters%20anytime%2C%20anywhere.

first introduced this rebounded as freight has limited sensitivity to pricing demand and will continue to travel and deliver goods in response to customer demands[23]. Through implementation of the congestion charge, kerbside access was largely preserved for freight, servicing and delivery vehicles, with subsequent changes to kerb management driven by concerns relating to safety, efficiency and emissions as well as the role freight plays in contributing to congestion[24].

6.3 Auckland context

Auckland Transport's Kerb Zone Management Framework (KZMF) outlines how AT will manage kerb zone space to better meet the needs of road users, including allowing for parking, movement, place, infrastructure, services, maintenance, and private functions[25].

Room to Move also highlights that kerb zone interventions should be implemented with other parking management interventions, to minimise the impact on the community and maximise the cumulative benefits[26]. This includes ensuring that rideshare space provision is flexible and responsive to demand at different times of the day and week.

Figure 8: Queen St Access and Servicing zones

Loading and Servicing

Numerous time restricted Loading Zones are already provided across the city centre and metro centres such as Newmarket. This ensures that loading and servicing needs are balanced with the needs of other users, with competition for space likely to increase as Auckland grows[27].

Pick Up/Drop Off areas

Time restricted Pick Up/Drop Off (PUDO) areas have been implemented in key locations around Auckland in response to demand and access restrictions. This includes PUDO areas around Queen St's Essential Vehicle Area, shown in Figure 8.

NZTA guidance highlights the important role PUDO play in providing access for people with limited mobility, and extending public transport networks for people who chose not to walk, cycle, or use micro-mobility, and do have good access to feeder services[28].

Figure 9: PUDO areas on / around Queen St

Shared Mobility Hubs

Shared Mobility Hubs are not common in Auckland, however for six months from November 2023 a Shared Micro-Mobility Hub was trialled in Glen Eden[29]. This consisted of secure bike and scooter parking with outlets for charging, and high visibility wayfinding, as well as e-scooters and bikes available for rent.

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[23] https://www.planning.nsw.gov.au/sites/default/files/2023-10/framework-valuing-green-infrastructure-public-spaces.pdf
[24] https://www.planning.nsw.gov.au/sites/default/files/2023-10/framework-valuing-green-infrastructure-public-spaces.pdf
[25] https://at.govt.nz/media/1988511/kerb-zone-management-framework.pdf
[26] https://at.govt.nz/media/1991931/auckland-transport-room-to-move-t%C4%81maki-makaurau-aucklands-parking-strategy-may-2023.pdf
[27] https://at.govt.nz/driving-and-parking/find-parking/parking-in-central-auckland/loading-and-servicing-management-plan
[28] https://www.nzta.govt.nz/walking-cycling-and-public-transport/public-transport/public-transport-framework/integrated-planning-and-design/public-transport-design-guidance/getting-to-and-from-public-transport/car-connections/
[29] https://www.bikeauckland.org.nz/glen-eden-micromobility-hub-network-pilot-programme/

6.4 Alignment with the Policy Framework

A high level of summary of Measure 4's alignment with the policy framework is outlined in Table 6 below in relation to both cordon and link scheme types. Initial assessment of impact is summarised as a score of 1, 2, or 3, with one representing a potential minor positive impact, two a potential moderate positive impact, and three a potential significant positive impact.

Table 6: Measure 4's alignment with the Policy Framework

Scheme Type	Summary	Initial assessment of impact (+ve)
Cordon	Kerb Zone Management could be **unlikely to have a more than minor impact on how effective a scheme is at reducing congestion.** However, greater certainty over temporal PUDO and goods and servicing access may benefit those who chose to pay the charge and enter the cordon and mitigate impacts on local businesses. Shared mobility hubs may enhance scheme benefits by providing alternatives to private vehicle travel within the cordon area. This measure would have a minor impact on this scheme's effectiveness, and moderate impact on fairness, and simplicity. However, it may have a role to play in securing a scheme's social licence without undermining effectiveness. Early engagement with stakeholders has highlighted the need to ensure access for businesses and customers (including PUDO and loading and delivery) is maintained during charged times. *Social licence and strategic alignment: Temporal kerb zone management that improves access for residents and business could support a scheme's social licence and is well aligned with existing strategic direction.*	Effective 1 Fair 2 Simple 2
Link	Kerb Zone Management could be **unlikely to have a more than minor impact on how effective a scheme is at reducing congestion.** However, certainty over PUDO and goods and servicing in key locations around charged points may help to mitigate the impacts of the schemes on local businesses and residents (although this is likely to more minor than cordon schemes). Shared mobility hubs may enhance scheme benefits by providing alternatives to private vehicle travel to / from public transport stops however this impact is likely to be minor. This measure would have a minor impact on this scheme's effectiveness and fairness impact, and a moderate impact simplicity, but may have a role to play in securing a scheme's social licence without undermining effectiveness. *Social licence and strategic alignment: Temporal kerb zone management that improves access for residents and business could support a scheme's social licence and is well aligned with existing strategic direction.*	Effective 1 Fair 1 Simple 2

6.5 Initial findings

This measure is unlikely to significantly contribute to reducing congestion regardless of scheme type. However, kerb zone management could play a role in complementing a scheme by providing greater certainty for goods, servicing, and pick up and drop off **in and around a charged area during charged times,** without undermining the scheme's objective. Future analysis should consider the opportunity to temporally manage kerb zone spaces as part of securing a scheme's social licence, particularly in regard to cordon schemes.

Engagement with the public, key stakeholders including business associations, and AT and Auckland Council SMEs would help to better understand the demand for and level of opportunity to enhance the scheme through this measure.

7. Measure 5: Active transport

Measure 5 is focused on improvements to active transport infrastructure including:

- Walking infrastructure, and
- Cycling infrastructure.

7.1 Purpose of the measure

The purpose of Measure 5 is to provide viable, safe, and accessible active mode alternatives to private vehicle travel to/from/within the charged area or as part of multi-modal journeys. This includes first and last mile Level of Service improvements to expand public transport catchments.

7.2 Global scan

This section outlines both measures identified by scheme operators as 'complementary measures' and 'BAU' programmes or projects which have had complementary effect on a scheme and could be implemented in Auckland under Auckland Transport and Auckland Council's existing mandate and strategic direction.

Key considerations for Auckland

- Typically, active transport is a complementary measure which ramps up in response to increased demand created by a scheme, rather than a measure which is required on day one.
- The ongoing delivery of existing and planned investment in active modes may be sufficient in the short-medium term to meet demand.
- Active transport investment has recently been reduced following shifts in central and local government policy and funding constraints.

7.2.1 London, United Kingdom

Over six million walking trips are made daily in London, providing significant health benefits, improving air quality, reducing congestion, and connecting communities.[30] Revenue from the congestion charge has been used to fund walking and cycling projects, including the reallocation of road space to active modes and protected cycle lanes. This has contributed to a 137% increase in the number of people cycling in London since 2000[31].

7.2.2 Stockholm, Sweden

Between 2013 – 2018 Stockholm invested approximately 1bn Swedish Kroner (around $170million NZD) in cycling infrastructure. This included more than 40km of new cycling infrastructure as well as supporting infrastructure such as bike parking. More than 90 projects – from tactical to permanent were delivered, with another billion kroner invested between 2019 – 2022[32]. Today around 32% of commuting trips in Sweden are made by bike[33].

Walking has also been made safer and more attractive, including the pedestrianisation of commercial streets in Stockholm's city centre. It is not possible to map if these authorities directly utilised scheme revenue to fund these projects, however these projects respond directly to, and enable greater, behaviour change catalysed by the implementation of a charging scheme.

7.3 Auckland context

Current cycling, walking, and micro-mobility use in Auckland

In 2022 58% of trips made by car in Auckland were under 5km, and 20% of trips by car were less than

[30] https://www.london.gov.uk/programmes-strategies/transport/cycling-and-walking/making-walking-count
[31] https://tfl.gov.uk/info-for/media/press-releases/2023/february/congestion-charge-marks-20-years-of-keeping-london-moving-sustainably
[32] https://ecf.com/sites/ecf.com/files/Boberg.J_Stockholm_Bicycle_Billion.pdf
[33] https://nyc.streetsblog.org/2024/05/13/streetsblog-abroad-congestion-pricing-will-make-new-york-a-world-class-city

2km[34]. Many of these trips could be made by active modes, particularly cycling, when a safe and connected network is available[35]. When e-bikes are considered a 10min trip equates to approximately a 3.6km distance[36]. Cycle use is currently trending upwards across Auckland compared to the previous 12 months, with automatic cycle counts recording a 10% increase in cycle movements from February 2023 to January 2024[37].

2024 research by Auckland Council found that 78% of surveyed drivers who reported making driving trips of less than 5km thought it would have been much less convenient to walk[38]. However, within the city centre walking is the most dominant form of transport, with an estimated 500,000 walking trips made each day[39].

Micro-mobility use (both private and shared use), most notably e-scooters, is growing, and has significant potential to expand public transport catchments and replace shorter vehicle, PT, or cycling journeys, especially in the city centre[40]. Currently rental providers are allocated a total of 3,000 e-scooters across Auckland with 900 in the city centre, 900 in the city fringe and 1,200 in outer suburbs[41]. From 4th November 2024 rental e-bikes will no longer be licenced in Auckland due to low demand, however operators have committed to working with Auckland Council and Auckland Transport to bring rental e-bikes back in the future.

7.4 Alignment with the Policy Framework

A high level of summary of Measure 5's alignment with the Policy Framework is outlined in Table 7 in relation to both cordon and link scheme types. Initial assessment of impact is summarised as a score of 1, 2, or 3, with one representing a potential minor positive impact, two a potential moderate positive impact, and three a potential significant positive impact.

Table 7: Measure 5's alignment with the Policy Framework

Scheme Type	Summary	Initial assessment of impact (+ve)
Cordon	Active transport improvements may have a **moderate impact on improving scheme effectiveness to / within a cordon area**, by **improving the quality and viability of active transport journeys and encouraging mode shift with a subsequent positive impact on journey times for drivers**. There may also be some benefit in improving the walking / cycling catchment to public transport stations as part of first / last mile improvements. The impact on fairness and simplicity is likely to be minor outside of/in close adjacency to the cordon area. *Social licence and strategic alignment: improving active travel within a cordon could support a scheme's social licence but may be unlikely to receive strong political support due to shifting strategic priorities.*	Effective 2 Fair 1 Simple 1
Link	Active transport improvements **could be unlikely to have more than a minor impact on scheme effectiveness** for link scheme options, due to the typically longer length of charged journeys and resultant lower likelihood of many people shifting to active transport. There may also be some benefit in improving the walking/cycling catchment to public transport stations as part of first/last mile improvements.	Effective 1 Fair

[34] https://nzta.govt.nz/assets/resources/sustainable-urban-mobility-benchmarking/sustainable-urban-mobility-benchmarking-report.pdf
[35] https://www.nzta.govt.nz/assets/resources/understanding-attitudes-and-perceptions-of-cycling-and-walking/Waka-Kotahi-Attitudes-to-cycling-and-walking-final-report-2022.pdf
[36] https://transformative-mobility.org/multimedia/e-bikes-catchment-area/
[37] https://at.govt.nz/cycling-walking/research-monitoring/monthly-cycle-monitoring
[38] https://knowledgeauckland.org.nz/media/ksml4zc4/tr2024-02-perceptions-of-public-transport-cycling-walking-auckland-drivers.pdf
[39] https://www.aucklandccmp.co.nz/outcomes/outcome-2-connected-city-centre/walking-cycling-and-micro-mobility/
[40] https://www.aucklandccmp.co.nz/outcomes/outcome-2-connected-city-centre/walking-cycling-and-micro-mobility/
[41] https://ourauckland.aucklandcouncil.govt.nz/news/2024/07/new-rental-e-scooter-license-granted-for-outer-suburbs/

	The impact on effectiveness, fairness and simplicity is likely to be minor outside those in close adjacency to public transport alternatives to the charged points of the network. *Social licence and strategic alignment: improving active travel to/from public transport connections is unlikely to significantly impact a link scheme's social licence and may be unlikely to receive strong political support due to shifting strategic priorities.*	1 Simple 1

7.5 Initial findings

This measure is likely to best complement a cordon scheme and may support congestion reduction to /from/within a cordon where active modes are a viable alternative for shorter private vehicle journeys particularly from adjacent residential areas and within the charged area. Active transport improvements are unlikely to deliver a more than minor contribution to congestion reduction for link schemes, where the longer and more dispersed journeys are less likely to be able to shift to active transport.

Further analysis could consider the specific active transport interventions which could be implemented, including the opportunity to bring forward or refine existing programmes of work.

8. Measure 6: Park and Ride

Measure 6 directly builds on TCQ which identifies the role of park and ride facilities as requiring further consideration. The provision of new or expansion of spaces in existing park and ride facilities is also highlighted as an important measure by a number of Local Boards in recent feedback – particularly in locations where existing park and ride facilities are currently nearing or reaching capacity.

Key considerations for Auckland

- Access to Park and Rides should be a key consideration going forward, to avoid the risk of creating localised congestion in key areas.
- Any further consideration of new or expanded Park and Rides would need to take into account land use planning, cost, and utilisation of land factors.

8.1 Purpose of the measure

The purpose of Measure 6 is to expand the catchment of public transport stations.

8.2 Global scan

This section outlines both measures identified by scheme operators as 'complementary measures' and 'BAU' programmes or projects which have had complementary effect on a scheme and could be implemented in Auckland under Auckland Transport and Auckland Council's existing mandate and strategic direction.

8.2.1 Singapore

15,000 new park and ride spaces established outside of the restriction zones[42]. Shuttle services were introduced to support the park and ride facilities and to ensure those using the park and ride had frequent and reliable connections into the charged zone[43]. Initially shuttle buses served limited stops and only allowed seated passengers in an attempt to provide a fast and comfortable alternative to private vehicle travel. Early monitoring indicated that motorists preferred the lower fares and service levels of the regular bus services, than the higher fares and service provided by the shuttle buses. As a result, the Government extended the shuttle bus routes to serve housing estates beyond the car parks on the zone fringe, and reduced fares, with several under-utilised park and ride facilities converted to other uses[44].

8.3 Auckland context

Auckland currently has 30 park and ride sites, with over 6,000 car parking spaces available, almost all of which also have bike parking[45]. Park and Ride largely favours a peak time commuter market across at 5km catchment, with sites are typically filled by 07:30 on weekdays and occupied for around 8 hours[46]. However, park and ride customers represent a minority segment of passengers accessing stations[47].

Auckland Transport also provides priority parking for carpooling/higher occupancy vehicles (defined as having two or more occupants) at the Albany busway station, and Birkenhead and Halfmoon Bay ferry terminals. In these locations carpool vehicles have priority to park in a limited number of spaces located closer to the bus station or ferry terminal[48].

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[42] https://www.tstc.org/reports/A-WAY-FORWARD-FOR-NEW-YORK-CITY-2017.pdf
[43] https://www.itf-oecd.org/sites/default/files/docs/congestion-control-singapore.pdf
[44] https://www.elibrary.imf.org/downloadpdf/journals/022/0013/001/article-A008-en.pdf
[45] https://at.govt.nz/media/1988494/park-and-ride-summary.pdf
[46] https://at.govt.nz/media/1988494/park-and-ride-summary.pdf
[47] https://at.govt.nz/media/1988494/park-and-ride-summary.pdf

[48] https://at.govt.nz/driving-and-parking/park-ride/carpooling-priority-parking

Room to Move details Auckland Transport's approach to Park and Ride facilities, ensuring that they are "provided and managed in locations where they improve access to the public transport network (primarily the Rapid Transit Network) and make a meaningful contribution to congestion reduction."[49] Users who park, but do not ride public transport, will be charged in order to disincentivise this behaviour.

Development of any new, or expansion of existing, park and rides would need to align with Auckland Council's land use planning and would need to be supported by a business case. AT may also implement pre-booked spaces for users at park and ride facilities (around 5-10% of spaces initially), however this must be capped so that the majority of spaces remain free and sized to maximise utilisation and meet demand.

8.4 Alignment with the Policy Framework

A high level of summary of Measure 6's alignment with the policy framework is outlined in Table 8 below in relation to both cordon and link scheme types. Initial assessment of impact is summarised as a score of 1, 2, or 3, with one representing a potential minor positive impact, two a potential moderate positive impact, and three a potential significant positive impact.

Table 8: Measure 6's alignment with the Policy Framework

Scheme Type	Summary	Initial assessment of impact (+ve)
Cordon	New or expanded Park and Rides **could have a moderate impact on scheme's effectiveness** by expanding public transport catchments to meet the modelled demand for rail and bus by supporting mode shift to public transport alternatives and reducing congestion for charged users. This measure could have a moderate impact on a scheme's perceived fairness, and a minor impact on simplicity. *Social licence and strategic alignment: increasing public transport catchments through Park and Rides could support a scheme's social licence but is not well aligned with AT and AC's existing strategic direction.*	Effective 2 Fair 2 Simple 1
Link	Likely limited demand for or benefit to new or expanded Park and Rides. However, increased parking availability could enable more people to drive and park at public transport stations and as a result **the impact on a scheme's effectiveness is likely to be moderate.** This measure could have a minor impact on a scheme's perceived fairness and simplicity. *Social licence and strategic alignment: increasing public transport catchments through Park and Rides could support a scheme's social licence but is not well aligned with AT and AC's existing strategic direction.*	Effective 2 Fair 1 Simple 1

8.5 Initial findings

This measure is unlikely to significantly enhance the benefits of any ToU scheme but could play a minor role in reducing congestion through extending the size of public transport catchments.

It will be important to work closely with Auckland Transport and Auckland Council to understand the opportunities and challenges of expanding park and ride facilities, including alignment with land use planning, cost, and the underutilisation of land.

[49] https://at.govt.nz/media/1991931/auckland-transport-room-to-move-t%C4%81maki-makaurau-aucklands-parking-strategy-may-2023.pdf

9. Measure 7: Parking management

Measure 7 Parking management is focused on the regulation of parking in key locations and routes in or adjacent to the charged area. This can take the form of interventions including:

- Time restricted parking,
- Parking pricing,
- Reducing parking supply, and
- Resident and local business only parking.

Key considerations for Auckland

- Any changes to parking management would need to align with AT's broader approach to parking across the region.
- It would also be important to understand, and have a clearly defined rationale for, the impact changes to parking could have on residents and businesses to ensure this measure strengthens a scheme's social licence.

9.1 Purpose of the measure

The purpose of Measure 7 is to minimise the impact of individuals attempting to avoid the charge by driving to the edge of the charged area, parking for a long period of time, while they travel the final leg of their journey into the charged area by public or active transport. If not addressed, this behaviour could lead to localised congestion around the extent of the scheme, or around key routes into the zone, and can also lead to a lack of parking spaces available to meet the needs of people trying to access homes, businesses, services, and facilities in key locations.

9.2 Global scan

This section outlines both measures identified by scheme operators as 'complementary measures' and 'BAU' programmes or projects which have had complementary effect on a scheme and could be implemented in Auckland under Auckland Transport and Auckland Council's existing mandate and strategic direction.

9.2.1 9.2.1 Stockholm and Gothenburg, Sweden

On street visitor, residential, and motorcycle parking in and around the inner Stockholm congestion tax cordon is charged between 07:00 – 19:00 weekdays (at approximately $3-5 NZ per hour), with reduced charging hours on weekends, broadly aligned with the time the congestion charge is active[50]. Residential parking is charged at approximately $15 NZ per day, or $230 NZD per month. A similar approach and level of charge is utilised in Gothenburg. Research in 2018 found that these parking charges were, in many cases, lower than optimal to have the desired effect[51].

9.2.2 9.2.2 Ghent, Belgium

Ghent's Circulation Plan, implemented in 2017, prevents through traffic from entering the city centre area[52]. The Plan divided the city centre into six zones around a restricted traffic area, with travelling by car from one zone to another only permitted via the inner ring road. This prevents through-traffic by non-residents and discourages short trips by private vehicles. The Circulation Plan is complemented by a Parking Plan which increased the number of residential parking areas and priced on-street and underground parking more heavily the closer to the city centre[53].

[50] https://parkering.stockholm/betala-parkering/taxeomraden-avgifter/
[51] https://www.itf-oecd.org/sites/default/files/docs/swedish-congestion-charges.pdf
[52] https://stad.gent/en/mobility-ghent/circulation-plan
[53] https://www.birmingham.gov.uk/transportplan

9.3 Auckland context

Room to Move outlines the readiness for change of locations across the region and identifies the preferred approach to on-street parking management for each 'Tier':

- Tier 1: Low readiness for change
- Tier 2: Moderate readiness for change
- Tier 3: High readiness for change

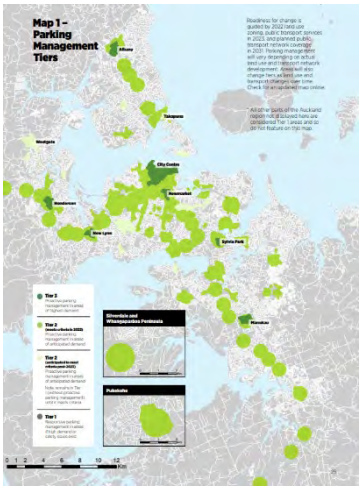

Figure 10: Parking Management Tiers

Time Restrictions

In Tier 2 and 3 locations AT is looking maintain or increase the amount of time-limited/short stay parking to ensure turnover and short stay. For example, in locations with a high number of cafes and restaurants, such as Newmarket, parking restrictions of 1-2 hours may be appropriate while in areas where shops are predominantly dairies and takeaways short-stay parking may be more appropriate.

Parking Permits

AT issues paid Residential Parking Permits for residents or businesses located within specific parking zones, alongside permits for Critical Service Workers[54, 55]. AT is seeking to minimise the use of user-specific coupons (such as coupons for tradespeople and contractors) as they represent an anomaly of the parking management system. Residential parking is already in place within/adjacent to areas within the scheme options, including Newmarket, Eden Terrace, Grafton, and Freemans Bay/Ponsonby.

Pricing

Room to Move outlines the role that demand-responsive pricing for on-street publicly operated car parking will continue to play in managing parking. Price setting will incorporate market value/rates, inflation, and other relevant factors, and will be updated regularly. Parking charges are, and will be, set to manage parking demand and support the achievement of the Strategy, not to maximise revenue. Tier 2 and 3 locations may experience increased parking charges across both on-street and off-street parking, an increase in time-restricted parking, and potential parking space repurposing.

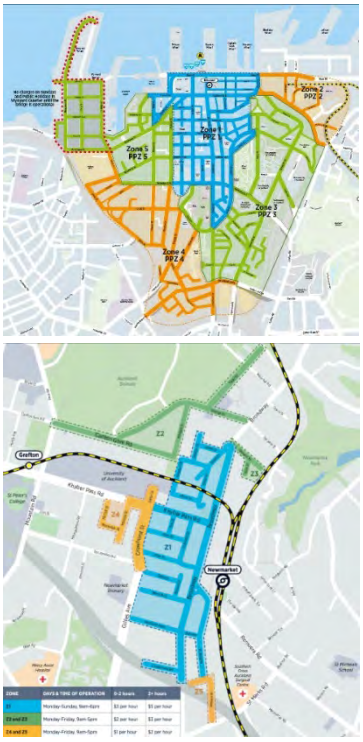

Figure 11: City Centre and Newmarket Parking Zones

As of July 1st, 2024, Auckland Transport has extended paid parking on Sundays and Public Holidays within Zone's 2-5 of Figure 11. It is also anticipated that overnight paid parking will be implemented across the City Centre Parking Zone, with charges and implementation date to be confirmed. Paid parking in Newmarket varies from $1 - $5 per hour depending on the duration of stay, time of day, and day of the week, as shown Figure 11.

Parking supply

Auckland Council's approach to parking supply is outlined in the Auckland Unitary Plan which no longer contains minimum parking requirements for Business – City Centre Zone, and Centre Fringe Office Control areas, and instead sets a maximum limit for the amount of parking which can be provided (Figure 12). There are

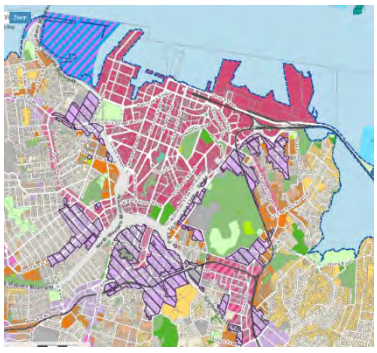

Figure 12: City Centre Zone (pink) and Centre Fringe Office Control Area (purple hash)

[54] https://at.govt.nz/media/1991931/auckland-transport-room-to-move-t%C4%81maki-makaurau-aucklands-parking-strategy-may-2023.pdf
[55] https://at.govt.nz/driving-and-parking/parking-permits/resident-parking-permits-coupons/resident-parking-zones

no requirements or limits on the amount of parking developments (excluding office and retail) can provide in Metro-, Town-, Local-Centre, and Mixed-Use Zones. This supports intensification and public transport use.

Room to Move outlines AT's position on the removal of parking noting that parking will be prohibited, and if necessary, removed, in locations where it would impede the safe and efficient operation of the transport system.

9.4 Alignment with the Policy Framework

A high level of summary of Measure 7's alignment with the policy framework is outlined in Table 9 below in relation to both cordon and link scheme types. Initial assessment of impact is summarised as a score of 1, 2, or 3, with one representing a potential minor positive impact, two a potential moderate positive impact, and three a potential significant positive impact.

Table 9: Measure 7's alignment with the Policy Framework

Scheme Type	Summary	Initial assessment of impact (+ve)
Cordon	Parking management is **unlikely to have more than a minor impact on a scheme's effectiveness**. Parking in and around the city centre cordon is already managed, however additional on-street parking restrictions could be considered to ensure boundary residents and businesses were not negatively impacted by 'park and hide' behaviour. This measure could have a minor impact on simplicity but a moderate impact on the perceived fairness of this scheme by mitigating impacts on local residents and businesses. *Social licence and strategic alignment: Parking management that improves access for residents and business may support a scheme's social licence if it and is well aligned with existing strategic direction. However, there is a risk removing parking or introducing could undermine social licence with stakeholders and the public if it is perceived as making access to shops and businesses harder.*	Effective 1 Fair 2 Simple 1
Link	Parking management is **unlikely to have more than a minor impact on a scheme's effectiveness.** The minor modelled shift onto public transport suggests that it is unlikely individuals will drive and park near public transport stops in significant numbers. As a result there is unlikely to be a significant impact on on-street parking demand around the charged areas of the motorway network, however any that does occur would negatively impact the safety, amenity, and wellbeing of local residents. As a result, this measure is likely to have a minor impact on the effectiveness, fairness and simplicity of a scheme. *Social licence and strategic alignment: Parking management that improves access for residents and business may support a scheme's social licence if it and is well aligned with existing strategic direction for an area. However, there is a risk removing parking or introducing controls could undermine social licence with stakeholders and the public if it is perceived as making access to shops and businesses harder*	Effective 1 Fair 1 Simple 1

9.5 Initial findings

This measure is unlikely to significantly enhance the benefits of a ToU but may mitigate the impacts on local residents/businesses in boundary areas where 'park and hide' is likely to occur.

Further analysis is required to understand the temporal component of parking management, and to ensure that any changes complement the scheme's intent (e.g. avoiding dropping prices during charged periods in response to the reduction in demand). It will be important to work closely with Auckland Transport SMEs to understand the current programme of parking management work, and whether any additional intervention could be required above and beyond this. This includes any shifts in prioritisation for ongoing parking management as indicated through Room to Move.

10. Summary of emerging findings

Initial analysis has identified the different types of complementary measures that are likely to best support different scheme types, as summarised in Table 10 below.

Table 10: Summary of findings for cordon and link schemes

	Cordon Schemes • Negative impacts concentrated within and around the cordon. • Generally smaller scale of impacts on vulnerable communities.	Link Schemes • Impacts more regionally dispersed. • Potential for traffic diversion, particularly when charged sections are short.
Public Transport	Significant potential to support scheme effectiveness in reducing congestion, mitigate the impacts and enhance benefits of cordon schemes due to geographically concentrated impact, and existing public transport infrastructure. Strong relationship with social licence and supported by existing strategic direction.	Some potential to support scheme's objective of reducing congestion. However, more challenging to use public transport to mitigate impacts and enhance benefits of link schemes due to regionally dispersed impacts. Strong relationship with social licence and supported by existing strategic direction.
Network Optimisation	This measure, while deployed differently to complement different scheme types, is likely to significantly support a scheme's efficiency, mitigate the impacts and enhance the benefits of all scheme types.	
Road space prioritisation	Limited need or benefit for road space prioritisation due to minor diversionary impacts around cordons.	Potential to mitigate diversionary impacts (safety and amenity) on local roads through temporal traffic management.
Kerb zone management	Some potential to benefit local and boundary residents and businesses by providing certainty over PUDO, loading and services. Likely key relationship with social licence.	Minor potential to mitigate impacts on residents and businesses in areas that could receive diversionary traffic by providing certainty over PUDO, loading and services.
Active transport	Minor potential to enhance benefits for residents and businesses within charged area, and support scheme's objective by encouraging mode shift.	Limited need or benefit due to length of trips making mode shift to active transport unlikely.
Park and Ride	Unlikely to have a significant impact on a scheme's effectiveness or social licence, and not strongly aligned with existing strategic direction.	
Parking management	Unlikely to have a significant impact on a scheme's effectiveness, with significant parking management underway and planned in most locations effected by the scheme options but may play a role in mitigating scheme impacts on local residents/businesses.	

10.1 Emerging findings

The following key findings have been identified through this paper:

- It will be important to have any public transport infrastructure and services that have been identified as critical in terms of capacity or routes to respond to a ToU charge in place in advance of the scheme opening to support behaviour change.
- Network Optimisation appears to have the potential to significantly enhance the benefits and effectiveness of all scheme options and is strongly aligned with existing strategic direction, with support from both central and local government.
- The temporal deployment of some measures should be considered further, particularly kerb zone management, parking management, and road space prioritisation. Permanent implementation of these measures may undermine a scheme's social licence.
- Temporal traffic management through road space prioritisation and network optimisation could mitigate the impact of diversionary traffic on local roads for link schemes, however this could undermine scheme efficiency by pushing traffic back onto charged routes.

11. Next steps

The following next steps have been developed to provide an indication of the approach which could be taken to develop complementary measures alongside scheme design, pricing, and mitigations:

1. Work with Auckland Transport and Auckland Council SMEs to better understand and map relationships with existing and planned programmes of work, including opportunities to bring forward or refine interventions which could complement a preferred time of use charging scheme.
2. Identify any additional complementary measures that would be appropriate for Auckland such as variable speed limits on parallel roads, education campaigns, real time wayfinding or Variable Message Signs (VMS).
3. Work with Auckland Transport and Auckland Council SMEs to better understand how measures can be implemented together to optimise impact.
4. Undertake engagement with stakeholders, the public and key groups, including Local Boards, the Stakeholder Reference Group, Mana Whenua, and the Citizens Panel to understand which of their needs and concerns could be addressed through particular complementary measures.
5. Alongside options assessment, further define and analyse a package of complementary measures for an emerging preferred option, including a more detailed understanding of specific interventions required i.e. an increase in x capacity of a particular bus route for a certain time period will be needed to respond to demand. This includes investigating specific demand and requirements for public transport network upgrades, the potential for new public transport routes, and refinement of the approach to network optimisation in response to anticipated demand and behaviour change.
6. Build a strong narrative and rationale for the complementary measures most appropriate for the preferred option, which can be used to support the development of a social licence for any scheme option.
7. Develop an approach to enable flexibility in decision making around the use of scheme revenue for complementary measures.
8. Continue to work alongside the options assessment and scheme design to ensure a ToU scheme is developed that:
    - Addresses impacts and enhances the benefits of a scheme while supporting the core objective of congestion reduction (with revenue spent accordingly), and
    - Supports a schemes social licence.

Appendix D

Auckland Transport
Time of Use Charging Study

Mitigations Policy Discussion Paper

Reference: TOU-EYARP-IAXX-RPT-000005_v3_202412_Mitigations Policy Paper

3 | 5 December 2024

This report has been authored by EY and Arup, to support the development of Time of Use (TOU) options. It represents a 'point in time view' which will need to be further refined and interrogated as the project progresses.
This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.
AT contract number: 781-24-657-PS

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Executive Summary

In the context of increasing congestion, and constraints (both practical and financial) on the ability to provide additional road capacity, Time of Use (ToU) charging has a role to play in better connecting people, places, goods, and services across Auckland by maximising the productivity of the city's road network.

This report provides an understanding of the mitigation measures component of a ToU scheme for Auckland at this point in time, building on the work and findings of The Congestion Question (TCQ). Initial analysis and findings relating to Mitigation Measures should be further developed alongside the design of an emerging preferred scheme option.

The role of mitigation measures

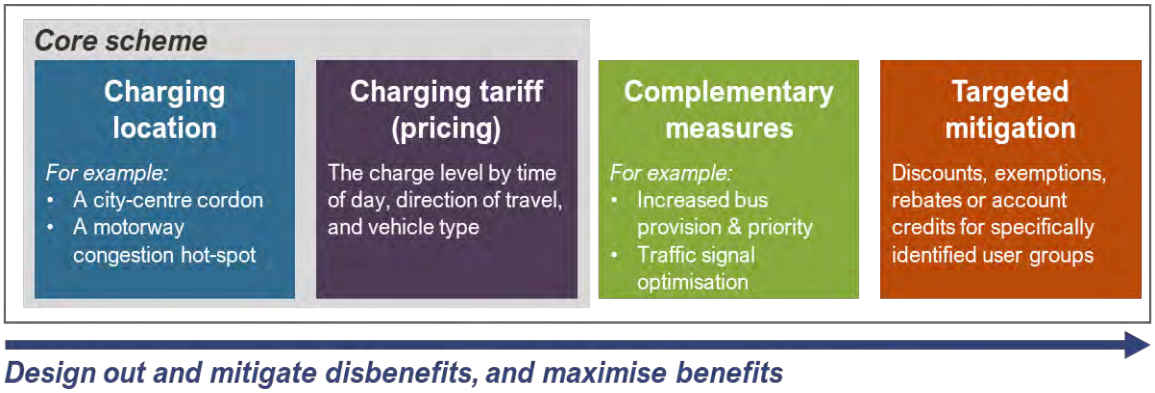
Mitigation measures are **targeted interventions** designed to **alleviate the financial or negative social impacts** of congestion pricing **on particular user groups**.

The analysis of congestion pricing schemes both internationally and within New Zealand underscores the need for flexibility to be built into legislation. Historical precedents, such as the evolution of Singapore's congestion management from the Area Licensing Scheme (ALS) to the Electronic Road Pricing (ERP) system, and the modifications to Stockholm's congestion pricing from its 2006 trial to its current form, illustrate the necessity for adaptability within charging schemes. London's scheme also provides an example of how mitigation measures can evolve over time to address change.

The elements of a Time of Use scheme

A ToU scheme is made up of four distinct elements. The first and most powerful lever to achieve the primary objective and avoid undesirable impacts is the design of the core scheme (the selection of charging locations and tariffs). Next, complementary measures are generally used to mitigate impacts and enhance benefits, while targeted mitigation is an exception to the scheme and generally deployed *only* when problematic issues cannot otherwise be avoided or alleviated by complementary measures. Mitigation measures are typically defined narrowly to avoid negatively impacting scheme performance.

Figure 1: Elements of a Time of Use charging scheme



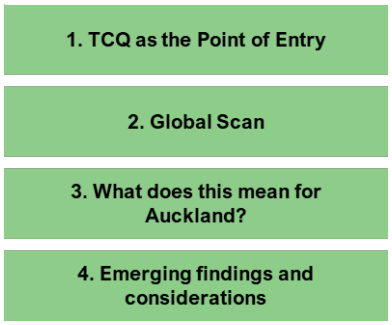
Time of Use charging for Auckland

Auckland Transport's primary objective for ToU charging is to manage travel demand to achieve an improvement in road network performance. This objective relies on three key principles: Effectiveness, Fairness, and Simplicity, which are essential for a successful scheme. Together, the core policy principles and primary objective should guide all aspects of scheme design.

Approach to this Mitigations Paper

In alignment with the policy papers on Complementary Measures and Pricing, this Mitigations paper begins with a brief explanation of the role of mitigation measures in a ToU scheme to achieve outcomes that are effective, fair, and simple. It explores how different urban road pricing schemes around the world have implemented mitigation measures and the implications for Auckland in developing its own mitigation strategies for the ToU scheme.

Figure 2: Common approach to the policy papers

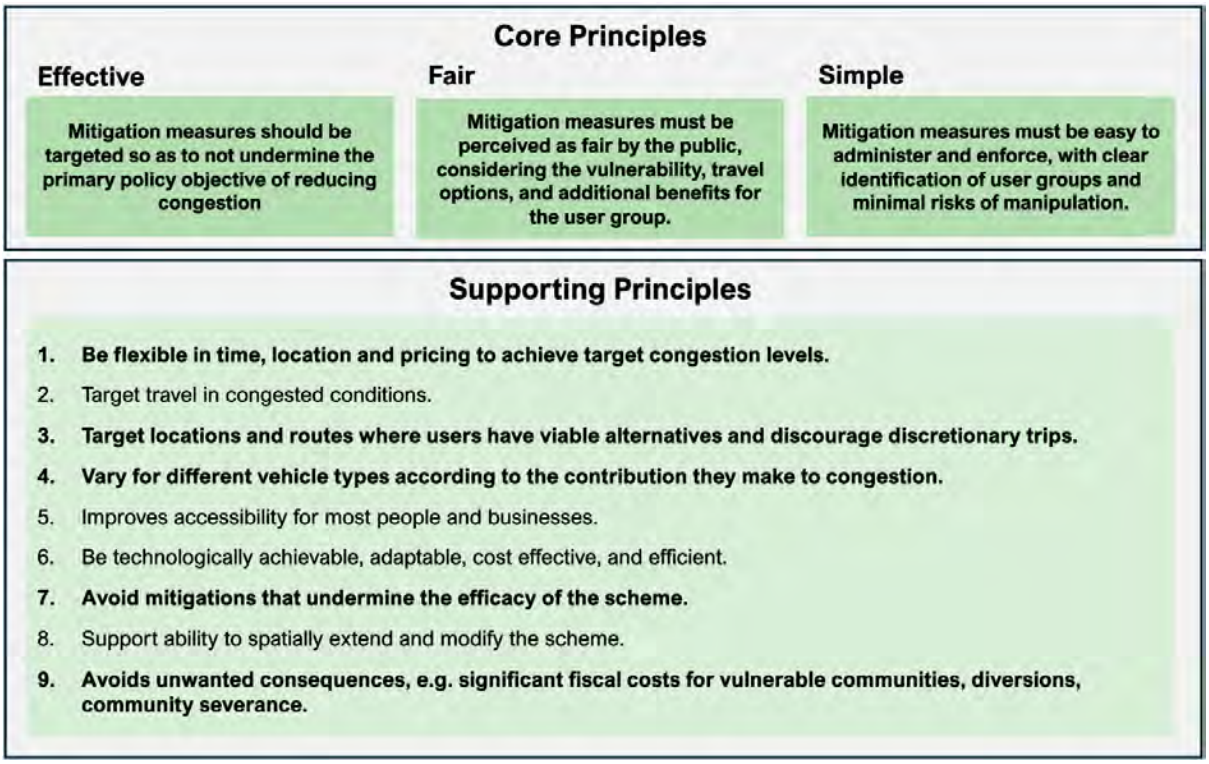


This is by no means a complete study on mitigation measures. The purpose of this study is to give insight into the role of mitigation measures and to undertake an initial assessment on potential options that could form part of a ToU scheme in Auckland.

Alignment with policy principles

Mitigation measures directly influence all three Core Policy Principles and several of the scheme's nine Supporting Policy Principles. The principles with the clearest links are highlighted in bold below.

Figure 3: Alignment between mitigation measures and policy principles



Emerging findings and considerations

- The Role of Mitigations: Mitigation measures are incorporated in all international schemes and are an important component to consider in scheme design. Mitigation measures can support the overall fairness of the scheme and increase public acceptability. However, there are also potential downside impacts on scheme effectiveness and simplicity if mitigations are overly broad.
- Mitigations should be consistent with Policy Objectives: Any use of mitigations should be consistent with the objectives and policy principles of the scheme. This context-specific approach will inform the assessment of mitigations and enable the scheme to remain fit for purpose over time.
- A conservative approach to adoption is warranted: Typically, there is a high threshold to justify introduction of mitigations. This is because other levers such as scheme design, pricing and complementary measures should be used first. Noting further that once a mitigation measure is put in place it is sometimes challenging to remove.
- Defining user groups is a necessary first step: Certain user groups are straightforward to define (particularly when linked to vehicle type) while others are more challenging (particularly when linked to the user in the vehicle). Defining potential user groups will be iterative and seek to balance the objectives of the scheme with the social license to implement.
- Three potential candidates have been identified: This paper has identified 13 user cohorts that have been selected in overseas jurisdictions, and could apply in an Auckland context, depending on scheme design choices.

  Based on a desk-based assessment of each user group against the Policy Principles, three potential candidates have been identified: emergency service vehicles, disabled users, and buses. It is noted that points of definition for these cohorts have been assumed but will require confirmation through engagement and development. Further work is necessary to fully understand if these three potential candidates warrant a mitigation measure in the Auckland context, and to test the impact this would have on the administration and financials of the scheme.

  A range of other potential user groups might be more or less relevant depending on definition, scheme design, and local conditions. An enabling framework is necessary to allow for local context to influence mitigation measures.
- All mitigation mechanisms should remain on the table – but some are easier to implement than others: The type of mitigation measures deployed is typically secondary to the above question of potential user groups. Implementation of specific measures should align to the policy objectives and there is no 'one-size-fits-all' solution.

  In general, price subsidies (exemptions, discounts, rebates) are preferable to income subsidies (withdrawable and non-withdrawable account subsidies) because they have stronger precedent overseas, are more targeted, and are easier to implement. However, all options should remain on the table at this stage, including using differential pricing as a potential tool to address the different impacts of the scheme.
- Local circumstances matter and flexibility to adapt over time is preferable: Global evidence reinforces that there is no single perfect approach to mitigation. The selection

of appropriate mitigation measures must be informed by the specific context of the charging locations, user groups, and traffic conditions, supported by quantitative efforts (modelling and analysis) and qualitative judgements. These conditions change over time and so the ability to respond via mitigations, if appropriate, is preferable.

- A fit for purpose monitoring and review process should be developed: Mitigation measures should be monitored and reviewed so they remain fit for purpose. Preserving flexibility in when and how this is done will be beneficial. This can be supported by a governance framework that provides reassurance over the process by which reviews and adjustments are undertaken.

Next steps

Remaining actions required to progress mitigation measures can be divided into two stages.

Actions required prior to public consultation

- Engage with central Government on the proposed parameters of mitigation measures.
- Consolidate information regarding potential user groups and available mitigation mechanisms for public consultation. Specifically:
    - Continue to clarify the definitions of user groups and explain how they would be identified in practice.
    - Continue to capture information about the impacts of specific time of use charging scheme options on each user group.
- Consider pre-engagement and consultation requirements for affected user groups.

Actions to complete prior to scheme implementation

- As scheme design is finalised, identify any major negative financial or social impacts on vulnerable user groups that are not addressed by pricing and complementary measures.
- Finalise proposed user groups (including definitions and mitigation mechanisms) given due consideration to enabling legislation, outcomes of public consultation, and alignment to policy principles.
- Develop a plan for how the impacts of a time of use charging scheme will be monitored and reported over time. This review process must ensure the use of mitigation measures reflects a suitable balance between effectiveness and fairness over time.

Glossary

Account credits (non-withdrawable)	The eligible owner's account is credited with a number of credits, which can be transferred between internal systems.
Account credits (withdrawable)	The eligible owner's account is credited with a number of credits, which can be transferred beyond internal systems by withdrawing credits.
ALS	Area Licensing Scheme
CCZ	Congestion Charging Zone
Charge cap	The maximum fee a vehicle can incur in a given time frame.
Discount	A discount reduces the congestion charge an eligible user or vehicle incurs at the point of charge.
Eligible user	An individual that meets criteria enabling them to receive a mitigation measure.
Eligible vehicle	A vehicle that meets criteria enabling it to receive a mitigation measure, or a vehicle that is registered to an eligible user.
ERP	Electronic Road Pricing
Exemption	A mechanism that grants the eligible vehicle full relief from the congestion charge.
Gaming Risk	The potential for misuse of systems to gain benefit when not entitled.
Income subsidy	A mechanism by which the income of the owner of an eligible vehicle is increased, in turn, alleviating the financial burden of the scheme due to an increase in the owner's disposable income.
Price subsidy	A mechanism that spares the eligible owner the full cost of the charge.
Rebate	The owner of the eligible vehicle can claim back a portion of the charges imposed.
Vehicle registration discount	A mechanism that reduces vehicle-related fees a vehicle owner is charged upon registration.
Welfare payment adjustment	A mechanism that increases welfare payments in the Auckland region to offset the costs of the scheme.

1. Introduction

In urban planning and traffic management, Time of Use Charging (ToU) schemes are employed as a tactical measure to reduce congestion and improve urban mobility. The effectiveness and acceptability of these schemes typically includes the incorporation of mitigation measures to counteract any unintended negative impacts on different user groups.

Generally, mitigation measures are seen as a 'last resort' and are to be used to mitigate the residual negative consequences of a charging scheme unaddressed by scheme design or complementary measures. Mitigation measures will therefore play a key role in determining whether Auckland's ToU scheme achieves the social license, which refers to the communities acceptance and approval of this project required for its success.

1.1. Scope

1.1.1. Purpose of this paper

This paper explores a range of mitigation measures to counter negative consequences of time of use charging schemes and is informed by TCQ research and examples from around the world. This is a study on mitigation measures to inform initial thinking on how mitigation measures might be used in a ToU scheme in Auckland.

1.1.2. Definition of mitigation measures

Mitigation measures are **targeted interventions** designed to **alleviate the financial or negative social impacts** of congestion pricing **on particular user groups**.

In practice, all elements of a time of use charging scheme will bear some relationship to the ability to mitigate negative consequences. For example:

- The geographic boundaries of a scheme will influence the number of 'vulnerable user groups' impacted by a charge. A narrower geographic boundary will generally limit the number of users captured and vice versa.
- The price of a charge will impact the scale of impacts on user group. A smaller overall charge will have a smaller impact, and vice versa, while different prices could also be charged for different vehicle types.
- Complementary measures can provide additional travel choices to users (i.e. through enhanced public transport) which again lessens the impact of a scheme on selected users.

Mitigation measures in this paper are focussed on direct interventions that seek to mitigate negative consequences for specific user groups and typically fall within two categories, price subsidies and income subsidies.

- Price subsidies reduce the cost of the congestion charge to the user, and include mechanisms such as exemptions, discounts, and rebates.
- Income subsidies increase the income of the user to alleviate the financial burden of the congestion charge, and include withdrawable and non-withdrawable account subsidies.

1.1.3. Alignment with strategic direction

There is currently limited 'strategic direction' for mitigation measures, because no time of use charging legislation exists. Enabling legislation is required to set out the parameters for any mitigation measures employed. Cabinet has agreed (CBC-24-MIN-0072) that all ToU charging schemes should:

- Enable a standard differential between charges for different vehicle types, and
- Be limited to exempting only emergency service vehicles to avoid risk of eroding the scheme's effectiveness (in reducing congestion) and simplicity.

This position is generally consistent with the approach to toll road pricing in New Zealand – noting that the rationale for toll roads in New Zealand is related, but fundamentally different to time of use charging. The rationale for tolling roads is to support the ongoing cost of delivering, maintaining, and operating toll roads, whereas the rationale for the ToU scheme is to reduce congestion on the road network.

It is noted that all international time of use charging schemes investigated contemplate mitigations for emergency vehicles, and most expand this to include other user groups and vehicle types to varying degrees. These are driven by local issues and the policy objectives of the scheme.

1.1.4. Relationship to social license

Evidence from oversees jurisdictions shows that mitigation measures play a pivotal role in the ability of the ToU scheme to obtain social license. The decision to implement a mitigation measure is a trade-off between its impact on the effectiveness of the scheme on the one hand and the perceived fairness of the scheme on the other.

Fairness relates to the ability of a scheme to minimise and mitigate adverse social impacts and ensure benefits and costs are fairly distributed across users. This is typically a value judgement made by decision makers and the public based on evidence and inputs from affected parties.

Given that the efficacy of a scheme, and the social impacts of a scheme shift over time, it is necessary to monitor these aspects and change settings if overarching policy objectives are not being achieved.

1.1.5. Relationship to revenue

By design, the presence of mitigation measures will alleviate the financial or negative social impacts of congestion pricing on particular user groups – but in turn this has the effect of reducing the gross revenue of the scheme.

Overall, the design of mitigation measures should consider impact on revenue generation and ensure that the scheme remains sustainable.

2. Approach

This paper represents a point in time understanding of the potential for mitigation measures to support a ToU project for Auckland. This paper builds upon insights from TCQ and applies a stronger 'user' lens to considerations of potential mitigation measures.

Table 1: Approach

a. Summarise eligible users (and mitigation mechanisms employed) in overseas jurisdictions.
A global scan of time of use charging schemes has enabled a comparison of eligible user groups and the mitigation mechanisms deployed – as well as some sense of how these conditions have changed over time. A summary of the findings is presented in Section 4.
b. Identify potential user groups
Those user groups identified in Section 4 have been carried through as a starting point for potentially eligible users in an Auckland context. Section 4 considers potential definitions for these groups, including identification challenges (if any), and provides an initial sense of the scale of these users in an Auckland context.
c. Assesses each user group against the policy principles of the scheme
Section 5 summarises the indicative, desktop assessment of the user groups against the core policy principles, which identifies whether user groups are: • Potential candidates for mitigation measures. • Potential candidates depending on further investigations and the outcome of further scheme refinements. • Not good candidates for mitigations measures.
d. Identifies a range of potential mitigation measures and their merits in application to Auckland's ToU scheme.
Section 6 summarises the indicative, desktop, assessment of the pros and cons of available mitigation measures.
e. Outlines a range of next steps
Section 7 provides range of next steps that have been identified and generally play out over two time horizons: • **Prior to public consultation:** Acknowledging the importance of public consultation in shaping and influencing the scope of selected users and mitigation measures. • **Prior to scheme implementation:** To support final implementation.

3. International identification of user groups and deployment of mitigation mechanisms

3.1 International precedent

Overseas congestion charging schemes provide precedent and insight into the identification of user groups and the mitigatory response adopted. Table 2 summarises user groups eligible for mitigation measures and how the mitigation mechanism is deployed to guide ToU mitigation considerations. What is clear is that every time of use charging scheme around the world uses mitigation measures and in almost all instances targets multiple user groups, with approaches to mitigation measures changing over time.

Key:	Exemption applies	Exemption has previously applied	Discount applies	Rebate applies	Account credit applies (non-withdrawable)	Mitigation measure does not apply

Table 2: Global scan

User group	Singapore	London	Stockholm	New York[1]	Milan	Seoul
Emergency service vehicles	Exempt – automatically applied at point of charge using registration	Exempt – automatically applied at point of charge using vehicle registration number	Exempt – appears to be automatically applied at point of charge using registration number	Exempt – as defined by New York State Vehicle and Traffic Law are exempt because they are essential for public safety and emergency response.	Exempt – must complete formal request within given time frame	Exempt – automatically applied at point of charge using registration[2]
Buses[3]	Exempt under ALS[4] - eligible user did not need to purchase license otherwise required by the ALS	Exempt - organisation to register for an exemption Discount – for vehicles with 9+ seats	Exempt – appears to be automatically applied at point of charge using registration number	Exempt – School buses contracted with the NYC Department of Education, commuter vans licensed with the NYC Taxi and Limousine Commission, and buses providing scheduled commuter services open to the public		Exempt – automatically applied at point of charge using registration
Motorcycles (and mopeds)	Exempt under ALS - eligible user did not need to purchase license otherwise required by the ALS	Exempt - automatically applied at point of charge using registration	Exempt – appears to be automatically applied at point of charge using registration number		Exempt – road users on mopeds do not require a ticket to enter the area	Exempt – automatically applied at point of charge using registration
Freight	Exempt under specific conditions each requiring self-identification via registration – including peak hours, special permits, green vehicles and specific routes	Discount - eligible vehicles apply for discount online, based on emissions and size	Exempt during off-peak hours - registration required		Exempt - only applies to low-emission vehicles, users must self-identify by registering	Exempt during off-peak hours - automatically applied at point of charge using registration
Taxis and Private Hire Vehicles (PHV)	Exempt under ALS - eligible user did not need to purchase license otherwise required by the ALS	Exempt – automatically applied while actively licensed with London Taxi and Private Hire	Exempt in trial – not explicitly stated, likely automatically applied using registration number		Exempt – vehicle owner must self-identify by registering license plate in database	Exempt – only if designated as wheelchair-accessible vehicles
Disabled people		Some exempt – automatically applied if exempt from vehicle tax and under a 'disabled' taxation class Others discounted - eligible to receive 100% discount upon provision of documentation confirming mobility impairment to TfL		Exempt – Individuals with disabilities or health conditions that prevent them from using transit can apply for the Individual Disability Exemption Plan (IDEP)	Exempt – disability pass holder must register their license plate in the electronic detection system (restricted to a single car)	Exempt - must register exemption Exempt – must register for exemption
Nationally significant vehicles[5]		Exempt – organisation must register for an exemption	Exempt – not explicitly stated, likely that organisation must register for an exemption	Exempt – Publicly owned vehicles specifically designed to perform public works other than general transportation, and directly engaged in a core agency purpose, are exempt to ensure that essential government service		Exempt – must register for exemption
Electric Vehicles (EVs) or alternative-fuel cars		Discount – eligible user applies for discount online	Exempt in trial – not explicitly stated, likely automatically applied using registration number		Exempt – road users with vehicles meeting emissions criteria do not require a ticket to enter the area	Discount – eligible user applies for discount online

[1] Noting the implementation of mechanisms are TBC where it is unclear how the mechanism will be implemented following pending approvals
[2] Journal of the Eastern Asia Society for Transportation Studies, Vol.11, 2015 (jst.go.jp)
[3] There is no universal definition of a 'bus'. In some instances, a vehicle with more than nine passenger seats is a demarcation point, and in others there has been a more qualitative description based on trip purpose. Where this is available, this has been stated within the table.
[4] ALS indicates exemptions under the Area Licensing Scheme in operation between 1975 to 1998.
[5] For example: the Coastguard, Port Authorities, armed forces, diplomats

User group	Singapore	London	Stockholm	New York[1]	Milan	Seoul
Special trip purpose (i.e., users travelling to/from hospital)		Rebates - eligible users travelling to/from hospital to apply to registered trust or hospital tasked with reimbursement			Exempt –vehicle owner travelling to/from hospital must complete formal request	Exempt – vehicle owner travelling to/from hospital must formally request exemption
Residents living within congestion zone		Discount – eligible user applies for discount online			Non-withdrawable account credit – residents self-identify using proof of address, receive 50 free entries annually Discount – available once account credits are exhausted, a discount applies	Discount – eligible user applies for discount online
Certain operational vehicles[6]		Exempt - organisation to register for an exemption				Exempt – automatically applied at point of charge using registration[7]
Through traffic		Exempt in original Congestion Charging Zone (CCZ) – all vehicles travelling through routes (primarily defined by the Western boundary) were exempt from the charge.	Exemption – vehicles travelling from or to an isolated island (Lidingö) are exempt, providing vehicles pass two defined control points within a span of 30 minutes			
Roadside recovery vehicles		Discount – eligible user applies for discount online, relying on vehicle registration details				Exempt – must register for exemption
Low-income vehicle owners				Discount – Those enrolled in the Low-Income Discount Plan (LIDP) receive a 50% discount after the first 10 trips in a calendar month.		Discount – eligible user must self-identify, evidencing income tax and be enrolled in government assistance programme

3.2 Key findings

As demonstrated in Table 2, mitigation measures are a common component of scheme design and they help account for negative financial or social impacts faced by selected user groups. In summary:

- **All schemes** recognise emergency vehicles through use of exemptions.
- **Many congestion schemes** (at least four) recognise buses, motorcycles (and mopeds), freight, taxis and Private Hire Vehicles (PHVs), disabled people, nationally significant vehicles, and EVs or alternative-fuel vehicles, primarily through use of exemptions, and in some cases discounts.
- **Half of the schemes** recognise users travelling for a specific purpose (i.e. travelling to/from hospital) and residents living within a congestion zone, through a combination of exemptions, discounts, rebates and non-withdrawable account credits.
- **Few schemes** (two or less) recognise operational vehicles, through traffic, roadside recovery vehicles and low-income vehicle owners, through exemptions and discounts.

In some cases, a mitigation measure may apply to all road users. A charge cap (the maximum fee a vehicle can incur in a given time frame) is one example of this. This blanket-approach has been applied in many overseas jurisdictions, including London, New York and Milan (each charging daily caps), and Stockholm (which applies on and off-peak caps). For the purposes of this paper, we have focused on the suitability of mitigation measures on user groups that are subsets of the general road user population. The applicability of charge caps is most suited to pricing and has been explored in the *Pricing Policy Paper*.

A notable characteristic of many charging schemes analysed is the flexibility of charging schemes to accommodate changing circumstances over time, as evidenced by the removal and addition of user groups throughout the lifecycle of the charging schemes. The general trajectory of mitigation measures, particularly in London and Singapore, is revision of mitigation measures over time. Hence, while a conservative approach to adoption is warranted, mitigation measures must be able to flex in response to changing local circumstances over time. The following table provides a summary of those specific changes, and where relevant, a justification as to why change occurred.

An alternative to providing an exemption, discount or rebate is the use of differential pricing. A scheme could use differential pricing as a means to incentivise or disincentivise the use of specific vehicle types. Tolling in New Zealand already uses differential pricing as a means to link the effects of specific types of vehicles (e.g., heavy vehicles) with their negative impacts on the road. The Pricing Discussion paper acknowledges the potential use of differential pricing as a means to price vehicle types according to the contribution they make to congestion.

[6] For example: Street cleaning and waste collection vehicles
[7] Journal of the Eastern Asia Society for Transportation Studies, Vol.11, 2015 (jst.go.jp)

Table 3: International Case Study

City	Initial Measures	Evolutions/ Current State	Reasons for Changes

Singapore	• Implemented a system-wide Area Licencing Scheme (ALS) in 1975.
	• Initial focus on peak-hour charges to reduce congestion.
	• Key mitigations included:
	  • Emergency service vehicles - exempt
	  • Freight – exempt
	  • Buses – exempt
	  • Motorcycles (and mopeds) – exempt
	  • Taxis and Private Hire Vehicles (PHV) – exempt
		• Adjusted to an Electric Road Pricing (ERP) system in 1998, leading to change in scheme operations.
		• Introduced off-peak charges and revised rates based on real-time traffic conditions.
		• Mitigations that have continued to apply include:
		  o Emergency service vehicles - exempt
		  o Freight - exempt
		• User groups removed by the ERP system include:
		  o Buses
		  o Motorcycles (and mopeds)
		  o Taxis and Private Hire Vehicles (PHV)
			• To better align with the primary policy objective of reducing congestion.
			• To provide a more dynamic and responsive system to current traffic conditions.

London	• Introduced the Congestion Charge in 2003, covering a 21km² area in Central London.
	• Initial flat daily rate for entering the congestion zone.
	• Key mitigations included:
	  o Emergency service vehicles - exemption
	  o Buses – exemption or discount
	  o Motorcycles and mopeds - exempt
	  o Licensed taxis - exempt
	  o Vehicles used by disabled people (with a valid Blue Badge) - exempt
	  o Motorcycles and mopeds[8] - exempt
		• Increased the charge from £5 to £11.50 over time.
		• Expanded the charging zone and introduced Ultra Low Emission Zone (ULEZ) in 2019.
		• Mitigations that have continued to apply include:
		  o Emergency services vehicles – exempt
		  o Buses – exempt or discounted as defined by vehicles with 9+ seats
		  o Motorcycles and mopeds – exempt
		  o Disabled people – exempt (some discounted)
		• Mitigations that the user group has stayed the same but the measure has changed to reflect the responsive nature of the congestion charge scheme.
		  o Freight – discount
		  o Taxis and Private Hire Vehicles – reduction in exemptions due to the increase in Ubers/private hire vehicles
		  o Nationally significant vehicles – exempt
		  o Special trip purposes (travelling to/from hospital) – rebates
		  o Residents living within congestion zone – discount
		  o Certain operation vehicles – exempt
		  o Roadside recovery - discount
		• Mitigation measures added and removed over time:
		  o Through traffic (through the Western extension) – exempt
		  o EVs or alternative fuel vehicles – exempt (until December 2025)[9]
			• To maintain the effectiveness of the charge and account for inflation.
			• To respond to changing policy objectives and local conditions. Notably, change to eligible user groups over time was driven by political campaigning, public consultation and changing attitudes towards scheme objectives (and the CCZ's role in emissions reductions).

[8] Congestion Charge | Transport for London
[9] Discounts and exemptions | Transport for London

4. Defining user groups in Auckland

4.1 Estimated scale and description of user groups

Using international precedent as a starting point, the following table outlines potential user groups, their potential scale (as a proxy for the impact on effectiveness) and how they may be identified in practice. Given this is an international scan, other local user groups, including but not limited to Mana Whenua or Māori, have not been explicitly identified here. It is expected that the evolution of the scheme, including through public consultation, will highlight other potential cohorts.

Table 4: Potential user groups

User group	Scale	Description
1. Emergency service vehicles	Unknown but expected to be limited and have little impact on the effectiveness of the scheme.	The user group will be straightforward to define. The Land Transport (Road User) Rules 2004 define an emergency service vehicle as a vehicle used for attendance at emergencies and operated by an enforcement officer, by an ambulance service, as a fire service vehicle, as a civil defence emergency vehicle, or as a defence force emergency vehicle. Emergency service vehicles can be identified using registration details held by the Motor Vehicle Register (MVR). There may be additional criteria required of emergency service vehicles – for example is there a distinction between an emergency service vehicle with siren off vs siren on – but this is not expected to be a challenge.[10]
2. Disabled people	~70,000 mobility pass/tag holders in Auckland and 7,000 that use the Total Mobility Scheme	There is no one-size-fits-all definition of disabled people. However, a reasonable starting point are those users who are eligible for the Total Mobility Scheme (TMS) or Mobility parking permit. There are well established processes by which parties can apply for this scheme or receive a permit. The TMS seeks to assist eligible people with long-term impairments to appropriate transport to meet their daily needs and can be claimed anywhere in New Zealand the scheme operates. As the TMS is operated and managed by regional councils, each region has different rules. In Auckland, individuals are eligible for the TMS if they have an impairment (physical, sensory, neurological, intellectual, psychiatric/psychological, or another) that can be permanent, fluctuating, or temporary, but must last for a minimum of six months that prevents the undertaking one or more of the following five components of a journey unaccompanied: a. Getting to the place where the transport departs b. Getting on to the transport c. Riding securely d. Getting off the transport e. Getting to the destination point. Disabled road users that are car-dependent can also be recognised by their eligibility for a disabled parking permit operated by CCS. This captures users who are: a. Unable to walk and always require use of a wheelchair, or b. Have a severely restricted ability to walk distances due to a medical condition or disability, or c. Require physical contact or close supervision to safely get around and cannot be left unattended due to a medical condition or disability. CCS disability parking permits are also available for organisations that transport road users eligible for CCS, and for visitors to New Zealand who meet the eligibility criteria.
3. Buses	13,000 bus services using ~1,800 daily bus services	There are several different interpretations of buses that will need to be clarified. As a vehicle type, buses are defined by the Land Transport (Road User) Rules 2004 as “a passenger service vehicle that has more than nine seating positions (including the driver’s seating position).” The MVR defines buses as either “light buses” or “heavy buses”. Light buses carry more than nine people and weigh up to 3500kg when fully loaded, while heavy buses have a gross vehicle mass of over 3500kg.[11] Vehicles considered light buses or heavy buses can be identified using the motor vehicle register. Vans and people movers are not recognised as buses, and are instead categorised as passenger vehicles, making them indistinguishable from other passenger vehicles based on registration numbers. There is a potential market distinction between public buses who provide a public good and private coaches that stand to commercially benefit from the scheme. Most overseas schemes have not made a functional distinction between the two. Further ambiguity may also arise. For example: a. Whether the user group could extend to adjacent groups including minivans performing bus like functions (such as dropping children at school) and organised carpooling, and b. Whether the bus must be performing a specific trip purpose at the point of a charge (e.g., taking a scheduled trip).

[10] Section 5.1 of the Road User Rules exempt an emergency service vehicle from abiding by the speed limit only if the emergency service vehicle is responding to an emergency, with the beacon and/or siren on. However, given the difference in rationale between exempting an emergency service vehicle from abiding by speed limits in specific situations versus alleviating the negative impact of a congestion charge on emergency services vehicles, there is no strong reasoning to support the use of additional criteria above vehicle type.

[11] Buses and taxis | NZ Transport Agency

User group	Scale	Description
4. Certain operational vehicles (street cleaning, waste collection etc)	Unknown, but expected to be fairly limited	Operational vehicles are not currently recognised as a category of vehicles explicitly defined in New Zealand legislation. Consequently, it is essential that specific operation vehicles are explicitly defined for the charging scheme. The scope of vehicles captured will be directly related to the scale of the user group, though are likely immaterial given 91% of motor vehicles are light passenger and commercial vehicles. All other vehicle types fall within the remaining 9%, including special purpose vehicles and heavy vehicle trucks – each of which are assumed to encompass operational vehicles.[12] Fleet vehicles, which would significantly broaden the scale of the user group, are not considered in scope. Specific vehicle types captured by 'operational vehicles' could be assumed to include, but are not necessarily limited to: a. Street cleaning vehicles (operated by Auckland Council and Auckland Transport) b. Motorway cleaning and maintenance vehicles (operated by Auckland System Management) c. State highway maintenance vehicles (operated by the NZTA) d. Waste collection and traffic management/construction vehicles e. Roadside recovery vehicles (termed 'vehicle recovery service vehicles' in the Land Transport (Road User) Rules 2004 as "a vehicle used or able for use in vehicle recovery service for towing or carrying on a road any motor vehicle")
5. Motorcycles (and mopeds)	~66,000 in 2022[13]	Motorcycles and mopeds are explicitly defined in the Land Transport (Road User) Rules and registration numbers are held by the MVR.
6. Freight vehicles	~7% of traffic is Heavy Commercial Vehicles[14]	Generally, the baseline assumption is 'freight vehicles' cover trucks that can be used to transport goods, termed "goods service vehicles" and defined within the Land Transport Act 1998 to be "a motor vehicle used or capable of being used in a goods service for the carriage of goods. This does not include a vehicle specified as an exempt goods service vehicle in the regulations or the rules." Ambiguity may arise given that adjacent groups, including courier services or other commercial deliveries operating using smaller vehicles, may propose they are considered as "freight vehicles."
7. Taxis and Private Hire Vehicles	Moderate	Taxis and private hire vehicles are considered 'small passenger service vehicles' and are well-defined in New Zealand legislation. This is due to the Land Transport Management Act 2003 mandating that a regional council, in a regional public transport plan must "identify any passenger services in small passenger service vehicles" at s 120. "Small passenger vehicles" are any passenger service vehicle that is designed or adapted to carry twelve or fewer people, including the driver, as per s2(1) of the Land Transport Act 1998. Generally, this encompasses taxis, shuttles, private hire vehicles, vehicles associated with app-based bookings, and dial-a-driver services. All individuals driving one of these services must obtain a Small Passenger Service License, which is registered to the number plate of the vehicle(s) they will operate.
8. Residents living within charging zone	Directly proportionate to the boundary of the scheme	The scale of residents living within the charging zone is entirely dependent on the scheme boundary. Based on 2023 Census data, it is expected that: • Options 1A, 1B, and 3C as centre cordons would each capture 31,460 residents • Option 1C for the fringe suburbs cordon excluding motorway links would capture 41,860 residents • Options 2A, 2B, and 2C as strategic corridors or isthmuths would capture 140,500 residents. Residents living within the charging zone would not be identifiable using a motorway charge, though would be definable using a cordon charge.
9. Specific trip purpose	Variable – but could be significant	Specific trip purposes capture a range of travel purposes, inferred by travel route. By nature, the definition of specific trip purposes is highly variable to its self-defined purpose, the scheme design, geography and demographics of each congestion charge. Using a combination of overseas precedent and high-level assumptions about travel patterns in Auckland, a number of travel purposes have been considered. Our initial assessment has provided a basis for included trip purposes, which may include, but are not limited to: a. Travel to/from hospital or a healthcare provider (possibly for a defined purpose, such as to receive emergency treatment, regular therapy or assessment, for recurrent surgical intervention, or to transport a dependent requiring the outlined services). b. Travel to/from places of importance to mana whenua c. Travel to/from school (capturing parents and staff) d. Travel to/from a cemetery e. Travel to/from a religious site (church etc) f. Travel to/from places of employment (where there is compromised ability to opt for public transport alternatives). Moreover, each 'specific trip purpose' requires a route of travel and a purpose for that travel, both of which are ambiguous. How trip purpose is evidenced and whether this extends to road users driving individuals travelling for an eligible trip purpose also become factors for consideration.
10. Through traffic	Unknown, dependent on scheme design	Through traffic can be assumed to capture vehicles that travel through the charging area to arrive at a destination point that is external to the charging area. There is significant definitional ambiguity regarding what travel patterns through traffic applies to, including: a. Whether a vehicle can still be considered through traffic if it has multiple destination points within the scheme boundary prior to reaching final destination beyond the scheme boundary b. Whether to be determined through traffic, a vehicle must pass vehicle identification on either side of the charging scheme within a certain timeframe

[12] New Zealand s, Annual Fleet Statistics 2021
[13] Based on New Zealand Transport Authority (NZTA) Open Data applied proportionally to the Auckland population deriving from Census 2023 data
[14] Heavy Commercial Vehicle average using AT Traffic Count data 2012 - 2014

User group	Scale	Description
		c. Which travel routes through traffic might apply to.
11. Low-income vehicle owners	300,000 Community Service Cardholders in Auckland. 19% of Aucklanders are defined as 'low-income'	The definition of low-income vehicle owners is ambiguous. ABM modelling applied income levels defined by national income ranges, which led to the categorisation of 'low-income' individuals to apply to those whose annual income was less than $30,000 (amounting to 19% of Auckland's total population, regardless of whether a road user). In practice, low-income individuals may then be recognised by one of two methods: a. Income tax brackets, or b. Eligibility for welfare (a less reliable form of evidence given the risk of this method failing to capture all low-income individuals, such as single people and couples without children who may not receive any transfer payments), or for a Community Services Card (totalling 300,000 cardholders in Auckland) The eligible individual would then be required to have vehicle ownership registered to their name. Generally, the aim of recognising low-income vehicle owners as a user group is to alleviate the financial burden the charging scheme imposes on individuals who may be disproportionately burdened by the charge. While low-income vehicle owners can be distinguished by falling within the national 'low-income' band, the proportion of the burden in relation to an individual's income is directly related to the price of the charge. A significantly higher charge might lead a greater scope of individuals to be disproportionately burdened and vice versa.
12. Electric Vehicles (EVs) or alternative-fuel cars	Limited, though like all user groups is reflective of a point in time. It is very likely EV uptake will increase the scale of this user group in future.	EVs and alternative-fuel cars can be easily defined using existing definitions, such as that applied for prior exemption of EVs and alternative fuel vehicles from Road User Charges. This defined electric vehicles as "powered fully or partly from externally supplied electricity and weighing 1001kg-3500kg gross vehicle mass." This included battery EVs, plug-in hybrid vehicles, plug-in diesel hybrid vehicles, hybrid petrol vehicles, and very light electric vehicles. Vehicles falling within this category are registered as such in the MVR.
13. Nationally significant vehicles (armed forces, diplomats, politicians)	Unknown, expectedly limited	The definition of a 'nationally significant vehicle' is ambiguous. Vehicles identified as being 'nationally significant' may include, but are not limited to the Coastguard, Port Authorities, armed forces, and vehicles transporting diplomats and politicians. There is no existing definition of nationally significant vehicles in New Zealand, nor are there definitions where the user group is recognised in overseas charging schemes. Where a congestion scheme provides a nationally significant vehicle with a mitigation measure, the vehicle has been explicitly listed (e.g., the Coastguard). Regardless of the scope of nationally significant vehicles within a chosen definition, the proportion of eligible vehicles in New Zealand is likely small.

4.2 Key findings regarding the identification of user groups

Identifying and defining user groups that require mitigation is an essential first step.

- **Those cohorts who can be identified by their vehicle is typically easiest to define as this information is captured in the motor vehicle register.**
- **Those cohorts who can be identified by the user in the vehicle is typically more challenging to define.** Two prominent challenges exist with these users: One is administrative (because not all users are backed by an administrative process) and the other is definitional (because there is often definitional ambiguity about what a 'special trip purpose is' for example).

User groups most easily defined include emergency services, disabled people (if existing mechanisms are used to define and identify the user group), motorcycles and mopeds, buses, taxis and private hire vehicles, and electric vehicles/alternative-fuel vehicles.

User groups that have more definitional ambiguity include certain operational vehicles, freight vehicles, residents living within the charging zone (for most of the Option 3 motorway charging points family, where there are no defined scheme boundaries), specific trip purposes, through traffic, low-income vehicle owners, and nationally significant vehicles.

Identifying and defining selected users is seen as a critical next step for the Programme and should be informed by specific scheme design options and the policy objectives of the scheme, as well as any pre-engagement undertaken with potential user groups.

5. User group alignment to policy principles

5.1 Our approach to assessment

An initial assessment of those user groups and their alignment to core policy principles is summarised in Table 5 below. For the purposes of this assessment, we have solely focused on how effective, fair or simple it is to recognise each user group. It is critical to note that the effectiveness, fairness, or simplicity of recognising a user group is highly dependent on scheme design. In future, as scheme design is consolidated it is essential to revise how baseline assumptions of this assessment have changed.

Table 5: Key for policy alignment scoring

Policy Guiding Principles		1	2	3
Effective	Effectiveness is based on whether by addressing the user group, the scheme will remain effective in reducing congestion, as measured by: • The size of the user group i.e. exempting small groups is expected to have a minimal impact on congestion reduction outcomes • Whether the user group is a net contributor or net reliever of congestion	• Small user group • Or net reliever of congestion		• Large user group • Or net contributor to congestion
Fair	Fairness is based on whether recognising the user group would lead the public to perceive the scheme as 'fairer'. This is measured by: • The vulnerability of the user group - in alignment with the AT Equity Framework (to be supplemented by negative outcomes once they become known following finalisation of scheme design) • Whether the user group has choice in their travel patterns • Whether a user group receives additional benefit from the scheme (e.g., commercial gain, reduced congestion) • Whether application of a mitigation measure to one user group reasonably invites applications from adjacent group(s)	• Highly vulnerable user • Little to no choice over travel patterns • Minimal or no additional benefits from the scheme		• Not a vulnerable user • Choice over travel patterns • Most benefit from the scheme
Simple	Simplicity is based on the ability to recognise a user group, and target benefits to that defined group, as measured by: • The ability to identify and distinguish the user group and administer the mitigation measure • The extent to which there are material gaming or enforcement risks.	• Straightforward to identify the user and administer the mitigation measure • Minimal or no gaming and enforcement risks		• Difficult identify the user and administer the mitigation measure • Significant gaming and enforcement risks

5.2 Scoring

By scoring each potential user group, three potential candidates have been identified: likely candidates, potential candidates and unlikely candidates for mitigation measures.

- **Potential candidates for mitigation measures:** user groups scoring a majority of 2's are potential candidates for mitigation measures and require more investigation due to having a moderate impact on the effectiveness, fairness and/or simplicity of the scheme, though generally having some definitional ambiguity making the effects of their recognition uncertain.
- **Unlikely candidates for mitigation measures:** user groups that score a 3 in any category are unlikely candidates for mitigation measures as user groups would significantly impede the scheme's effectiveness, fairness, and/or simplicity. However, there may be exceptions to this rule as described throughout the remainder of this paper.

It is worth stressing that this is an indicative desktop assessment and is not based on a specific scheme design or option. Moreover, these impacts have not been tested with any affected parties.

5.2.1 Likely candidates for mitigation measures

Table 6: Emergency service vehicles

Policy alignment	Justification
Effective 1	• There are a limited number of emergency service vehicles inferring the scale of the user group have a negligible impact on congestion. The amount of emergency service bases (including police stations, fire stations, and hospitals) that are captured by scheme design may influence the scale of the user group. • Emergency vehicles are arguably a contributor to congestion, but their small scale and small frequency of travel means they will have an immaterial impact on congestion.
Fair 1	• Emergency service vehicles respond to those in highly vulnerable circumstances and all international schemes have exempted emergency service providers from their charging schemes. • The need for rapid response times eradicates the choice of travel patterns for this user group. Argument could be made there is some degree of choice over travel patterns when an emergency service vehicle is not responding to an emergency. However, the public safety attributed to the presence of emergency service vehicles counteracts the need for congestion charging to distinguish this difference in travel purpose. • There are no expected applications from adjacent groups for similar treatment.
Simple 1	• Emergency service vehicles can be simply identified using existing definitions and vehicle registration details held in the MVR. • There are not expected to be 'gaming' issues if the user group applies to all emergency service vehicles regardless of travel purpose.

Table 7: Buses

Policy alignment	Justification
Effective 1-2	• Generally, buses perform the same function but can typically be categorised in one of three groups: public transport buses (contracted by AT), privately owned coach services, and other bus services (including vans and minibuses for specific purposes). The eventual definition of a 'bus' and the geographic boundary of the scheme, will impact the scale of the users impacted and therefore the scheme's effectiveness. If the user group is defined as public transport buses (contracted by AT), the scale of the user group will be moderate, given there are 13,000 bus services and ~1,800 daily bus services. The scale of the user group can be expected to increase if the definition of buses is extended to include other categories of buses. • While buses are larger than private vehicles (which on a per unit basis is assumed to increase congestion) they act as net relievers of congestion when carrying passengers as an alternative to individual car use.
Fair 1	• The vulnerability of the user group is dependent on the trip purpose of the bus. A stronger argument could be made for ensuring public transport buses are not unduly penalised by the scheme given that they are intended to provide travel choice to all Aucklanders. The vulnerability of users of privately owned coaches and other bus services is less clear and is focused on the trip purpose of these buses. • Travel pattern, being frequency and coverage of public transport, is driven by demand. To respond to demand inherent to, or increased because of the presence of a scheme, it is expected that choice in travel patterns will reduce due to the presence of a scheme. • Buses will benefit from reduced congestion. There is risk that charging buses would lead to additional costs being passed on to users through higher bus fares, potentially discouraging the use of public transport and undermining the scheme's incentives. The administrative costs of transferring funds between publicly owned bus service operators and the congestion charging authority could also lead to deadweight costs. • If the definition of a bus is defined narrowly (i.e. just to public transport buses) then adjacent user groups to the 'bus' cohort defined will likely raise reasonable applications for inclusion.
Simple 1	• The simplicity of identifying buses and administering mitigation measures within the congestion charging scheme is influenced by the definition of a bus. If buses can be easily identified using data from the Motor Vehicle Register (MVR), the process will be straightforward. • However, if the definition includes other vehicle types or specific passenger thresholds, the identification process and scheme administration could become more complex, raising concerns about the simplicity of the scheme.

Table 8: Disabled users

Policy alignment	Justification
Effective 1	• The proportion of the New Zealand population that holds a disability permit is relatively small, at 70,000 disabled users, indicating that the inclusion of disabled users within a congestion charging scheme is unlikely to significantly impact its effectiveness. • Disabled users travelling using private vehicles are net contributors to congestion, though the scale of disabled users is potentially modest.
Fair 1	• Disabled users are considered highly vulnerable due to their unique transportation needs and the barriers they face in accessing mobility. This is well recognised in AT's Equity Framework. • The travel patterns of disabled users are often constrained, with limited choices available to them. This lack of choice necessitates the inclusion of provisions within the congestion charging scheme that account for their specific circumstances, further contributing to the fairness of the system. • Any additional benefit of reduced congestion will be unlikely to influence perceptions of fairness for recognising this user group by mitigation measures.

	• Existing mechanisms to provide mobility parking permits and total mobility services explicitly consider the disability of the individual and the impact of that disability on travel. These processes provide a mechanism to vet any potential spurious or adjacent applications.
Simple 1-2	• Established systems such as mobility parking permits and the Total Mobility Scheme are broadly recognised, which simplifies the process of directing benefits to this user group. • There is a potential risk of gaming with non-disabled users using those vehicles that have a disability exemption. It is expected that this would be a relatively small fraction of total users.

5.2.2 Potential candidates for mitigation measures

Table 9: Motorcycles (and mopeds)

Policy alignment	Justification
Effective 1-2	• The inclusion of motorcycles is expected to have a minor to moderate impact on the scheme's overall effectiveness with a population of ~66,000 2022 (based on Auckland population and ~200,000 across NZ) or 4.76% of all light vehicle fleet 2023. • It is contestable the extent to which motorcycles contribute to congestion – in some instances the relation is less than 1:1 with a private motor vehicle, in other instances, the presence of a motorbike will occupy space equivalent to a vehicle. Their impact on the overall effectiveness of the scheme will be minor to moderate depending on the boundaries of the scheme, the price settings, and the time of use charged.
Fair 3	• There is no general vulnerability faced by those using motorcycles given the wide range of trip purposes and users captured. • The user group typically does not have any significant impediments to their choice in travel pattern that invoke the need for consideration. • It is likely that reduced congestion will provide the user the additional benefit of reduced travel time. However, this may be minimal given they are generally better able to manoeuvre through congestion than other vehicles. • There are no obvious adjacent groups who may look to request similar mitigations.
Simple 1	• The identification of motorcycles (and mopeds) is straightforward, as the user group can be identified using vehicle registration details. This simplicity in identification facilitates the efficient administration of the scheme for motorcycles. • As vehicle identification relies on registration details and is directly linked to the vehicle, there is little to no risk of gaming or enforcement issues.

Table 10: Freight

Policy alignment	Justification
Effective 2	• Freight vehicles constitute a meaningful portion of the vehicle fleet. The size of the cohort will be dependent on scheme design including routes and times. Their impact on congestion can at times be substantial, and thus, addressing freight traffic can significantly influence the scheme's ability to alleviate congestion. • Freight vehicles are typically net contributors to congestion due to their size, slower speeds, and the need to make deliveries during business hours. However, efficient freight movement is crucial for the economy, and improvements in freight logistics can potentially relieve congestion by reducing the overall number of trips or optimizing delivery times.
Fair 2-3	• Freight companies operate in a competitive market, and additional costs or restrictions from congestion schemes can impact their operations. However, they are not typically considered vulnerable in the same way as individual citizens or essential service providers might be. • Freight schedules are often dictated by customer demands, which can limit flexibility in travel patterns. Some deliveries must occur within specific time windows, making it difficult to avoid peak congestion times. • Freight vehicles could directly benefit from reduced congestion through faster delivery times and lower operational costs. However, if the scheme imposes restrictions or fees, it could also lead to increased costs for freight companies. Scheme design will determine the level of benefit and/or commercial gain. • The typical definition of “freight vehicles” covers trucks that can be used to transport goods. However, there is definitional ambiguity and it is expected that adjacent groups including courier services or other smaller commercial delivery vehicles will likely apply to be recognised as a “freight vehicle” based on shared travel purpose.
Simple 1-2	• The ability to identify the user group is dependent on the definition of a “freight vehicle”. While the MVR recognises heavy commercial vehicles, smaller courier services or commercial delivery vehicles may be more difficult to identify and require the user or organisation to self-identify. • There is minimal to no risk of gaming or enforcement issues if freight vehicles are limited to heavy commercial vehicles. However, the broader the definition becomes, the more gaming or enforcement risks may arise. For instance, if the definition extends to include private hire vehicles being used for commercial delivery (i.e. uber eats).

Table 11: Taxis/Private Hire Vehicles (PHVs)

Policy alignment	Justification
Effective 2	• Taxis and PHVs are significant in size, and their inclusion in the congestion charging scheme could moderately affect its effectiveness. Depending on location, the number of these vehicles on the road is considerable, and their continuous operation throughout the day could influence congestion levels. • Taxis and private hire vehicles contribute to congestion, but they also provide a service that can reduce the number of private vehicles on the road. Their role in the transportation ecosystem is mixed, as they can both contribute to and alleviate congestion depending on the context.
Fair 2	• Taxi/Private Hire Vehicles (PHVs) are not considered vulnerable users due to their commercial nature. While in some instances they may facilitate the transport of vulnerable users dependent on taxi/PHV services, this vulnerability is a measure of that specific user group (i.e., disabled people), rather than taxi/PHVs. • Despite choice in travel patterns being driven by consumer demand, taxis/PHVs generally have flexibility in how and when they travel. • Taxis/PHVs could be expected to receive additional benefit from reduced congestion, which may allow the user group to provide increased services and make commercial gain. However, if the charging methods of taxis/PHVs mean the user group makes greater commercial gain on congested roads (due to increased travel time), customers may face increased fares. • Use of existing definitions (such as 'small passenger service vehicles') which strictly define the user group will diminish risk of adjacent user groups applying for recognition, though there will likely be a degree of applicants by adjacent user groups not captured by existing mechanisms but performing similar functions.
Simple 1-2	• Identifying taxis and private hire vehicles for the congestion charging scheme is expected to be administratively simple as they should be recorded on the motor vehicle register. However, with the uptake of Ubers and private hire vehicles identifying vehicles in this category may become administratively more difficult. • There may be considerable gaming or enforcement risks given that taxis and private hire vehicles are not always in use for commercial purposes, which may allow road users to benefit from mitigation measures for taxis/private hire vehicles

Table 12: Specific trip purpose (e.g. hospital, maraes, churches, cemeteries

Policy alignment	Justification
Effective 1-3	• The size of the user group is entirely dependent on the scope of trip purposes captured. Trips for healthcare, cultural, or spiritual purposes, including travel to hospitals, maraes, churches, and cemeteries are expected to represent a relatively small proportion of overall traffic, though is strongly linked to whether these sites are captured within a scheme boundary. If other purposes such as school trips are captured, then this would represent a large cohort, particularly at am peak. • These trips are net contributors to congestion.
Fair 1-3	• Each trip purpose has a varying level of vulnerability associated with it, with individuals traveling to receive healthcare services assumed to be the most vulnerable users. • Choice over travel patterns is similarly dependent on the specific travel purpose. Often, travel to receive healthcare services is associated with minimal choice over travel patterns. Generally, it is assumed that there may be some choice over travel to sites of spiritual significance (including maraes and cemeteries). • Users will receive the additional benefit of reduced travel time and improved reliability. Arguably these benefits may be greater depending on the importance of the purpose of travel. • Any definition of "specific trip purpose" will invoke considerable application for adjacent user groups, some of which will have a strong influence on the perceived 'fairness' of the scheme. • There is an extremely high likelihood of adjacent user groups requesting recognition of their trip purpose by a mitigation measure given the potentially broad spectrum of travel purposes that may be defined and the many nuances to travel purpose that will affect a user's eligibility.
Simple 3	• The ability to identify the user group is challenging. Where the user group is travelling to a hospital or healthcare provider, there may be existing administrative processes that can be leveraged to confirm travel purpose. Alternatively, new mechanisms may need to be established. For example, in London, National Health Service (NHS) patients and staff eligible for a mitigation measure (reimbursement) must make a claim to NHS trusts and hospitals tasked with managing claims and reimbursing eligible members. For many other trip purposes, including travel to a spiritual site, there is no existing mechanism to leverage to verify travel purpose and it would be significantly difficult to impose one. • The inability to verify many of the travel purposes will lead to significant gaming and enforcement risks by those seeking to avoid charges which may heavily impact the legitimacy of the scheme.

Table 13: Residents living within zone

Policy alignment	Justification
Effective 1-3	• The size of this cohort is a direct function of the boundary of a scheme. This could be very small if targeted to corridors or could be very large if cordon based.
Fair 2-3	• Residents might be considered vulnerable if they have limited choices in altering their travel patterns due to the location of their homes within the charged area. • The degree of choice residents have in their travel patterns can vary, influenced by factors such as the availability of public transport and the scheme's design. • Residents are likely to benefit from reduced congestion, noise, pollution, and road danger. They may also enjoy improvements in public transport and active travel infrastructure. • This mitigation may invite applications from adjacent areas, potentially complicating the fairness of the scheme.
Simple 2	• Identifying residents and administering the mitigation measure could be complex, requiring proof of address and potentially leveraging existing systems like resident parking permits. • The risk of gaming by users registering vehicles to addresses where they do not reside, including the use of PO Box numbers, presents a small (in size) but potentially administrative complex challenge.

Table 14: Operational vehicles (including roadside recovery vehicles)

Policy alignment	Justification
Effective 1-2	• Operational vehicles, including roadside recovery vehicles, waste management, street cleaner etc, are expected to represent a small proportion of Auckland's vehicle fleet. This small size suggests that their direct impact on alleviating congestion through any scheme is likely to be minor to medium depending on if fleet vehicles are included. • While operational vehicles are essential for city functioning and safety, their operations can both contribute to and relieve congestion. For example, roadside recovery vehicles relieve congestion by clearing accidents but may contribute to congestion during the recovery process. The net effect depends on the specific circumstances and timing of their operations.
Fair 2	• Operational vehicles perform essential services that benefit the public (e.g., waste collection, roadside assistance). Their operations are not just for commercial gain but for maintaining city operations and safety. • Some operational vehicles, like rubbish trucks, have some flexibility in scheduling (e.g., operating outside peak hours). However, others, such as roadside recovery vehicles, must operate as needed, regardless of time or congestion levels. This limited choice in travel patterns highlights a need for special consideration. • Operational vehicles (particularly those with commercial interests) might receive indirect benefits from congestion alleviation schemes, such as more efficient routes or quicker response times. However, these benefits are in line with their public service roles. • Operational vehicles may invite similar applications from groups performing similar operational roles (including those operating fleets),
Simple 2	• The diversity within operational vehicles (private vs. public operations, different functions) complicates their identification and the administration of any mitigation measures. A consistent approach to vehicle identification and scheme application is needed to address this challenge effectively. • The varied nature of operational vehicles and their roles could introduce risks related to gaming the system or enforcing scheme rules. Clear guidelines and enforcement mechanisms are necessary to mitigate these risks.

5.2.3 Unlikely candidates for mitigation measures

Table 15: Through traffic

Policy alignment	Justification
Effective 2-3	• Through traffic is dependent on scheme design but may amount to a large user group. It is likely that these users would travel around schemes to avoid paying a charge which may introduce larger net congestion effects across a network. • Through traffic is a net contributor to congestion, as it increases the volume of vehicles on the road, leading to higher traffic density and slower traffic times.
Fair 2-3	• Through traffic is generally not considered a vulnerable user group. There is varying reason for through traffic to travel through the charging area, some of which may be specific to vulnerable user groups. • Through traffic is assumed to have choice over travel patterns per se, though there may be a notable proportion of through traffic made up of commuters. • Those commuting to work, with limited choice of travel time will benefit from reduced congestion. • The application of mitigation measures to through traffic may invite similar applications from other groups who feel they are unfairly charged, potentially complicating the scheme's fairness.
Simple 2	• Through traffic could be identified as vehicles enter and exit the congestion charging zone. This often requires a vehicle to pass from one identification point to another within a given time frame to evidence the vehicle's final destination is beyond the scheme boundaries. However, this may be heavily disputed where a vehicle has faced an intervening reason for extended travel times (e.g., congestion caused by a crash). • If a time limit is imposed, there will be significant enforcement risks due to the likelihood of disputes by vehicle owners seeking to avoid the charge.

Table 16: Low-income vehicle owners

Policy alignment	Justification
Effective 2-3	• The low-income user group would likely be substantial, with national standards estimating low-income individuals make up 19% of Auckland's population. The significant scale of the user group would significantly impede on the effectiveness of the scheme. • Low-income vehicle owners are net contributors to congestion.
Fair 1	• The congestion charge will financially burden low-income, car dependant vehicle owners, the are considered to be vulnerable user groups due to economic constraints. • Low-income vehicle owners are perceived as having compromised choice over travel times with shift work ect and are generally to be located in areas with high transport deprivation which would restrict their choice over travel modes. • While low-income vehicle owners would benefit from reduced congestion, the substantial scale of the user group may compromise the effectiveness of the charge and consequently reduce this additional benefit. • It is likely that adjacent groups facing similar financial hardships faced by those captured by the definition of a "low-income vehicle owner" will apply to be recognised by a mitigation measure. As scheme design and the pricing of the charge is a key determinant of the financial burden faced by road users, the greater the costs of the charge to the user – the greater the financial burden and thus the more individuals that may have strong arguments for financial hardship.
Simple 3	• Identifying low-income vehicle owners is significantly difficult. Even if existing mechanisms are used to identify low-income individuals (i.e., through use of income tax brackets), significant administrative burden is required to validate applications (including coordination with external entities, linking applicants to vehicles, and revising eligibility over time). • There are material gaming and enforcement risks associated with recognising low-income vehicle owners, which may involve the transferral of vehicle ownership to leverage another individual's eligibility, or the continued benefit of individuals who are no longer eligible based on change in income.

Table 17: Nationally significant vehicles

Policy alignment	Justification
Effective 1	• The size of the user group consisting of nationally significant vehicles, such as those used by the armed forces and diplomats, is expected to be very small. Therefore, addressing this group is unlikely to have a significant impact on the scheme's ability to alleviate congestion. • While these vehicles are important for national functions, they are not a major contributing factor to congestion due to their low numbers. As such, their inclusion in the congestion charging scheme is more about recognising their role rather than significantly affecting congestion levels.
Fair 3	• Nationally significant vehicles serve important national functions and are not typically considered vulnerable. • The travel patterns of nationally significant vehicles are often determined by official duties and obligations, which may limit their choice in travel patterns to some extent. • Overseas experience has shown that there is strong public opposition to providing exemptions to these vehicles. • The application of mitigation measures to nationally significant vehicles may invite similar applications from other groups with perceived important roles, potentially complicating the scheme's fairness.
Simple 2	• Identifying nationally significant vehicles and administering mitigation measures within the congestion charging scheme could be moderately challenging due to the diversity of the group and the lack of a consistent identification approach. • The scheme will need to establish clear criteria and processes for recognising and providing benefits to nationally significant vehicles to minimise gaming and enforcement risks. Ensuring a straightforward and enforceable approach is crucial for maintaining the simplicity of the scheme.

Table 18: Electric vehicles/alternative fuel vehicles

Policy alignment	Justification
Effective 1-2	• The size of the user group for electric vehicles (EVs) and alternative fuel vehicles is currently small, and their inclusion in the congestion charging scheme has a minor impact on its effectiveness. The percentage of trips made by EVs or alternative fuel vehicles is not substantial enough to significantly affect congestion. • While EVs and alternative fuel vehicles do not contribute to emissions, their presence on the road during peak times could be perceived as counterproductive to the congestion scheme's goals. However, their actual effect on congestion is minor at this point in time. This balance may shift in the future with increased EV uptake, affecting the scheme's effectiveness.
Fair 3	• EV owners typically are not from low-income households (given the higher up front cost of vehicle ownership) and so are not expected to be vulnerable users. • Owners of EVs and alternative fuel vehicles have the same choice in travel patterns as other users. • Mitigation measures for EVs and alternative fuel vehicles, such as exemptions or reduced charges, may reduce the perceived fairness among non-EV users, as they may view these benefits as preferential treatment. Furthermore, emissions reductions are not a policy objective of the scheme. • The application of mitigation measures to EVs and alternative fuel vehicles may invite similar applications from adjacent groups, such as hybrid vehicle owners or other low-emission vehicle users, potentially complicating the scheme's fairness.

Simple 1	• Identifying EVs and alternative fuel vehicles within the congestion charging scheme is moderately straightforward, as these vehicles can be verified through their registration details. However, the range of vehicles and the need for verification add a layer of complexity to the scheme. • There are no material gaming issues or enforcement risks.

6. Applicability of mitigation mechanisms

Once a set of target users have been defined, it is then relevant to consider the specific mitigation mechanism deployed. This will be a function of administrative simplicity (and cost) as well as the extent to which the mechanism has direct line of sight to the policy objective being sought.

Tables below examine possible mitigation mechanisms, using those in TCQ as a starting point, and outlines key considerations that should be accounted for when assessing applicability (divided into pros and cons).

6.1 Price subsidies

Price subsidies are mechanisms that reduce the cost of the congestion charge to the user.

Table 19: Price subsidies

Mitigation Mechanism	Pros	Cons
Exemptions: Identified users/vehicles would avoid paying the time of use charge in full.	Comparatively simple administrative process if existing databases (such as the NZTA Motor Vehicle Registration database) can be utilised to automatically apply exemptions to specific types of vehicles that it would not be in the interests of the scheme to charge (e.g. emergency service vehicles, buses). Clear international precedent with all international time of use charging schemes deploying this mechanism (albeit to varying user groups). Clear line of sight between policy intent and affected users.	No major concerns. Potentially not suitable for all user types who might warrant mitigation.
Discounts: A discount reduces the congestion charge at the point it is incurred (by a predetermined percentage of up to 100%) for eligible users/vehicles.	Suitable for mitigating impacts on user groups who are not categorised simply by the type of vehicle they drive. Clear international precedent with all international time of use charging schemes deploying this mechanism (albeit to different user groups).	More administrative difficulties. There would be a need to either develop and maintain databases or 'link into' existing databases, and if discounts are offered to groups of individuals that do not already fall into a 'category' (e.g. residents of a particular area) then they may have to submit paperwork etc to prove their eligibility. Potential risk of gaming due to enforcement difficulties.
Rebates: A rebate enables eligible users/vehicles to claim back a portion of any charges imposed. Rebates occur after the time of charge.	Suitable for mitigating impacts related to specific trip purposes (e.g. hospital visits) when users we are seeking to help are not categorised simply by the type of vehicle they drive, and where we are seeking to selectively target certain of their travel but not necessarily all of it.	Significant ongoing administrative requirements with the cost of enforcement depending on the scope of eligibility. Requires a transparent and accessible process for users to claim rebates.
Account credits (non-withdrawable): Preloading a designated number of credits into the owner's account (i.e. HOP cards), which can be used to offset the costs associated with congestion charges. These could operate as a substitute for discounts if they are time-limited and provided on a regular basis.	As credits are non-withdrawable, they can rely upon internal credit transfers (i.e. to pay for the scheme or to be used on a HOP card).	Significant ongoing administrative requirements. Requires user-friendly administrative systems for users to retrieve account credits.
Charge caps: A mechanism that can be deployed alongside all of the above price subsidies but sets a maximum fee for each eligible vehicle/user. This cap could apply over different periods of time.	Administratively simple given the measure applies to all users and could adopt a form similar to the AT $50 seven-day fare cap for bus, train and inner-harbour travel. [This is implicitly assumed in scheme assessment to date for all users.]	No major concerns.

6.2 Income subsidies

Income subsidies are mechanisms that seek to increase the disposable income of the owner of an eligible vehicle to offset the financial burden of the charging.

Table 20: Income subsidies

Mitigation Mechanism	Pros	Cons
Account subsidy (withdrawable): Credits an eligible owner's account with funds that are available for withdrawal by the owner (i.e., by transfer into their public transport card, or personal bank account), which could be used to offset burdens of congestion charge (i.e., if used towards the purchase of a bike).	No major advantages.	Significant ongoing administrative burden that requires very careful management to avoid overpayment and may impact entitlement for welfare payments if classed as 'income'. Withdrawable account subsidies have not been applied globally, however, trials in Australia demonstrated that this measure may not provide an incentive on their vehicle owner to not travel as people want to retain as much of the "free" money as possible for private use
Vehicle registration discounts: Provide discount to vehicle-related fees that are charged to decrease the financial burden the charge imposes.	Minimal administrative burden to issue the discount to the vehicle, given it is applied at time of licensing.	Legislative amendment required which may be challenging given registration costs are relatively low. Revenue from the congestion scheme would need to compensate for the discount.
Welfare payment adjustments: The costs of a scheme could be offset by increased welfare payments for all people with low incomes in the Auckland region.	No major pros, though this offers a unique approach to administering a low-income-specific mitigation measure.	Potentially broad scope of eligible users, likely to require a significant portion of congestion pricing revenue to fund, political contentiousness may tarnish the public's perception of the congestion scheme.

6.3 Key findings

Analysis of potential mitigation mechanisms demonstrates that:

- Price subsidies are routinely used overseas and appear to be highly applicable in a New Zealand context.
- Income subsidies would be harder to implement, are less attributable to the direct effects of a time of use charging scheme, and therefore are likely to be less relevant.
- However, all options should remain 'on the table' until a scheme is materially defined and consultation with the public takes place.

7. Next steps

Remaining actions required to progress mitigation measures can be divided into two stages.

7.1 Actions required prior to public consultation

- Engage with central Government on the proposed parameters of proposed mitigation measures.
- Consolidate information regarding potential user groups and available mitigation mechanisms for public consultation. Specifically:
    - Continue to clarify the user groups definitions and their identification methods in practice.
    - Continue to capture information about the impacts of specific time of use charging scheme options on each user group.
- Consider pre-engagement and consultation requirements for affected user groups.

7.2 Actions to complete prior to scheme implementation

- As scheme design is finalised, determine the negative financial or social impacts user groups may face that are not addressed by pricing and complementary measures.
- Finalise proposed user groups (including definitions and mitigation mechanisms) given due consideration to enabling legislation, outcomes of public consultation, and alignment to policy principles.
- Develop a plan for how the impacts of a time of use charging scheme will be monitored and reported over time. This review process must ensure the use of mitigation measures reflects a suitable balance between effectiveness and fairness over time.

Appendix E

Auckland Transport

Time of Use Charging Study

Gap Analysis

Reference: TOU-EYARP-IAXX-RPT-000005_v2_202409_Gap Analysis

2 | 06 September 2024

This report has been authored by EY and Arup, to support the development of Time of Use (ToU) options. It represents a 'point in time view' which will need to be further refined and interrogated as the project progresses.

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.
AT contract number 781-24-657-PS

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Executive Summary

This Gap Analysis paper takes a critical eye to testing, validating and updating the inputs and findings of The Congestion Question (TCQ). This responds to developments relating to Auckland's people, places, and priorities since TCQ was completed. Updating or filling gaps relating to these areas will ensure we establish a robust and defensible foundation for subsequent investigation into detailed scheme options.

Congestion is defined as a condition on road networks that occurs when traffic demand exceeds capacity, leading to slower speeds, longer trip times, and increased vehicular queuing. Our review of TCQ excludes the AT Technology Stack and NZTA Technology Stack under review separately.

This Gap Analysis paper provides a source of information at the current point in time in support of the broader project, as outlined in Figure 1 below. In future, as new information comes to light and is required for by the project, assumptions will need to be revised.

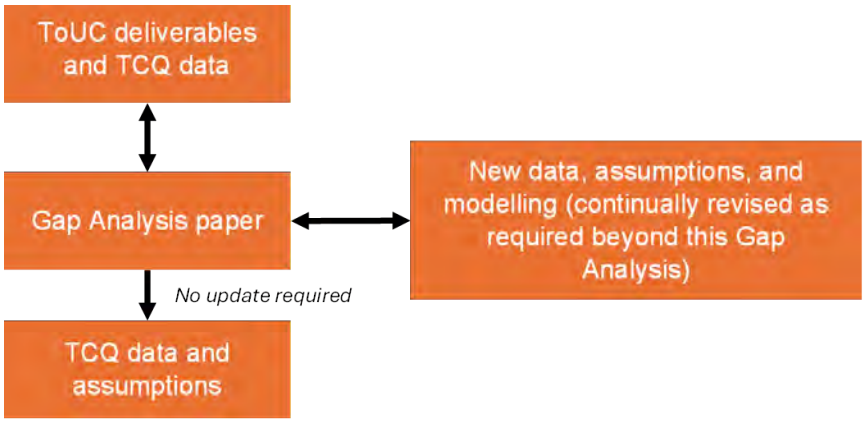

Figure 1: Function of the Gap Analysis paper

Five lenses of the Backcheck

1. The purpose of the Backcheck is to reconfirm gaps or assumptions in TCQ. This fed into the Gap Analysis, which outlined contextual changes since TCQ and our approach to existing or new gaps. The Backcheck was a robust and holistic overview undertaken through five lenses:
2. Reconfirming local context
3. Ensuring alignment with policy and strategic direction
4. Confirming technical systems requirements
5. Confirming modelling assumptions and specifications
6. Expanding the case

Changes since TCQ

While there have been changes in Auckland's people, places, and priorities, little has changed since the development of TCQ that would have a material impact on scheme design or implementation. Moreover, while some assumptions have changed as a result of new data, for example the percentage of people full time Working from Home growing from 9% to 13%, the majority of these updated assumptions are minor and won't have a significant impact on scheme design and assessment.

Similarly, while a number of gaps have been identified in TCQ, including opportunities to expand the case to incorporate a more robust understanding of social equity implications, these have largely been

deemed to be minor changes. An approach has been outlined to filling each of these gaps through Section 3 of this paper.

Additionally, the options carried forward from the TCQ have been enhanced through the development of three option families, integrated due to the new understanding of the context, the political appetite, and other emerging factors that were not previously considered. This inclusion ensures that the scheme is responsive to the evolving landscape and is reflective of a comprehensive approach to addressing the needs identified.

It is important to note that StatsNZ data is currently being updated to reflect the 2023 census, and that figures referenced throughout this report may change as that information becomes available.

People

Who is living in Auckland?

Since the publication of TCQ the population of Auckland has seen net growth of around 40,000 individuals and is forecast to reach approximately 2.23 million residents by 2053. This is a slightly slower growth rate than anticipated in TCQ – with the overall population growing by just 5.4% between 2018 – 2024, compared to the 11% increase over the preceding five years.[1] This is likely due to several factors, particularly the impact of COVID-19 (closed borders and a drop in international student numbers). At the same time the population of Auckland is getting older, and the working age population is falling – with potential implications for how and when people are moving around the city.[2]

The spatial distribution of socioeconomic deprivation across Auckland has not changed markedly since TCQ[3]. However, rising costs of living are putting increasing pressure on households, particularly through higher interest rates (28.2% increase), costs associated with private transport supplies and services (9.6%), and insurance (17.9% increase)[4]. The Māori population of Auckland is growing at a slightly faster rate than the broader population, however this is still a lower growth rate than the rest of the country.

How are people moving within Auckland, and why?

TCQ assumed 7% of employees worked from home (WfH) based on census data. This is likely to have changed significantly as a result of the impact of the COVID-19 pandemic, with recent WfH data suggesting the percentage of workers working from home three to four times a week could be as high as 10%.[5]

Although Public Transport (PT) use in Auckland has not fully recovered from the impacts of COVID-19 patronage is trending up – reaching approximately 90% of 2019 levels in February 2024.[6] Similarly, in almost all locations within the City Centre pedestrian counts have increased since the same time last year.[7]

Public transport use is likely to continue to grow over the coming years with CRL anticipated to cope with 54,000 passengers an hour at peak travel times by 2035.[8] The opening of CRL will provide a reliable and frequent public transport alternative to private vehicle use and will at least double the capacity of the rail network. **Understanding updates in CRL service assumptions and subsequent transport network impacts will be critical to developing an accurate future baseline of Auckland's**

[1] Infometrics (2023). Auckland Population Growth. https://ecoprofile.infometrics.co.nz/Auckland/Population

[2] Auckland Council (2023). Auckland Council Population Projects. https://www.knowledgeauckland.org.nz/publications/auckland-council-population-projections-total-auckland-march-2023/

[3] https://www.ehinz.ac.nz/indicators/population-vulnerability/socioeconomic-deprivation-profile/

[4] StatsNZ (2024).Household living costs increase 6.2 percent. https://www.stats.govt.nz/news/household-living-costs-increase-6-2-percent/

[5] EY 2023 Mobility Consumer Index

[6] Auckland Transport (2024). Public transport hits highest usage in five years. https://at.govt.nz/about-us/news-events/media-centre/2024-media-releases/public-transport-hits-highest-usage-in-five-years

[7] Heart of the City (2024). Pedestrian Counts. https://www.hotcity.co.nz/city-centre/results-and-statistics/pedestrian-counts

[8] City Rail Link (2024). Frequently Asked Questions. https://www.cityraillink.co.nz/city-rail-link-faq

transport network for modelling, and its capacity to act as an alternative in various time of use charge schemes, as well as influencing the extent to which complementary investments are prioritised.

Rising costs of living and increased private vehicle ownership and operations costs may impact when and how far individuals are driving – for example city centre on street parking weekday parking charges which come into effect in late 2024. New attractors such as the planned opening of IKEA in 2025 could also have an impact on congestion outside of weekday peaks.

Places

Where are people living and working in Auckland?

Since the publication of TCQ Central Government direction has further supported enabling growth and density both within and outside of existing urban areas. A requirement to "live-zone" for 30 years of growth, coupled with enabling increased height and density around strategic transport corridors, will change how and where Aucklanders are living.

Over the past five years population distribution has changed across the city, with outer suburbs including Papakura and Upper Harbour experiencing significant (up to 26%) growth over this time.[9] The distribution of growth across the city is mixed, with apartments and townhouses accounting for a significant proportion of dwellings consented in 2022/2023 (71%, up from 69% in 2021/2022).[10] 20% of all dwellings consented in 2022/2023 were within 1500m of train stations and the Northern Busway, with 83% of all dwellings consented situated within the existing urban area.[11]

As recognised by Auckland Council, compact urban growth paired with travel alternatives (such as frequent PT) or incentives to reduce private vehicle usage reduce car dependency and private Vehicle Kilometres Travelled (VKT). In turn, reducing GHG emissions or exacerbation of poor accessibility to employment and education opportunities.[12]

While areas such as the city centre are experiencing some employment growth[13] the creation of new urban centres in locations such as Drury, Red Hills, and Whenuapai, and ongoing business growth around Albany, Westgate, and Manukau, will further reshape the location of business, employment, and industrial land uses.

Priorities

What are Auckland's priorities?

Broadly the strategic direction for Auckland's transport and land use future is aligned with the direction outlined in TCQ. Recent direction has become more supportive of congestion pricing – including explicit references in the Auckland Regional Land Transport Plan (RLTP), TERP and GPS. Beyond committed and renewal projects, providing funding for the implementation of an initial Time of Use scheme was noted as a priority.[14] However, the legislative basis required to enable the implementation of a scheme is still under development via progression of the Land Transport Management (Time of Use Charging) Amendment Bill.[15] The 2023 Government Policy Statement on land transport explicitly stated intention to allow for time-of-use charging on New Zealand's most congested roads to reduce congestion and maximise existing assets.[16]

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[9] RadioNZ (2024). Thousands of residents leave Auckland's central suburbs – census. https://www.rnz.co.nz/news/national/518201/thousands-of-residents-leave-auckland-s-central-suburbs-census#:~:text=Auckland's%20overall%20population%20grew%20by,Population%20growth%20has%20slowed

[10] https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/auckland-plan/about-the-auckland-plan/Pages/development-strategy-progress.aspx#:~:text=The%20annual%20Auckland%20Plan%202050,retirement%20village%20units)%20across%20Auckland.

[11] https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/auckland-plan/about-the-auckland-plan/Pages/development-strategy-progress.aspx#:~:text=The%20annual%20Auckland%20Plan%202050,retirement%20village%20units)%20across%20Auckland.

[12] Auckland Council (2024). Future Development Strategy. https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/Documents/future-development-strategy.pdf

[13] Infometrics (2023). Auckland City Centre Economic Profile. https://rep.infometrics.co.nz/auckland-city/report

[14] Auckland Regional Land Transport Plan (2024-2034). https://at.govt.nz/media/pbyl211t/auckland-regional-land-transport-plan-2024-2034.pdf

[15] CBC-24-MIN-0072

[16] Government Policy Statement on land transport 2024-34

Throughout this strategic direction, as well as recent reports into Auckland's economy and productivity, congestion is frequently highlighted as a challenge to Auckland's global competitiveness, environmental / climate resilience, and equitable growth. As Auckland's economic productivity is critical to the ongoing success of the country, with the city's GDP accounting for 38% of the national GDP, reducing congestion in Auckland is a nationally significant issue.[17] We are currently in the process of updating the benefits of decongestion to current capacity in Auckland, last outlined by the 2017 NZIER Report as being between $0.9 billion and $1.3 billion.[18]

Through a Deliberative Democracy forum in 2024 it became clear that while some Aucklanders may not initially support the idea of being charged for the use of congested roads, the proportion of supporters grew to 49% in support of the idea through deliberation. Social equity is also frequently highlighted by politicians and community members as a concern when considering implementing a road pricing scheme in Auckland and contributed to the prioritisation of mitigations and public transport availability in the Council's Select Committee submission of 2021.

What material assumptions are we changing?

Table 1 outlines the material assumptions made in TCQ to be changed through the next phase of this work. Other assumptions identified in this paper have been determined to be minor and will be updated through the course of modelling runs and refinement of the strategic narrative.

Table 1: What material assumptions are we changing?

Assumption	Impact	Approach
Working from home assumption	The portion of employees working from home directly impacts the flow of traffic and need for congestion charging. The assumption applied in the TCQ recommended option was 7%.	Revise the WFH assumption using recent data, which has suggested the percentage of workers working from home three to four times per week could be as high as 10% (refer to 4.6 for modelling assumptions).[19] Revised WFH data will be used to test impacts of time of use charging on different work-from-home assumptions.
CRL - Future network impact	Understanding how CRL will impact Auckland's future transport network will be critical to developing an accurate future baseline of Auckland's transport network for modelling, and its capacity to act as an alternative in various time of use charge schemes.	Work with CRL to understand extent of future road and public transport network impact of scheme. Modelling team will incorporate CRL assumptions into model runs (as further mentioned in Section 4).

What are the material gaps?

The majority of gaps identified through review of TCQ and outlined through Section 3 of this paper are minor. While minor, filling these gaps in our knowledge would:

- create a richer and more robust evidence base,
- inform our understanding of the congestion problem for different user groups, as there is a lack of 'user' definition in TCQ modelling.
- help us better understand the impact time of use charging could have on individuals and communities (particularly Mana Whenua), and

[17] StatsNZ (2020). Regional gross domestic product. https://www.stats.govt.nz/information-releases/regional-gross-domestic-product-year-ended-march-2020/
[18] NZIER (2017). Benefits from Auckland road decongestion
[19] EY 2023 Mobility Consumer Index

- help to create a stronger strategic narrative and social licence.

Four material gaps have been identified and are outlined in Table 2. Addressing these gaps will be critical to ensuring scheme design and implementation is fit for purpose, and is able to secure social and political licence.

Table 2: What are the material gaps?

Gap	Impact	Approach
Legislation to enable the delivery of a congestion pricing scheme in Auckland	No congestion pricing scheme can currently be implemented until legislation is in place. The form of the legislation will impact scheme design.	Develop Auckland view to policy and principles including revenue allocation, exemptions / discounting / credits, and mitigations and complementary measures. Work with Ministry of Transport (MoT) to understand draft legislation and how it will function within an Auckland context.
Aucklanders' perceptions of time of use charging	Through deliberation as part of the NIF Deliberative Democracy Forum the proportion of supporters grew to 49% in support of road pricing. Social equity is frequently highlighted by politicians and community members as a concern when considering implementing a road pricing scheme in Auckland. Changes to Aucklanders' perceptions of time of use charging will be a key influence in the framing of objectives and successful public consultation.	Incorporate findings from the Deliberative Democracy Forum, early focus group testing, and other available relevant information, in future iteration of time of use charging programme. Work with the Engagement Team to ensure emerging public sentiment, concerns, and questions, are fed back into business case and scheme design. Work with Māori engagement team to ensure Māori and mana whenua perceptions, concerns and opportunities relating to time of use charging are captured, incorporated, and responded to proactively.
Congestion baseline	An up to date and robust understanding of the baseline level of congestion is critical to demonstrate the problem we are solving and the merits (or otherwise) of a time of use charging system. This includes confirmation of the date we are forecasting congestion to.	Confirmed scheme opening year target and other future years for assessment (refer to 4.1) Develop position on the congestion baseline / problem in Auckland. This includes updating LoS data and congestion mapping using 2024 AT traffic counts and TomTom data.
Mana Whenua impact	The report "Mana Whenua Analysis Congestion Question" outlines the key next steps to carry out to build on the analysis already undertaken and should form a basis for future engagement with Mana Whenua including informing engagement, decision making processes, and mitigation development.	Confirm approach to progressing analysis, using the "Mana Whenua Analysis Congestion Question" report and discussion with the AT Māori engagement team as the starting point. Work with AT Māori engagement team to determine approach to **engagement and decision making**, including utilising forums and approaches such as Kaitiaki Forum, IMSB, Governance Forums, 1:1

Gap	Impact	Approach
		engagement, and Mana Whenua community engagement. Establish approach to developing mitigation options with Mana Whenua that address particular areas of concern.

Confirming the Policy Framework

Auckland Transport has undertaken significant work to develop a Policy Framework, building on the approach laid out in TCQ. This includes securing endorsement for the Policy Objective through the June 2024 Transport and Infrastructure Committee Meeting. Through our review of existing material, professional expertise, and understanding of global best practice, we are supportive of the Policy Framework AT has developed. We note however that it will be important to revisit the Policy Assessment Criteria as it informs and gives effect to the Policy Framework.

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1. Introduction

1.1 Purpose

The purpose of this Gap Analysis is to test or validate the input assumptions to TCG work noting changes to people, place, and priorities between when that work was completed and now. This paper also highlights potential gaps in thinking, and challenges and validates policy priorities in order to set the programme up for success.

This Gap Analysis paper provides a source of information at the current point in time in support of the broader project. In future, as new information comes to light and is required for by the project, assumptions will need to be revised.

1.2 Scope

The scope of this paper includes:

- Review of TCQ
- Review of publicly available supporting technical documentation.

We have focused our review on assumptions and gaps identified in TCQ which require filling or changing as a result of new data or information. Additionally, we have noted where it may be important to incorporate references to new strategic direction or trends as part of the broader strategic narrative.

We have also noted instances where assumptions or new material are broadly consistent with the direction or data used in TCQ and do not require updating.

As the project progresses it will be important to refer back to this paper, and to incorporate updates to data or narrative currently identified as minor or not required.

1.3 Approach

Our approach encompasses:

- Development of a Glossary of Terms to establish a shared understanding of language and terminology.
- Backcheck and analysis of key gaps and updated assumptions since TCQ.
- Policy Framework validation to provide sufficient direction to the completion of all major elements of the Programme.

2. Glossary of Terms

A Glossary of Terms has been developed to ensure consistency and clarity of language. This draws on existing definitions used by Auckland Transport, Ministry of Transport, and the terminology used in TCQ. Where there is ambiguity relating to the definition of terms it has been highlighted that these terms require further definition with Auckland Transport.

Table 3: Glossary of Terms

Term	Definition
Access Charge	Approach to charging where every vehicle faces the same charge when it is detected on a charged road. The charge is incurred for entering, travelling within, or leaving the charged area.
Assessment Framework	A structured means of assessing options against a series of criteria, allowing impacts to be summarised and systematically compared.
Complementary Measure	Interventions such as parking policy, car sharing, reverse tolling, and upgraded/expanded public transport provision, which would support the implementation of a time of use charging scheme.
Congestion Charge	A fee charged to vehicles that enter or travel within a congested area during peak times, with the goal of reducing traffic congestion.
Cordon Charge	A fee charged to vehicles that enter a defined area, incurred by crossing the charging boundary.
Corridor Charge	A fee charged to vehicles that travel through a defined road/motorway.
Credits	The use of financial credits to subsidise eligible individuals or vehicles use of the scheme.
Demand Management	Strategies aimed at influencing travel behaviour to reduce congestion, such as through road pricing or public transportation incentives.
Discounts	Reduced charge to offered to eligible drivers to subsidise costs incurred by the scheme.
Distance Charge	Distance charging charges motorists for the distance they have travelled.
Environmental Impact	The effect that road pricing policies have on the environment, including reductions in emissions and improvements in air quality.
Exemption	Mechanism to allow particular users of vehicles to travel through the charged area or corridor free for charge – for example, emergency

Term	Definition
	vehicles, buses, motorcycles / scooters, and non-powered types of vehicles.
Mitigation	Interventions to reduce some of the impacts of congestion charging for particular user groups (i.e. financial impacts). This could include credits, discounts, charge caps, or exemptions.
Policy Framework	The set of principles, guidelines, and regulations that govern the implementation and operation of road pricing systems.
Policy Objective	The central goal that drives what we're trying to achieve.
Policy Principles (core)	The critical success factors which will be fundamental to scheme design[20].
Policy Principles (supporting)	Factors which will guide the development of the scheme design,
Public Acceptance	The level of support or opposition from the public regarding the implementation of road pricing policies.
Revenue Allocation	The process of determining how the funds collected from road pricing are used, such as for direct and indirect costs of managing and operating the scheme, mitigations and complementary measures, or other purposes.
Road Pricing	The application of charges for the use of roads. This can include tolls, congestion charges, distance or time-based fees, and other pricing mechanisms designed to manage traffic demand or generate revenue.
Stakeholder Engagement	The process of involving individuals, groups, or organizations that may be affected by road pricing policies in the decision-making process.
Tariff Level	The structure of charges including times, directions, days, vehicle types and charge level.
Toll	A charge payable for the use of a particular stretch of road or bridge, often collected at toll booths or via electronic toll collection systems.

[20] The extent to which these align with the critical success factors in the business case remains a work in progress.

Term	Definition
Transport Modelling	The use of mathematical models to predict traffic flow and the impact of road pricing on congestion and travel patterns.
Variable Pricing	A pricing strategy where the cost of road use varies based on factors such as time of day, traffic conditions, or vehicle type.
Vehicle Kilometres Travelled (VKT) Tax	A road pricing mechanism that charges drivers based on the number of kilometres they travel, rather than the time or place of travel.
Social License	Acceptance by the general public.

3. Backcheck

TCQ was reviewed considering the following five lenses:

1. Reconfirming local context
    a. How has the Auckland context changed since the development of the TCQ?
2. Ensuring alignment with policy and strategic direction
    a. How as central and local government direction and legislation changed since TCQ?
3. Confirming technical systems requirements
    a. Auckland Transport are currently undertaking a review of the AT Technology Stack and NZTA Technology Stack. These reviews will identify any gaps associated with TCQ work.
4. Confirming modelling assumptions and specifications
    a. How have modelling assumptions and specifications changed since TCQ?
5. Expanding the case
    a. What are the new issues a road user charge may seek to address and ensure the core conclusions of the TCQ can secure realisable benefits for society?

Key gaps or assumptions relating to each lens have been identified and an approach to updating each gap or change outlined through Sections 3.1, 3.2, 3.4, and 3.5.

Gaps and assumptions have been determined to be either **material** (likely to have a significant impact on scheme design or option assessment), or **minor** (likely to have limited to no impact on scheme design or option assessment).

3.1 Reconfirming the local context

Since the development of TCQ the Auckland context has changed in a number of ways, both anticipated and unexpected. In some instances, such as population growth and commuter mode share, this has been driven largely by the impacts of net migration patterns and the COVID-19 pandemic. Other changes, including the elements such as the costs of owning and operating private vehicles, have been driven by market dynamics and changes in local and national direction such as the removal of the Regional Fuel Tax.

It is noted that there is an element of overlap between some local context and local policy (in Section 3.2).

3.1.1 Summary of changes relating to local context

Largely changes in the local context have been minimal since the development of TCQ, with only WfH assumptions identified as a material assumption requiring update. For the most part minor assumptions have already been updated through AFC modelling updates or will feed into the evolution of the strategic narrative.

Some material gaps relating to local context have been identified in TCQ, however. Most significantly this includes the need to determine a strong congestion baseline, and the need to understand community perceptions of congestion and any time of use charging scheme.

Table 4: Reconfirming the local context

#	Status	Issue	Description	Impact	Approach
1.1	Assumption (material)	Working from home assumption	TCQ identified working from home as growing proportion of the commuter mode share, but this has changed considerably since the COVID-19 pandemic	The portion of employees working from home directly impacts the flow of traffic and need for congestion charging. TCQ used data from the 2013 and 2018 census on Journey to Work Patterns to conclude 10% of workers work from home. The assumption applied in the TCQ recommended option was 7**%.** Working adjustments strengthened due to COVID-19 and technological advances have generally increased work from home capabilities. This has caused sustained change to commuter mode share that must be reflected.	Revise the WFH assumption using recent data, which has suggested the percentage of workers working from home three to four times per week could be as high as 10% (refer to 4.6 for modelling assumptions).[21] Revised WFH data will be used to test impacts of time of use charging on different work-from-home assumptions. Note – this may be superseded by StatsNZ data anticipated to be released December 3rd 2024.
1.2	Assumption (material)	CRL impacts	Future network impact	Understanding how CRL will impact Auckland's future transport network will be critical to developing an accurate future baseline of Auckland's transport network for modelling, and its capacity to act as an alternative in various time of use charge schemes.	Work with CRL to understand extent of future road network impact of scheme. Modelling team will incorporate CRL assumptions into model runs (as further mentioned in 4.3).
1.3	Gap (material)	Aucklanders' perceptions of time of use charging	TCQ perceptions focuses on business and employment perceptions regarding congestion.	Through deliberation as part of the Deliberative Democracy Forum the proportion of supporters grew by 53% to 49% in support of road pricing. This highlights the importance of a clear and compelling congestion baseline. Social equity is also frequently highlighted by politicians and community members as a concern when considering implementing a road pricing scheme in Auckland. Changes to Aucklanders' perceptions of time of use charging will be a key influence in the framing of objectives and successful public consultation. Linked to 1.3, as part of understanding Aucklanders' perception of the congestion problem, how it impacts them, and how road pricing could impact their lives.	Update TCQ with findings of Deliberative Democracy Forum, early focus group testing, and other available relevant information. Continue to work with engagement team on the next stages of the deliberative democracy process to ensure emerging public sentiment, concerns, and questions, are fed back into business case and scheme design. Work with Māori engagement team to ensure Māori and mana whenua perceptions, concerns and opportunities relating to time of use charging

[21] EY 2023 Mobility Consumer Index

#	Status	Issue	Description	Impact	Approach
					are captured, incorporated, and responded to proactively.
1.4	Gap (material)	Congestion baseline	Updating TCQ's understanding of the congestion baseline in Auckland	An up to date and robust understanding of the baseline level of congestion is critical to demonstrate the problem we are solving and the merits (or otherwise) of a time of use charging system. This also requires confirmation of the date we are forecasting congestion to.	Confirm scheme opening year target and other future years for assessment (refer to 4.1). Develop position on the congestion baseline / problem in Auckland - this may warrant a stand-alone paper or report. This includes updating LoS data and congestion mapping using 2024 AT traffic counts and TomTom data. Where possible utilise existing material including case studies of what has happened in Auckland when we have reduced road space, trend line of how congestion is tracking in Auckland, data on how buses are coming into the city, information on corridor productivity. There is also the possibility of utilising Future Connect tool to help stakeholders understand impacts of ToU on local transport challenges.
1.5	Gap (material)	Mana Whenua impacts	TCQ brings together Māori and mana whenua impact assessments under one methodology, referenced in 1.8. A follow up desktop analysis in 2020 built on this assessment and identified how Option 1 and 2 affect mana whenua identity and wellbeing. This analysis did not include, and is not a substitute for, mana whenua engagement and involvement in decision making which is a critical next step for this project.	The report "Mana Whenua Analysis Congestion Question" outlines the key next steps to carry out to build on the analysis already undertaken including: • Update Te Waharoa Database with Māori information layers such as Treaty settlement redress properties, papakāinga, urupā. • Seek permission from Mana Whenua to view relevant Māori Values Assessments and other information held by partner organisations that relate to these locations. • Upload the Project GIS locations into Te Waharoa to get accurate locations of affected areas. • Update engagement tools for discussion with Mana Whenua including simplifying the general Project information. • Consider relevance of other Project workstreams on Mana Whenua and include in engagement materials. • Compile an engagement package to support engagement with Mana Whenua that includes: o Simplified project need, options and process o Wider project considerations e.g. social impact on Māori o Specific Mana Whenua assessment o Process for Mana Whenua input o Decision-making o Mitigation options This report was requested by the Auckland Transport Kaitiaki Forum, who requested additional work be carried out to understand how this project considered information already provided by Mana Whenua. It responds directly to that request and should be used to support future engagement.	Confirm approach to progressing analysis, using the "Mana Whenua Analysis Congestion Question" report as the starting point. Work with AT Māori engagement team to determine approach to engagement and decision making, including Kaitiaki Forum, IMSB, Governance Forums, 1:1 engagement, Mana Whenua community Engagement, etc. Establish approach to developing mitigation options with Mana Whenua that address particular areas of concern.

#	Status	Issue	Description	Impact	Approach
1.6	Assumption (minor)	CRL impacts	Current disruption from construction	Understanding the current impact of CRL works on traffic etc will feed into baseline narrative, and understanding what could be driving 'blips' in congestion trends.	Work with CRL to understand extent of construction impact on network.
1.7	Assumption (minor)	Private vehicle operating costs – EV exemption and no specific consideration of the Clean Car rebate	TCQ outlines why vehicle type taxes should be considered through the Singapore case study. Vehicle operating costs within the MSM were and are still based on MBIE projections without specific consideration of the Clean Car rebate.	Since 2009, and at the time of TCQ, electric vehicle (EV) owners were exempt from Road User Charges. The Ministry of Transport announced owners of EVs, and plug-in hybrid vehicles, would start paying road user charges when the exemption expired at the close of 31 March 2024.	Determine how the impact of the removal of the EV RUC exemption impacts on the costs of vehicle operators (refer to 4.7). Determine whether this will impact EV ownership, noting that this may have some impact on charging should it consider vehicle type (as the Rules Engine did in TCQ Technical Report).
1.8	Assumption (material)	Social assessment - methodology	TCQ outlines the methodology taken to carry out the social assessment. TCQ considers household income and costs of private vehicle ownership. Increased costs of living since TCQ have exacerbated these considerations.	Maximising the accuracy of measuring social impact is key to determining the outcomes of congestion charging and how revenue may be redistributed equitably and effectively. To measure social impact, TCQ drew from the 2017 roundtable of the International Transport Forum on the social impact of road pricing. This referenced three pillars of fairness to consider: • Vertical equity • Horizontal equity • Spatial equity. TCQ referenced three previous studies that may inform the equity impacts of potential road pricing schemes in Auckland, including: • 2006 Auckland Road Pricing Evaluation Study • 2008 Auckland Road Pricing Study • 2014 Funding Auckland's Transport Future These studies do not capture broader social impacts which could have an impact on equity (a gap outlined in Section 3.5).	Confirm the outcomes of the ITF Roundtable in 2017 contain the most recent policy insights in social impact. Incorporate findings from more recent equity impact studies, such as the 2019 Social and Distributional Impacts of Time and Space-based Road Pricing report, for its' general framework on social and distributional impact assessment. Update assumptions to capture most up to date data relating to household income and size at a Local Board level. Consider any further social impacts not included, or whether any have worsened or been reduced (refer to Section 3.5 – Expanding the Case). Employ agent-based modelling to identify and understand additional equity implications not considered in TCQ. (refer to Section 3.5 – Expanding the Case)
1.9	Assumption (minor)	Environmental performance	TCQ referenced the social benefit of reduced carbon emissions	Integrating the impacts of charging on greenhouse gas emissions to ensuring environmental performance is fully analysed and aligns with national and agency-based emissions targets.	The carbon price used must reflect recent updates. Traffic emissions can be calculated using MSM, by providing distance travelled by vehicle type, which can be calculated against emissions factors and carbon prices.
1.10	Assumption (minor)	Population	TCQ assumes an Auckland population of 1.7 million, with forecast growth of 730,000 people over the next 30 years.	Since the publication of TCQ the population of Auckland has seen net growth of 40,000 individuals and is forecast to reach approximately 2.23 million residents by 2053, according to Auckland Council projections. This is a slightly slower growth rate than anticipated in the TCQ – with the overall population growing by	Update with population assumption from Auckland Council's Future Development Strategy AGS 2023 v1 (as adopted in the transport modelling done by AFC) and StatsNZ Local Board

#	Status	Issue	Description	Impact	Approach
				just 5.4% between 2018 – 2024, compared to the 11% increase over the preceding five years. Local Board population growth should also be considered to understand how trends at a local level could impact congestion.	population. Further update with StatsNZ census information when available in late 2024. Refer to 4.2.
1.11	Assumption (minor)	New and funded public transport and roading projects	Considering significant new and funded transport projects not captured in TCQ and the alternative options they provide to travellers.	Changes to the public transport and roading networks, **in addition to CRL** (refer 1.2 and 1.6, will have an impact on how and when people travel throughout the Auckland Region. It is also important to consider how many, and which, public transport initiatives are affordable with / without a time of use charging scheme. For example, the presence of a charge might support bringing forward or delaying projects.	Consider how these public transport projects could act as an alternative for those who want to avoid road charges in scheme design. Refer to 4.3, 4.4, and 4.5 for modelling assumptions implications.
1.12	Assumption (minor)	Commuter mode share – public transport	Changes to mode share are likely to have broadly remained the same since TCQ, as PT levels have started to trend upwards post COVID.	While Public Transport (PT) use in Auckland has not fully recovered from the impacts of COVID-19, patronage is trending up reaching approximately 90% of 2019 levels in February 2024 (as indicated by AT).	Commuter mode share and the use of public transport is most recently indicated by the Household Travel Surveys. Change in mode share is likely to be minor, and no update to assumptions is required. Note – this may be superseded by StatsNZ data anticipated to be released December 3rd 2024.
1.13	Assumption (minor)	Commuter mode share – walking		In almost all locations within the City Centre pedestrian counts have increased since the same time last year. Since the TCQ, the City Centre has undergone changes influencing commuter accessibility, including the implementation of an Essential Vehicle Area in the CBD and pedestrian-friendly modifications.	Change in mode share is likely to be minor, and no update to assumptions is required. Ongoing trends in walking may be analysed with historical data. Note – this may be superseded by StatsNZ data anticipated to be released December 3rd 2024.
1.14	Assumption (minor)	Commuter mode share – cycling		Monthly cycle monitoring reports show a general increase in cycling, with cycle movements between February 2023 and January 2024 marking a 14.6% increase in cycle movements compared to the previous 12 months. This is largely driven by investment under the Auckland Cycling Programme 2018-2028 to improve cycling connections.	Change in mode share is likely to be minor, and no update to assumptions is required. Ongoing trends in cycling may be analysed with data contained in: - Monthly cycle monitoring - The 2022 snapshot, and - The Auckland Cycling 10-year plan Note – this may be superseded by StatsNZ data anticipated to be released December 3rd 2024.
1.15	Assumption (minor)	Car ownership	TCQ assumed there are approximately 744 per 1,000 people in Auckland.	Monthly light vehicle registrations have been trending up in Auckland since 2024, however they are broadly in line with the 10 year average.	Assumption has not changed significantly, and no update is required.
1.16	Assumption (minor)	Vehicle Kilometres Travelled (VKT)	TCQ highlighted that the VKT travelled in Auckland had grown by 42% in Auckland since 2001, compared to 29% nationally.	AT reporting in 2022 highlighted a small downward trend in average monthly VKT compared to 2020 (from 400million per month to 358.4million per month). At the same time the % of EV, PHEV, or hybrid vehicles imported into the country has been growing.	Ensure assumption accounts for recent downward trend data, and uptake in EV/PHEV/hybrid light vehicles. Refer to 1.6 and 1.9.

#	Status	Issue	Description	Impact	Approach
1.17	Assumption (minor)	Travel Patterns and Trip Length	TCQ assumed travel patterns using preliminary 2018 census data.	2020 analysis by Auckland Council utilising 2018 census data considered: • Movement patterns at a broad sectoral level, distinguishing between central, inner and outer areas in the region (including an assessment of growth patterns since the last Census in 2013) • Analysis at a more disaggregated local board area, highlighting the different trip patterns for each of these board areas • Analysis at a more detailed level assessing how modal shares and trip lengths vary across the region and also looking in more detail about trip patterns into the central city/City Centre area • A brief assessment of the linkages between social deprivation and trip patterns across the region. Broadly this analysis is aligned with TCQ but applies more robust data. For example, 2020 analysis indicates average trip length by private vehicle decreased from 13.5km in 2013 to 11.6km in 2018.	Update to reflect Auckland Council's 2020 analysis where appropriate. Refer to 4.7.
1.18	Assumption (minor)	Assessment of Māori impacts	The social assessment in TCQ considered Māori households in Auckland in its own category, ultimately finding that there was no basis to adopt different trip rates for Māori or non-Māori households.	Māori outcomes for transport planning are of primary significance as the congestion planning effectively charges Māori for land access, including access to sites of significance, and ability to participate in cultural protocols / activities, and may have nuanced impacts on Māori. Thorough analysis of impacts on Māori communities must inform the approach to rates charges and will be key to completing a full social impact assessment. While the social assessment in TCQ considered Māori households in Tāmaki, this was a random selection. There may need to be targeted engagement with Māori communities / whānau Māori who not only live within particular areas, but who access particular cultural sites within an impacted area. For example, engaging directly with whānau whose tamariki attend kōhanga reo located in/around the CBD. This is important to ensure that Māori are able to access their culture and there may not be kōhanga or kura in their neighbourhood, or they want to send them to kōhanga or kura where their whānau also attend/have attended.	Reconfirm whether there is or is not a basis for adopting different trip rates. Update Sites of Significance to incorporate new spatial data including sites introduced through Plan Change 102: Sites and Places of Significance to Mana Whenua Tranche 2a. Consider what impact congestion charging may have on Māori households in Auckland and how this may be mitigated, potentially through revenue distribution, or by creating a 'pass' to ensure that mana whenua who are accessing their rohe / tribal lands, or whānau Māori who are accessing kōhanga or kura, aren't being charged. Engagement with Māori communities is integral to ensure the full scope of impacts have been considered. This includes engaging with communities that are associated with institutions / sites of cultural importance to Māori (for example kōhanga, kura, marae) This can be supplemented with Māori Outcomes Reports which will provide further insight.
1.19	Assumption (minor)	Impact on Māori businesses	TCQ identifies the impact on Māori businesses as a consideration of the Māori impact assessment but does not provide a detailed assessment or engagement	Te Ōhanga Māori – the Māori economy – encompasses the broader economic activities of all Māori, and Pākihi Māori (Māori-owned businesses), plays a critical role in Auckland's overall economic landscape. It is critical to understand the impact time of use charging could have on Pakihi Māori, to ensure the project continues to support the direction set out in the Auckland Plan (to advance and support Māori business and iwi organisations to be significant drivers on the Auckland economy).	If available (to be confirmed with the Auckland Transport Māori Engagement Team), a dataset of the approximate location of self-identified Māori businesses, business type (e.g. retail, service, manufacturing, etc.), and approximate number of employees, can be paired with ABM results to infer the impact to Māori businesses.

#	Status	Issue	Description	Impact	Approach
			with Māori or Mana Whenua on this issue.		
1.20	Gap (minor)	Parking	TCQ identified parking pricing / costs as tools to manage / influence demand.	At the time of TCQ, the 2015 AT Parking Strategy was in place. This has since been replaced by Room to Move: Tāmaki Makaurau Auckland's Parking Strategy 2023 (the Strategy). The Strategy is targeted to where travel demand is highest and supply of space is lowest, on key roads and near key centres. There have been and will be changes to parking accessibility and rates due to the Strategy. The impact of these changes may influence commuter mode share and congestion. Some carve-outs exist to ensure parking permits have allocated fairly and equitably, based on need, by offering a Critical Services permit, Event permit, Authorised vehicles permit, residential parking permit, off-peak parking permit, and other coupons based on daily prices for tradespeople, subcontractors and some public service entities).	Outline what changes have been made and planned under Room to Move. Use this insight to determine any effects on congestion. Determine the impact of parking rates on congestion. Determine the relationship between parking rate exemptions and congestion charging exemptions.
1.21	Gap (minor)	Private vehicle operating costs – Fuel Tax	TCQ incorporates the Auckland Regional Fuel Tax, which was implemented in July 2018, charging a rate of 10c per litre (plus GST) on petrol, diesel, and their bio-variants for funding to support transport projects. This initiative was abolished in June 2024.	The abolishment of regional fuel tax changes costs is associated with vehicle use. TCQ noted that use of revenue may be redistributed in the form of reductions to taxes related to vehicle usage, including fuel. It may also have some impact on the behaviour of vehicle operators and consequently congestion.	Determine how the removal of the Regional Fuel Tax changes costs for vehicle operators and whether this leads to any congestion pattern changes.
1.22	Gap (minor)	New incentives / subsidies for using Public Transport including the 7-day fare cap	TCQ identifies free or subsidised public transport as a potential complementary measure, however the $50 7-day fare cap was not in place when TCQ was developed.	Could incentivise Public Transport use over private vehicle use in some locations. May need to be included in transport modelling assumptions.	Update modelling assumptions.
1.23	Gap (minor)	Kāinga Ora: Auckland Housing Programme	Considering new large scale housing programme not incorporated in TCQ which may impact congestion.	Identifies significant urban development areas, in particular, large social housing developments delivered by Kāinga Ora.	Not a significant gap but should be considered in scheme design. Population growth will be captured in updated population assumption (refer to 4.2).

3.2 Ensuring alignment with policy and strategic direction

Alignment with Central and Local Government policy and strategic direction is critical to the successful development and implementation of a time of use charging scheme. The Congestion Question noted many considerations required to implement time-of-use-charging. This section aims to identify changes to policies that were noted and identify those that were not explicitly included to ensure the analysis completed is relevant to the views today.

3.2.1 Summary of changes relating to policy and strategic direction

The policy and strategic direction relating to time of use charging in Auckland has undergone limited change since the development of TCQ. Where change has occurred, the shift has been increasingly positive, including explicit references to time of use / congestion charging / road pricing in central and local government direction including the Government Policy Statement on Land Transport and Auckland Transport's Regional Land Transport Plan.

Critically, there is a gap in legislation to enable the implementation of a time of use scheme. While the Ministry of Transport is currently developing legislation the details of this work, and the impact of the legislation on an Auckland scheme, are not yet apparent

Central Government

Since the publication of TCQ policy and strategic direction from Central Government has largely moved to be more explicit in the support of time of use charging. Most significantly the Government Policy Statement on Land Transport (GPS) outlines the need for legislative reform to enable time of use charging to reduce congestion and maximise use of existing assets. However, it is important to note that this legislation does not yet exist – and is a significant gap.

Table 5: Ensuring alignment with policy and strategic direction – Central Government

#	Status	Issue	Description	Impact	Approach
2.1	Gap (material update – when available)	Legislation to enable the delivery of a congestion pricing scheme in Auckland.	TCQ identified the introduction of congestion pricing legislation as a critical implementation task.	No congestion pricing scheme can currently be implemented until legislation is in place. The form of the legislation will impact scheme design.	Develop Auckland view to policy and principles including revenue allocation, exemptions / discounting / credits, and mitigations and complementary measures. Work with MoT to understand draft legislation and how it will function within an Auckland contemporary context.
2.2	Gap (minor)	Ministry of Transport - Government Policy Statement on Land Transport (GPS) 2024-34 *Status: Final, published Jun 2024*	TCQ built on the findings of the Auckland Transport Alignment Project (ATAP) which takes guidance from the GPSY.	The 2024-34 GPS has stated that reforms to legislation will be explored to enable time of use charging on the most congested parts of New Zealand's Road network with the key goal being to reduce congestion and maximise use of existing assets. AT's RLTP also notes that the Government has indicated that it expects NZTA to look at other funding sources to support the delivery of their Roads of National Significance (RoNS) Programme and other major projects such as Northwest Rapid Transit and Airport to Botany Rapid Transit. NZTA will assess mechanisms such as time of use charging.	Broadly aligned with TCQ and no update to assumptions required. Use the direction outlined in the GPS to inform discussions with Ministry of Transport and NZTA. Noting the GPS has been updated since.
2.3	Gap (minor)	Ministry for Environment: Emissions Reduction Plan *Status: First Emissions Reduction Plan published 16 May 2022. Second plan in consultation and will close 19 August 2024. Plan is due to be*	TCQ acknowledged the environmental impact that congestion has on the rate of emissions	The Emissions Reduction Plan sets out the policies and strategies to decarbonise every sector of the economy including Transport. A key consideration was reducing reliance on cars and supporting mode shift to alternatives such as public transport. Although the TCQ did not explicitly reference this plan, it is in alignment with regards to how improvements to the transport system can reduce emissions.	TCQ in alignment. No update to assumption required but suggest explicit reference and/or consideration to the Emissions Reduction Plan when designing a ToU scheme.

#	Status	Issue	Description	Impact	Approach
		published by end of 2024.			
2.4	Gap (minor)	Ministry for the Environment: Medium Density Residential Standards *Status: Amendment to Resource Management Act (1991), came into effect August 18 2022. Implementation now optional if certain conditions are met (outlined in GfHG).*	TCQ references Auckland's low housing density as a key consideration in effectiveness of scheme design.	Requires high-growth councils to ease planning restrictions for what can be built without a resource consent. If implemented in Auckland, this will change the growth dispersal of the city and allow for more medium density provision across the existing urban area.	No significant gap in TCQ and no update required. Important to note due to direction to enable greater density within the existing urban area – and the impact this could have on scheme design and functionality.
2.5	Gap (minor)	Ministry of Housing and Urban Development: National Policy Statement on Urban Development (2020) *Status: Central Government Policy Statement. Local Authorities required to implement within certain timeframes*	TCQ references Auckland's low housing density as a key consideration in effectiveness of scheme design.	Requires Auckland to enable: • buildings of six storeys or more within walkable distances to our city centre • buildings of six storeys or more within walkable distances to our ten large metropolitan centres, train stations and rapid busway stops, • greater heights and density rules in and next to town centres and local centres Implementation of the NPS UD through Plan Change 78 (2.9) could change the pattern of growth dispersal across the region.	No significant gap in TCQ and no update required. Important to note due to direction to enable greater density within the existing urban area – and the impact this could have on scheme design and functionality.
2.6	Gap (minor)	Ministry of Housing and Urban Development: Going for Housing Growth (GfHG) *Status: Government Direction from July 2024*	TCQ refers to anticipated increases in greenfield roading capacity to respond to forecast growth. TCQ also highlights housing density (and Auckland's comparatively low housing density) as a key consideration in how a scheme will function.	GfHG requires Auckland to: • Enable 30 years of feasible housing capacity, using 'high' population growth indicators, • Prohibits Councils from imposing rural-urban boundary lines, ' • Enable appropriate levels of density across urban areas, deliver housing intensification along 'strategic transport corridors', and directly offset any housing capacity lost to reasons such as special character' elsewhere. This direction also makes the MDRS optional as long as councils are demonstrating compliance with their housing growth targets. This direction is part of Central Government's broader plan to tackle the country's housing shortage and could change the pattern of growth across the region.	No significant gap in TCQ and no update required. Important to note due to direction to enable development outside of the existing urban area, and greater density within the existing urban area – and the impact this could have on scheme design and functionality.

Local Government

Local Government plans and policies set out Auckland Council and Auckland Transport's position on congestion, future growth, and emissions reduction. While a number of new and updated documents have been released since TCQ the direction they provide is broadly consistent with TCQ and no to limited updates to assumptions are required.

Table 6: Ensuring alignment with policy and strategic direction – Local Government

#	Status	Issue	Description	Impact	Approach
2.7	Gap (minor)	Auckland Transport - Auckland Transport's Regional Land Transport Plan (RLTP) *Status: 2024-34 Draft plan published in Q1 2024. Final RLTP to be submitted to NZTA 1 August 2024.*	TCQ built on the findings of the Auckland Transport Alignment Project (ATAP) which takes input from the Regional Land Transport Plan (RLTP).	The draft 2024-34 RLTP responds to the challenges Auckland face brought about by the growing population. It helps deliver the GPS on Land Transport's desired outcomes, one of which includes reduced congestion. The Time of Use Programme has been explicitly named as one of the key projects considered to deliver Local Road Improvements and optimise networks. This programme is sixth out of seven discretionary projects that is flagged to be funded by NLTF if AT is to get sufficient funding.	TCQ in alignment. No update to assumption required but suggest explicit reference and/or consideration to the RTP particularly as part of business case and options analysis. This has been updated between the TQC and now. Use this to inform discussions with other agencies to show alignment.
2.8	Gap (minor)	Auckland Council: Long Term Plan 2024 – 2034 *Status: Final, implemented in July 2024*	New since TCQ - sets out Auckland's ten-year budget.	The LTP outlines the importance of reducing congestion – and identifies the development of a time of use charging scheme as a critical action to cut congestion.	Aligned with TCQ and no update to assumptions required. Important to note as Auckland Council support for congestion pricing, including the need to work with Government to confirm details around ownership and operation of the scheme.
2.9	Gap (minor)	Auckland Council: Auckland Plan 2050 Future Development Strategy *Status: Adopted 2024*	New requirement since the publication of TCQ. Sets out how Auckland will grow and change over the next 30 years, including the infrastructure needed to support growth.	Identifies future growth areas (both brownfield and greenfield) for the next 30 years which could pattern the pattern of growth dispersal across the region. The FDS pushed back the release of significant areas of greenfield growth areas in the west and south.	No update to assumptions needed but could be beneficial to understand the alignment of the RLTP and the FDS and the impacts this alignment or misalignment might have on TCQ.
2.10	Gap (minor)	Auckland Council: Plan Change 78 *Status: Draft Plan Change*	Proposed plan change introduced since the publication of TCQ, in response to the NPS UD (refer 2.4).	Enables greater density and development within the city centre, and in walkable catchments of the city centre, metro centres and rapid transit stops. Also incorporates the MDRS which has now been made optional (refer 2.3).	No update to assumption required but suggest explicit reference and/or consideration to the Plan including in flexibility of scheme design.
2.11	Gap (minor)	Auckland Council: Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan *Status: Latest version published Dec 2020*	TCQ acknowledged the environmental impact that congestion has on the environment.	Limited impact, but supportive of mechanisms to reduce congestion due to the subsequent emissions reduction. Te Tāruke-ā-Tāwhiri highlights the relationship between congestion and emissions, particularly the impact WFH 2-3 days a week could have to "help lower congestion, reduce our transport emissions and create more pleasant urban environments".	TCQ in alignment. No update to assumption required but suggest explicit reference and/or consideration to the Plan. Confirm with Auckland Council if there is a more up to date version of the plan available.
2.12	Gap (minor)	Auckland Transport: The Regional Public Transport Plan 2023-2031 *Status: Published in 2023.*	TCQ acknowledged that time-of-use charging is only one element to helping improve congestion and optimise Auckland's transport network. TCQ acknowledged that investing on public transport	The Regional Public Transport Plan 2023-2031 (RTP) was not explicitly referenced in the TCQ, however it could be seen as a relevant component as the key vision of the RTP is "To massively increase public transport use to reduce congestion, improve access for Aucklanders, support the economy and enhance the environment". This aligns with the objectives for time-of-use charging. The RTP notes the relevance of ToU as:	TCQ in alignment. No update to assumption required but suggest explicit reference and/or consideration to the RTP particularly as part of business case and options analysis. Use this to inform discussions with other agencies to show alignment.

#	Status	Issue	Description	Impact	Approach
			should also be considered to improve network efficiencies.	• It could be a source of funding for public transport improvements • Is a factor for mode shift from private vehicles to public transport Access to well-designed public transport can help avoid adverse equity impacts that ToU could bring about.	
2.13	Gap (minor)	Auckland Transport: Transport Emissions Reduction Pathway (TERP)	TCQ acknowledged the environmental impact that congestion has on the environment.	The TERP provides formal direction that Auckland Council and Auckland Transport must follow in all of their activities. This includes updates of key planning and funding documents such as ATAP and the RLTP. Outlines what should be in place before congestion charging (i.e. CRL and fair fares) and highlights the importance of equitable and impactful pricing of the transport network to reduce congestion. Identifies delivery of a congestion pricing scheme, including mitigation strategies as a key action – with revenue generated reinvested into public transport and active modes and the option to expand the scheme as access to sustainable transport options improves.	TCQ broadly in alignment. No update to assumption required but suggest explicit reference and/or consideration to the TERP when designing the ToU scheme and any revenue policy or mitigations and complementary measures principles.
2.14	Gap (minor)	Auckland Transport Sustainability Strategy *Status: Published in 2024.*	TCQ acknowledged the environmental impact that congestion has on the rate of emissions.	Although the TCQ did not explicitly reference the AT Sustainability Strategy, it is in alignment with regards to how the transport system can reduce emissions.	TCQ in alignment. No update to assumption required but suggest explicit reference and/or consideration to the Sustainability Strategy when designing the ToU scheme, particularly for consideration in the business case workstream. Use this to inform discussions with other agencies to show alignment.
2.15	Gap (minor)	Auckland Transport Equity Framework	TCQ refers to social equity as a critical consideration for any scheme design, including access to jobs and education opportunities.	AT's new equity framework is focused on monitoring progress towards a more equitable transport system and should be considered in the assessment of options.	TCQ in alignment. No update to assumption required but suggest explicit reference to AT Equity Framework in the business case workstream and options assessment.

3.3 Confirming modelling assumptions and specifications

Initial conversations with AT and the Auckland Forecasting Centre (AFC) have shed light on changes in the future year scenario being modelled since TCQ, as well as the metrics needed from the transport models to assess the efficacy and impact of various time of use charging schemes. This means that transport model assumptions used in AFC's Macro Strategic Model (MSM) should be confirmed to ensure optimal representation of how people will react to charging schemes. The assumptions and specifications will then go into the development of an agent-based model (ABM) that will run concurrently with the MSM and provide insight that the MSM would find difficult to do, including but not limited to social equity and peak spreading impacts, it is a material gap and that ABM will be used to address this gap.

3.3.1 Summary of changes relating to modelling assumptions and specifications

The confirmation modelling assumptions and specifications has identified only minor updates required to key assumptions, in addition to broader updates to modelling parameters already incorporated by AFC. These updates will enable the modelling and evidence base to provide a more accurate representation of impact of implementing a time of use charging scheme in Auckland.

Table 7: Confirming modelling assumptions and specifications

#	Status	Issue	Description	Impact	Approach
4.1	Specification (minor)	Confirmed scheme opening year target and other future years for assessment	Transport network and land-use conditions.	Able to be more accurate in knowing what PT network, road network, and land-use assumption to use for modelling.	AFC and ABM modelling runs will adopt an assumed 2026 (current scheme opening year target) and other potential future years transport network and land use assumptions (refer to 1.4).
4.2	Assumption (minor)	Changes to future population, employment and school enrolment	Trip-making demand from land-use intensity and distribution.	More accurate representation of demand to travel in Auckland because of renewed population and land-use forecasts.	Alignment with AFC on population, employment, and school enrolments used, which is currently the Auckland Council's Future Development Strategy AGS 2023 v1 (refer to 1.10 and 1.23).
4.3	Assumption (minor)	Changes to future public transport network	Since TCQ, AT have completed further work on provision of future PT network including 2031 RLTP. This enables use of this network as a framework for complementary measures.	More accurate complementary measures programme, and capture of potential mode shift by different areas due to charging schemes.	Identification of changes in public transport services according to AT plans (e.g. RLTP) with coordination with AFC for modelled future years (refer to 1.2 and 1.11).
4.4	Assumption (minor)	Changes to future road network	Clarity on future highway capacity schemes as a result of government policy.	More accurate future highway network capacity representation.	Identification of changes in road network with coordination with AFC for modelled future years (refer to 1.11).
4.5	Assumption (minor)	Tolled roads	Government policy change may affect direct user costs for use of state highway network.	Could significantly affect user costs in addition to time of use charge.	Sensitivity testing in modelling, discussion with NZTA and stakeholders (refer to 1.11).
4.6	Assumption (minor)	Increase in percentage of people working from home	Trip-making demand.	Likely to result in lower traffic levels, lower impact and lower number of charges paid.	Representation of change in % working from home (refer to 1.1).
4.7	Assumption (minor)	Other modelling parameters adopted by AFC (including value of time, vehicle operating cost, inflation, etc)	To record and understand any changes in mathematical representation of how people value their time depending on various transport modes, or the cost to use private or goods vehicles. AFC parameters may be adopted into the agent-based model, if necessary.	Changes in value of time and vehicle operating costs for future years will impact mode choice and travel route choice in the transport models.	Alignment with AFC on parameters used. This has likely not changed since TCQ, but confirmation is needed (refer to 1.7, 1.16, and 1.17).

3.4 Expanding the case

This reviewed focused on identifying any new issues a road user charge may seek to address and ensuring the core conclusions of the TCQ can secure realisable benefits for society. All gaps have been determined to be minor, however filling these gaps in our knowledge would create a richer and more robust evidence base, inform our understanding of the congestion problem for different user groups, help us better understand the impact time of use charging could have on individuals and communities, and help to create a stronger strategic narrative and social licence.

3.4.1 Summary of changes relating to expanding the case

Opportunities to expand the case broadly centre around key social and distributional factors that were not considered as part of TCQ. Minor updates are required to ensure trip modelling presents an accurate reflection of the Auckland population to enable equity implications to be properly considered and assessed.

A number of other minor gaps have been identified related to various policy and operational components of the scheme, including the tax status of the charge, enforcement policy and customer experience components.

Table 8: Expanding the case

#	Status	Issue	Description	Impact	Approach
5.1	Gap (minor)	Impacts on older people and young people	TCQ 'social evaluation' differentiates users by income group only. The evaluation does not consider the effect a charge may have on different groups of people based on their age.	Elderly and young people are less likely to own a vehicle and therefore less likely to experience significant behavioural change as a consequence of a congestion charge. Simultaneously these groups are often more susceptible to the negative health impacts of pollution so could stand to disproportionately benefit from the effects of a road user charge in reducing vehicle air pollution.	Employ agent-based modelling to understand the impacts to different age groups.
5.2	Gap (minor)	Impacts on people with disabilities	TCQ 'social evaluation' differentiates users by income group only. The evaluation does not consider how people with disabilities may be differentially affected.	People with disabilities may be less likely to own vehicles and therefore may exhibit less significant behavioural change as a consequence of a road user charge. Simultaneously, some people with disabilities may disproportionately affected by a charge if (1) they are more reliant on vehicles as their primary mode of travel (2) are unable to substitute trips to receive care or (3) are more susceptible to the negative health impacts of pollution.	The proportion and distribution of people with disabilities in Auckland will be scoped as part of the SIA/DIA baseline.
5.3	Gap (minor)	Impacts across type of work by commuting window	TCQ 'social evaluation' differentiates users by income group only. The evaluation does not consider the effect a charge may have on different occupational groups based on the time of day they are most likely to commute.	The behavioural impact of a road user charge is likely to differ across different occupational types depending on the time of day they typically perform their commute. For example, individuals working in the service industry often work at different hours than the majority commuter population meaning they could be more or less affected by a road user charge depending on the time of day the scheme is activated.	Employ both AFC model and agent-based modelling outputs to understand the differential effect of a charge for different commuting windows (i.e. peak spreading). Stakeholder engagement likely to be required to properly identify the full range of occupational groups and associated commuting windows.
5.4	Gap (minor)	Impacts across type of work by car dependency	TCQ 'social evaluation' differentiates users by income group only. The evaluation does not consider the effect a charge may have on different occupational groups based on the substitutability of cars for other modes of travel when completing a commute.	The behavioural impact of a road user charge is likely to differ across occupational groups depending on the requirement to use a car to travel to/from work/ For example, individuals employed as landscapers are often expected to arrive at work with their own tools which could make substituting away from a private vehicle impossible, thus preventing them from avoiding a road user charge if the scheme is turned on during the hours/on the routes they use to travel to work.	Stakeholder engagement likely to be required to properly identify the full range of occupational groups that are unable to substitute away from private vehicles to commute to/from work.
5.5	Gap (minor)	Pasifika impacts	TCQ 'social evaluation' includes an evaluation of Māori households but does not	Ensuring that Pasifika perspectives are integrated is essential for cultural inclusivity and equity.	Engagement with Pasifika communities will be required to properly identify how Pasifika people

#	Status	Issue	Description	Impact	Approach
			consider the differential effect a charge may have on Pasifika.		are likely to be differentially affected by a road user charge on the basis of their cultural identity. Employ agent-based modelling to understand the impacts of different charging schemes to Pasifika communities.
5.6	Gap (minor)	Trip purposes	TCQ aggregates trip types across work, education and other modes and does not consider the variance in demand elasticity across trip purposes.	A person's elasticity of demand for private vehicle travel is likely to differ on the basis of trip purpose i.e. travelling to receive care, travelling for education purposes, a person's ability to work from home vs. requiring a vehicle to travel.	Employ agent-based modelling to understand differences in travel behaviours to a charge across trip types (e.g. commutes from and to work or school, leisure or shopping trips, etc.).
5.7	Gap (minor)	Encouragement of physical activity	TCQ does not reference the role road user charging can play in encouraging physical activity, including active modes.	Shifting modes from private vehicles to active travel modes leads to benefits for both physical health and the environment.	Employ agent-based modelling outputs to understand how people may shift from private modes to walking and cycling.
5.8	Gap (minor)	Noise pollution impacts	TCQ does not reference the noise reduction benefits associated with road user charges whereby the charge reduces traffic flow in congested areas.	A reduction in noise pollution can contribute to a greater sense of tranquillity and well-being in previously congested areas.	High-level qualitative assessment of potential noise reduction benefits in identified scheme option areas.
5.9	Gap (minor)	Community space enhancement	TCQ does not reference the benefits of road user charging in enabling the repurposing of streets and public spaces for recreational activities.	Reduced traffic allows for the repurposing of streets and public spaces for recreational activities, which can foster a stronger sense of community and belonging among residents as well as providing opportunities to socialise and connect with neighbours.	Engagement likely to be required to understand what impacted stakeholders expect and would like to see from a customer service perspective. Review of international case studies to understand how community space enhancement has previously been achieved.
5.10	Gap (minor)	Customer experience	TCQ identifies 'customer service' teams and tools as a component of technology options but does not reference the specific factors and conditions that might improve or worsen a customer's experience.	Customer experience, including the provision of information, vehicle checking, payment systems, enforcement, queries and complaints, is significant in terms of the public acceptability of the scheme.	Engagement likely to be required to understand what impacted stakeholders expect and would like to see from a customer service perspective. Review of international case studies to understand how successful customer experience has been previously achieved.
5.11	Gap (material)	Tax status of the charge	TCQ does not outline a view on the tax status of the charge.	The tax status of the charge could have a significant impact on behaviour. For example, this may affect the elasticity of demand for travel if the full cost of the charge is not borne by individuals.	This is a critical question being worked through as part of the part of the governance workstream. Depending on the findings, these conclusions may be major and may need to be adopted in both AFC model and agent-based modelling.

#	Status	Issue	Description	Impact	Approach
5.12	Gap (minor)	Enforcement policy	TCQ does not outline a view on enforcement policies.	Potential that an enforcement policy could drive adverse consequences (i.e. not registering vehicles to avoid payment).	Consider range of available enforcement policies based on experience from international bench-marking and best practice. Depending on the findings, these conclusions may need to be adopted in both AFC model and agent-based modelling.

4. Policy Framework

Auckland Transport has undertaken significant work to develop a Policy Framework, building on the approach laid out in TCQ. This includes securing endorsement for the Policy Objective through the June 2024 Transport and Infrastructure Committee Meeting.

Through our review of existing material, and understanding of global best practice, we are supportive of the Policy Framework summarised below. It is important to note however that the framework will need to be kept front of mind, and potentially refined, as the broader policy programme is progressed – the assessment framework is there to support the policy framework of developed around exemptions, mitigations, complementary measures, and enforcement.

In addition to the Policy Principles outlined below a principle of Feasible' was included in the Assessment Process to ensure this area was appropriately considered.

Table 9: ToU Policy Framework

Component	Purpose	Description
Policy Objective	The central goal that drives what we're trying to achieve	To manage travel demand to achieve an improvement in road network performance by: • reducing congestion • increasing throughput of people and goods • improving reliability of the road network
Core Policy Principles	The critical success factors which will be fundamental to scheme design	1. **Effective:** Improve network performance. 2. **Fair:** Minimise and mitigate adverse social impacts and ensure benefits and costs are fairly distributed across users. 3. **Simple:** Be understandable and avoid complexity.
Supporting Policy Principles	These will guide the development of the scheme design	1. Be flexible in time, location and pricing to achieve target congestion levels. 2. Target travel in congested conditions. 3. Target locations and routes where users have viable alternatives and discourage lower value discretionary trips. 4. Vary for different vehicle types according to the contribution they make to congestion. 5. Improves accessibility for most people and businesses. 6. Be technologically achievable, adaptable, cost effective, and efficient. 7. Avoid mitigations that undermine the efficacy of the scheme. 8. Support ability to spatially extend and modify the scheme.

		9. Avoids unwanted consequences, e.g. significant fiscal costs for vulnerable communities, diversions, community severance.

5. Disclaimer

In accordance with Sprint Two of the Time of Use Charging engagement Ernst & Young and Arup have prepared this Gap Analysis report for Auckland Transport. This material has been prepared for general information purposes only and is not intended to be relied upon as accounting, tax or other professional advice.

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