

Auckland Road Pricing Study Options to Improve Travel Choices and Enhance Equity



Final Report

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1 Executive summary

This report was one of several work streams undertaken by the Ministry of Transport to investigate the potential effects of road pricing in Auckland. Its scope covers the mitigation of potential adverse effects on households following the deployment of a road pricing scheme. A separate evaluation was undertaken on impacts of road pricing on the business community.

1.1 Report purpose and objectives

This project investigated the effectiveness of mitigation measures such as the use of exemptions and discounts to mitigate potential adverse effects of road pricing schemes in Auckland. The key study objectives were to understand:

- the likely effectiveness of mitigation measures which could be implemented to reduce the social impact of road pricing on affected households, without sacrificing the gains from road pricing
- which measures are more, or less, effective at mitigating social impacts through expanding the travel choice options available to affected households
- the level of targeting of measures which is necessary or desirable
- which measures are worth considering on the basis that they contribute strongly towards enhancing the equity outcomes from road pricing and enhance public acceptability
- what is the remaining level of social impact which remains unable to be addressed through the application of these options

A key purpose of the project was to consider these issues in an Auckland context, in particular through focus groups, rather than simply relying on abstract analysis.

1.2 Approach

There were two main aspects of this project. One was a desktop review that provides important contextual information on how people make choices and also generated potential mitigation measures for evaluation. The other was the running of five focus groups to evaluate the potential acceptability and relative importance of these mitigation measures.

1.2.1 Desktop review

Road pricing theory provides a clinical view of how travel behaviour will be influenced by changes in price (cost to road users) under the assumption of perfect rationality. The literature review identified a trend towards using behavioural economics to relax perfect rationality. In reality people have neither complete information, nor usually spend large

amounts of time making decisions. This has direct implications for the social acceptance of road pricing and provides some context for the responses received from the focus groups.

Behavioural implications mean that people tend to respond using simple heuristics that are based upon the way an issue is framed. Optimism bias may also be present in terms of miscalculations about the effects a future policy or change is likely to impose on individuals and can also be affected by existing habits that may affect response to issues.

The desktop review also identified mitigation options that have been implemented in overseas examples of road pricing, in particular London and Stockholm. In general minimal exemptions and mitigation options were utilised with active schemes, for example:

- London's scheme featured mitigation options that are restricted to offering people living within the area a 90% discount, buses a 100% discount and a 100% discount for alternative fuelled, electric and high capacity vehicles.
- Stockholm's scheme exempts emergency vehicles, buses, partially or fully electrically powered vehicles, vehicles equipped to carry the disabled and motorcycles. The only part of the internal area with an exemption is an isolated island, however there are time and access restrictions placed upon this exemption.

Exemptions are generally kept to a minimum to keep transactions costs low and the scheme manageable during operations. It is also important to keep proposed schemes simple and therefore understandable during the introductory stages when it is critical to build support for road pricing. The initial presence of many exemptions may be confusing.

1.2.2 Focus groups

The focus groups provided feedback about the current impact of congestion, how people would respond to revenue-based and congestion scheme options, and whether mitigation of any adverse scheme impacts were sought by the focus groups.

The focus groups were run in areas selected to represent different demographic groups most likely to be affected by the road pricing schemes. The groups were selected to represent areas that would be more affected by road pricing, based upon a range of data including out of pocket costs and socio-economic deprivation levels.

The deprivation index is an index of socio-economic deprivation. It combines nine variables from census data which reflect dimensions of deprivation. The scale ranges from 1 to 10, where 1 represents the areas with the least deprived scores and 10 the areas with the most deprivation.

Table 1: Area data

	Auckland Averages	Albany	New Lynn	Mangere	Avondale	Remuera
Income Levels						
Mean household income	\$68,578	\$33,333	\$48,695	\$60,533	\$61,476	\$79,892
Deprivation index	5	10	8	9	8	4
Impact Levels						
Share of households impacted by avoiding charge - area 2016	8%	4%	8%	3%	9%	33%
Share of households impacted by incurring charge - area 2016	11%	5%	9%	3%	9%	45%
Total share of households impacted - area 2016	19%	10%	17%	6%	18%	79%
Focus	N/A	Students	Families	Families	Elderly	Families

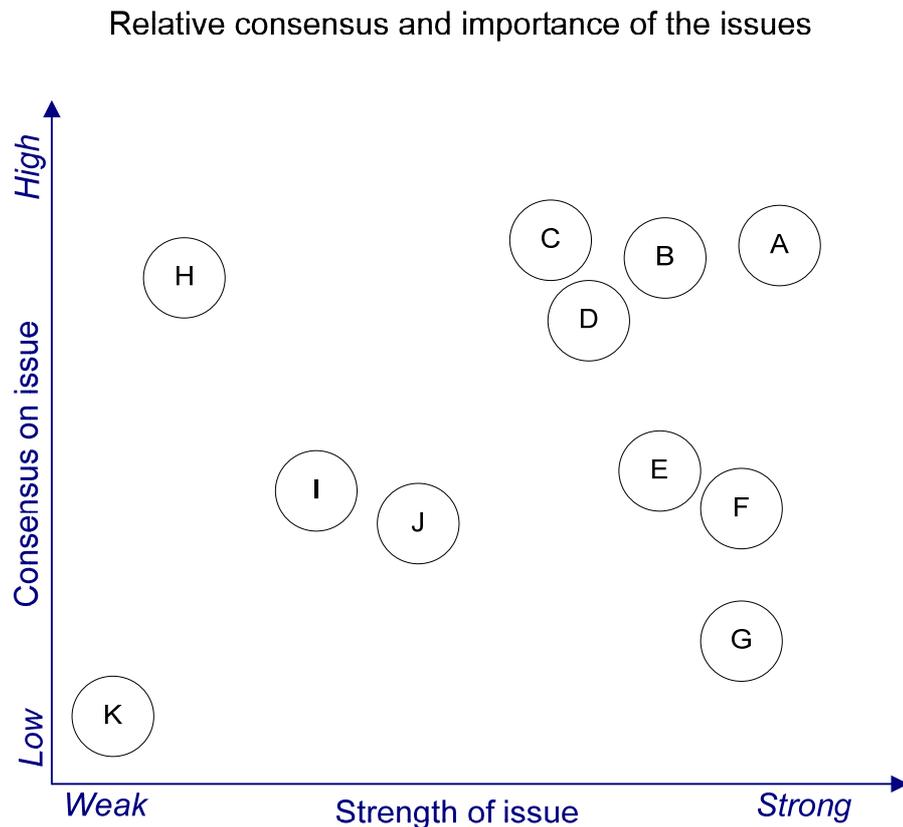
Five focus groups were used in this study as shown in Table 1. In consultation with the Ministry, three focus groups concentrated on households that consisted of families with school aged children, one focused on students and one focused on the elderly.

This focus group design enabled us to place emphasis on those likely to be most impacted by a charge (families with fixed schedules such as school trips), and to capture segments that were likely to have more flexible travel patterns and differing experience and views to regular family commuters (students and the elderly).

1.3 Key findings

The results from the focus groups are summarised in Figure 1 in terms of the degree of consensus in the groups and the strength of feeling around the issues.

Figure 1: Relative consensus and importance of issues



Strong views and feelings on issues

- a **Severe adverse effects of congestion** – Without exception, all participants in all focus groups spoke of the negative effects of congestion on themselves, on businesses, on their friends and family, and on the Auckland community and economy overall.
- b **Targeting of revenues** – There was strong consensus that all money raised in any road pricing scheme adopted in Auckland should be spent in Auckland on transport (either as capital expenditure or as subsidies for public transport).
- c **Need for the scheme to change behaviour** – There was strong consensus that any scheme that was introduced would need to influence people's behaviour and target congestion. If revenue generation was the principle purpose, then there are more efficient ways to raise revenue than the revenue scheme.

- d Enhanced public transport** –The participants agreed that this was a vital step that had to be made to provide alternatives to paying the charge and that no scheme should be introduced before these improvements were in place.
- e Scepticism on enforcement** – There were mixed feelings about the value of introducing various features such as discounts, exemptions, incentives or rewards given the potential for evasion and the associated administrative and enforcement costs.
- f Flexibility to adapt travel patterns** – Some people in the groups felt that it was likely they would attempt to adjust their travel patterns (e.g., through staggering their work hours) if a scheme was introduced – to avoid the charge.
- g Environmental** – A few people were interested in the effect that a road pricing scheme would have on the environment and the extent to which environmental concerns were addressed with the introduction of road pricing. In particular a minority were concerned with reducing Auckland’s carbon footprint.

Weaker views and feelings on issues

- h Incentives and free travel** – There was strong consensus that there should be no incentives or free travel rights granted. It was believed that if there were free travel rights this would undermine the whole purpose of the road pricing scheme, both in terms of reducing revenue and reducing congestion.
- i Exemptions** – There were some mixed views on exemptions – 3 out of the 5 groups concluded exemptions were not desirable, while 2 groups considered they may play a role. Some people thought that there were sections of the community that could benefit from exemptions/discounts. However, exemptions were also seen as being counter to the objectives of the scheme in terms of both revenue and congestion reduction and open to abuse (scepticism of enforcement). Exemptions also run counter to participant’s sense of equity and fairness that leaned towards the need for universality in the application of any scheme.
- j Alternatives to travel** – There were mixed views on alternatives to travel. Some people felt that it would be relatively easy to adjust their lifestyles, e.g. to change jobs or work from home, to reduce or remove their need to travel into the charge zone while others did not see this option as a reasonable alternative.
- k Walking and cycling** – There were very mixed views on the use of walking and cycling as an alternative to private vehicles, as most people travelled a distance that precluded walking or cycling being a reasonable alternative.

The responses received in the workshops should be interpreted in a behavioural context. The outputs were framed by the theme of congestion – all participants understood what congestion was and how it

currently affected them. Framing and optimism bias could also be introduced into the focus group responses due to the current stage of the economic cycle. With low current unemployment people are likely to be more bullish about their employment prospects and their ability to adapt behaviour, including switching jobs in the future.

There also seems to be a higher degree of flexibility to change amongst the focus group participants than would be expected given overseas experience and a sometimes almost flippant response to making changes suggests transition under road pricing won't be too painful. This begs the question, how necessary are mitigation options? However, it could also be a function of the participants discounting the impacts of a scheme they view as not occurring until 2016.

1.4 Comparative scheme analysis

In four out of the five groups it was felt that the charge proposed in the revenue scheme was too low (“... at \$3 it's a cup of coffee”) to be effective enough to change travel behaviours. Participants in these groups predicted that they would carry on as usual if such a scheme was introduced and that the scheme would have no material effect on their lives. The scheme was also rejected on fairness and efficiency grounds.

The higher congestion charge operating during the morning peak drew a favourable response, with people thinking that the charge had a higher likelihood of changing travel behaviour. A peak time targeted scheme was more likely to force people to reconsider their travel times, their daily routines, such as working from home, and whether they took public transport or used alternative modes.

1.5 Mitigation options

Focus groups felt strongly that there should be significant improvements made to public transport prior to introduction of road pricing. Approval of road pricing is somewhat conditional on improvements in passenger transport and the introduction of mitigation options, assuming a level of improvement in passenger transport above current performance.

1.5.1 Passenger transport

The passenger transport (PT) study found that on average, across the region, car trips to the charged area will be faster than PT trips. Should a scheme be adopted, the analysis has showed that the main focus would need to be on improving relative travel times between car and public transport trips. Looking to the future, should a decision be made to implement a road pricing scheme in Auckland, a detailed PT service design exercise would be required. For that exercise, the ability of the PT services to provide an acceptable and attractive alternative to car users in a post charging regime would depend on some key factors:

- Being able to plan and provide an integrated passenger transport network as set out in the Passenger Transport Network Plan (PTNP).
- Enhancing the ability to interchange (e.g. through integrated ticketing, seamless connections).
- Being able to respond quickly and effectively to situations of overcrowding or low service levels.

The PT study notes that the introduction of these changes is dependent on the PT procurement regime presently under development.

However, what is clear from this research and focus group work is that making such improvements, while necessary may not be sufficient to meet people's expectations of passenger transport. Understanding peoples' *perceptions* of what an attractive transport system may be matters; as their acceptance of road pricing is conditional on PT improvements. The modelling of PT improvements based on the generalised cost of travel may not capture important elements of convenience, status and other social factors associated with the choice of travel mode. We note Land Transport NZ has just initiated a research programme aimed at better understanding non-PT user preferences concerning their choice of travel mode.

1.5.2 Other mitigation options

The mitigation options were evaluated as shown in Table 2. It is proposed that exemptions would be introduced on institutional (e.g. emergency services, hospitals), rather than on an *individual* road user basis in order to reduce administration costs and minimise abuse and enforcement costs. Overseas experience indicates that targeting institutions rather than individuals helps to decrease the scale of scheme abuse.

Table 2: Analysis of mitigation options

Mitigation Options*	Transactions costs	Effectiveness	Impact	Understanding
Revenue Targeting	✓	✓ ✓ ✓	✓ ✓	✓ ✓ ✓
Exemptions and Discounts	✓ ✓ ✓	✓	✓ ✓	✓ ✓
Free Travel Rights	✓ ✓ ✓	✓	✓	✓
Incentives and Rewards	✓ ✓ ✓	✓	✓	✓

*Note: 3 ticks indicate high, 2 ticks moderate and 1 tick low.

Of the options, revenue targeting offers the best combination of lowest cost (compliance, administrative simplicity and enforcement) balanced against effectiveness (improving infrastructure and services), impact on travel behaviours and ease of understanding. The other schemes all have higher transactions costs, require a greater degree of

understanding and encourage past behaviours and habits to be maintained. These other schemes also have cost impacts upon the revenue gained from the road pricing scheme as shown in Table 3.

Table 3: Estimated maximum cost of mitigation measures

Mitigation measure	Estimated maximum cost
Residents within area get 10% discount	\$4.4m (2016)
Emergency services get 100% discount	Minimal cost
One day of free travel per week	\$32.8m (2016 area scheme)

Giving a 100% discount to emergency services is a minimal cost item because of the number of emergency vehicles compared to the general traffic volume. A 10% discount to residents living within the congestion (area) scheme would cost \$4 million out of the estimated \$164 million annual revenue. The largest loss comes with issuing free travel rights for one day a week, which would drain 20% of estimated annual revenues.

1.6 Conclusions

The output of this project suggests adopting the following sequence of mitigation strategies with the introduction of a road pricing scheme in Auckland:

- 1 The first best option is to run a 'clear' scheme with no mitigation strategies other than revenue targeting. All net revenue earned should be recycled into the Auckland transport system and balanced between investment in roads and passenger transport.
- 2 As with 1, but provide emergency services with discounts – this exemption was easily understood by focus groups.
- 3 Provide residents living within the area with discounted travel, with the level of discount not approaching a full exemption in the first instance.
- 4 Target institutions caught within the road pricing area, such as hospitals and rest homes, rather than individuals.
- 5 As a last resort, consider introducing incentives, rewards and/or travel rights.

A theme running through the focus groups was that interventions such as those listed in 2 to 5 should be delayed for two to three years to allow the road pricing scheme to establish itself and to allow mitigation needs to be genuinely assessed. From a strategic point of view, having options in reserve over the first three years of the scheme would provide policy makers with flexibility to adapt to changing road user perceptions and behaviour responses to the scheme.

Exemptions can be applied and implemented if necessary through the use of electronic tags. The charging mechanisms work has shown that current technology is capable of segregating groups with special needs

and applying differential charging. There are no barriers to other responses, such as car pooling and walking and cycling, with investment in the latter needing serious consideration within the charging zone.

2 Introduction

This project investigated the effectiveness of mitigation measures such as the use of exemptions and discounts to mitigate potential adverse effects of road pricing schemes in Auckland. The key study objectives were to understand:

- the likely effectiveness of mitigation measures which could be implemented to reduce the social impact of road pricing on affected households, without sacrificing the gains from road pricing
- which measures are more, or less, effective at mitigating social impacts through expanding the travel choice options available to affected households
- the level of targeting of measures that is necessary or desirable
- which measures are worth considering on the basis that they contribute strongly towards enhancing the equity outcomes from road pricing and enhance public acceptability
- what is the remaining level of social impact which is unable to be addressed through the application of these options.

A key purpose of the project was to consider these issues in an Auckland context, in particular through focus groups, rather than simply relying on abstract analysis. The outline of the rest of this report covers how this process has unfolded:

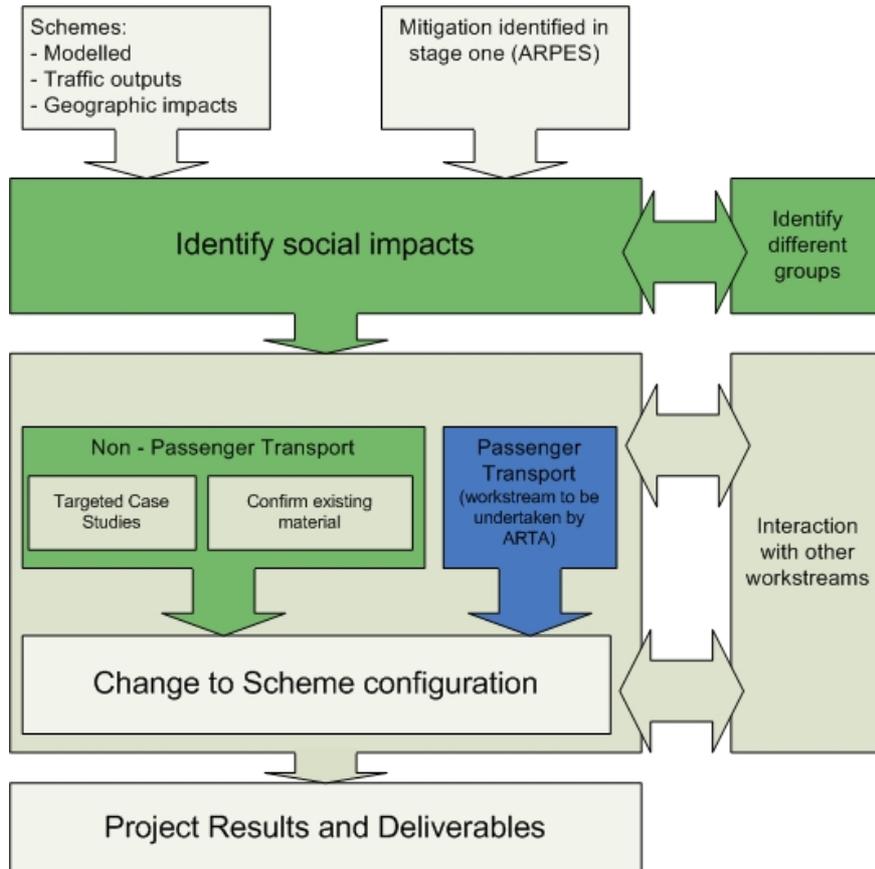
- **Section 3** discusses the methodology adopted for the purposes of this study.
- **Section 4** briefly reviews the two proposed schemes; the revenue generation scheme based around a 24/7 cordon and the congestion scheme operating an area-based peak period charge.
- **Section 5** describes the desktop review that was undertaken and includes a brief review of the key mitigation strategies analysed in the previous Auckland Road Pricing Evaluation Study (ARPES), an overview of road pricing theory and how behavioural economics can be used to better understand issues around social acceptability, and a discussion of travel choices and their potential application.
- **Section 6** discusses the recruitment of the focus groups and the approach used to obtain the qualitative responses.
- **Section 7** provides a detailed picture of the focus group outcomes and the conclusions about the potential for both the revenue and congestion schemes.
- **Section 8** covers the mitigation options in the context of the desktop review and focus group process.

The work in this project has relied upon input from the other work streams involved in studying Auckland road pricing, including passenger transport and charging mechanisms.

3 Methodology

3.1 Our approach

The approach that was taken to the project is shown in the diagram below. Essentially it shows the overall framework for two key streams – the Passenger Transport assessment, and the Travel Choice and Equity streams.



3.2 Methodology description

There were two main tasks involved in this work stream. The first was a desktop review of literature on issues surrounding behaviour, travel choices and mitigation options. This review was then used to inform a qualitative market research process using focus groups to determine the opinions toward the use of either a revenue scheme or a congestion based scheme and the use of mitigation options.

3.2.1 Desktop review

The literature review pulls together articles on road pricing and influences on the social acceptance of changed travel behaviour. Behavioural economics attempts to assist policy development in a manner that gains higher social acceptance in the introduction of road pricing. Travel choices were then explored through the theoretical literature, e.g. through 'mobility rights' and current application around the world in places such as London and Stockholm.

3.2.2 Focus groups

The second task in this work stream involved running five focus groups to gather household's views on different aspects of the project. Using information from the household impact work stream areas that are likely to be affected the most that had high scores on the deprivation index were chosen. Also chosen were areas with mid level deprivation levels and high levels of impact.

In consultation with the Ministry of Transport (the Ministry) these areas were narrowed down into five groups that covered a range of areas, demographic and socio-economic profiles. Sessions with these groups were run to identify views on congestion, road pricing and possible features of a road pricing scheme.

4 Proposed schemes

4.1 Current scheme concepts, details and principles

The current work on Auckland road pricing has focussed on two schemes; one based upon optimising 'revenue', and one concerned with congestion reduction. The two scheme concepts that are being considered have been developed as separate approaches, each with their own set of principles and objectives. The following table sets out the definitions, characteristics and principles of each.

Table 4 summarises the key information for each scheme. The revenue scheme is designed to work off the minimum number of charge points necessary and to balance capital invested and operating costs against the need to maximise revenue. The congestion-focused scheme, while also focused on ensuring cost-effective collection, requires consideration of technology-driven 'fixes' to some of the real or perceived social and economic impacts.

Table 4 Scheme descriptions and base assumptions

	Congestion Scheme	Revenue Scheme
General Scheme Description / Characteristics		
Type of Scheme	Area – charge to enter and/or travel within the boundaries.	Cordon – with a charge in both directions.
Boundaries	Based on the Area Charge zone boundaries from the first ARPES study – small <u>area</u> tightly focussed on the CBD.	Based on the Area Charge zone boundaries from the first ARPES study – small <u>cordon</u> tightly focussed on the CBD.
Time of Day	6-10am	24 hours a day.
Days of week	5 days per week	7 days per week
Vehicles Included	Buses receive a 100% discount. All other vehicles are charged (motorbikes, taxis & trucks pay charge).	Buses receive a 100% discount. All other vehicles are charged (motorbikes, taxis & trucks pay charge).
Exemptions / Discounts	Subject to the findings of this paper.	Subject to the findings of this paper.
Charge Regime	Charge level of \$6 per trip. Maximum of \$6 per day. (I.e. pay once and you have paid for the day).	\$3 per trip charge Maximum \$3 charge per day (i.e. pay once and it covers multiple entries and exits).
Maximum charge per day	\$6 per day	\$3 per day
Number of toll points	70	40

	Congestion Scheme	Revenue Scheme
Other relevant descriptors	Aim is to make a meaningful difference to congestion levels – consideration of appropriate alternatives (e.g. passenger transport, other options) is important	The aim of this scheme is to minimise diversion impact (and social impacts), but to deliver revenue to improve Auckland's transport networks.
Objectives/Principles		
Costs	A technology solution that maximises net revenue would be valued, but the primary objective is to manage congestion	The technology solution must maximise net revenues
Options for mitigation of social impacts/ providing exemptions	The possibility of using the technology solution to provide for mitigation options such as 'mobility vouchers' would be seen as an advantage Ability to provide non-charged options for transport disadvantaged to be provided	Not a priority – the \$3 charge is envisaged as being sufficiently low to not require a focus on mitigation
Payment Options	Balance of convenience, cost and 'message to road users that they are paying to use in peak periods' to be considered	Convenience for users is important, but overall aim must first be to keep the operating costs of the system low
Inter-relationship with Toll Systems Project	Not an absolute requirement, but departure from TSP operating model will need to be justified	Not an absolute requirement, but departure from TSP operating model will need to be justified
Enforcement	Scheme must be capable of automatic enforcement to ensure integrity of the system	Scheme must be capable of automatic enforcement to ensure integrity of the system, but balance of capital and operating cost will need to be considered to ensure that net revenue is maximised

Figure 2 and Figure 3 illustrate the layout of these schemes. Locations of boundary and internal charge/check points have been assessed based on a review of aerial surveys, lane configurations, and optimising coverage.

Figure 2: Revenue Scheme

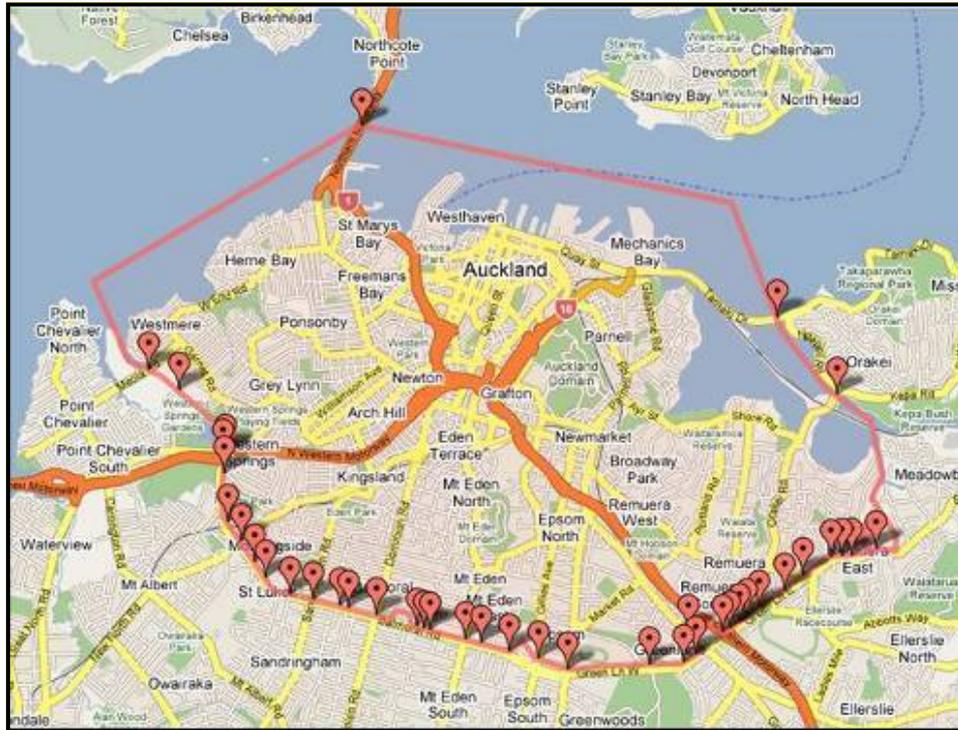


Figure 3: Congestion Scheme



5 Desktop review

5.1 ARPES mitigation strategy proposals

The previous ARPES work¹ included a significant technical note on potential mitigation strategies for dealing with the adverse impacts presented by each of the pricing schemes under consideration. The key findings from that study covered:

- Households assessed as the highest priority were those who had the lowest ability to pay the charge (affordability), along with the lowest ability to avoid the charge and the least ability to change travel behaviour.
- The cordon scheme created the most adverse impact, with the highest impacts occurring in the areas with highest social deprivation covering those households most in need of using a car and least able to afford the charge. The area scheme also created a significant adverse impact, but this was spread over a wider number of households.
- The report recommended that the primary mitigation approach involved making improvements to the public transport system.
- Even with public transport improvements, there was still some residual equity impact to be accounted for. This covered groups such the disabled, health system users, volunteers, specialist education providers and those beneficiaries transitioning into employment.
- The report proposed that these groups have their adverse impacts mitigated through electronic vouchers issued by the agencies responsible for managing the welfare programmes.
- Improvements to cycling and walking were also identified as being required, particularly with respect to the area scheme.

The cordon scheme created a high impact in the areas immediately outside the cordon to the west and south, which includes many areas with high deprivation scores. The cordon scheme would impact on some well established travel patterns from the west, notably for work and school, and that for many of the trips originating in this area PT was limited as an alternative, as these areas were not well-served by public transport. The main mitigation strategies relied upon increasing accessibility to public transport services via a radial expansion to destinations across the isthmus. Differential cordon charges were also considered to be viable given the concentration of impact in the south and west.

¹ Mein Consulting Limited; "Auckland Road Pricing Evaluation Study. Technical Note: Mitigation Strategy Proposals". September 2005.

Area scheme impacts fall most heavily upon households either in the area of the scheme or directly adjacent to it, but had less impact on the areas to the south and west, unlike the cordon scheme. Some impact is also expected on the boundary of the scheme from traffic looking to divert to avoid the charge. Mitigation options are again led by public transport access, with radial trips to the CBD fringe and east-west travel within the area noted as needing improvement. Other mitigation needing consideration in the area scheme includes the provision for more alternative modes (walking and cycling), as well as improving travel conditions on the boundary routes.

The success of a road pricing scheme and the associated mitigation strategies depends heavily on how people will react to price changes and their perceptions of fairness and equity. These issues are covered in the literature review below.

5.2 Literature review

This section pulls together standard road pricing theory and behavioural economics to show how price is only one of the decision making components in peoples' travel choices. Perceptions of equity changes derived from altering travel behaviour arise from the way the road pricing and travel choice issue is framed and how people are influenced by their own circumstances and decision making rules.

5.2.1 Road pricing theory

Congestion on roads arises when there are too many vehicles trying to use a finite road space. Traditionally economists have taken the view that roads, like other commodities, should be priced. This view is typified by Newberry (1990)²:

“As road space is a valuable and scarce resource, it is natural that economists should argue that it should be rationed by price - road users should pay the marginal social cost of using the road network if they are to be induced to make the right decisions about whether (and by which means) to take a particular journey, and, more generally, to ensure that they make the correct allocative decisions between transport and other activities. If road users paid the true social cost of transport, perhaps urban geography, commuting patterns, and even the sizes of towns would be radically different from the present.”

Hau (1992) goes further in highlighting the temporal nature of the congestion issue:

² Newberry, David; “Pricing and congestion: economic principles relevant to pricing roads”. Oxford Review of Economic Policy, October 1990.

“Yet there is considerable excess capacity in urban transport if one were to spread travel demand uniformly over a twenty-four hour basis -- as argued forcefully in *The Urban Transportation Problem*, by Meyer, Kain and Wohl (1965, pp. 83-88). Hence, it is the distinctive nature of the cyclic peak/off-peak period demands which leads to significant resource misallocation.”

The standard micro-economic theory of road pricing asserts that road users only take into account the average costs of their journey rather than their marginal social costs. Taking average costs as the pricing factor only recognises the internal costs to the road user, such as fuel, vehicle wear and tear and travel times. If the supply of road space is fixed, especially from the temporal perspective described by Hau above, then road users using average costs tend to generate excess demand for road space, or traffic congestion, hence the allocative inefficiency.

Congestion is part of a wider set of problems generated by excess traffic demand that also include environmental problems (air and noise pollution) and economic and social impacts (lower output and productivity). These wider problems are called externalities and lead to the resource misallocations highlighted above. A road pricing charge that reflects these externalities forces road users to consider, or internalise, them as part of their trip making and travel choice behaviour. Accounting for externalities imposes on road users the marginal social cost of their trip, with the higher trip price curtailing demand, given fixed supply.

The implicit assumption underlying road pricing theory is that road users respond to these price signals in a *perfectly rational* manner. Perfect rationality considers economic actors to have access to all the information needed and the computational capacity to act on that information to make decisions that maximise individual welfare. A price increase for a good, such as road space, will cause road users to respond rationally and economise on that particular good, within their particular budget constraint.

However, introducing road pricing can also be made for revenue generation (to pay for infrastructure), as well as congestion reduction. Either of these will increase the cost of travel to vehicle users and cause a reduction in the number of people travelling. Perfect rationality would require road users to understand and accept the charge imposed and adjust their behaviour to continue maximising their welfare. However, real world experience indicates that social acceptance is not always forthcoming and in some ways runs counter to the outcomes suggested under rationality. Achieving social acceptability for road pricing can be complex and requires careful study before proceeding with any kind of pricing scheme.

5.2.2 Social acceptability

The social acceptability of road pricing in a community is a key component to its success. However, a consensus on whether road

pricing is needed is usually not there. Varying opinions between different groups in society oppose a homogenous perfectly rational view on the subject. The leadership element of society may agree on the need for road pricing, but the public at large may be uncertain, creating barriers to its introduction.

Bird and Morris (2006) illustrate the roller-coaster of public opinion on the introduction of road pricing by using a diagram from Goodwin, as shown in Figure 4³. Cities which have introduced some form of road pricing, such as London, Singapore and Stockholm have all faced some form opposition and debate surrounding its deployment⁴. The referendum in Stockholm was close and highlighted the gap in opinions between people – those inside the area covered by the scheme were more in favour than those outside (especially rural) that had to drive into the area. The scheme proposed for Edinburgh failed to win support in a referendum, while the concept of introducing road pricing into New York is currently generating significant debate.

Figure 4 – Variation in public acceptability in the road pricing introduction process



³ Bird, Jenny and James Morris; "Steering through change: winning the debate on road pricing". Institute for Public Policy Research (IPPR), 2006.

⁴ Singapore may be less so because of the authoritarian regime running the country and the longer association the country has with using charging mechanisms to regulate vehicle use.

Bird and Morris (2006) offer several explanations as to the difficulties of gaining social acceptability for road pricing. These consist of:

Scheme ineffectiveness – initially road pricing can be counter-intuitive to most people, so it is not obvious how it will have an effect. Alongside this is the belief that a large reduction in traffic volumes will be required to relieve congestion. Key issues commonly raised include:

- car journeys are not considered optional
- people already do their best to avoid congestion
- public transport is not a viable alternative
- road pricing will divert traffic onto other routes, transferring congestion
- case studies of successful road pricing schemes are dismissed as special cases with underlying factors that support it (e.g. the existence of expansive PT services)

Stealth taxation – road pricing is part of an underlying motive to raise more money:

- people already pay too much
- confusion about what happens to current vehicle taxes and levies
- trips are not optional – e.g. work and school
- lack of clarity and predictability.

Loss of freedom – not just as a mobility issue but also from a social perspective:

- levels of choice becomes restricted
- invasion of privacy – scheme can be used to monitor movements
- public transport not a viable alternative in terms of providing the flexibility to travel, at the time required and to the destination desired.

Other concerns – including:

- waste and bureaucracy – with costs passed on to the public
- fairness (disadvantages to low income people)
- evasion, ‘free riding’ and a corresponding lack of enforcement
- scheme management – who should set prices?
- climate change.

Gaining social acceptance for road pricing comes down to being able to influence the way the issue is understood, which, given the diversity of peoples’ attitude formation and decision making, is a complex task. The

literature on behavioural economics provides insight into the behaviours people adopt and the choices they make.

5.3 Behaviour and choice

People do not make what would appear to be rational decisions and base their decisions and choices on a number of factors traditional economics does not consider, including the surrounding environment and the amount of information available to them. To form a better understanding of how travel choices will be made, along with any resulting equity issues that may arise and the potential success of mitigation factors rests on knowledge of behaviour.

5.3.1 Behavioural economics

Behavioural economics challenges the rationality assumptions underpinning the traditional economic analysis, which is the framework used to analyse the impact of road pricing. Price is but one decision point and all other factors are not held constant, but influence the decision making process. NEF (2005) have identified seven principles relevant for policy makers to consider when designing and introducing new policies⁵:

- **Other peoples' behaviour matters** – when in doubt people look to others to see how to behave.
- **Habits are important** – these mental short cuts, which occur without conscious thought, become ingrained within behaviour and are thus very hard to change.
- **People look to 'do the right thing'** – monetary incentives may not work all the time – sometimes altruism plays its part.
- **Self expectations influence how people behave** – people want their behaviour to be consistent with their beliefs and values.
- **Loss aversion is top of mind** – people fear a loss more than a gain and will fight to keep what they think is theirs by right.
- **People are bad at calculation** – in general people tend to over-discount the far off future and under-discount the near future, while emphasising recent events. People also have difficulty assigning probabilities to events and calculating impacts, thus can either positively or negatively over-emphasise unlikely events.
- **Involvement and effectiveness are catalysts for change** – people need to feel actively involved in a decision and effective as part of a process in order to make a change. Rendering people

⁵ New Economics Foundation (NEF); "Behavioural Economics: seven principles for policy makers". Briefing paper 2005.

passive through information and incentives just makes them feel powerless and less able to make a change.

Two key issues arise from these principles that will affect the way road pricing is portrayed and how travel choices and mitigation issues are dealt with. Firstly, framing plays an important role in how people perceive issues. How issues or problems are presented to people has a heavy bearing on how they react and make decisions about situations. Secondly, loss aversion and poor computational capabilities can lead to miscalculations when judging the impact of change and optimism bias with regard to future situations.

5.3.2 Types of decisions

The amount of information available for people to make decisions is directly affected by accessibility and cost. In general, people only have a limited set of information directly available to them, the rest being dispersed throughout society. Gathering more information comes at a cost in terms of time and energy expended, with people having to decide how much information is enough to facilitate an effective decision.

Because of this disparity in access and cost, people generally make decisions in three ways based on information they have either received or gathered.⁶

- 1 **Decisions made with certainty** – when all possible potential information is accessed and used in decision making and the outcome is known and certain.
- 2 **Decisions made with risk** – when a smaller set of information is available, but probabilities can be assigned and used in decision making.
- 3 **Decisions made with uncertainty** – fragmented information means that it becomes too costly to stop and collect a wider information set that could be accessed and used in decision making. This and the introduction of time as a factor make the outcome uncertain.

Decisions made with certainty tend to be smaller, simpler and made more frequently, where the information set has been built up through experience and knowledge. Decisions made under either risk or uncertainty requires more thought and judgement, but at the same time opens decision making to framing and optimism bias issues.

⁶ Leveritt, Geoffrey, Cossar, Alison, Jones, Mark, and Hull, Louise. *Behavioural analysis for policy - New lessons from economics, philosophy, psychology, cognitive science, and sociology*. New Zealand Ministry of Economic Development, October 2006.

5.3.3 Behaviour and decision making

The principles underlying behavioural economics and the three types of decision making listed above influence the way decisions are made and attitudes are formed. Bird and Morris (2006) in outlining the cognitive research into decision making and attitude formation divide the way decisions are made into two forms; simple and complex. This is done to conserve, or ration, cognitive resources.

Simple decision making consists of heuristics and automatic cues that enable incoming information to be processed quickly and connected with stored knowledge. Under these circumstances snap judgements are more likely and type 1 decisions predominate, where attitudes and thoughts are formed in a non-deliberative manner, making it more difficult for policy makers to create sustained behavioural and attitudinal change.

Complex decisions involve more type 2 and 3 processes and involve more deliberation before decisions are made. Under these circumstances attitudes are more stable and resistant to change, making behaviour prediction more likely. However, being able to engage people in positive deliberation is also the main recourse for attitudinal and behavioural change, which raises the possibility of imparting sustained change.

The interplay of simple and complex decisions raises issues that affect travel patterns, choices and equity, including:

- **Perception of fairness** of an issue or situation guides people's choices. If a person thinks or believes they are treated fairly or unfairly then a decision is influenced by this experience. In relation to the implementation of a pricing scheme, if people perceived the scheme is fair they are more likely to accept it.
- **Peer pressure** from friends or colleagues and cultural social norms from within a person's family unit affect how decisions are made. For example, if a person's friends recognise using the bus or carpooling as positive and viable options for transportation, the person is more open to using the bus or carpooling also.
- **Personal beliefs**, identity within the community, dictate behaviour. How an individual sees themselves taking the bus, carpooling, or paying a road pricing fee, and how they think members of their social group will perceive him or her for their travel behaviour, will influence acceptability and compliance.
- **Vehicle ownership is a status symbol** in many cultures and communities. People tend to judge their social standing by what they own and drive. This factor is closely linked to peer pressure/social norms and a person's identity.
- **Personal involvement** and input into the making decision process will influence how people make decisions, or more importantly, how they form attitudes towards an issue. If there is some

measure of involvement made into reaching a decision, people will have a vested interest in its outcome and be more willing to partake in the activity.

Attitudes towards travel choices and the sense of equity under a road pricing scheme will fall under simple snap judgements if people are influenced by issues around fairness, peer pressure and vehicle ownership. Whereas engaging people around their personal beliefs (e.g. climate change) and seeking to involve them personally is more likely to make them think deliberately about road pricing, travel choices and equity. Therefore people's background and circumstances become important factors in decision making.

5.3.4 Understanding people's circumstances

Background and circumstances form part of how people perceive the world around them and are a component of the framing issues mentioned earlier. There are circumstances that will sway decision making, so it is important to understand these issues because they are at the core of how people make their travel choices.

Perception of fairness is connected to how people estimate the probability of an event occurring and this estimation of probability is affected by emotion. One of the principles of behavioural economics is that people are bad at computing probabilities and over-emphasise potential negative experiences. People may estimate they cannot get to the bus on time or carpool with anyone because their schedule conflicts. Alternatively, a negative PT experience may bias their estimation towards the positive probability of having another negative experience.

How information on the pricing programme and scheme is presented to people through the media and advertisements will affect their judgement. If information on the programme is presented sporadically, or an outside or unlisted source is provided to the public, and it is tainted with false data, confusion and adverse reactions are more likely to eventuate. On the other hand, if too much information is provided all at once, people may have a negative reaction or perception to the overload of material (often referred to as invoking a sense of helplessness).

Habits develop from past behaviour and form part of the simple decision making processes and heuristics that people use on a day-to-day basis. This will be one of the most difficult circumstances that will hinder change in travel behaviour and the social acceptability of a pricing scheme. Habits will play an important role in determining the equity impact perceived by different demographic groups.

Old habits have an element of loss aversion – people will feel as though they are losing something if they change their travel behaviour. Although, through changing travel behaviour people may save more money, there is an emotional tie to the habit and people may feel they have lost a sense of belonging and communal attachment.

5.4 Travel choices

5.4.1 How people feel about travel choice

A perception of fairness and travel behaviour is linked to the idea and belief of “mobility rights”. A mobility right is an entitlement to drive; currently this is freely, anywhere and anytime. The introduction of a pricing programme gives the impression that mobility rights are unimportant and the entitlement to drive freely anywhere and anytime is unnecessary.

The linking of mobility with driving is a perception issue that prevents people from exploring other options. Habits form around the use of the car which affects the acceptability of road pricing. This can be influenced by a number of factors, such as the way the issue is framed, whether people make snap judgements that are formed out of existing habits or peer pressure and other circumstances.

Getting people to disassociate mobility with car travel and to think about mobility more as a choice between modes is the critical issue. Seeing mobility in a wider context covers not only cars, but should also stimulate choice for alternatives, including PT, car pooling, changing travel times, and walking and cycling etc.

Some people have more choice than others as to which mode to utilise, but fall back on habit – cars are comfortable, safe and private. The wider range of travel choices are available now, but people still choose private vehicles over other modes, even when travel behaviour change programmes are introduced, because they lack incentives to sustain behavioural change.

Pricing programmes do not hinder mobility but they do force change in travel behaviour. What congestion-pricing programmes do is recognise that there is inefficiency – there is not enough road infrastructure in place to sustain demand from traffic. The allocation of funding to building more roads has its merits but continuously, over time this solution has negative consequences on the physical environment. “The exercise of mobility rights in dense urban areas is jeopardising other rights, namely the right to a tranquil and safe urban environment, and the right to clean air.”⁷

5.4.2 How people make choices about travel behaviour

People choose their method of travel based on the **location** of their residence and employment; their **lifestyle, income levels, and travel costs**. Typically, people that live further away from their place of

⁷ Viegas, José M. *Making urban road policy acceptable and effective: searching for quality and equity in urban mobility*. Transport Policy 8 (2001) 289 – 294.

employment or have unusual work hours will drive to their jobs. The reasons for this are associated with accessibility to public transport, convenience, or in the case of working late hours, safety.

Lifestyle is reflected in the activities people participate in such as sport or unpaid work (e.g. charity work, volunteering, coaching etc). Parents with school-aged children often travel between after school activities, work and home. If children are too young to access public transport by themselves, parents will choose to drive. If a person wants to have dinner with friends, they will again decide to drive for convenience reasons.

High income levels naturally allow people to have more choice with respect to travel, including having the ability to pay under a pricing scheme. The motivation to change may be difficult for these individuals since a fee or toll is not a hindrance to driving. On the other hand, travel costs do have more of an impact on low-income earners.

5.4.3 What influences people's choices in changing travel behaviour

People will change their travel behaviour depending on the flexibility of the factors mentioned above. If they move closer to their employment there will be more options to getting to and from work. If after school activities can be coordinated with other parents, travel behaviour can be modified. However, income levels will have an overwhelming influence if people can move closer to their respective work places.

If the type of employment people work in allows them to change their schedules, change in travel time can occur but not everyone works from 8 am to 5 pm. Those with inflexible work schedules will need to have alternatives available to them to make a change in their travel behaviour. Travel time and the reliability of the method of travel also influence a person's travel behaviour. People are more likely to take a certain form of transport if it has a more reliable travel time than other methods available.

5.5 Ideas for gaining pricing acceptability

Though any pricing scheme needs to consider the behavioural elements of changing travel behaviour, gaining pricing acceptability with the public will take approaching implementation from various angles.

5.5.1 Changing travel behaviour in favour of a pricing scheme

As seen from above, involving people at an early stage increases the likelihood that a road pricing scheme will be effectively introduced. People can be engaged in a road pricing scheme in a number of ways.

Trial period: The public will be more likely and willing to participate in a pricing scheme if introduction of the charge scheme is gradual over the course of time. This means “trialling” the pricing programme for a short period to explore how a full-fledged programme would work. The City of Stockholm trialled their congestion pricing programme for seven months prior to full implementation in August 2007. The Stockholm cordon scheme levied a fee at 18 different charge points circling its central business district (CBD), was in place during weekday business hours between 6:30 am to 6:29 pm, and varied charges by time of day. During this period, Stockholm realised a 28% decrease in the number of vehicles accessing the CBD.

The trial allowed the public to get accustomed to the idea and begin to prepare for travel change by investigating what options or alternatives they have to make a mode shift. In addition, the trial allowed officials to measure its success in terms of reduced congestion, increased accessibility to the city centre, and improved air quality. Stockholm residents were surveyed and their impression of the programme and results indicate that public perception improved with time. Drivers had the highest level of negative responses but the response rate did improve.

The Stockholm survey also found that high and low income earners were largely unaffected by the new scheme. High wage earners continued to drive and low wage earners already used public transport. The group affected was middle-income earners who did have to change their travel behaviour.

Free ration scheme: Develop a scheme that includes “free rations” of driving into the programme area. “The basic proposition is that all local taxpayers receive a monthly allowance of ‘mobility rights’ which can be used interchangeably for both private car driving in the tolled area and for riding public transport. Any consumption above the ration is subject to payment.”⁸ Athens, Greece and São Paulo, Brazil both have a free ration scheme in place with varying degrees of success.

This feature of a pricing scheme requires advance technological use, which is discussed later in this chapter.

Progressive approach: Progression charging means introducing the new pricing programme in a simple manner initially. Advanced technologies incorporating more features to the programme are then gradually added as the public’s comfort levels with the scheme increases and they become more knowledgeable about their own travel behaviour.

Cash discounts as an incentive: Toll road operations in Japan have taken to using discount regimes to encourage changes in behaviours along the following lines:

⁸ Ibid.

- To increase the uptake of electronic toll collection through on-board units (OBUs).
- To shift travel behaviour towards off-peak use of the toll roads.
- To encourage traffic back onto toll roads and away from highly congested non-tolled alternative routes.

The last two points above are particularly relevant to the Auckland road pricing context in terms of improving transport efficiency and encouraging better utilisation of the whole road network by trying to reduce traffic diversion on the periphery of the scheme's cordon or area.

Introducing car-free days as an alternative to road pricing: The imposition of a car-free day provides a potential alternative to introducing road pricing. A car-free day involves the blocking access for cars to key streets, such as those around city centres, with only passenger transport access allowed.

Since 2000, a World Car-free day program has been held on, or around, the 22 September in approximately 1500 cities in 40 countries. In Seoul (Korea), every year, downtown roads are closed to traffic from 4 a.m. to 6 p.m. on 10 September as part of the Seoul city government's effort to promote the benefits of sustainable public transport, including reducing congestion and environment externalities. While participation in this campaign is not mandatory, only buses are permitted the use of major downtown thoroughfares. Government parking lots are also closed in the car-free hours. The car free day is supported by free early morning bus rides.

The car free day campaign was created by the World Car-free Network, an organization dedicated to promoting alternatives to car dependence and automobile-based planning at the international level. The inaugural event was held in France in 1997 and was established as a Europe-wide initiative by the European Commission in 2000. In addition to implementing an annual car-free day, certain parts of Korea implement car-free streets on daily, weekly and monthly occurrences⁹.

For car-free days to have a meaningful impact on congestion and environmental issues in the same way road pricing potentially does, car-free days would have to be imposed on a more frequent basis. It should be noted here that cities with a significant investment in passenger transport, such as Curitiba in Brazil, already use some form mechanism to curtail and/or control private vehicle use in city centres in support of their transport initiatives.

It is also noted here that in the early 1980's Hong Kong trialled a then sophisticated but now outdated electronic pricing system that was eventually never adopted. Adoption lacked political appeal to the entire

⁹ See for instance: J. Jangwon, "An empirical study on survey and impact analysis of local development by car-free streets in Korea". Journal of East Asia Society for Transport Studies, October 2003.

programme but also many people objected to the potential privacy invasion from the system.

5.5.2 Charge scheme collection

The collection of fees or charges needs to be easy for the public to understand and to facilitate people into compliance. Payment methods should include pre and post paid collection, automatic deduction from bank account, over the phone and internet, SMS, and at convenience shops and post offices.

Smart card: Using a card as part of the collection system, that has the capacity to have multiple functions is optimal. A card that serves as a ticket to use the bus or train, and can store toll credit on it will increase public acceptability.

The more data available on the card the more people can interchangeably use the system as a whole. However, the more information stored on the card the more valuable it becomes and thus open to theft and issues around privacy.

Incentives: Open discussions with employers. Employers may be willing to provide their employees with benefits for carpooling or taking public transport if they see how it will positively affect their business. Encouraging employers to promote walking or cycling and provide lockers with shower facilities not only reduces congestion but also adds health value. Moreover, employers should be encouraged to introduce flexible work schedules or allow high performing employees to work from home as a way of rewarding employees.

Discounts / exemptions: There will need to be discounts or exemptions to the fee for the new pricing policy to be accepted publicly. Emergency vehicles such as ambulances and the police should be exempt from the fee since they are providing a needed public service. When London introduced its pricing scheme, it gave residents living within the charge area a 90% discount. Low income groups including people with disabilities were given this discount too. Some cities offer discounts to those who pay their fees early, who have high usage, low usage, drive a hybrid vehicle or have an unavoidable medical emergency to the hospital.

The range of discounts and exemptions are limitless but it's important to select those that apply and have the most meaning to the community. The discounts and exemptions discussed here are those most widely used in cities with pricing schemes however, which are not to say that there may be other discounts that are more applicable to the Auckland area.

5.5.3 Allocation of funds received

From an equity perspective, the funds collected should be applied to transport related expenditure. According to the Economist Intelligence Unit (EIU), this is another area where theory and reality clash:

“Transport economists insist that, from a theoretical perspective, what you do with the money raised from road charging doesn’t matter. In the real world, however, experiences in Europe and extensive behavioural surveys show that clear targeting of revenue is essential in countering the argument that road user charging is simply intended to increase revenue. More crucially, experience shows that authorities must provide visible new public transport alternatives (or some other sweetener) before the implementation of congestion charging; simply promising improvements in the future is not enough.”¹⁰

Experiences from Hong Kong, Stockholm, and London indicate that the public will demand transparency of funds collected and their use. A London study indicated Londoners preferred money collected is spent on public transport. Trondheim, Norway has been able to finance new roads, public transport, and pedestrian and bicycle passages, which was a condition required to introduce road pricing in the first place. From a social acceptability perspective the use of funds must be clear:

“A distinct strategy for communication is crucial. Politicians and planners must clearly illustrate the purpose of the charge, and describe how they will fit into the overall strategy. Central issues concerning how the revenue will be used, why the charges are designed a certain way, and what other measures will be taken must be explained in a trustworthy manner.”¹¹

Other mitigation options should be considered with care. In general, exemptions are kept to a minimum to keep transactions costs low and the scheme manageable during operations. It is also important to keep proposed schemes simple and therefore understandable during the introductory stages when it is critical to build support for road pricing. The initial presence of many exemptions may be confusing.

Mitigation options that have been implemented in overseas examples of road pricing, in particular London and Stockholm. The literature showed that in general minimal exemptions and mitigation options were utilised with active schemes:

- London’s scheme featured mitigation options that are restricted to offering people living within the area a 90% discount, buses 100%

¹⁰ EIU; “Driving Change: how policy makers are using road charging to tackle congestion”. The Economist Intelligence Unit report, 2006, page 20.

¹¹ Eliasson, Jonas and Lundberg Mattias. *Road pricing in urban areas*. VV Publication 2002:136E [Jones (2002). PRIMA (2002)].

discount and a 100% discount for alternative fuelled, electric and high capacity vehicles.

- Stockholm's scheme exempts emergency vehicles, buses, partially or fully electrically powered vehicles, vehicles equipped to carry the disabled and motorcycles. The only part of the internal area with an exemption is an isolated island, however there are time and access restrictions placed upon this exemption.

Looking at the equity effects from the Stockholm trial¹², the analysis showed that how the revenues generated from the scheme are used determines the total equity effects and their distribution. On average, the net economic benefit calculated (travel time savings etc less the cost of the congestion charge) was negative. Net economic gains were only made where the scheme revenues are distributed to the benefit of the area's population. Even then, such distributions made a disproportionate impact across the population. For instance, revenues used for public transport tended to support low income and younger people, whereas those disadvantaged by the application of revenues to public transport tended to be those employed and with children, who use public transport less. This serves as a reminder that any allocation of revenues should be done with distributional impacts in mind.

5.6 Conclusions

Price is but one decision factor that people take into account when making their travel choices. Introducing and implementing a new road-pricing scheme needs to consider circumstantial and decision-making factors highlighted by behavioural economics and not traditionally considered in most economic analyses of road pricing. Before any new programme becomes socially acceptable and road users willingly change their travel behaviour, issues around equity, scheme performance and use of revenues generated by the scheme need to be addressed.

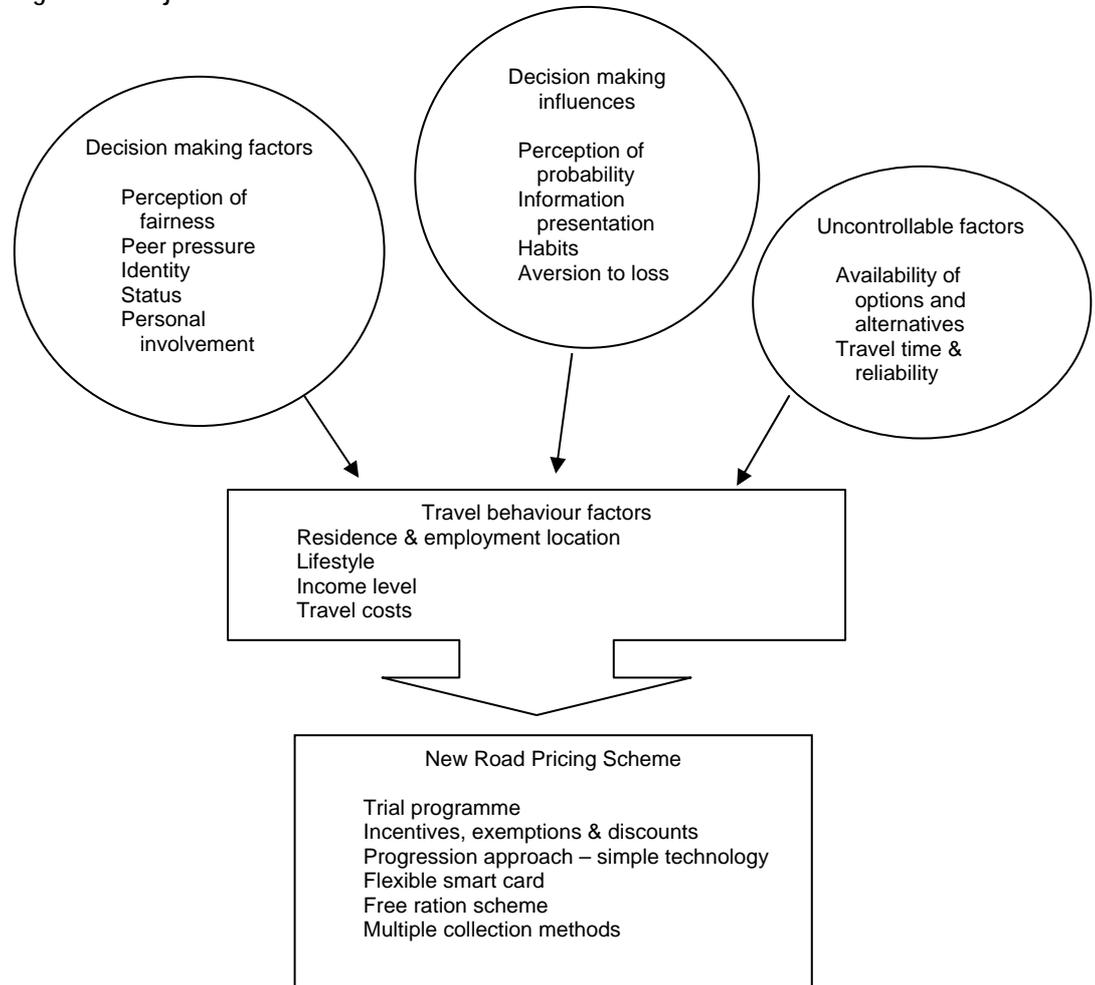
Overseas experience indicates that a range of incentives, exemptions and discounts should be proposed to allow necessary public services to continue to operate and to encourage compliance within different groups. The scheme should be introduced in a trial period to allow the public to adjust to the change; collection methods should include a multi-purpose and flexible use *smart card* that is simple to understand and use; and can incorporate a free ration scheme.

Figure 5 provides an overview of the decision making environment discussed in this section and how that environment is driven more by the subjectivity associated with psychology and sociology than it is by perfectly rational beings focussed solely on price. The results from this desktop review feed into the experimental design used for the focus

¹² Transek "Equity Effects of the Stockholm Trial". 2006, pp 56-58.

groups and the outcomes from the focus groups will be discussed with this review in mind.

Figure 5 – Subjective nature of travel decision factors



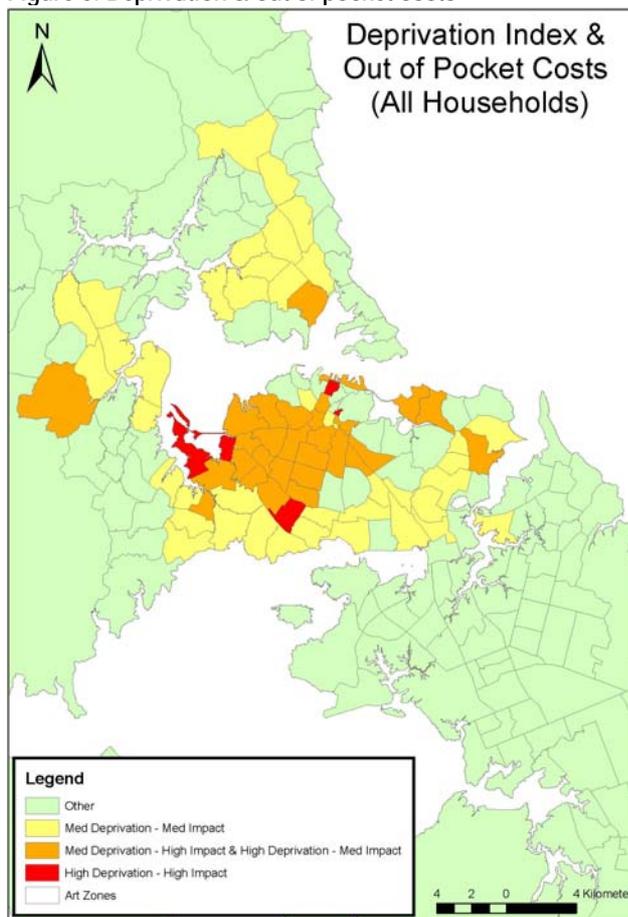
6 Focus group recruitment and approach

6.1 Recruitment of focus groups

A critical component of the project involved running five workshops with people from different areas in Auckland. Initially we narrowed down the areas of interest to 11 different suburbs. These were primarily based on a mix of:

- Areas with low income levels
- Areas with deprivation levels that put the area in the bottom 40% of households
- Areas that faced high relative public transport times
- Areas that faced high relative public transport costs
- Areas with a high level out of pocket costs and with household deprivation levels that indicated that households in the area would be affected to a greater degree than other areas with less deprivation or lower out of pocket costs (see Figure 6).

Figure 6: Deprivation & out of pocket costs



Source: ARPS 2007-08 – Assessing Household Impacts

In selecting the areas for study, we were also mindful of the results from the work done on mitigation for the previous ARPES report (see section 5.1 above). Specifically, the cordon based scheme created adverse impacts to the south and west of the cordon that contained areas with high deprivation index scores, and also featured households with trip making behaviour that would be difficult to change.

The area scheme also had impacts outside the charging zone, but captured those households within the zone as well, thus distributing costs across a larger number of households, placing more burdens on households within the zone. These issues were kept in consideration in order to preserve some continuity between studies in terms of assessing the potential impact on a similar cross-section of households.

6.1.1 Deprivation index

The Index of Deprivation is an index of socioeconomic deprivation. It combines nine variables from census data which reflect eight dimensions of deprivation. The NZ index of deprivation ordinal scale ranges from 1 to 10, where 1 represents the areas with the least deprived scores and 10 the areas with the most deprivation. The NZ scale of deprivation from 1 to 10 divides New Zealand into tenths of the distribution of the first principal component scores. For example, a value of 10 indicates that the area is in the most deprived 10 percent of areas in New Zealand, according the scores. The deprivation scores apply to areas rather than individual people.

6.1.2 Out of pocket costs

A household is considered to be impacted by the charge if they change their travel behaviour to avoid the charge. This includes going to different destinations, travelling at different times, using public transport, walking or cycling and rideshare arrangements.

A household incurring the charge is one that pays the charge. The total share of households impacted is a sum of those paying the charge and those avoiding the charge.

The out of pocket costs and deprivation scores for the areas that we investigated can be found below in Demographics of focus groups.

6.1.3 Demographics of interest

The Ministry also wanted to investigate the impact on an area that was middle class. This area was likely to have good household income levels but also face higher fixed costs such as larger mortgages.

One of the groups that we were interested in looking at was a middle class group that was likely to be highly affected. We added areas that had average levels of income and deprivation but high levels of impacts. The group that stood out as fitting this description well was Remuera.

Remuera has an above average income but also has a high level of impact from the charging scheme.

6.2 Initial areas of interest

The 12 areas listed below were selected for consideration to be included in the focus groups based on the factors outlined above:

- Albany
- New Lynn
- Otara
- Lincoln
- Central Auckland
- Mangere
- Waterview
- Sandringham
- Birkdale
- Greenlane
- Remuera
- Avondale

These areas were examined in more detail including looking at some social impact analysis data. Table 5 summarises the findings of the demographic analysis.

6.3 Demographics of focus groups

Given the above requirements, the areas of interest were narrowed down to five that provided the best fit. These areas were selected while making sure that there was a spread of various characteristics among the different suburbs. At this stage there was also some consultation with the Ministry to ensure the analysis captured the groups that they were most interested in.

The final five areas selected were:

- Albany - Students
- New Lynn - Families
- Mangere - Families
- Avondale - Elderly
- Remuera - Families

The spread of areas managed to capture the range of demographic and socio-economic issues, including lower income and older groups to the south and west, as well as a group that would be contained within the area scheme. The addition of a northern group allowed for not only a younger and lower income profile, but also included a relatively newly developing residential and commercial area.

6.4 Methodology for the focus groups

Figure 7 highlights the methodology employed to run the focus groups. It was envisaged that the best output could be obtained from the focus groups by first setting the scene with a discussion around current transport system conditions, including congestion. Introducing the idea of road pricing to the groups was done after they had given some thought to the future of the Auckland transport network.

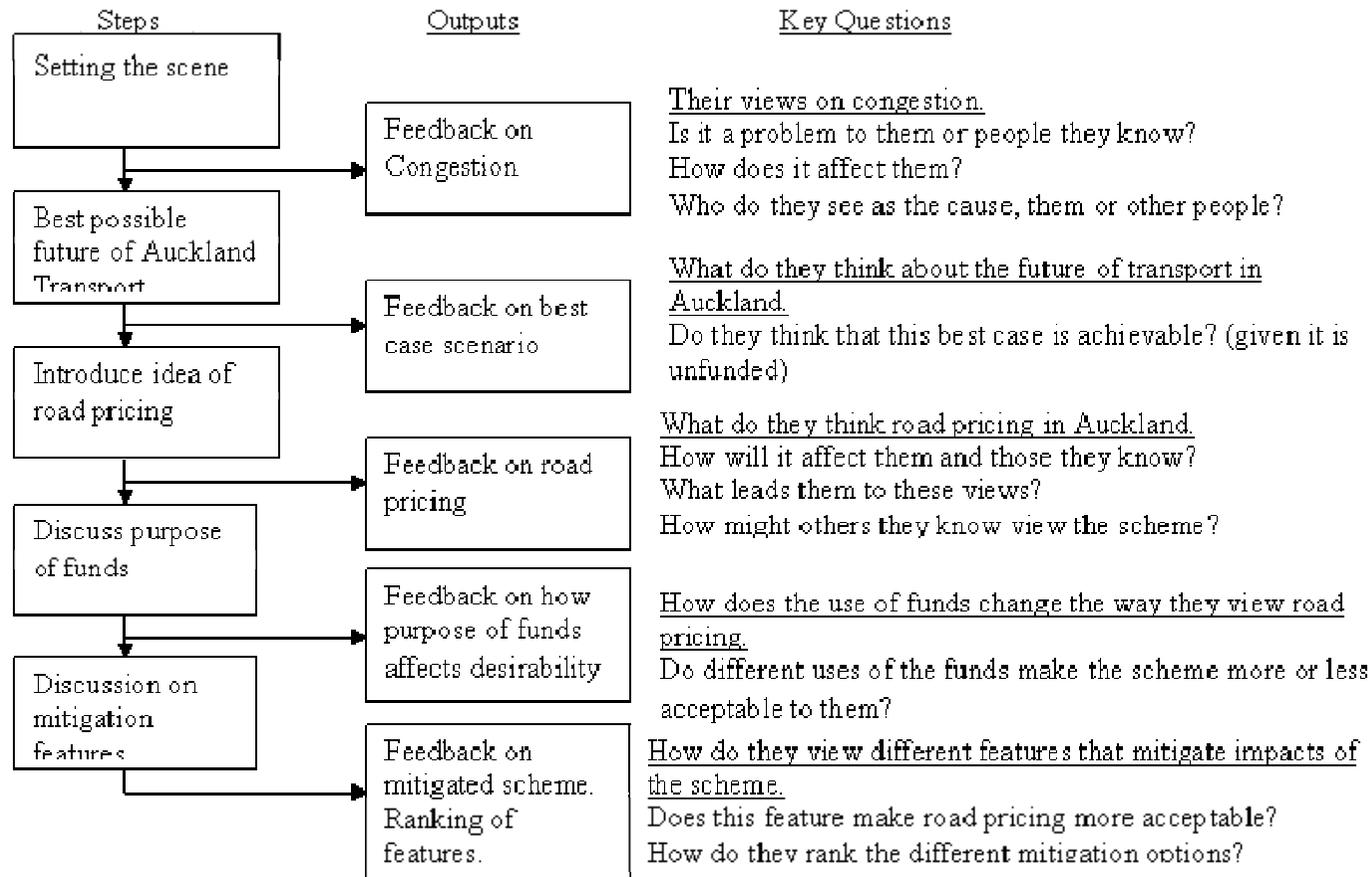
This was done partly to establish future oriented thinking, as the introduction of road pricing carries an assumed introduction date of 2016. Once the conceptual idea of road pricing had been established and understood, focus group members were then invited to discuss what happen to revenues generated from any scheme, as well as the deployment of any mitigation measures which were considered appropriate. More discussion on methodology can be found in Section 7.

Table 5: Demographics and Impacts on selected Auckland areas

	Auckland Averages	Albany	New Lynn	Otara	Lincoln	Central Auckland	Mangere	Sandringham	Avondale	Birkdale	Greenlane	Remuera
		Selected	Selected	Considered	Considered	Considered	Selected	Considered	Selected	Considered	Considered	Selected
Income Levels												
Mean household income	\$68,578	\$33,333	\$48,695	\$53,984	\$55,406	\$57,346	\$60,533	\$63,886	\$61,476	\$65,611	\$75,477	\$79,892
Household income as % of Auckland Mean		47%	71%	79%	81%	84%	88%	93%	90%	96%	114%	116%
Deprivation index	5	10	8	10	8	9	9	7	8	5	4	4
Impact Levels												
Share of households impacted by avoiding charge - area 2016	8%	4%	8%	2%	5%	29%	3%	14%	9%	9%	9%	33%
Share of households impacted by incurring charge - area 2016	11%	5%	9%	2%	6%	39%	3%	16%	9%	9%	12%	45%
Total share of households impacted - area 2016	19%	10%	17%	5%	11%	67%	6%	30%	18%	17%	21%	79%
Costs to households												
Annual Average Out of Pocket Cost to All Households	\$138	\$98	\$143	-\$11	\$93	\$323	\$22	\$273	\$201	\$182	\$196	\$631

	Auckland Averages	Albany	New Lynn	Otara	Lincoln	Central Auckland	Mangere	Sandringham	Avondale	Birkdale	Greenlane	Remuera
Annual Average Time Cost to All Households	-\$41	-\$102	-\$68	\$5	-\$27	\$2	\$11	\$47	-\$15	-\$210	\$79	\$49
Annual Average Total Cost to All Households	\$96	-\$3	\$58	-\$6	\$66	\$324	\$33	\$320	\$186	-\$28	\$275	\$679
Vehicle ownership												
Average no. Of vehicles per household	1.70	1.13	1.43	1.49	1.63	0.60	1.72	1.45	1.66	1.69	1.69	1.74
Vehicle ownership compared to Auckland Average	100%	66%	84%	88%	96%	35%	101%	85%	98%	99%	99%	102%
Average no. Of usual residents per household	2.95	2.91	2.90	4.63	3.22	1.80	4.66	2.76	3.40	2.84	2.70	2.91
Average no. Of vehicles per usual residents	0.58	0.39	0.49	0.32	0.51	0.33	0.37	0.53	0.49	0.60	0.62	0.60
Other												
Share of households with internet access	62%	55%	56%	17%	53%	52%	27%	61%	52%	65%	69%	78%
ART Zone		9	68	170	55	72	147	101	83	26	119	116

Figure 7: Methodology applied to the focus groups



6.5 Mitigation measures proposed to focus groups

The Mitigation measures that were proposed to the focus groups came under four different types of mitigation.

6.5.1 Exemptions/discounts

The groups were presented with the following list of different groups to consider who could benefit from exemptions:

- taxis, buses and emergency vehicles
- people visiting hospitals
- people with disabilities
- buses
- people living inside the cordon and/or area
- elderly
- low income households
- origin exemptions, e.g. people from poorer suburbs

6.5.2 Period vs. charge level

We presented the Congestion scheme as an option (a modification of the revenue scheme that we had already introduced to them). This was to get some idea as to which scheme they thought would have lower impacts.

The three options were:

- all the time (24/7)
 - \$3 charge
 - small reduction in congestion
- only in AM peak period (6am-10am)
 - \$6 charge
 - larger reduction in congestion
- other

6.5.3 Free travel allowance

Here we asked the groups to consider if they thought there should be some number of free trips issued as a “household / personal / business mobility right”:

- allocated to each account
- can be shared between account vehicles
- eligible to regular drivers

- transferable to public transport

How many free account trips would improve acceptability of scheme?

6.5.4 Scheme incentives and rewards

Reward regular car users for reduced car use (e.g., through carpooling, working from home, off-peak travel, using public transport, etc.)

Reward options:

- free or discounted public transport trips
- reward points e.g. shopping discounts
- free or discounted car parking
- priority access for vehicles with passengers

6.5.5 Importance of scheme features

The groups were then asked to rank the relative importance of the different mitigation options, including proposing any additional features they would like to possibly see.

7 Focus group findings

Based upon the socio-economic and demographic analysis conducted in Chapter 6, the focus groups were conducted in a range of suburban areas including:

- New Lynn (8 participants with school-age children),
- Remuera / Meadowbank (9 participants with school-age children),
- Massey campus at Albany (13 student participants),
- Mangere (10 participants with school-age children), and
- Avondale (12 older participants, mostly aged in their 60s, 70s and 80s).

Participants were selected on the basis of a number of variables including location, household composition, socio-economic status, employment status and age. They included family households (one and two-parent), students (mostly in flatting situations) and retired people.

As well as socio-economic and demographic factors, the focus group locations were selected on the basis of distance from the cordon area and also reflected the multi-cultural nature of Auckland, although they were not selected on the basis of cultural identity. They included Maori, Asian, European, Pacific Island, Pakeha and others.

This section of the report gives an account of focus group discussions against a set of themes. These included:

- traffic congestion in Auckland – its causes and effects at individual and community levels
- planned transport infrastructure development – its capacity to resolve the problem in a context of population growth and increasing car numbers
- road pricing – its effects at individual and community levels
- road pricing revenue – acceptable uses
- the capacity of various features to mitigate the impacts of a cordon scheme:
 - time period vs. charge level
 - exemptions and discounts
 - free travel rights
 - incentives and rewards
- the optimum mix of features.

7.1 Congestion: Causes and effects

Without exception, all participants in all focus groups spoke of the negative effects of congestion on themselves, on businesses, on their friends and

family, and on the Auckland community and economy overall. Some also talked about the impacts on the New Zealand economy as a whole, given the importance of Auckland's contribution at a national level.

There was general consistency between the groups about when the peak traffic times occurred, with agreement that the morning peak occurred somewhere between 6.30 and 9.30am and the afternoon peak occurred somewhere between 3.30 and 6.30pm. The Mangere and Avondale groups extended the afternoon period: in their experience, it starts at around 1.30pm.

As a number of people across the groups pointed out, the current congestion problems mean that drivers have only five to six daylight hours available outside of peak times to get around the city easily. One participant also reported the added impact of clear zones, the extended times of which further limit drivers' ability to drive and stop around the central area.

Some of the more frequently identified impacts of traffic congestion on individuals who participated in the groups included:

- Arriving late to work, appointments, lectures, meetings, social occasions etc.
- Health costs, including tension and anxiety, arising from the frustration of sitting in traffic and the unpredictability of arrival times. They also talked about the health implications of exposure to exhaust fumes for prolonged periods. People in the Mangere focus group, for instance, reported that, on average, the trip from home to the city area took an hour and that a two hour trip was not unusual in peak time.
- A reduction in family and community activities, and in socialising and recreating generally, given the time used up (and wasted) travelling. People, for instance, talked about how long their working days are, given the travel time required at each end of the working day and, therefore, their lack of time and inclination to engage in out-of-work activities away from home. Others described their decreasing inclination to leave the city during long weekends, preferring to stay at home and avoid the holiday rush. They are also reluctant to visit the central city area during weekends, given their weariness of commuting during the week, and their unwillingness to waste any more time travelling.
- A general waste of resources, including time and fuel.
- Delays due to traffic accidents. One Avondale participant described her delay of the previous day, when her usual forty-minute trip to town took almost three hours because of a nose-to-tail somewhere ahead of her on the motorway.
- Economic costs including direct driving-related costs from extra fuel and car maintenance expenses that arise from extended engine use and wear and tear from idling in traffic. Participants in all the focus groups also described work-related costs including, for employees, loss of earnings when they arrive late at work and, for business

owners, the loss of earnings and jobs. Examples of personal and business costs that participants described include:

- A Mangere-based father of young children having to compare the relative costs and benefits of paying for 'before and after-school care' or leaving work early to get home in time to care for the children himself, with consequent earning losses. As he pointed out, in Auckland, parents have to leave work earlier than they would elsewhere to be home in time for their children's return from school;
 - A delivery business that is experiencing ever reducing work volume because delivery vans cannot be sent out after 1.30 in the afternoon, as traffic congestion means drivers cannot complete round trips if they leave any later;
 - A plumber who reported losing jobs when he cannot get to scheduled appointments because of traffic congestion;
 - A business owner reporting reduced worker productivity because of employees' regular and often unavoidable lateness;
 - Another reporting loss of business because of the unpredictability of services and the delivery of goods.
- Arranging work to accommodate congestion peaks. So, in four of the focus groups people talked about working staggered hours so that they could avoid the peaks. The Avondale focus group was the only one without participants describing their staggered work hours to fit around the peak times. This could not be explained by their non-participation in the workforce: most of the older participants were still in the workforce on a full or part-time basis. Someone in the Remuera/Meadowbank group described working at home for some of the working week and students described trying to find employment, not always successfully, that did not require travel to busy areas or in busy times.
 - Lost or reduced opportunity to use other more environmentally friendly and healthier travel options, especially cycling.
 - Changing travel behaviour as congestion has worsened. Students in particular reported using public transport more, although this is particularly difficult given their Albany location, and trying to use alternative travel more, especially cycling and walking.

Identified impacts on family and friends were similar to those that participants identified for themselves, with most emphasising the level of impact that travel difficulties have on family and friend interactions.

Participants also described community impacts. Most frequently, they talked about the cumulative impacts of individuals' downtime on the Auckland economy. They talked about the slowing down of the city, the opportunity costs of people travelling instead of working and the loss of productivity, given workers' lateness, tiredness and unpredictable arrival times. Without trying to put a figure on the amount, participants assumed the costs must run into the millions, if not billions.

They also talked about the cumulative impacts of people retreating from social interactions and community activities, given a mix of the difficulties they faced travelling anywhere (either driving or using public transport) and the reduced time they have available anyway, given these travel problems.

One of the effects of people's driving frustrations, people emphasised, was more aggressive driving, risk taking and road rage, which together undermined the safety of the roads.

People also talked about a current or potential threat to the viability of local amenities arising from difficulties moving around Auckland. In particular, the New Lynn group described a tendency for people to use downtown amenities on their way home from work rather than visit those in their local areas. They believed that people were increasingly staying in town to, for instance, go to the gym or do their shopping and heading home when the worst of the peak traffic has dissipated. As a consequence, they believed, communities' infrastructure is being further eroded as people overlook or bypass local amenities.

A number of participants were concerned about the environmental costs of congestion. The Mangere group was the most concerned. As they pointed out, congestion contributes directly and indirectly to Auckland's carbon footprint. On the one hand, congestion increases carbon emissions because cars are on the road for longer periods to cover the same distance. And on the other hand, there are decreasing opportunities for people to user 'greener' modes of transport. The student group and the group from Mangere believed the density of traffic makes 'green travel' (especially cycling and walking) more difficult and dangerous.

One community impact raised at two of the focus groups, Remuera/Meadowbank and Mangere, was displacement of congestion and its impacts on new areas of the city. So, participants noted growing congestion in some areas where people sought alternative routes to the already crowded ones. Some also talked about the extension of commuter parking from central areas to suburban areas as inner city parking reached capacity. The Avondale group also described the steady encroachment of congestion into areas that had been previously traffic-free.

While participants across the five focus groups recognised that all drivers (including themselves) contributed to the congestion problem, they also stressed the particular contributions of other groups. They identified those who added to the volume of traffic and those who interrupted traffic flow. The volume contributors identified include: commuters going to work and study; parents dropping off and picking up their school-aged children; people on their way to recreational and social activities; and commercial drivers (trucks, vans and taxis).

Public transport was also implicated, its lack a cause of traffic volume. Those undermining traffic flow were identified as: buses; cyclists (mainly because drivers do not know how to accommodate them); motor cyclists (who were characterised as often aggressive risk-takers); and poor drivers (e.g., inattentive, aggressive, discourteous, distracted, etc). Avondale participants also attributed traffic hold-ups to insufficient policing of speed

restrictions that, they argued, lead to unnecessary risk-taking amongst some drivers and associated accidents.

This group attributed much of the congestion to driving practices rather than vehicle volume. Other conditions and events were also implicated including wet weather, road works, clear zones, poorly timed traffic light phasing, long weekends (and other holidays), and sports and other one-off events.

In most groups, it was also noted that holiday periods have a positive effect on congestion, as the school runs cease. Some participants wanted to focus on previous planning and decision-making as a contributor – they attributed current congestion problems to inaccurate population projections in the past and insufficient investment in roading and public transport.

7.2 Responding to congestion

It was very difficult for focus group participants to understand the details of planned developments in the Auckland transport network. This was at least partly due to the complexity of information represented in the two maps on transport infrastructure included in the focus group presentation and the small amount of time available for participants to study them.

Participants found it difficult to imagine what the transport network would be like in reality in the specified 2016 scenario. They accepted that it was necessary to assume there would be a more comprehensive transport network in the future for the purposes of the discussion. However, they tended to hark back to the current situation or express their scepticism about the improvements actually occurring or having a significant impact on the problem. More or less without exception, participants in all focus groups considered the current public transport network as inadequate in terms of coverage, reliability, frequency and, for some, affordability.

Given the projected population growth, and reported increase in car numbers, participants in most groups concluded that some sort of change in driving practices would be needed alongside the planned infrastructural development if congestion was to be addressed effectively. Statements such as “We will be running to stand still” typified their responses to a programme of road building and public transport development in the absence of such changes.

The Mangere group also noted the obligations New Zealand has now, and will certainly have in 2016, to reduce carbon emissions and, therefore, the imperative to reduce the numbers of cars on the road. This group, and the student group, were the most vociferous in arguing that roading development is not a long-term solution. They stressed the need for infrastructure development that takes a wider focus and includes cycle tracks, bus lanes, and other non-car related amenities that might reduce Aucklanders’ carbon footprint.

7.3 The acceptability of road pricing

More or less without exception, participants in all the focus groups initially expressed opposition to the concept of road pricing, regardless of evidence of its positive impacts in cities overseas. Data collected about focus group participants' driving patterns over the previous week showed their considerable reliance on cars (it was common for people to be doing ten to fifteen round trips per week). The data also showed the high proportion of these trips that required crossing the cordon boundary specified in the 2016 scenario.

This is not surprising, as focus group participants were selected on the basis of their regular driving into the central Auckland area. Most participants crossed the specified cordon boundary several times a week, usually on weekdays. Reasons for travel included driving into work, dropping their children at pre-school or school, shopping, visiting friends and family, engaging in community and voluntary activities and so on. Parents in Remuera/Meadowbank, which straddles the specific cordon area, crossed the boundary several times a day. Rarely did they drive entirely within the area. Those in the outer suburbs similarly crossed the boundary at least twice a day during the previous week.

When asked what the effects of a 'three-dollar, twenty-four, seven' scheme would be for them, focus group participants were initially expansive in their predictions. They would variously:

- Change the way they travel by:
 - avoiding the cordon area where possible (including using alternative routes and parking outside the cordon area and walking or using public transport);
 - using public transport more (although students at the Albany campus and participants in the Mangere groups noted the poor public transport links they currently experience);
 - walking when they could;
 - car pooling;
 - cycling (except when it rained);
 - Taking alternative routes (although they acknowledged this could create problems elsewhere).
- Change their work/business arrangements through:
 - working at home;
 - working longer hours to cover costs;
 - negotiating with employers to cover cordon costs in employment contracts;
 - changing jobs (looking for work outside the area);
 - relocating businesses out of the area;
 - charging extra costs on to customers.

- Change other aspects of their lives, including:
 - limiting visits to family and friends or encouraging them to make the visit;
 - rationalising trips, including squeezing activities into fewer days;
 - changing location of recreational activities;
 - shopping locally;
 - selecting their children's school to avoid the cordon;
 - reducing or ceasing community and voluntary activities.

Participants within or near the cordon area predicted benefits for themselves, including less congestion in suburban streets (although they also predicted that commuters may park in these streets and walk or find other ways to get to work); faster commutes; and increased desirability of the 'within-cordon' area leading to increased house prices and more housing intensification.

At a broader community level, people predicted that social interaction would decrease (because people would avoid crossing the cordon boundary); and that use of city amenities like museums, the Viaduct and shops in the cordon area would fall away. Therefore, they predicted, the city hub would be further eroded. However, others thought local community interaction would increase, because people would stay home. They also predicted that local businesses would benefit because people would be more locally focused. One person predicted that the court system would be clogged-up dealing with 'non-payers'.

Participants also identified groups they thought would be particularly disadvantaged by the charge. These included:

- hospital visitors and out-patients
- volunteers
- low-income people who live in outer suburbs
- part-time workers
- health providers
- students
- businesses that have to pay employees to cover the costs
- businesses that have to travel in and out of the area
- retailers and shoppers
- people who are disabled.

While initially railing against the road pricing scheme, participants' thinking seemed to change as the discussion progressed. Participants in four of the groups concluded that a scheme that involved a three-dollar maximum daily charge could only be seen as a revenue-raising scheme. And that conclusion tended to add to their frustration: they felt they were already

contributing to Auckland's infrastructure through a number of different levies and taxes (e.g., the regional petrol tax was still a contentious issue).

They also considered that there were easier ways to collect revenue than through a cordon scheme. However, participants in the Avondale group had a different view. They assumed that a three-dollar, twenty-four, seven scheme could reduce congestion – although one participant was of the view that similar schemes overseas were not necessarily established to reduce congestion. He believed that the London scheme was introduced to reduce greenhouse gases, although that included reducing the number of cars.

7.4 Time period vs. charge level

Across four of the focus groups (New Lynn, Remuera/Meadowbank, Massey campus students and Mangere), there was a general belief that any effective response to congestion requires behaviour change (that is, whether and when people drive rather than how they drive). Participants in these groups concluded that, as a consequence of the need to change driving behaviour, a road pricing scheme aimed at revenue-raising (that is, a three-dollar, twenty-four, seven scheme) would not address congestion effectively.

Almost unanimously, participants in these groups predicted that they would carry on as usual if such a scheme was introduced and that the scheme would have no material effect on their lives. In each of these groups, participants had previously concluded that Auckland could not 'build its way out of the problem'. So, in deliberating about the relative costs and benefits of the basic scheme and one that included a higher charge implemented during peak periods, the great majority of participants in these four groups listed above opted for the latter.

They believed that this option would change the way people travelled. A typical response was: "Why bother with the alternative? If revenue-raising is the aim, there are more effective, simpler ways to do it." To prove the point, they described ways that they would respond to a peak-time scheme being in place:

- In each of the four groups, around half said they would change their work arrangements. Most commonly, they would avoid the peak time by staggering their hours of work (usually by starting and finishing later) or working at home, or a mix of the two. One or two in each group said they would change jobs so that they would not have to cross the cordon boundary. In two of the group discussions (Mangere and Remuera / Meadowbank), a few said they would negotiate with their employers to cover the cordon costs.
- Around half the participants in each of the four groups would change the way they travelled to work, most commonly by using public transport (assuming the services were more convenient, reliable and frequent). Others would carpool or drive to the edge of the cordon area and then walk or use public transport. In the Mangere group,

one person thought she would encourage her employer to subsidise employees' use of public transport as part of its strategy to reduce the company's carbon footprint.

Although participants in these four groups believed that a cordon area could reduce congestion, not all people supported its introduction. Some problems they identified are listed:

- Some groups would be disadvantaged (as identified previously in the general discussion about road pricing).
- There could be problems around the shoulder periods, when people might travel to avoid the charge (thereby creating new congestion periods).
- Childcare providers, schools and kindergartens might be pressured to change their hours to fit with parents new staggered work hours (e.g., starting earlier or finishing later).
- And other effects were viewed as positive. For instance, businesses may relocate out of the city area, which a few participants believed was a good thing. Others, as discussed previously, were concerned about an eroding of the central city area. One participant expressed considerable anger about perceived government gains, getting extra revenue from both the tax generated from higher productivity (as a consequence of congestion reduction) and the scheme revenue. He believed personal and business taxes should be reduced to compensate.
- The Avondale group stood out from the others in that participants more or less unanimously preferred a three-dollar, twenty-four, seven schemes if there had to be one. First, they believed people would change their driving practices if such a scheme was introduced (e.g., avoid the cordon area, use public transport, etc) and, therefore, it would reduce congestion. And they believed that a universal scheme, which everyone had to comply with, was fairer and easier to administer. For instance, one participant argued that it was quite unfair for workers to have to pay a cordon charge in peak times because their employers required them to work during standard hours while others could avoid it.
- Two groups, Remuera/Meadowbank and Mangere, emphasised the need to establish a monitoring system to measure the impacts on congestion, and on particular groups of road users.

7.5 Mitigation strategies

7.5.1 Road pricing revenue targeting

Participants rejected any suggestion that revenue collected from road pricing could be used for anything other than upgrading the transport network. Upgrades, they stressed, need to focus on public transport, the roading network and amenities that enable and encourage alternative

transport such as cycling and walking. Some also referred specifically to the ferry component of the public transport system.

There was some variation amongst groups about how investment could be distributed across public transport and roading. For instance, the Mangere group, student participants and, to a lesser extent, the Avondale group, argued in favour of more public transport investment. However, across the focus groups there was strong support for balanced investment across both public transport and roading.

A common theme emerging from all the focus groups was concern about the administrative costs of a road pricing scheme, and a consequent reduction in revenue available to invest in the transport network. A number of people expressed concern about the costs associated with collecting the money, including compliance costs.

Some groups, in particular Mangere, were keen to make specific suggestions about how any revenue could be best invested. This group was most interested in how Auckland could address its carbon footprint in future transport planning and infrastructure development. Some investment ideas suggested by participants across the focus groups focused on roading and public transport and included:

- extra lanes on existing motorways, based on research to identify the optimum number to maintain traffic flow
- extra lanes on motorway exits
- providing incentives for drivers to use the western ring route.
- alternative infrastructure, including an underground rail system and / or a monorail
- carpooling lanes
- a more extensive public transport network, including more, rather than fewer, rail stations (one participant described the loss of two stations in a year, requiring her to travel far further from home to board the system)
- better co-ordination between different modes of public transport, so that commuters have a more seamless system
- free or subsidised public transport
- cycling safety
- pollution monitoring and management
- developing alternative fuels
- increasing the capacity of park 'n' ride facilities.

Some of the groups also discussed other actions that need to be taken, either in tandem with such a scheme or instead. These included:

- increasing tariffs on imported, used cars
- free or low priced, frequent, public transport

- increasing roading charges for trucks and incentives for rail freight.

7.5.2 Exemptions and discounts

There were some interesting differences between groups when discussing the efficacy of including exemptions and discounts in the scheme and identifying the groups that should be eligible for them. By now, the scheme that four groups (as listed previously) were discussing was that of a higher charge (say \$6 during peak times). In two groups (Remuera/Meadowbank and New Lynn), there was strong agreement that there should not be any exemptions or discounts. Reasons included that it would be too easy for the system to be abused, and that the groups eligible for discounts are probably not going to travel in the peak times anyway or would have the ability to work around the peak times.

In the New Lynn group, one respondent was of the view that the scheme should be applied universally like GST, with other mechanisms used to address the needs of special groups. Others in the group agreed. In the Remuera / Meadowbank group, one participant's comment reflected other views: "The more complex the system, the harder it will be to enforce. So, in general, we don't believe on exemptions". Another added: "The Government already taxes the rich (or those perceived to be rich – we have mortgages) and this is another tax. It should be applied to everyone".

Three of the groups (Mangere, Avondale and the student group) agreed that there might be value in including exemptions and discounts in the scheme. They generally agreed with the special needs groups listed in the PowerPoint presentation shown as part of the focus group facilitation. Groups they identified as needing to also be included were:

- people needing to visit hospitals (to visit sick relatives and for their own health needs)
- care givers (e.g., of people who are disabled, sick, etc.)
- students
- tourists
- people who live in the cordon area
- city businesses
- shift workers going home and coming to work in peak times (but against the traffic so not contributing to the problem)
- frequent public transport users
- volunteers and other community workers.

Those participants supportive of exemptions and discounts were not keen on them being transferable, given enforcement problems. A participant asked, for instance, how to stop able-bodied people borrowing a disabled person's car to cross the cordon free-of-charge.

7.5.3 Free travel rights

Amongst all of the groups there was a general rejection of free travel rights as a useful feature of a cordon scheme. A number of people across the groups saw the feature as inherently contradictory to any revenue-raising scheme as it would reduce the amount of revenue collected. As one participant rather colourfully commented, “It would be stupid – it would increase the set-up costs and reduce the revenue collected. It undermines the purpose of the scheme”.

In addition, people saw it as unfair to those who previously used public transport on a frequent basis. They also saw the feature as something to be potentially exploited. Because groups generally did not support the feature, they avoided discussing how many passes per household or account may make a cordon scheme acceptable. One person suggested that the number of free passes could be linked to the mileage account holders previously drove. The higher the mileage, the more free passes.

Participants would generally prefer a feature that reduced the costs of public transport to a feature that reduced the cost of the cordon scheme. However, if it was introduced, then a small number of participants indicated that they would prefer a cheaper daily cordon charge or free travel in the weekends to free travel passes during peak times. In addition, they would prefer the feature to be introduced after 2-3 years when the impacts of the overall scheme on congestion and revenue-raising are better understood and the purposes of the added features are clearer.

7.5.4 Incentives and rewards

As with their views about free travel rights, participants across the focus groups were generally opposed to the addition of a feature that includes incentives and rewards. They saw it as open to abuse, essentially unfair and administratively expensive. One person described it as “a big headache”. Instead, especially amongst the participants in the Mangere group, people would like more targeted incentives to increase use of public transport, including substantial discounts.

For instance, some participants in Mangere concluded that public transport would need to be at least 50 percent of the cost of car travel to be the preferable option (assuming it was more or less as convenient). Some Avondale participants referred to a perceived promise that Auckland pensioners would soon be eligible for free or heavily discounted public transport. While they suggested that might encourage them to use public transport more, they doubted it would come to fruition.

For those who agreed with the inclusion of incentives and rewards, they would prefer them to be public transport-related. And, as one participant in Mangere stressed, incentives and rewards should not be available for those who have exemptions or discounts. There was strong support for a reduction in public transport fares overall and an increase in public transport efficiency. A number of participants were opposed to transferring revenue gained through the scheme into individual rewards and incentives.

Participants in one focus group, Mangere, supported collective rewards like reduced public transport costs rather than individual rewards. Across all the focus groups, participants described their weariness of incentive schemes like shop loyalty schemes.

7.5.5 Summary of critical issues

Without exception, participants across the five focus groups reported that traffic congestion in Auckland had a major impact on their lives, yet in the first instance road pricing was not seen as an option:

- Most focus group participants were initially opposed to the concept of road pricing through the establishment of a cordon area.
- However, as discussion progressed, most groups accepted that something more than investment in the transport network would be needed to address congestion.
- There was general agreement in all the focus groups that congestion would worsen, given projected population increases, despite planned roading, public transport and other related development.

The above statements are consistent with the material presented in our literature review and align with overseas findings that highlight initial reluctance to conceptually accept road pricing (see the references made to Bird and Morris and Figure 4). Once the road pricing issue was framed in the context of increasing congestion and traffic network pressure by 2016, the focus shifted to making road pricing work, which is again consistent with our literature review findings.

When discussing the potential impact of road pricing, revenue distribution was a very important factor:

- Any revenue collected from the introduction of a road pricing scheme is spent on Auckland's transport network.
- There was general agreement that there needs to be a balance between the optimal distribution of spending across roading infrastructure and public transport...

The purpose of road pricing was also highlighted as a factor influencing the acceptance of any proposed scheme:

- Groups tended to favour a scheme that aimed to reduce congestion through changing people's driving practices.
- Participants were generally less supportive of a road pricing scheme that was principally designed to raise revenue.
- Some participants in some groups (particularly Mangere and, to some extent, Avondale) also talked about preferring schemes that also aimed to reduce carbon emissions – directly rather than as a by-product of other objectives.

The current state of public transport concerned focus groups:

- Participants emphasised the need for significant improvement in the public transport network in terms of coverage, reliability, convenience, frequency and, for some, affordability.
- A common complaint was that the current system is inadequate for a modern and growing city and that current inadequacies reflect what they perceived as previously inadequate investment and planning.

The congestion scheme was judged potentially more effective than the revenue gathering scheme:

- A \$3 charge would hardly change the driving behaviour of participants in the first instance (“... at \$3 it’s a cup of coffee), which is broadly consistent with the findings in the earlier ARPES study.
- However, the majority of people in these groups variously anticipated changing their driving, work and other practices and activities if a peak-charge scheme was introduced.
- In contrast, only the older Avondale group predicted that they would change their driving practices and work, family, play and voluntary activities if a basic lower charge twenty-four, seven scheme was introduced.
- In opting for the peak-period charging, participants in four out of the five groups explicitly rejected the lower priced, twenty-four, seven option. Their reasoning was that such a scheme would not change people’s behaviour, which they saw as essential to making any significant improvement to traffic volume and flow. They also rejected such a scheme for its revenue-raising potential, given its ‘unfairness’ (it would not impact on all network users)

Participants across the groups also emphasised that the relative value of adding other features to the scheme needs careful consideration. As one participant in the New Lynn group pointed out, it would not be difficult to work out which features are important if the purpose of the scheme is clear and revenue-spending is targeted. This group felt that consideration of these other features should be delayed for a few years after any introduction of a scheme, when its effectiveness and positive and negative impacts are better understood.

The New Lynn group were of the view that the acceptability of any scheme should not be a priority. They concluded that Auckland needs a scheme that will have an immediate result. However, they cautioned that any introduced scheme should not to be a prototype for others to imitate: “We don’t want other cities in Auckland to duplicate this to deal with their congestion - even if it has been caused by this scheme”.

Overall, participants were opposed to mitigating features such as rewards and incentives, free travel passes and, to a lesser extent, exemptions and discounts.

- The former two sets of features (rewards and incentives, and free travel passes) were rejected by most or all participants in all the focus groups.

- Various reasons were given for this rejection, including their unfairness, their potential to be abused, their likely administrative costs and their inconsistency with any revenue-raising scheme objectives.

Three of the groups (the students and the Mangere and Avondale groups) could see the value of exemptions and discounts, especially for low income and other groups that they see as disadvantaged. However, they also considered that these exemptions and discounts were potentially open to abuse. The Avondale group concluded that any scheme should be universal (they rejected all the mitigating features) and the other groups remained uneasy about how problems around including this feature could be adequately addressed.

7.6 Potential equity impacts of a congestion scheme

The general rejection of the revenue-based scheme as largely ineffective, both on revenue raising and behavioural grounds, may make the success of introducing such a scheme difficult to judge. While generating revenue, such a scheme may not divert sufficient people onto alternative modes to have an impact on congestion, therefore not alleviating the negative impacts that current levels of congestion have on people (discussed above), let alone conditions likely to be experienced in 2016. This could potentially put the sustainability of the PT system in doubt by affecting its long-term performance.

A peak-time targeted congestion scheme was more likely to force people to reconsider their travel times, their daily routines, such as working from home, and whether they took public transport or used alternative modes. The outcomes here are consistent with the results obtained in the stated preference survey conducted for the previous ARPES report, which indicated that for an area scheme, 65% of those surveyed would pay a \$2 charge, and 35% would at \$5, while only 17% would pay at \$10 (the results for the cordon were very similar).

However, deploying a congestion scheme requires an understanding of some key issues alluded to by the focus groups:

- Potential measures which could be implemented to mitigate the social impact on households were roundly rejected as discussed above.
- There was more focus on people making travel choices based upon a congestion charge forcing a reconsideration of travel behaviour.

Behavioural economics and the literature reviewed suggests that the way to reinforce this potential change in travel behaviour is not through subsidy, or incentives and rewards, but to carry through and invest the revenue raised by the congestion charge back into better transport infrastructure and services. Delivering better access to the CBD periphery through more 'cross-town', or radial, bus routes as identified in the original ARPES mitigation study (and is a continuing issue today) would likely benefit the households to the north, west and south of the charging zone.

The demographics data collated in Table 5 shows that the share of impacted households in these areas is small relative to the Auckland average and to areas contained within the charging zone (e.g. Remuera) or on the periphery (e.g. Sandringham). While areas to the south and north receive a small subsidy (a small decrease in annual average total costs per household), those within the area and on the periphery are burdened with the major proportion of costs per household.

Solely focussing on improving services in these areas would leave a large proportion of impacted households 'uncovered' from a mitigation perspective. Achieving a balance between the outlying areas and the needs of those closer in is desirable. There is some overlap in requirements, such as the need for more PT services that are radial in nature and service the periphery of the CBD and charge zone.

Investment in alternatives, such as walking and cycling facilities, would benefit those closer in to the CBD, given that people have indicated they would look to change behaviour through finding employment closer to home, working from home, or altering travel times. Other mitigation measures could include road enhancement and traffic management activities on the periphery so that suburbs such as Sandringham are not left to deal with the negative effects of traffic diversion.

The remaining levels of social impact not covered by these mitigation measures refers to specific groups of people, such as the disabled, rather than to households in specific locations. Mitigation dealing with specific groups is usually considered through the financial and quasi-financial measures largely rejected by the focus groups above. The next section of the report deals with the potential application of these measures to specific groups.

8 Mitigation options – Practicality, costs and benefits

In the first instance it should be noted that focus groups felt strongly that there should be significant improvements made to public transport prior to the introduction of road pricing. So, the results covering mitigation options assume a base level of improvement in passenger transport from the current position by the time of scheme introduction in 2016. We consider the findings from the passenger transport analysis undertaken by Auckland Regional Transport Authority (ARTA) and its implications prior to assessing the value of different options.

8.1 Passenger transport

As part of a work programme building from ARPES, the Ministry has worked with the ARTA to undertake more detailed work on passenger transport in the context of road pricing in Auckland. The purposes of this work are to ascertain the extent to which current and planned passenger transport networks in Auckland can provide a reasonable alternative to using a private car to travel into the charged area.

From early in the study a decision was undertaken to focus on the central isthmus area, for two main reasons:

- 60% of all passenger transport trips in Auckland end in the area affected by the proposed charges (i.e. the area is well-served by passenger transport).
- There are 36,000 trips to the CBD in the morning peak each weekday – 16% beginning within the CBD, 23% from the North Shore, 20% approx from the West and 18% from Manukau.

The modelling undertaken for this study shows that road pricing is an effective complement to the plans to significantly increase the role of public transport in Auckland. The congestion scheme, as modelled in this study (a \$6 charge to enter the central city area), shows a strong improvement in public transport's mode share in the peak period from the 11% Regional Land Transport Strategy (RLTS) target to 15% of all trips across the region. It also promotes an improvement in overall (region-wide) passenger transport travel times, due to reduced congestion resulting in higher road speeds and correspondingly higher PT road-based speeds, and an even stronger improvement in travel time to employment centres because of the dominance of the CBD for PT demand. Thus road pricing will assist to make public transport even more effective in Auckland.

8.1.1 PT improvements and risks of PT as a mitigation measure

The study found that on average, across the region, car trips to the charged area will be faster than PT trips. The analysis undertaken in this study shows that, based on the modelled outcomes, PT is slower than using the private car, particularly on short distance trips because modelled car travel times do not have access, egress, wait or transfer time components (which

for instance means there is no allowance for those that do not have a parking spot at their destination). Longer distance trips result in PT times becoming more competitive. The analysis does show that most of the northern and western parts of the region can access the charged area at approximately the same travel time as private car. Zones close to the charged area, such as those used in the focus groups, can be accessed by car very quickly relative to PT, thus reflecting poor PT/car time ratios. These zones potentially provide more of an opportunity for walking or cycling than PT.

Should a scheme be adopted, the analysis has showed that the main focus would need to be on improving relative travel times between car and public transport trips. Looking to the future, should a decision be made to implement a road pricing scheme in Auckland), a detailed PT service design exercise would be required. For that exercise, the ability of the PT services to provide an acceptable and attractive alternative to car users in a post charging regime would depend on some key factors:

- Being able to plan and provide an integrated passenger transport network as set out in the PTNP.
- Enhancing the ability to interchange (e.g. through integrated ticketing, seamless connections).
- Being able to respond quickly and effectively to situations of overcrowding or low service levels.

The PT study notes that the introduction of these changes is dependent on the PT procurement regime presently under development.

However, what is clear from this research and focus group work is that making such improvements, while necessary may not be sufficient to meet people's expectations of passenger transport. Understanding peoples' *perceptions* of what an attractive transport system may be matters; as their acceptance of road pricing is conditional on PT improvements. The modelling of PT improvements based on the generalised cost of travel may not capture important elements of convenience, status and other social factors associated with the choice of travel mode. We note that Land Transport NZ has just initiated a research programme aimed at better understanding non-PT user preferences concerning their choice of travel mode.

8.2 Mitigation options under consideration

The focus groups were given a range of mitigation options to consider which included:

- **Revenue targeting** – putting net revenues back into the transport system.
- **Exemptions and discounts** – applying either exemptions to the charge or discounts on the charge to selected user groups.

- **Free travel rights** – issuing a number of free trips as a mobility right to affected parties, e.g. individuals, households and businesses, within the region.
- **Incentives and rewards** – can be applied to either regular scheme users or to those who use alternative forms of travel, such as PT, or travel at different times, e.g. off-peak.

Each of these options has specific strengths and weaknesses, which are evaluated against the criteria described below.

8.3 Evaluation criteria

The mitigation options under consideration were evaluated against a set of criteria that covered four main themes focussed upon cost, effectiveness, impact and understanding.

- 1 Transactions costs.** The levels of transactions costs within a system dictate how internally efficient the system is at generating results. The mitigation options that introduce high levels of transactions costs into a charging scheme will lower operational efficiency and thus make the scheme look ineffective to external users. Such scheme ineffectiveness was identified in section 5.2.2 as one of the key difficulties for gaining social acceptability for a road pricing scheme. There are three areas where transactions costs can impact upon the effectiveness of mitigation schemes:
 - Compliance costs – mitigation options should not make the scheme difficult (in terms of time and cost) to comply with and should be fair to all.
 - Administrative simplicity – minimises bureaucracy and waste so that costs are either not passed on to the end user, or do not overly burden the revenue generated from the scheme.
 - Enforcement – this is a key area in terms of whether a scheme is judged to be effective. A lack of will to enforce the scheme harms its credibility, so any mitigation option introduced should not impede enforcement, nor create 'free riding' opportunities.
- 2 Effectiveness at mitigating impacts.** Any mitigation option being considered should actually produce the result intended and create no further distortions to the road pricing scheme. Effectiveness should be judged against its performance at:
 - Providing relief to high travel users – ensuring the scheme does not over-burden those heavily dependent upon travelling.
 - Dampening the impact upon low income areas – ensuring that areas featuring low income families are not overly affected by the charge through having accessible alternatives if required.
- 3 Impact on travel behaviour and revenue.** The mitigation option under consideration should not overly affect the original purpose of the scheme and its performance. Mitigation impacts should be minimised on:

- Changing travel behaviour – moving marginal trips to different times of the day and/or encouraging the use of PT and alternative modes.
- Generating revenue – the scheme generates sufficient revenue to pay for itself and to hypothecate net revenues back into the transport system.

- 4 Ease of understanding.** The mitigation option should be easy to understand by the end user, given the discussion earlier around some of the decision making and attitude formation biases that can arise, such as loss aversion and people being bad at calculation.

These factors provide a qualitative assessment framework against which the mitigation options were judged.

8.4 Results of option evaluation

The mitigation options were evaluated using focus group responses against a set of criteria outlined above and summarised in Table 6. The number of ticks each option receives against the evaluation criteria measures the strength of its effectiveness against that criteria and its likely impact upon the road pricing scheme.

It should be noted that it is assumed that exemptions be introduced on an institutional (e.g. emergency services, hospitals), rather than on an *individual* road user basis in order to reduce administration costs and minimise abuse and enforcement costs. Overseas experience indicates that targeting institutions rather than individuals helps to decrease the scale of scheme abuse.

Table 6 Analysis of mitigation options

Mitigation Options*	Transactions costs	Effectiveness	Impact	Understanding
Revenue Targeting	✓	✓ ✓ ✓	✓ ✓	✓ ✓ ✓
Exemptions and Discounts	✓ ✓ ✓	✓	✓ ✓	✓ ✓
Free Travel Rights	✓ ✓ ✓	✓	✓	✓
Incentives and Rewards	✓ ✓ ✓	✓	✓	✓

*Note: 3 ticks indicate high, 2 ticks moderate and 1 tick low.

Evaluating the mitigation options based upon the above criteria and the focus group outcomes yielded the following results:

- Revenue targeting offers the best mitigation option:
 - It has the lowest transactions costs associated with it, in terms of no additional compliance costs imposed, it remains administratively simple and there are extra enforcement requirements.

- It is relatively effective in terms of revenue being able to be applied to low income areas and for providing more options to frequent travellers.
- It can impact travel behaviour in terms of net revenues being re-invested into the transport sector, if these revenues are targeted at PT and travel alternatives.
- It is relatively easy to understand in terms of where the net revenue goes.
- Exemptions and discounts provide the next best alternative as high transactions costs are balanced against moderate performance in impact and understanding.
 - Enforcement and administrative costs will be high for exemptions and discounts as it will be important to maintain scheme integrity. User compliance cost is also likely to be higher because of the time spent applying for exemptions.
 - Effectiveness in this case may be lower because it is more difficult to target those whose need for relief is higher without opening the scheme to abuse.
 - Offers moderate impact on getting people to change behaviour because the exemption or discount acts as an incentive to continue with past habits (see section 5.3.1).
 - Has a mildly negative effect on understanding because of the additional material required explaining how exemptions and discounts to the scheme work.
- Free travel rights and incentives and rewards
 - Can attract higher compliance costs for administration and enforcement
 - Effectiveness may be influenced by the difficulty of targeting the groups most at need (e.g. only 5% and 6% of the households in Otara and Mangere are impacted by incurring the charge in 2016 – see Table 5).
 - Low impact in terms of changing travel behaviour because the travel rights potentially undermine the system.
 - They take more understanding and it thus requires more effort to communicate the key aspects of these mitigation options.

Of the options, revenue targeting offers the best combination of lowest compliance costs and ease of understanding, combined with allocative efficiency. It is possible for net revenue to be allocated in a broadly visible and equitable way across the transport system, and according to the results of the focus groups, PT should receive the largest allocation of funds. The other mitigation options carry costs in terms of either lost or allocated revenue that would affect the overall equity of the scheme. These costs are discussed below.

8.5 Cost of mitigation options

The mitigation options proposed also have cost impacts upon the revenue gained from the road pricing scheme as shown in Figure 8.

Figure 8: Estimated maximum cost of mitigation measures

Mitigation measure	Estimated maximum cost
Residents within area get 10% discount	\$4.4m (2016)
Emergency services get 100% discount	Minimal cost
One day of free travel per week	\$32.8m (2016 area scheme)

The cost of mitigation:

- Giving a 100% discount to emergency services is a minimal cost item because of the number of emergency vehicles compared to the general traffic volume.
- A 10% discount to residents living with the congestion (area) scheme would cost \$4 million out of the estimated \$151 million annual revenues.
- However, a 90% discount for residents living within the area results in the largest loss of revenue equating to \$39.72 million.
- Another significant revenue loss comes with issuing free travel rights for one day a week, which would drain \$33 million, or 22% of estimated annual revenues.

Typically, the mitigation options other than revenue targeting focus on giving away revenue to one form of special interest group or another. The costs of doing this vary, but the result is the same – revenue given to one specific group cannot be shared with another. Targeting special interest groups generally creates more calls for exemptions, weakening revenue streams further and leaving less to invest in or subsidise PT. This would be a significant risk given that PT systems historically require ongoing investment in order to maintain service levels. Using PT as the main distribution mechanism could be seen as spreading the resource across the widest area possible and in the most equitable manner.

8.6 Mitigation options strategies

The output of this project suggests adopting the following sequence of mitigation strategies with the introduction of a road pricing scheme in Auckland:

- 1 The first best option is to run a 'clear' scheme with no mitigation strategies other than revenue targeting. All net revenue earned should be recycled into the Auckland transport system and balanced between investment in roads and passenger transport.

Focus group participants felt strongly that the scheme should be introduced in a universal manner, had mixed views feelings on exemptions and that revenue be applied to the region's transport system. This is consistent with overseas experience.

- 2 As with 1, but provide emergency services with discounts – this exemption was easily understandable by focus groups.
- 3 Provide residents living within the area with discounted travel, with the level of discount not approaching a full exemption in the first instance.
- 4 Target institutions caught within the road pricing area, such as hospitals and rest homes.
- 5 As a last resort, consider introducing incentives, rewards and/or travel rights.

A theme running through the focus groups was that interventions such as those listed in 2 to 5 should be delayed for two to three years to allow the road pricing scheme to establish itself and to allow mitigation needs to be genuinely assessed. The issues of equity and fairness were focussed around abuse of the scheme and universality, with many seeing the scheme being difficult to enforce if exemptions were introduced too early. From a strategic point of view, having options in reserve over the first three years of the scheme will would provide policy makers with flexibility to adapt to changing road user perceptions and behaviour responses to the scheme.

To achieve the right balance in any scheme, careful research and planning needs to be undertaken to find both the optimum charging level that generates revenue and also changes travel behaviour.

8.7 Applying mitigation options

If it becomes necessary to apply mitigation options, such as those listed in 3 to 5 above, then the technology, as it was described in the charging mechanisms work undertaken for this project, enables selectivity to be built into the system. The technology choice adopted (using a combined number plate and tag based system) was in part due to the flexibility that it provides for current and future exemptions and special conditions.

A system incorporating tags provides a more reliable and efficient means of processing transactions cost-effectively, allowing operators to implement special charging regimes based on multiple points, trips or routes (e.g. Stockholm's through traffic exemptions). The tag issuing and management process also provides for increased flexibility, to issue tags to individuals through an auditable process, separated from a specific vehicle, and to provide a tangible device as a basis for recording trips, or assigning credits or discounts efficiently and securely.

Tag based systems also provide the potential for future integration with other payment systems (e.g. integrated PT payments) in order to facilitate the assignment of charges, credits, exemptions and discounts across modes.

8.8 Key messages

If adopting a congestion based scheme then the following should be considered:

- Keep things simple. The scheme should be introduced in as pure form as possible, with no initial exemptions or other mitigation options applied. Ease of understanding, fairness and a settling in period for the scheme are considered important factors to its sustainability. A trial period may also be considered in a similar fashion to that used in Stockholm.
- Concentrate on PT first. This is seen as the most important initiative by the focus groups. This is reinforced by the literature on social acceptability and behavioural economics, which indicates that prior to scheme introduction, investment in PT is needed and that PT services need to be seen as reliable before behaviour change can be considered.
- Investment in walking and cycling facilities within the charged area should also be considered a priority. The responses from the focus groups also suggested that the congestion charge would encourage people to find employment closer to home and/or consider working from home. Therefore, strategically targeted walking and cycling investment around other urban centres may also assist with changing travel behaviours.
- There are no significant barriers to other responses, such as carpooling and changing travel times. Pricing would provide increased incentives in support of these responses.
- There were strong views in opposition to exemptions amongst the focus groups. The reasons for opposition include concerns over possible scheme abuse and the people most in need of exemptions being able to reorganise themselves around the peak times. If scheme exemptions need to be considered then the implementation mechanism is known – target institutions in the first instance and use tags to administer exemptions.
- Building free days into the scheme could work however there would be significant loss of revenue from the scheme. There was no strong alignment to the concept amongst the focus groups, but again, there is an avenue to implementation through the use of tags. Staggering free days amongst households in certain areas may also provide an incentive to car-pool.

All of the above points are also applicable to a revenue scheme, however the issues are less difficult (and important) to resolve because the charge is too low to have any meaningful impact upon travel behaviour.

Appendix 1: Key assumptions

The following is a list of key assumptions made during the course of the project.

- People most affected would be low income or middle income households
- People who worked would be more affected than those who didn't due to having specific work hours
- There will be 59,015 households inside the boundary of the pricing scheme in 2016

Mitigation cost assumptions

Mitigation measure	Estimated maximum cost
Residents within area get 10% discount	\$4.4m (2016)
Emergency services get 100% discount	Minimal cost
One day of free travel per week	\$32.8m (2016 area scheme)

10% resident discount

There are an estimated 59,015 households within the area in 2016. If we assume that 48% of them travel five days a week, 52 weeks a year then the total cost of the discount will be \$40m.

Assumption	Value
Households inside boundary (2016)	59,015
Median % of impacted households inside boundary	48%
Trips per annum	5 trips per week
	52 weeks per year

Households	Households impacted	Trips per annum	Discount	Cost of discount per trip	Total cost
59,015	28,327	260	10%	\$0.60	\$4,419,043

Free trips for emergency vehicles

The assumption is that emergency vehicles make up a tiny proportion of the total amount of traffic that there would be minimal impact on the revenue.

One day of free travel per week

To calculate the cost of one free day of travel per week the first year's revenue of \$164m was divided by 5 to approximate 1 in 5 days being free.

First year revenue	Free days per week	Costs of one free day
\$164,000,000	1	\$32,000,000

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