WORKING PAPER

The Congestion Question

Could road pricing improve Auckland's traffic?

Workstream 2

Tariff policy

August 2019

Working draft vC

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1 Introduction

1.1 Purpose

Following the completion of the comprehensive short-list evaluation exercise and the provision of advice to decision-makers, the next phase of the TCQ project is to refine the City Centre Cordon and Strategic Corridors options as they were recommended to be taken forward for further detailed investigation and analysis. A more focused approach will allow the Project Team to iterate and improve the two preferred options, as opposed to the comparative evaluation undertaken in Phase II.

This note updates the previous tariff policy workstream for the two short-list options and provides some recommendations on the starting tariffs required to undertake the next round of traffic modelling. Following on the from the preliminary tariff policy, the paper outlines the main elements and features underpinning the development and design of the preferred tariff policy including pricing, review process, vehicle classification and discounts/exemptions. The important interaction between the tariff policy and social considerations is also discussed.

1.2 Short-list evaluation – summary

1.2.1 City Centre Cordon

The City Centre Cordon, where vehicles are charged to enter and exit a cordon covering the city centre during congested periods, covers a small area and has a limited impact on network performance, mainly targeting home to work (commuting) trips. Small scale and proven technology translates into low technical, implementation, operating, and privacy risks. Equity impacts are likely to be modest because of the small number of trips impacted and wide availability of public transport alternatives for travel to the city centre. For these reasons, along with its comparability to international schemes and potential for public acceptability, this option presents a potential low-risk starting point for introducing congestion pricing.

1.2.2 Strategic Corridors

The Strategic Corridors option, where vehicles are charged to travel on congested corridors during congested periods, is the most targeted option and generates meaningful, region-wide network performance benefits and congestion relief. The option has low technical implementation and operating risks because it is relatively simple to develop, operate and manage. For a large scheme, there are limited privacy concerns because it only requires the collection of automatic number plate recognition (ANPR) image data to match vehicles with charging locations. The estimated average change in financial costs for households are broadly similar by location, and as the scheme targets congested routes, boundary effects are not anticipated.

2 Tariff policy workstream

2.1 Tariff principles

The development of a preliminary tariff policy for the purposes of the TCQ was undertaken by the Project Team in early 2018. Based on insights from the economics literature and real-world considerations

derived from a review of international congestion pricing schemes, the study found that an optimal tariff policy for Auckland will reflect sensible trade-offs between improving network performance as a result of modifying travel patterns, the need to ensure charges are workable and the requirement to minimise adverse social impacts.[1] To achieve these goals, congestion charges in Auckland should be based on the following principles:

1. Be effective in terms of generating sustainable improvements in network performance.
2. Be flexible to achieve target levels of service by time and location.
3. Target travel in congested conditions.
4. Target travellers with potential alternatives and discourage lower value discretionary trips.
5. Support functionality to ensure tariffs can be regularly reviewed to continue to generate target levels of service.
6. Vary for different vehicle classes according to the contribution they make to congestion.
7. Be technologically achievable, cost effective, practical and efficient.
8. Be understandable and avoid undue complexity.
9. Have minimum exemptions and discounts to avoid undermining the efficacy of the scheme.
10. Support ability to spatially extend and modify the scheme.
11. Support the requirement to promote fairness and minimise adverse social impacts.
12. Support liveable communities and improve urban, environmental and safety outcomes.

2.2 Steering Group recommendations

On 19 April 2018, the Steering Group approved the preliminary TCQ tariff policy. The paper included the following recommendations:

1. Confirm that the Short-list Options should be modelled and evaluated with a time and spatially based tariff, aimed at generating a defined level of service to improve network performance, subject to practical limitations.
2. Confirm that the Short-list Options should be modelled and evaluated with two tariff options, being: a one-off charge per trip OR a distance-based charge per trip, subject to practical limitations.
3. Direct the Project Manager to establish the starting values for the preliminary two charge levels, by reference to the Stockholm and Gothenburg congestion pricing schemes.
4. Confirm that that the Short-list Options should be modelled and evaluated to establish the magnitude of the preliminary charges.
5. Direct the Project Manager to review the preliminary modelling results and modify the preliminary Tariff Policy accordingly.
6. Direct the Project Manager to employ the preliminary Tariff Policy to support the evaluation of the Short-list Options, including the Social/Equity and Practical evaluation.

[1] *Tariff Policy Development*, Briefing note, TCQ Project Team, (May 2018).

2.3 Updated tariff policy

An updated tariff policy is required to support the Steering Group to further develop and assess the two preferred short-list options. The exercise to update the previous tariffs is supported by insights gained from the detailed network and social impact modelling undertaken as part of the short-list evaluation exercise. Although the main findings from the previous research remain valid, the Project Team now has a better understanding of the absolute charging levels required to generate a meaningful improvement in network performance, and the trade-offs that exist between the structure of the tariffs and their social impact. These matters are examined in the next section, along with an updated discussion on the other parameters that underpin the tariff policy.

3 Key considerations

3.1 Introduction

Articulating and resolving the principles underpinning a practical, effective and fair tariff policy will inevitably require trade-offs and judgements, similar in kind to that faced by all complex public policy exercises. This section discusses a number of key considerations that will underpin the development of the preliminary congestion pricing tariff policy suitable for the Auckland environment. The discussion builds on the preliminary TCQ tariff policy adopted in 2018.

3.2 Tariff structure

The Steering Group, as noted above, previously directed the project team to evaluate the short-list schemes with two tariff options, a one-off charge per trip for the cordon and area schemes, and a km-based charge for the corridor and network options. Although the tariffs selected reflected practical considerations around the analysis tools available, the modelling generated sensible results that demonstrated that both tariff options were potentially viable.

3.2.1 Point-based charges

All the international cordon congestion pricing schemes reviewed, with the exception of London, levy point-based charges for vehicles detected crossing a boundary in both inward and outward directions. The Singapore ERP, which is a combined cordon/corridor scheme, also employs a point-based tariff, where vehicles are automatically charged whenever they pass a roadside charging point.

Point-based charges can also vary by time and location, and can be set using an administrative process or adjusted using a rules-based approach to achieve a network performance target. These permutations are discussed in more detail below. Point based charges are compatible with ANPR technology platforms, and so are cost effective and can be easily implemented without requiring the installation of in-vehicle hardware.

3.2.2 Access-based charging

An access-based tariff represents a variation on a point-based tariff, where every vehicle faces the same charge regardless of the location of the chargeable event. In addition, unlike a point or distance-based tariff, an access charge tariff is not cumulative, no matter how many times a vehicle is detected by the

roadside infrastructure within a given defined window. An access charge could vary by time to help create incentives to avoid travel during peak periods. Similarly, an access charge could vary by location, noting that this would add complexity to both administration and communication regarding the charge.

An access charge is typically linked with the implementation of an area based congestion scheme, but in theory it could also be compatible with a cordon or corridor based scheme. Internationally, London is the only the jurisdiction that has implemented a flat access charge, from 0700-1800 weekdays (except public holidays), to support its area based charging scheme.

3.2.3 Distance-based charging

Distance or km-based charging seeks to link the consumption of road space with a charge that varies by distance travelled by a vehicle. No jurisdiction has implemented km-based congestion charges, but in theory, distance-based tariffs could also vary by time and location. Distance based charging ideally needs to be supported by the installation of in-vehicle hardware supplemented by an ANPR enforcement regime. The on-board units (OBUs) determine a vehicle's location based on receiving satellite signals, and record time and position data, which is then processed into trip data and transmitted via wireless communications to a central server for matching to a pricing scheme for charge generation.

The Phase II evaluation exercise found that the Regional Network option which requires the installation of in-vehicle units had the lowest estimated benefit-cost ratio because of high capital and operating costs, and with no international precedent, the scheme had the highest technical risk of all the short-list options. [2]

It is potentially possible to apply a distance-based charge to a corridor-based or network congestion pricing scheme that relied solely on an ANPR system [3], but this approach would be problematic because:

1. Distance-based charging would require an extensive network of charging sites, with potentially high error rates, vulnerable to legal challenge.
2. Distance-based charges disproportionality penalise longer commuter trips and could be seen as punitive and more in the nature of a revenue instrument.
3. Distance-based charges favour shorter trips potentially undermining scheme effectiveness.

Cordon schemes, like the option developed for the Auckland City Centre, are not compatible with distance-based congestion charges.

In the context of social impacts, a distance-based charge is likely to amplify adverse social impacts because lower income households are disproportionally located in outer suburbs. This could potentially be addressed through a daily charging cap, discussed in more detail below.

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[2] *Evaluation of shortlist of road pricing options for Auckland: practical considerations*, D'Artagnan Consulting, (2018).

[3] Under this scenario vehicles would incur cumulative charges each time they pass a charging staging station. Depending on the design this could generate charges that approximate a distance-based charge.

3.3 Administration versus rules-based

The international review found that most pricing schemes adjust prices irregularly through an administrative process which reflects several factors including revenue, network performance, affordability and political considerations. London has increased prices four times over 14 years and Stockholm only once in 10 years. The fact that charging levels change so infrequently makes these schemes easy to understand. However, the disadvantage with an administrative approach and infrequent price changes is that it may erode the link between the charges and the goal of improving network performance. This is particularly important if service levels deteriorate in the face of increasing traffic volumes, as in the case of the London scheme. While in Stockholm, recent price increases reflected a motivation to increase scheme revenues which had the effect of undermining public support. By contrast, the initial Stockholm tariffs were set to improve network performance by reference to extensive traffic modelling.

The only jurisdiction to adopt a strict rules-based approach to setting tariff levels is Singapore which reviews and adjusts prices for individual links every three months to ensure speeds on the routes that are charged are managed within a range of 45km/h-65km/h for expressways and 20km/h-30km/h for local streets (based on an 85th percentile of speeds sampled). If speeds are too low at specified charging points (prices vary by charging point and direction of travel), prices will be raised at the times of congestion. If speeds are above the target, it is assumed that the ERP is suppressing traffic demand excessively, so prices are incrementally reduced. This helps ensure that charge rates are not too high for the travel time savings obtained (so do not price away economically valuable trips), and overall the Singapore approach means that a minimum standard of network performance is assured.[4]

The Singapore model also helps build public acceptability because those paying the charge receive a target level of service resulting in improved network conditions, and by reducing charges in some circumstances it dispels concerns that the scheme exists primarily to generate revenue.

3.4 Time bands

The international review found that most pricing schemes adjust prices according to time bands that range from 30 minutes to five hours. Experience in Singapore, Stockholm and Gothenburg indicate that having a graduated series of steps in charges up to a peak rate (and down again) helps to spread demand. Gothenburg reported that the charging scheme has spread demand to a "fairly even level" during charging hours and Stockholm reported that the different charge levels had a traffic smoothing effect. The area scheme in London by contrast levies a single charge for an entire day. This generates a perverse incentive for traffic to undertake numerous trips within the charging zone (e.g. delivery vehicles) because it is the same price for circulating for the entire day as it is for one trip.

[4] ERP charges at three gantries were recently removed during the morning peak in response to higher travel speeds. https://sg.news.yahoo.com/erp-charges-three-gantries-removed-peak-morning-hours-125315512.html

3.5 Direction of travel

Traffic congestion is usually related to the direction of travel, with most cities characterised by a pattern of slow conditions during the 'incoming' city bound AM peak, and the 'outgoing' suburb bound PM peak. It is therefore sensible to consider adding the direction of travel as a metric to assist in tariff setting. In this context, trips in the congested direction are discouraged through higher charges while those travelling in the uncongested direction should enjoy a lower (or zero) tariff.

In Singapore, in addition to the use of time bands, charging rates (set by the required levels of service) can vary by the direction of travel. When considered alongside its other features, the ERP is now seen as the most sophisticated and effective road pricing solution, as each charging point has its own price schedule based on time of day, direction of travel and even day of the week (some operate on Saturdays).

3.6 Charging caps

3.6.1 City Centre Cordon scheme

The application of a point-based charge (potentially with different tariffs for different time periods) is straight-forward in the case of a cordon charging scheme. Nevertheless, a potential issue that arises is where motorists undertake multiple trips across the cordon points both within and across different time bands.

In the case of the Stockholm and Gothenburg cordon congestion pricing schemes, this matter is addressed through the application of a daily maximum charge per vehicle. In Stockholm the daily charging cap is set at SEK 105 (NZD $17) representing approximately three peak period trips depending on the exact time of travel, noting that the scheme operates between 06:30 and 18:30 on week days.

The introduction of daily maximum charges helps to mitigate excessive negative financial impacts for travellers who have a limited ability to switch modes, change departure times or defer their travel. Daily caps may also be a sensible response for commercial vehicles required to undertake numerous trips as part of their business activities such as couriers. Like discounts and exemptions, discussed below, daily caps add administrative and technological complexity in reliably identifying eligible accounts and ensuring details are accurate if circumstances change. By contrast, Singapore does not apply daily caps for private or commercial vehicles, noting that this would be difficult to achieve because the ERP system is based on pre-pay accounts which are deducted each time a vehicle is detected by a charging point.

3.6.2 Strategic Corridors scheme

The situation where motorists face multiple charges (and potentially tariffs) over the course of a single journey or a day also arises in the case of a Strategic Corridors scheme. And because it may be preferable to avoid creating a situation where motorists incur cumulative charges it may be necessary to develop some charging rules to preserve the intention of the tariff policy and mitigate adverse social impacts.

By contrast this issue is ignored by Singapore, the only jurisdiction that operates a corridor-based scheme. Under the rules implemented by the ERP system, vehicles that undertake longer journeys will incur multiple and cumulative charges (including those that take place over different time periods).

In the context of Auckland, daily caps could be implemented in keeping with the Swedish approach, or even used in conjunction with more sophisticated tariff rules to address the situation where vehicles incur multiple charges.

There are many possible variations and trade-offs with potential daily charging caps. However, the final tariff policy adopted should avoid undue complexity and must be well designed to ensure scheme objectives are met and any unintentional travel and network impacts are minimised. At this stage it seems likely that an arrangement that caps daily charges is sensible and would support the objective to minimise negative equity impacts.

3.7 Vehicle classes

The international review undertaken by the TCQ found that congestion charges in Stockholm, Gothenburg, and London do not vary according to vehicle classes, but Singapore has a differentiated charging structure based on Passenger Car Unit (PCU) equivalents as follows:

1. Cars, taxis and light goods vehicles are 1PCU.
2. Motorcycles are 0.5PCU; heavy goods vehicles and small buses are 1.5PCU.
3. Very heavy goods vehicles and big buses are 2PCU

There are legitimate grounds for why a space-related adjustment should be used because it helps capture the consumption of road space by a vehicle and therefore its contribution to congestion. Differentiated tariffs for vehicle classes are often employed by toll facilities, including New Zealand's three toll roads.[5]

The other consideration is that any adjustment needs to be fair and administratively simple. In this respect the Singapore approach appears sensible and could be readily adapted to the Auckland environment, noting that the short-list evaluation exercise assumed that motorcycles would be exempt on the grounds that they make a minor contribution to congestion in Auckland.

3.8 Exemptions and discounts

Internationally, congestion charging schemes grant exemptions or discounts to particular groups of vehicles. Examples include:

- Emergency vehicles are universally exempt.
- Buses are exempt in all schemes except Singapore because there is no demand response expected from them and they help to reduce congestion.
- Motorcycles and scooters are exempt from the London and Stockholm schemes.
- London has a long list of discounts and exemptions including resident concessions and taxis. Due to the relatively high proportion of taxis in the charging zone, this means that approximately half of traffic circulating in central London does not pay the congestion charge. The approach adopted by London has dramatically undermined the effectiveness of the scheme in managing

[5] https://www.nzta.govt.nz/roads-and-rail/toll-roads/toll-road-information/tolls-and-fees/

congestion, so it will be important to be careful about applying discounts and exemptions to maintain scheme credibility. [6]

3.8.1 Buses

Public transport is intended to reduce private vehicle use, reducing demand for the road network. Buses are therefore recommended to be exempt from charging. It would be reasonably straightforward to exempt all scheduled bus services, which would include council funded passenger services and school buses, as there are good records of the vehicles providing these services. The complication arises when these vehicles are performing other activities such as charter services.

As well as public bus services there are also a wide range of private transport services that carry multiple passengers and contribute to reduced congestion. These include commercial shuttle services, private shuttles carrying workers to job sites or students to schools, and those that carry hotel guests to the airport or similar locations. It would be possible to extend the exemption for public transport to private services that are effectively substituting for more than one private motor car trip.

Given the relatively small size of the wider bus fleet, an appropriate measure is to simply extend the exemption to all vehicles defined as having more than nine seating positions (including the driver's seating position), regardless of ownership. This is a standard vehicle attribute recorded on the New Zealand motor vehicle register.

This is a practical way to ensure that large passenger vehicles are not charged and continue to help to reduce congestion. The potential for this exemption to undermine the efficiency of the scheme is negligible given the number of vehicles that would be exempted compared to the wider Auckland vehicle fleet of 1.2 million vehicles.

3.8.2 Other considerations

Discounts and exemptions can be used to mitigate excessively negative impacts upon road users who are not the target of a congestion pricing scheme (eg drivers with mobility impairments). However, discounts and exemptions add costs to any scheme, as they add administrative and technical complexity in reliably identifying eligible vehicles and ensuring details are updated for such vehicles if circumstances change. Measures need to be taken to minimise fraudulent applications for discounts and exemptions and gaming of the system. While not a driver for TCQ, discounts and exemptions will also reduce scheme revenue.

3.8.3 Recommendations for Auckland

The recommended exemptions for Auckland are:

- Emergency vehicles
- Buses (defined as having more than nine seating positions including the driver's seat)
- Motorcycles and scooters on the grounds that they make a minor contribution to congestion

[6] *Review of International Pricing Schemes, Previous Reports and Technologies for Demand Management*, D'Artagnan Consulting, (2017)

- Mobile machinery (eg forklifts, tractors), on the grounds that they make a minor contribution to congestion.
- Non-powered vehicles such as trailers, on the grounds that to be contributing to congestion they will be attached to a powered vehicle that is already subject to the charge.
- Other minor vehicle classes may be considered for exemption (eg military vehicles) as the scheme policy is refined during detailed design.

3.9 Social and equity considerations

The consideration of social and equity impacts is important to the development of an optimal tariff policy for Auckland. The social impact of potential mitigation measures and targeted expenditures, such as increased public transport services, is also likely to have an impact on the final shape of the tariff policy.

The social assessment, undertaken as part of the short-list options evaluation, developed a spatially based model which uses Statistics NZ data and outputs from the Auckland Macro Strategic Model (MSM) to estimate impacts on households from congestion pricing. Although the model only focusses on financial costs and ignores travel benefits, the results were informative:

- In line with international evidence, all the short-list options generate higher absolute costs for high income households, but higher costs as a percentage of income for low income households.
- Business impacts are generally positive because overall travel costs decline.
- The scale and distribution of financial impacts across households depend on the spatial coverage of the scheme and the location and number of trips impacted.
- Overall financial and spatial impacts of the City Centre Cordon are likely to be modest because of the small number of trips impacted and wide availability of public transport alternatives.
- The Isthmus Area option results in disproportionate financial impact on Isthmus based households.
- For the two larger schemes which modelled a distance-based tariff, the distribution of financial impacts reflected travel patterns and household compositions across Local Board Areas.
- Distance-based charges are likely to generate negative equity impacts given the location of many lower socio-economic households in car-dependent outer suburbs.

The final tariff policy will need to be informed by the refined social assessment which will be conducted for the two preferred short-listed options once the outputs are generated from the next round of the MSM modelling undertaken by the Auckland Forecasting Centre (AFC).

3.10 Practical considerations

Practical considerations in the context of the tariff policy are concerned with technical feasibility, enforcement, risk and public acceptability.

Previous work undertaken on behalf of the Project Team as part of the short-list evaluation, found technical considerations support the adoption of a tariff structure that can be implemented and enforced with an ANPR based charging network, a proven technology with low technical, implementation,

operating, and privacy risks.[7] Other practical considerations are that charges should be readily understandable and avoid undue complexity. Undue granularity and excessive changes will raise legitimate concerns and public opposition.

Public acceptability can be viewed as part of practical considerations and is an important factor in the overall evaluation of a potential congestion scheme. This has many elements including social and equity impacts, the use of revenues and technology platform adopted. Another important aspect is that ideally charges should only be levied for trips undertaken in congested conditions. This supports the use of a rules-based approach, with time, location and direction of travel metrics used to estimate price levels.

In keeping with the range of other considerations discussed above, the development of the refined tariff policy will be required to evaluate explicitly its contribution to overall public acceptability.

4 Tariff values

4.1 Short-list options evaluation

For the purposes of conducting the short-list options modelling exercise, the Steering Group approved a simple methodology developed by the Project Team to establish the starting peak period tariff values with reference to the Stockholm and Gothenburg congestion pricing schemes. The Swedish congestion pricing schemes were chosen as the best benchmark for Auckland because Gothenburg and Stockholm are comparable in size, household income and characteristics, and all share a constrained geography.

For the Phase II short-list options evaluation exercise, AFC used the Swedish-based starting tariff values. for the AM peak modelling as follows:

1. $4.60 for the cordon/area schemes
2. $0.46/km for the corridors/network schemes

Sensitivity tests on the tariff values were undertaken based on a 50% decrease and 50% increase in the base tariff values. For the distance-based tariff, a 75% decrease was also modelled giving a total of seven different charge scenarios.

The modelling conducted by the AFC during the shortlist assessment used a 2028 baseline scenario, which assumes the improvements committed in the Regional Land Transport Plan (RLTP) have been made to the transport network. The model generated a number of key metrics on network performance to compare the five options against the baseline and observe the relative impact of each option on the network. The following table presents the MSM modelling results for the two selected short-list options for the seven tariffs selected by the Project Team.

The different nature and scale of the short-list options means that strict 'apples with apples' comparisons are not always achievable or appropriate, nevertheless the preliminary modelling demonstrates that

[7] *Evaluation of shortlist of road pricing options for Auckland: practical considerations*, D'Artagnan Consulting, (2018).

meaningful improvements in network performance were achieved with relatively modest tariff levels. The results also demonstrate that higher tariff values displayed diminishing marginal impacts on network performance, noting the inherent shortcomings associated with all transport modelling exercises.

4.1.1 Options modelling results

Results of the seven charge scenarios from the 2018 short-list options evaluation exercise, for the City Centre Cordon option and the Strategic Corridors option are as follows:

TABLE 1 OPTIONS MODELLING RESULTS

	Baseline	City Centre Cordon			Strategic Corridors			
AM Peak only		$2.30	$4.60	$6.90	$0.12/km	$0.23/km	$0.46/km	$0.69/km
Employment accessibility (30min)	281,214	286,748	297,039	298,156	322,241	359,111	378,101	333,359
Congestion (% hours of travel)	34.10%	32.9%	32.3%	31.8%	29.6%	24.8%	15.5%	12.1%
Motorway Congestion (%vkt)	34%	33%	33%	33%	28%	25%	11%	4%
Arterial Congestion (%vkt)	19%	18%	17%	17%	17%	15%	12%	11%
Average speed on network	36.1	36.5	36.8	37.0	37.7	38.5	37.5	35.2
Total vehicle travel (vkt)	6,510,208	6,494,572	6,477,741	6,469,913	6,249,919	6,036,640	5,591,366	5,164,898
PT Mode share	12.4%	12.5%	12.6%	12.6%	12.6%	12.9%	13.6%	14.4%

% changes	Baseline	City Centre Cordon			Strategic Corridors			
AM Peak only		$2.30	$4.60	$6.90	$0.12/km	$0.23/km	$0.46/km	$0.69/km
Employment accessibility (30min)	-	2.0%	5.6%	6.0%	14.6%	27.7%	34.5%	18.5%
Congestion (% hours of travel)	-	-3.6%	-5.4%	-6.7%	-13.2%	-27.3%	-54.6%	-64.6%
Motorway Congestion (%vkt)	-	-2.9%	-2.9%	-2.9%	-17.6%	-26.5%	-67.6%	-88.2%
Arterial Congestion (%vkt)	-	-5.3%	-10.5%	-10.5%	-10.5%	-21.1%	-36.8%	-42.1%
Average speed on network	-	0.9%	1.9%	2.5%	4.2%	6.5%	3.8%	-2.5%
Total vehicle travel (vkt)	-	-0.2%	-0.5%	-0.6%	-4.0%	-7.3%	-14.1%	-20.7%
PT Mode share	-	0.8%	1.6%	1.9%	1.9%	4.0%	9.7%	16.2%

Constraints imposed by the MSM limited the full range and nature of the potential tariffs that could be evaluated during the short-list options evaluation, but the short-list modelling exercise demonstrated that the time and spatial options available were sufficient to assess network performance and support the social, practical and cost benefit analysis (CBA) assessment activities.

4.2 Network performance

Following the logic of a rules-based approach to determining tariffs, a view is required around the level and nature of the improvement in network performance that would be required from the introduction of congestion pricing for the two preferred short-list options. Network performance has many elements and judgement is required as to which parameters a congestion scheme should be assessed against.

In addition, the overall magnitude of the target level of improvement in network performance has to reflect a sensible balance between many factors. In particular, the ability for peak period car trips to realistically respond to congestion charges through mode and time changes and deferred trips will reflect existing travel patterns and transport infrastructure availability within the Auckland region.

International schemes were observed to have demand responses to the introduction of congestion pricing within the range of 15-20% reductions in traffic. However, a more realistic improvement in network performance for Auckland is likely to be more in the order of the 8-11% long term reduction achieved by

Gothenburg, a smaller city with a comparable public transport mode share. Social considerations will also limit the level of network performance that could otherwise be achieved through higher tariffs.

4.2.1 Preferred options evaluation

Overall, considerations around Auckland's existing mode shares, public transport network capacity and social impacts, suggest that the starting tariff values adopted for the AM peak for the next round of modelling should be at the low end of the charges analysed for the short-list options evaluation as follows:

1. $2.30 for the City Centre Cordon scheme
2. $0.12/km for the Strategic Corridors scheme

Another round of sensitivity tests should also be undertaken with an increase in the base tariff values in the order of 100%. This is required to understand the impact of any changes to scheme coverage (as part of the option refinement process) on network performance. This will give two charging levels for each preferred option model run. With these charge levels, the Steering Group can undertake the next round of transport modelling and an assessment of the two refined options. This in turn will form the basis of the refined social, practical and CBA assessments.

5 Recommendations

Since the provisional tariff policy was adopted, the Steering Group has conducted the short-list evaluation which assessed the impact of the options in terms of network performance, practical and social considerations. When considered alongside previous insights from the economics literature and real-world considerations derived from a review of international congestion pricing schemes, the results of the short-list options assessment generally support and endorse the original tariff policy settings.

Going forward, the Steering Group now has the opportunity to refine and improve the provisional tariff policy in preparation for the final stage of the project. A key part of this exercise is the next round of transport modelling which will be conducted on the two preferred options, followed by the refined social, practical and CBA assessments.

To establish the refined Tariff Policy, the Steering Group endorse the following steps:

1. Note the broad tariff parameters, objectives and main findings outlined in this paper.
2. Confirm that the preferred options should be modelled using the starting values established by the short-list options modelling exercise, being:
    i. $2.30 for the City Centre Cordon scheme
    ii. $0.12/km for the Strategic Corridors scheme
3. Confirm that the preferred options should be modelled with two different tariff levels, as determined by the Project Manager.
4. Direct the Project Manager to employ the results from the traffic modelling to undertake the refined social and practical assessments, and the revised CBA.
5. Review the results of the network performance, social and practical assessments, the CBA, and amend the tariff policy accordingly.