Measuring the effectiveness of strategic transport policy packages

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1 Introduction

In most Australasian cities, the trend of urban population growth is continuing, and travellers and businesses are experiencing more traffic congestion, especially during peak-periods. To address the pressure of population growth on urban transport systems, strategic transport policy options are often sought to address sustainable growth objectives. Examples of the strategic options include improvement of bus services and bus priority treatments to better use road capacity; introduction of user charges or road pricing to discourage private car use; and increase of land use density to encourage short-distance travels which could subsequently promote walking and cycling. To meet the sustainable growth objectives, choosing an appropriate strategic option or package of the options in one city is closely related to its urban characteristics and future development strategy, local transport system structure, and transport objectives and targets. The decision of the choice of transport policy options is also related to the implementation cost, alternative funding mechanisms and political and community support. During the assessment process, their effectiveness or the order of the effectiveness needs to be first understood.

This paper discusses how the effectiveness of various strategic transport policy packages can be measured within the context of the Greater Christchurch sub-region in New Zealand. The local authorities in the Greater Christchurch area and Transit New Zealand have adopted the Greater Christchurch Urban Development Strategy (UDS) for the sub-region to address the challenges of population growth over the next 30-35 years, to 2041. But due to recent higher growth projections, concerns have been raised about the existing and currently planned transport system capability to cope with the future transport demand triggered by the land use growth. In seeking the most appropriate strategic transport policy packages, the effectiveness of various policy packages has been assessed to provide guidance on the strategic transport direction for the sub-region. This paper aims to provide an example to assess the order of the effectiveness of various key strategic transport policy packages.

2 The UDS

The Greater Christchurch UDS was developed as a partnership between Christchurch City Council, the district councils of Waimakariri and Selwyn, Environment Canterbury and Transit NZ, and covers principally:

- the location of future population growth areas (intensification and greenfields)
- the location of new or enhanced social and retail centres of activity,
- the location of areas of new or increasing employment, and
- transport servicing and integration.

The Strategy also provides guidelines for the management of how the Strategic Partners, communities, business, Central Government and non-government agencies can work collaboratively to manage growth in a sustainable way.

Some of the key objectives of the UDS were to support more sustainable transport outcomes, including through consolidation of population and employment growth to reduce the need to travel and to make better use of existing transport infrastructure.

The UDS area is illustrated in Figure 1.

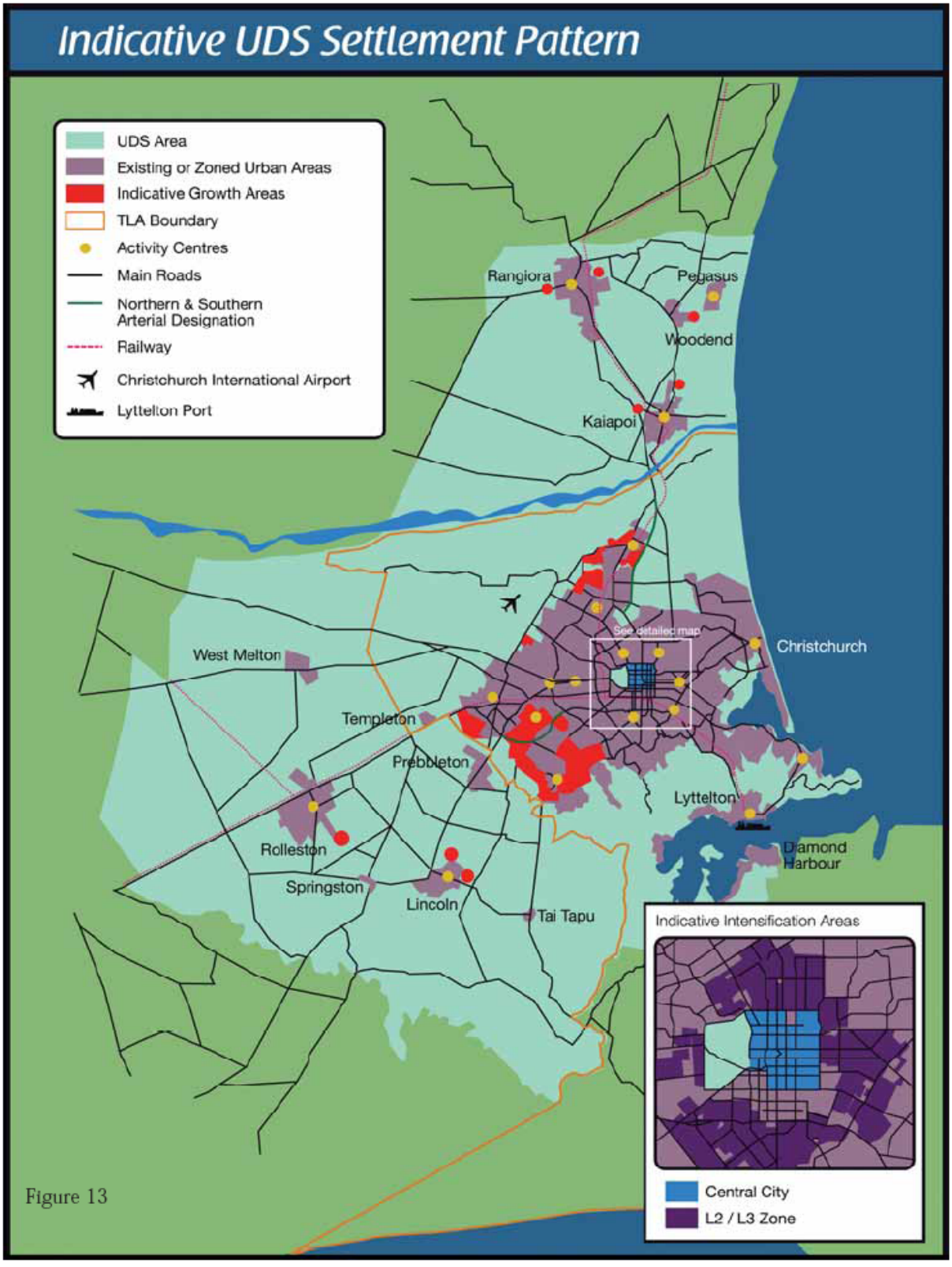

Figure 1 – The Greater Christchurch UDS Area

Sixteen sectors were used to divide the UDS area into analysis zones in this project. According to the preferred UDS growth scenario, households and employment opportunities in the UDS area are expected to grow rapidly over the next 30 years (refer to Table 1). From 2006 to 2026, households are forecast to grow by 30%, with employment opportunities to grow by 18%. The growth in the period between 2006 and 2026 is expected to be higher compared to the later period from 2026 to 2041.

Table 1 – Growth scenario adopted by the UDS[1]

	2006	*2026*	*2041*	*Average Annual Growth Rate*	
				2006-2026	*2026-2041*
Households[2]	164,100	212,900	238,900	1.5%	0.8%
Employment	221,900	260,400	269,400	0.9%	0.2%

The distribution of the projected household and employment growth from 2006 to 2041 is illustrated in Figure 2 and Figure 3. The higher growth in households is forecast to occur around the CBD, and suburban centres in the north, south-west and to a lesser extent, the east; employment is expected to grow in the same broad locations. But the reduction in employment opportunities will also occur at some locations. As the Figures show, the UDS strategy is aimed at ensuring that employment opportunities are located near areas of household growth, to reduce the need to travel.

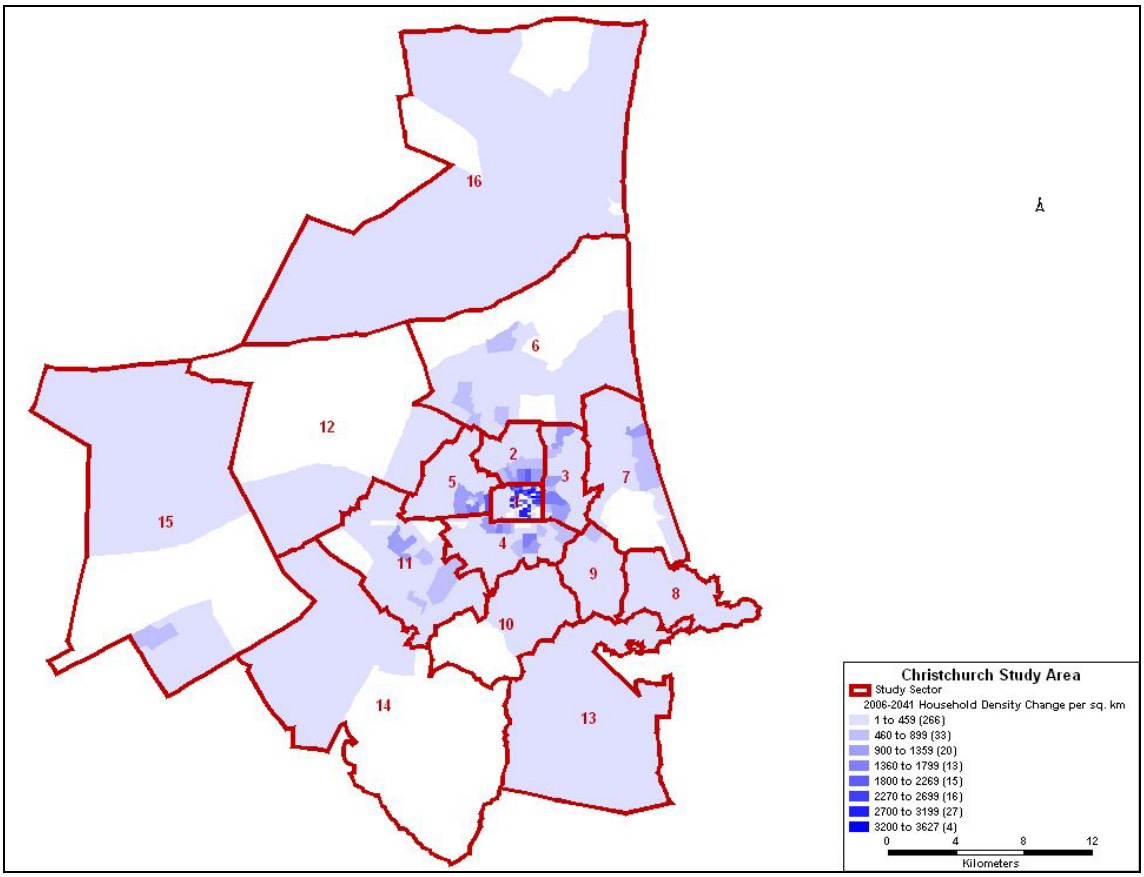

Figure 2 – Distribution of household density changes between 2006 and 2041[3]

[1] Source: Christchurch Transport Study (CTS) models
[2] Households are used as proxy for population in this study
[3] Numbers are the order of the 16 sectors divided into the UDS region

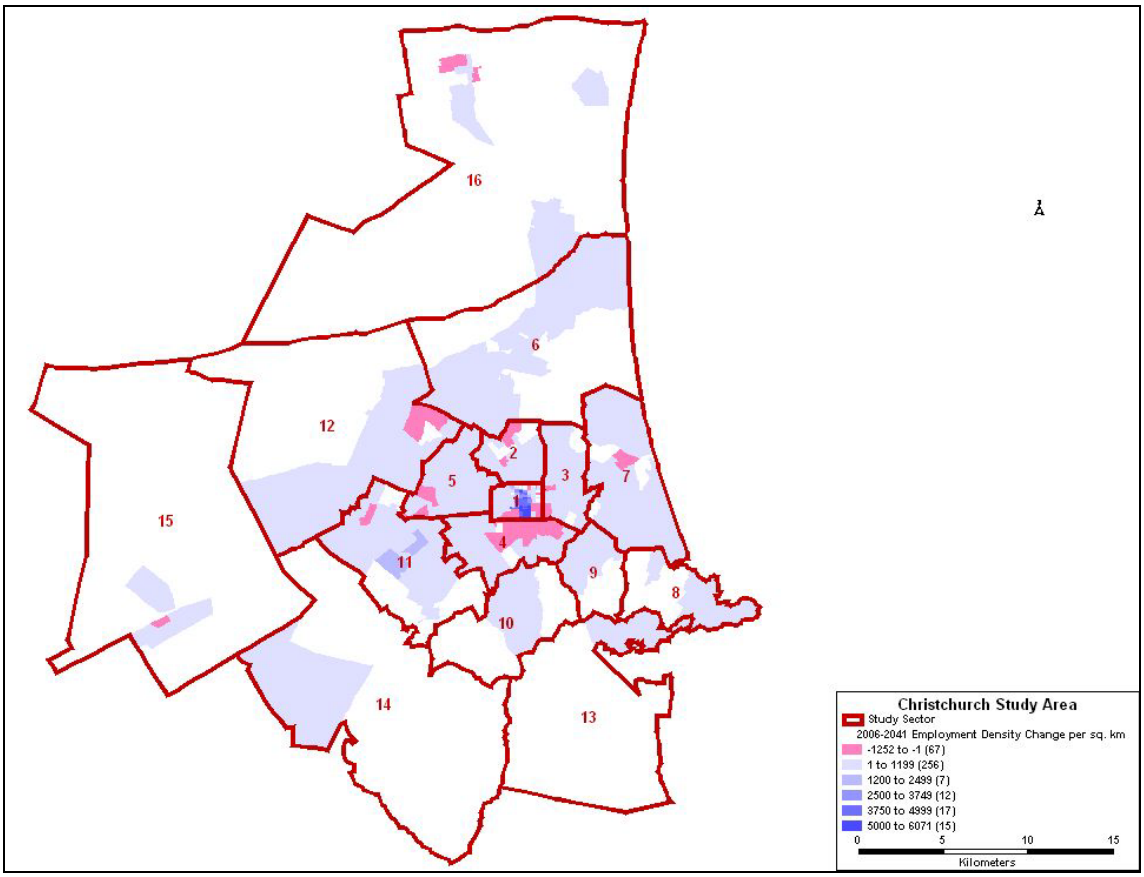

Figure 3 – Distribution of employment density changes between 2006 and 2041

3 The UDS private vehicle travel demand

The Christchurch Transport Study (CTS) model is a standard 3-step traffic model, and forecasts 2026 and 2041 private vehicle travel demand, by taking into account the UDS growth. The model has considered planned future road improvements, but it focuses on the 'car driver' mode only. Therefore, the trip tables derived from the model are only for private vehicle trips, not able to reflect any changes in public transport provision, car sharing, cycling and walking facilities. The private vehicle trip demand discussed below is treated as the base case for identification of the order of the effectiveness of various transport improvement strategies.

As expected, future private vehicle trip demand will increase, commensurate with the forecast household and employment growth. In 2006, the number of private vehicle trips for all purposes totalled 177,680 during the AM peak period (2 hours). In 2026 for the same period, the trips are forecast to grow to 224,860, representing a 27% increase, with a further expected increase to 246,130 trips in 2041 (a further 12% increase). Summary details of the trips by purpose are presented in Table 2.

Table 2 – CTS projected private motor vehicle trips (AM peak – 2 hours)

Trip Purpose	*2006*	*2026*	*2041*	*Average Annual Growth Rate*	
				2006-2026	*2026-2041*
Work	65,250	76,350	78,460	0.9%	0.2%
Other	78,080	95,740	102,960	1.1%	0.5%
External	6,360	9,750	12,300	2.7%	1.7%
Freight	27,990	43,010	52,420	2.7%	1.5%
All purposes	**177,680**	**224,860**	**246,130**	**1.3%**	**0.6%**

4 Road capacity assessment

The road capacity was assessed regarding traffic forecasts indicated by the CTS model, in turn based on the UDS growth projections. From the CTS model, there is a clear directional peaking of private vehicle movements in the morning peak, which is towards Sector 1 (the CBD). To quantify the crossing-sector vehicle demand and identify road capacity deficiencies for the future years, sixteen screen-lines were established, as shown in Figure 4.

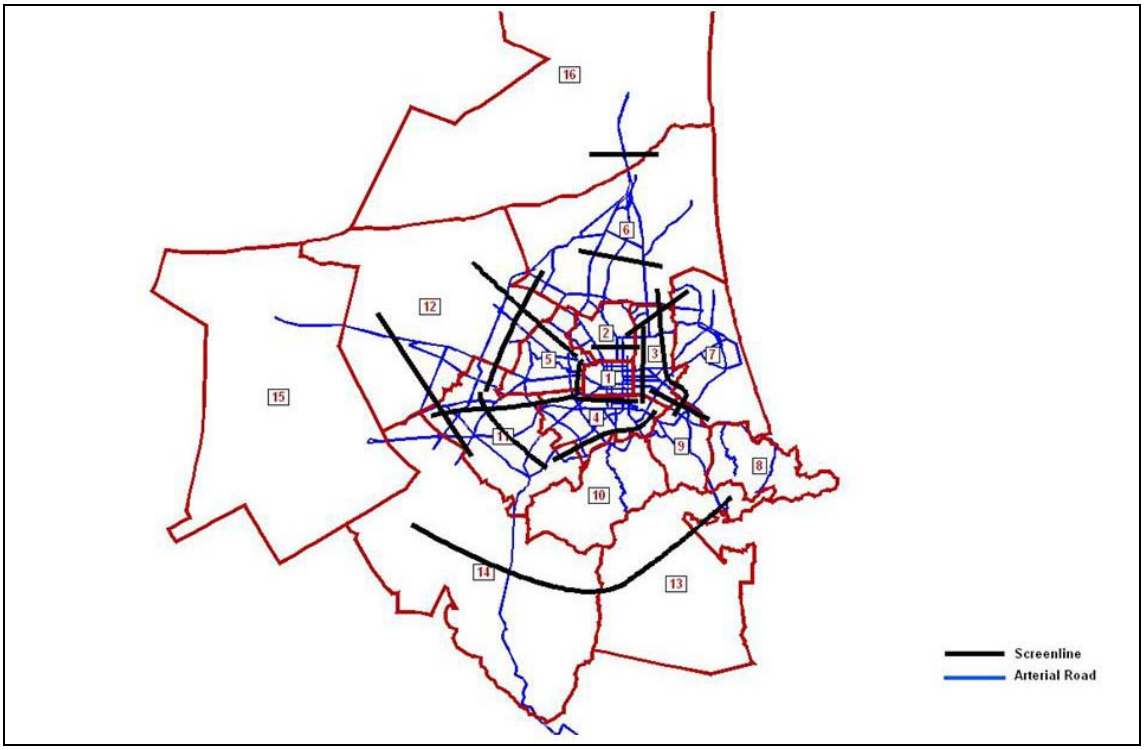

Figure 4 – Screen-lines across the UDS area

The traffic volumes (AM peak, 2 hours) generated by the CTS model with the assumption of status quo (2006) modal share on arterial roads were analysed for the AM peak period for each design year across the respective screen-lines. It is expected that the level of private vehicle demand across these screen-lines will grow across the UDS area, commensurate with forecast changes in land use. The 2041 AM peak capacity (2 hours) across the screen-lines was estimated based on the pattern of arterial roads and motorways crossing each respective screen-line. A capacity of 900 cars per lane per hour for interrupted flow on urban roads, and a capacity of 1,800 cars per lane per hour for motorways, were adopted for use in the broad-brush capacity estimation, and a factor of 1.7 was then applied to convert the

hourly capacity into an equivalent 2-hour capacity to reflect the peak period demand distribution. The assumptions of road capacity improvements made in the CTS model have been included in the capacity estimation. The comparison of the AM peak vehicle demand with the 2041 AM peak road capacity is presented respectively in Table 3 for the travel towards the CBD.

Table 3 – Screen-line demand and capacity comparison towards the CBD (2hrs)

Corridor	*AM Peak Vehicle Demand*			*AM Peak Capacity*	
	2006	*2026*	*2041*	*2006*	*2026/2041*
East Corridor					
Screen-line 1	8,740	9,930	10,190	7,650	9,180
Percentage of capacity	114%	108%	111%		
Screen-line 2	12,020	13,370	13,440	12,240	13,770
Percentage of capacity	98%	97%	98%		
North Corridor					
Screen-line 1	10,330	11,610	11,730	9,180	12,240
Percentage of capacity	112%	95%	96%		
Screen-line 2	5,880	7,830	8,960	4,590	12,070
Percentage of capacity	128%	65%	74%		
Screen-line 3	8,040	10,700	11,550	9,010	9,010
Percentage of capacity	89%	119%	128%		
West Corridor					
Screen-line 1	6,650	7,300	8,650	9,180	9,180
Percentage of capacity	72%	80%	94%		
Screen-line 2	4,550	5,420	5,720	10,710	10,710
Percentage of capacity	42%	51%	53%		
Screen-line 3	5,790	6,560	7,350	7,650	15,130
Percentage of capacity	76%	43%	49%		
South Corridor					
Screen-line 1	8,190	9,440	10,290	12,240	12,240
Percentage of capacity	67%	77%	84%		
Screen-line 2A	5,480	8,980	10,530	7,650	16,660
Percentage of capacity	72%	54%	63%		
Screen-line 2B	5,530	6,480	6,810	9,180	10,710
Percentage of capacity	60%	61%	64%		
Screen-line 3	2,100	2,330	2,360	4,590	4,590
Percentage of capacity	46%	51%	52%		

The road service level with LOS D (in which the volume/capacity ratio is not greater than 81% of the capacity), is a satisfactory target for the future road system performance. Based on this criterion, the following excess vehicle demand in Table 4 needs to be addressed through measures such as diversion to other modes, partially redistributed/re-routed, moved to another time period or otherwise managed with potential strategic policy packages.

Table 4 – Vehicle demand reduction required to achieve road LOS D

Corridor		*AM Peak Vehicle Demand*		
		2006	*2026*	*2041*
East Corridor				
	Screen-line 1	2,540 (29%[4])	2,500 (25%)	2,750 (27%)
	Screen-line 2	2,110 (18%)	2,210 (17%)	2,290 (17%)
North Corridor				
	Screen-line 1	2,890 (28%)	1,690 (15%)	1,820 (15%)
	Screen-line 2	2,160 (37%)	-	-
	Screen-line 3	740 (9%)	3,400 (32%)	4,250 (37%)
West Corridor				
	Screen-line 1	-	-	1,220 (14%)
	Screen-line 2	-	-	-
	Screen-line 3	-	-	-
South Corridor				
	Screen-line 1	-	-	370 (4%)
	Screen-line 2A	-	-	-
	Screen-line 2B	-	-	-
	Screen-line 3	-	-	-

The above screen-line capacity analysis suggests that:

- The future traffic demand according to the UDS, will exceed road capacity on the two screen-lines along the eastern corridor, even with the proposed, albeit few, road widening projects for 2026 and 2041.
- The screen-lines along the northern corridor will also face over-capacity issues.
- The screen-line 1s around the CBD will all have capacity constraints in 2041.
- Alternative strategic policies or measures are needed to address the over-capacity private vehicle demand towards to the CBD in the AM peak period.

5 Strategic transport policy package development

The regional transport implementation plan (the Canterbury TRIP 2008-2038) developed for the study area proposed a range of transport infrastructure and service improvements designed to accommodate the growth in future transport demand. Given the results from the CTS model analysis, which has incorporated most of the improvements in the TRIP plan, the vehicle travel demand will exceed the future road capacity across some of the screen-lines. There is a desire in the UDS partners responsible for the transport system that, instead of managing the issue by simply increasing road capacity, there is a need to identify a range of transport policy options on a strategic level to accommodate future travel demand in a more sustainable manner under the preferred UDS growth scenario. The policy options are expected to encourage modal shifts, trip reduction, and travel modifications from the 'car driver' mode. This paper only presents strategic policy packages, not individual policy

[4] Equivalent to the percentage of capacity

options, and focuses on the effectiveness of the packages, the order of the effectiveness in particular, using the elasticity technique.

5.1 Elasticities

Transport elasticities are measured in a ratio of the proportionate change in demand for a particular mode to the proportionate change in the infrastructure and service provision of its own mode or other relevant modes or policy factors. They were adopted in this study to overcome general limitations in travel demand models including the current CTS travel modes to model the changes of travel demand in response to changes in various transport policy instrument and improvement packages.

The elasticities applied are referred to as point elasticities as collected from literature review and presented in Table 5. As the result, there is some uncertainty to be recognised in their usage. They may not be reliable when potentially large scale changes of policy measures are considered. For example, the effects of an increase in CBD parking costs on car travel demand to the CBD can be assessed in terms of a price elasticity which leads to a reduction in car travel to the CBD. But this does not explain the consequential overall potential travel impact changes. The use of the cross-elasticity can predict the shift to public transport, but it explains only part of the shift. It is likely that that remaining shift from car travel would be a combination of changes in destination choice, shifts to other modes (cycling and walking), changes in time of travel, a reduction in discretionary travel, and increases in trip chaining.

The focus of this paper is to assess the relative effectiveness of individual policy and service provisions in packages on a strategic level. Therefore, instead of focusing on the exact merits of each policy measure which could be potentially hindered by the transferability of elasticities derived from other regions in the world, this study was to provide the order information of the effectiveness of each package to help assess which package is more effective than the others.

As indicated in Table 5, the proposed strategic policy or measures mainly focus on those having primary effects on modal shifts. It is acknowledged that there may be other options which have minor impacts on transport mode usage but lack of their quantified effects is an issue for including them in this effectiveness analysis. Some of the policy options studied here such as introducing congestion charges are only relevant to transport corridors or a local area such as the CBD, while others such as increasing fuel prices would affect the UDS area as a whole.

6 Strategic transport policy package assessment

The packages seeks to slow down the growth of private vehicle usage in the respective peak hours, coupled with promoting sustainable mode use such as public transport, cycling and walking, in response to the travel demand growth attributable to the UDS land use growth. In defining the packages, the aim was to group the policy options with similar policy implications. This approach is intended to generate optimal and integrated overall transport system outcomes, and to simplify package implementation by policy makers.

Three packages have been developed with assumptions of base case values: pricing ('push' package), traffic demand management ('pull' package) and alternative modes ('encouragement' package). As more than one policy is included in each package, there is a cumulative effect of one policy on another in the elasticity calculation. Therefore, the effectiveness of a package should be greater than the linear addition of the effectiveness of each policy when it is individually applied. In a package, the same levels of change of policy instruments or measures are assumed to limit the levels for the assessment.

Table 5 – List of strategic options and their elasticities

Strategic Option	*Elasticity (long run)*	*Change attribute by*					
		2%	*5%*	*10%*	*15%*	*20%*	*50%*
Impact on private motor vehicle mode share change percentage							
Increase fuel prices	-0.24	-0.5%	-1.2%	-2.4%	-3.6%	-4.8%	-12.0%
Increase parking charge s(for commuting to CBD)	-0.30	-0.6%	-1.5%	-3.0%	-4.5%	-6.0%	-15.0%
Increase parking charges (for non-CBD)	-0.10	-0.2%	-0.5%	-1.0%	-1.5%	-2.0%	-5.0%
Increase congestion charges in CBD	-1.00	-2.0%	-5.0%	-10.0%	-15.0%	-20.0%	-50.0%
Increase car travel times by reduce car speeds	-0.29	-0.6%	-1.5%	-2.9%	-4.4%	-5.8%	-14.5%
Impact on public transport mode share change percentage							
Increase accessibility	0.60	1.2%	3.0%	6.0%	9.0%	12.0%	30.0%
Improve service levels (priority, frequency and reliability)	0.75	1.5%	3.8%	7.5%	11.3%	15.0%	37.5%
Improve regional employment (employment centres)	0.25	0.5%	1.3%	2.5%	3.8%	5.0%	12.5%
Increase central city population	0.61	1.2%	3.1%	6.1%	9.2%	12.2%	30.5%
Increase fuel prices	0.20	0.4%	1.0%	2.0%	3.0%	4.0%	10.0%
Increase park and ride facilities (for trips to CBD)	0.36	0.7%	1.8%	3.6%	5.4%	7.2%	18.0%
Reduce provision of parking spaces	0.77	1.5%	3.9%	7.7%	11.6%	15.4%	38.5%
Increase congestion charges in CBD	1.00	2.0%	5.0%	10.0%	15.0%	20.0%	50.0%
Reduce public transport fares	0.60	1.2%	3.0%	6.0%	9.0%	12.0%	30.0%
Impact on other mode share change percentage							
Increase parking charges on walking in CBD	0.09	0.2%	0.5%	0.9%	1.4%	1.8%	4.5%
Increase parking charges on cycling in CBD	0.06	0.1%	0.3%	0.6%	0.9%	1.2%	3.0%
increase parking charges on carsharing to CBD	0.05	0.1%	0.3%	0.5%	0.8%	1.0%	2.5%
Introduce transit lanes on carsharing to CBD	0.29	0.6%	1.5%	2.9%	4.4%	5.8%	14.5%
Introduce cheaper parking charges for carsharing to CBD	0.30	0.6%	1.5%	3.0%	4.5%	6.0%	15.0%
Introduce individualised marketing program for carsharing to CBD	0.10	0.2%	0.5%	1.0%	1.5%	2.0%	5.0%

6.1 'Push' package

'Push' package is to reduce private motor vehicle modal share through pricing related strategies. The package includes increasing fuel price, increasing parking charges in both CBD and non-CBD areas, applying congestion pricing for access to the CBD and cheaper car parking rates for carsharing. The joint effectiveness of the package is presented in Table 6, as measured in trip reductions and trip increases.

Table 6 – Effectiveness of 'Push' package

Base case	*Change attribute by*					
	2%	*5%*	*10%*	*15%*	*20%*	*50%*
$2 / litre – fuel price (UDS)	$2.04	$2.10	$2.20	$2.30	$2.40	$3.00
$160 – monthly parking rate for drive alone (CBD & non-CBD)	$163.20	$168.00	$176.00	$184.00	$192.00	$240.00
$160 – cheaper monthly parking rate for car sharing (CBD)	$156.80	$152.00	$144.00	$136.00	$128.00	$80.00
$2 – congestion charge (CBD)	$2.04	$2.10	$2.20	$2.30	$2.40	$3.00
Car trip reduction – UDS as a whole						
2026	-1,080	-2,700	-5,400	-8,100	-10,790	-26,980
2041	-1,180	-2,950	-5,910	-8,860	-11,810	-29,540
Car trip reduction to CBD						
2026	-990	-2,460	-4,860	-7,210	-9,490	-22,010
2041	-1,060	-2,630	-5,190	-7,690	-10,130	-23,500
Car trip reduction to non-CBD						
2026	-90	-210	-430	-640	-850	-2,130
2041	-90	-230	-460	-690	-920	-2,300
Public transport trip increase – UDS as a whole						
2026	80	200	400	610	810	2,020
2041	90	220	440	660	880	2,210
Public transport trip increase to CBD						
2026	10	30	70	100	140	340
2041	20	40	70	110	150	370
Walking trip increase to CBD						
2026	20	40	80	110	150	380
2041	20	40	80	120	160	400
Cycling trip increase to CBD						
2026	10	10	20	30	40	90
2041	10	10	20	30	40	100
Carsharing trip increase to CBD						
2026	140	350	710	1,060	1,410	3,530
2041	150	380	750	1,130	1,510	3,760
Total car trip reduction (including carsharing trip increase)						
2026	-2,300	-5,720	-11,400	-17,000	-22,550	-54,650
2041	-2,480	-6,190	-12,310	-18,370	-24,370	-59,100
Trips changed to other modes, destinations or periods of time						
2026	2,180	5,440	10,820	16,150	21,420	51,820
2041	2,360	5,880	11,700	17,450	23,150	56,020
Total VKT reduction (average car travel distance of 7 km)						
2026	-16,070	-40,060	-79,730	-118,990	-157,840	-382,550
2041	-17,370	-43,300	-86,170	-128,610	-170,620	-413,670

6.2 'Pull' package

'Pull' package is to increase the public transport modal shares through travel demand management (TDM). The package includes increasing land use development densities for household and employment, reducing provision of parking spaces in CBD and undertaking individualised marketing to increase car occupancy such as carpool and car sharing. The joint effectiveness of the package is presented in Table 7.

Table 7 – Effectiveness of "Pull' package

Base case	*Change attribute by*					
	2%	*5%*	*10%*	*15%*	*20%*	*50%*
500 – regional employment density per km^2	510	525	550	575	600	750
2,000 – central population density per km^2	2,040	2,100	2,200	2,300	2,400	3,000
38,000 parking spaces (CBD)	37,240	36,100	34,200	32,300	30,400	19,000
100 – individualised marketing programs	102	105	110	115	120	150
Public transport trip increase – UDS as a whole						
2026	350	880	1,770	2,680	3,600	9,460
2041	380	960	1,940	2,930	3,940	10,350
Public transport trip increase to CBD						
2026	50	130	270	400	530	1,320
2041	60	140	280	420	570	1,410
Carsharing trip increase to CBD						
2026	50	120	240	350	470	1,180
2041	50	130	250	380	500	1,260
Total car trip reduction (carsharing trip increase plus 3 times public transport trip increase)						
2026	-1,250	-3,140	-6,330	-9,570	-12,850	-33,510
2041	-1,370	-3,430	-6,900	-10,430	-14,010	-36,540
Trips changed to other modes, destinations or periods of time						
2026	850	2,140	4,300	6,500	8,720	22,730
2041	930	2,330	4,690	7,080	9,510	24,780
Total VKT reduction (average car travel distance of 7 km)						
2026	-8,760	-22,000	-44,330	-66,980	-89,950	-234,600
2041	-9,550	-23,990	-48,330	-73,020	-98,070	-255,790

6.3 'Encouragement' package

'Encouragement' package is to increase modal shares for sustainable modes through provision of alternative modes. The package includes encouragement of cycling, walking and carsharing through limiting private vehicle speed, increasing accessibility, improving service quality (priority, frequency and reliability), increasing park and ride facilities for travel to the CBD, reducing public transport fare levels, and introducing transit lanes. The joint effectiveness of the package is presented in Table 8.

Table 8 – Effectiveness of the alternative mode package

Base case	*Change attribute by*					
	2%	*5%*	*10%*	*15%*	*20%*	*50%*
25 km/h – car speed	24.5 km/h	23.8 km/h	22.5 km/h	21.3 km/h	20 km/h	12.5 km/h
10 min – access time to bus services	9.8 min	9.5 min	9 min	8.5 min	8 min	5 min
25 min – bus travel time	24.5 min	23.3 min	20.9 min	17.8 min	14.2 min	7.1 min
10 min – park and ride facilities	10.2	10.5	11	11.5	12	15
$3 – bus fare	$2.94	$2.79	$2.51	$2.14	$1.71	$0.85
40 km – transit lane	40.8 km	42 km	44 km	46 km	48 km	60 km
Car trip reduction – UDS as a whole						
2026	-1,300	-3,260	-6,520	-9,780	-13,040	-32,600
2041	-1,430	-3,570	-7,140	-10,710	-14,280	-35,690
Public transport trip increase –UDS as a whole						
2026	820	2,080	4,300	6,670	9,180	27,720
2041	890	2,280	4,710	7,300	10,050	30,340
Public transport trip increase to CBD						
2026	30	60	120	190	250	620
2041	30	70	130	200	260	660
Car sharing trip increase to CBD						
2026	140	340	680	1,020	1,360	3,410
2041	150	360	770	1,090	1,460	3,640
Total car trip reduction (plus the carsharing trip increase)						
2026	-1,440	-3,600	-7,200	-10,800	-14,410	-36,010
2041	-1,570	-3,930	-7,870	-11,800	-15,730	-39,330
Trips changed to other modes, destinations or periods of time						
2026	600	1,460	2,780	3,950	4,980	7,670
2041	650	1,590	3,030	4,300	5,420	8,320
Total VKT reduction (average car travel distance of 7 km)						
2026	-10,080	-25,210	-50,420	-75,630	-100,840	-252,090
2041	-11,010	-27,530	-55,060	-82,590	-110,120	-275,300

6.4 Comparison of package effectiveness

The order of the effectiveness of the three packages is presented in Table 9, based on Tables 6 to 8. Key findings are:

- 'Push' package (pricing) has largest effect on reducing private vehicle trips and VKT.

- 'Encouragement' package (alternative modes) has the largest effect on increasing public transport trips.
- In 'Encouragement' package, if the service levels are improved by 10%, the highest public transport modal share could reach 5.6% (4.5% is the existing public transport modal share level); if the change increases to 20%, the public transport mode share could increase to 6.8%. A 50% change (to reach a PT mode share of 12 per cent) is unlikely to be achievable through service improvements alone.

Table 9 – Comparison of the three packages

Package	*Change attributes by*					
	2%	*5%*	*10%*	*15%*	*20%*	*50%*
Order of total car trip reduction – UDS area						
2026						
'Push' package	1	1	1	1	1	1
'Pull' package	3	3	3	3	3	3
"Encouragement' package	2	2	2	2	2	2
2041						
'Push' package	1	1	1	1	1	1
'Pull' package	3	3	3	3	3	3
"Encouragement' package	2	2	2	2	2	2
Order of total public transport trip increase – UDS area						
2026						
'Push' package	3	3	3	3	3	3
'Pull' package	2	2	2	2	2	2
"Encouragement' package	1	1	1	1	1	1
2041						
'Push' package	3	3	3	3	3	3
'Pull' package	2	2	2	2	2	2
"Encouragement' package	1	1	1	1	1	1
Order of total VKT reduction– UDS area						
2026						
'Push' package	1	1	1	1	1	1
'Pull' package	3	3	3	3	3	3
"Encouragement' package	2	2	2	2	2	2
2041						
'Push' package	1	1	1	1	1	1
'Pull' package	3	3	3	3	3	3
"Encouragement' package	2	2	2	2	2	2
Public transport modal share for UDS area						
2026 & 2041						
'Push' package	4.5%	4.6%	4.7%	4.8%	4.9%	5.7%
'Pull' package	4.6%	4.7%	5.0%	5.3%	5.6%	7.4%
"Encouragement' package	4.7%	5.0%	5.6%	6.2%	6.8%	11.7%

7 Conclusions

This paper, based on the current stage of the project, discusses a practical way to guide the selection of appropriate strategic transport policy packages to address the demand increase brought out by urban growth on transport infrastructure. The advantage of the method discussed here is the use of the elasticity technique which has been widely suggested in the literature to measure the effectiveness of policy or transport measure packages without resorting to complex modelling process to generate local elasticities within a short timeframe.

The study suggests that one package is more effective than others in reducing private vehicle use, while another is stronger in promotion of public transport modal share. The choice of an appropriate package for implementation will, in a practical sense, be subject to the local transport objectives and targets, political imperatives, available funding resources and community support. However, caution is needed in interpreting the effectiveness results due to the limitations of point elasticities and their transferability from other cities. The order of the effectiveness is considered more realistic reference to assist the policy selection.

This study also indicates that combinations of individual policy options in other ways are possible to achieve the maximum advantages combined from individual measures. Further directions for analysis include development of local elasticities and understanding of their conditions to minimise the elasticity uncertainty, assessment of additional policy instruments or measures to explore other potential opportunities, and over other travel periods.

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