Introduction

The Wellington Regional Council adopted its current Regional Land Transport Strategy in September 1999. An outline of the strategy and the process used to develop it is described in Ashley, Brennand and Houghton (1999).

This strategy has considerable buy in from key stakeholders and the community at large. It sets out an ambitious, but realistic programme, to deliver enhanced accessibility and economic development potential, safety and environmental outcomes at reasonable cost.

As with all strategic documents translating the strategy into meaningful programmes that the respective responsible agencies can implement is fundamental to achieving the desired outcomes.

This paper outlines a process used in delivering the strategy that focuses on defining in detail the programmes for the corridors that make up the Region's transport network.

Background

Section 175(2) of the Land Transport Act requires every Regional Council to produce a Regional Land Transport Strategy that:

(a) identifies the future land transport needs of the region concerned; and

(b) identifies the most desirable means of responding to such needs in a safe and cost effective manner, having regard to the effect the transport system is likely to have on the environment; and

(c) identifies an appropriate role for each land transport mode in the region, including freight traffic, public passenger transport, cycling and pedestrian traffic; and

(d) states the best means of achieving the objectives referred to in paragraphs (b) and (c) of this sub-section.

All Local Authority programmes must implement the strategy and Government agencies may not act in a manner that is inconsistent with the strategy.

The most recent Wellington Regional Land Transport Strategy was adopted in September 1999. This document has considerable buy in from key stakeholders and the community at large. The document is strategic and contains an integrated set of proposals to address the region's needs and ensure its wellbeing.

The linear structure of the region's transport network (refer figure 1) and the close proximity of the highways to the rail service ensures that there is strong network interaction. Network improvement projects cannot be considered in isolation and their performance is dependent on upstream parts of the network, alternative modes and will have impacts on downstream parts of the network.

This means that successful implementation of the Regional Land Transport Strategy requires that the intended balance between the respective improvement proposals is important.

Despite the strong buy in from the key stakeholders the implementation of a Regional Land Transport Strategy can be problematic. Responsibility for the strategy implementation is fragmented. Transit New Zealand is responsible for State Highway projects, Local Authorities for local road projects and Regional Council for passenger transport projects.

The reasons for implementation difficulties includes politics, resource and technical difficulties, and inertia. The Regional Land Transport Strategy is a strategic document and so the implementation of a project may require the appropriate authority to undertake some considerable detailed work before that project can be implemented.

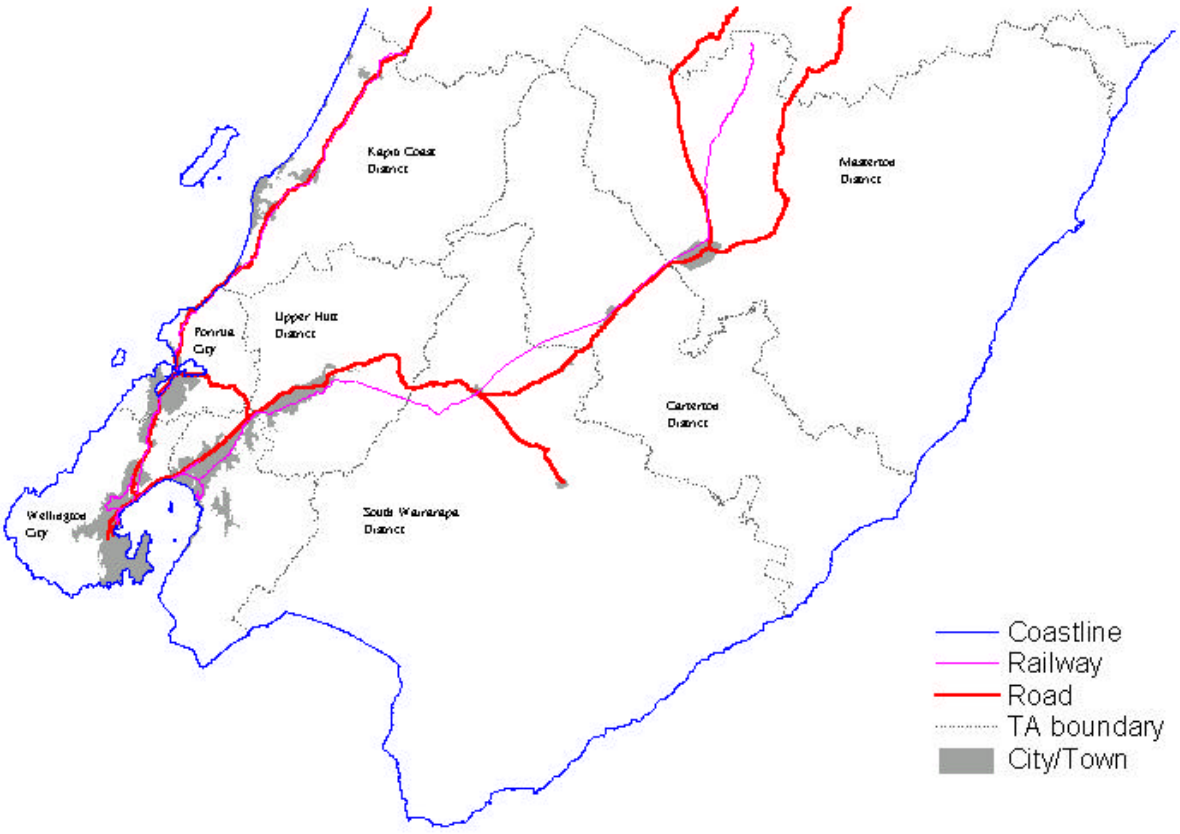

Figure 1 Major transport routes of the Wellington region

Corridor plan approach

The linear nature of the Wellington network enables distinct transport corridors to be defined. These corridors are shown in Figure 2.

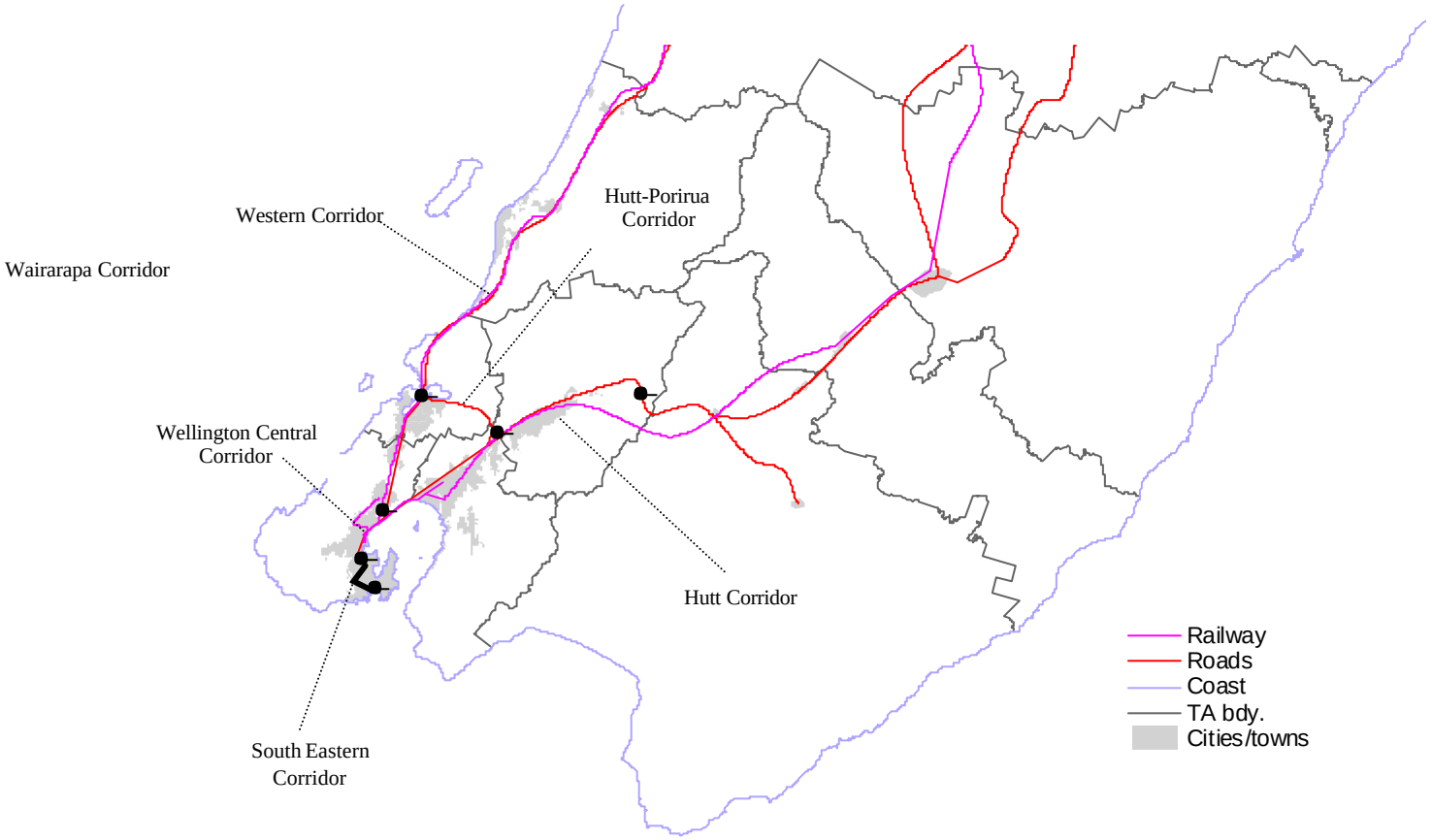

Figure 2 Wellington Region's Strategic Transport Corridors

The Regional Land Transport Strategy sets the overall integrated plan for the region. It is possible to take each individual corridor separately and undertake a detailed investigation of the projects that make up the corridor. These more detailed projects can be developed assuming the rest of the network improvements are in place. Through this process all corridors can be investigated with detailed projects defined all feed back to the original integrated strategy.

It has been precisely this approach which has been adopted in Wellington. At the time or writing this paper, the Western Corridor Plan investigation had been completed and adopted as a refinement of the Regional Land Transport Strategy. Work has commenced on both the Hutt corridor and Wellington Central corridor plans.

Corridor plan process

The corridor plan process is not unlike the Regional Land Transport Strategy process except that;

(i) projects in the strategy in other corridors are treated as a given.

(ii) objectives, needs, issues and projects in the corridor are considered in much greater detail and those specific to the corridor can now be included.

(iii) the range of options considered in the corridor are not as broad as those considered in strategy development.

(iv) a check is made that the more tightly defined proposals for the corridor do not change the need for the proposals in other corridors.

The Regional Land Transport Strategy development work provides a useful insight into what range of proposals can be realistically considered. This is used as a guide to narrow down the range of possible proposals and enable more concentration on the details of the proposal to be considered. Consequentially, this means that the corridor planning process uses strategic transport modelling tools in tandem with extensive use of more detailed models. The Regional Land Transport Strategy work was essentially driven by the strategic model with limited recourse to detailed models.

The basic process is outlined in figure 3 below.

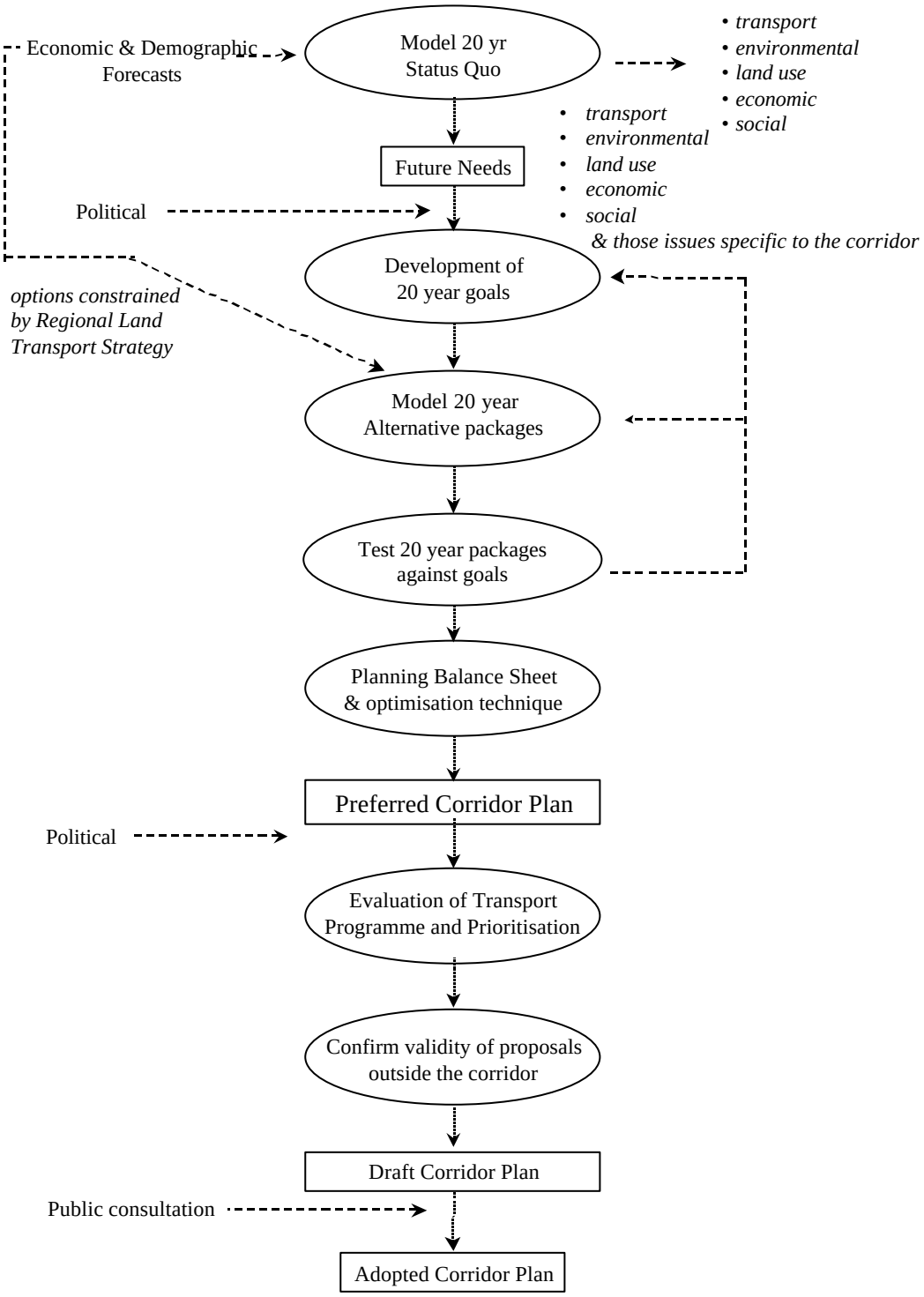

Figure 3 Corridor Plan Process

Evaluation

The evaluation follows a planning balance sheet approach. there One or more performance indicators is developed against each objective. These should cover the range of key issues, including those specific to the corridor. The modelling of detailed proposals allows different corridor proposals to be evaluated against a broad range of objectives using a scale of = (very poor), - (poor), 0 (neutral), + (good) and ++ (very good).

This approach is helpful not only in the final evaluation of a corridor plan but also at the intermediate stages. This because weaknesses in one set of proposals can be identified so that refinements or inclusion of elements from other proposals can mitigate or remove those weaknesses.

Application in the Wellington region

Western Corridor

The first example of the development of a corridor plan has been the Western corridor Plan. This corridor connects two high growth areas in the region: Kapiti Coast District and Wellington City. The corridor is subject to growing pressure on both the highway system and the passenger rail system at peak times.

The process shown in Figure 3 was followed in the Western corridor Plan investigation. It was found that there were no new needs and issues identified that were specific to the corridor except that community severance was particularly important. The Regional Land Transport Strategy work had clearly identified the range of road and rail options. Essentially the Western Corridor investigation involved resolving detailed design and timing issues.

In order to provide direction in this exercise a technical steering group was set up. This steering group included officials from the relevant local Councils, Transit New Zealand (the State Highway Authority), Transfund New Zealand (the national funding agency for roads) and the Wellington Regional Council.

The technical group has an important function It has the job of ensuring that the technical analysis is robust but also provides and important link to the political arm of the agencies represented. This link enables a two way flow of issues and ensures that the key political decision-makers experience no surprises. In many respects the technical group experiences a collective learning exercise. This approach enhances buy into the corridor plan at all levels.

The Western Corridor Plan resolve some key issues on the corridor. For some time growing congestion on the existing highway had been a problem. However expanding the highway exacerbated environmental conditions on the existing highway and delayed the construction of an inland motorway known as Transmission Gully. It is also known that continued expansion of the existing highway, whilst feasible in the short term,

would eventually require expansion of sections that were very difficult in engineering terms and expensive.

The Regional Land Transport Strategy work had shown that it would be necessary to build the Transmission Gully, some carefully selected improvements to the existing highway and a significant upgrade to the adjacent passenger rail services.

This led to a number of questions that the Western Corridor Plan was designed to answer.

(a) what is the optimal time to provide Transmission Gully?

(b) what is the timing and design of improvements to the existing highway, if any, to go with the Transmission Gully project?

(c) what is the timing and detail of the rail service upgrades?

To answer the questions a range of improvements on the existing corridor were examined. These included:

(i) no improvements other than those required for hazard mitigation.

(ii) a short length of evening peak only northbound clearway.

(iii) a short length of morning and evening peak clearways both northbound and southbound.

(iv) full length northbound and southbound morning and evening peak clearways.

A range of rail enhancements were also considered. These included service frequency enhancements, new stations and track extensions.

These options were considered in permutations and also varied against the timing of the Transmission Gully Motorway.

A cost-benefit evaluation of each package was undertaken and this was fed into the broader evaluation matrix shown in Table 1.

	Do Min	Rd0PT1	Rd0PT2	RdAPTO	RdAPT1	RdAPT2	RdBPT0	RdBPT1	RdBPT2	RdCPT0	RdCPT1	RdCPT2	RdDPT0	RdDPT1	RdDPT2
Accessibility Car	0	0	0	++	++	++	+	+	+	++	++	++	++	++	++
Accessibility PT	0	+	++	-	+	++	-	+	++	-	+	++	-	+	++
Economic Development	0	0	0	+	++	+	0	+	0	+	++	+	+	++	+
Safety	0	+	+	+	++	++	0	+	+	+	++	++	+	++	++
Economic Efficiency	0	+	0	++	++	+	+	+	0	++	++	+	++	++	+
Affordability															
• **User**	0	0	0	-	-	-	0	0	0	-	-	-	-	-	-
• **Funding**	0	0	-	-	--	--	0	-	--	-	--	--	-	--	--
• **PT subsidy**	0	+	++	-	0	++	-	0	+	-	0	++	-	0	++
Sustainability															
• **Environment**	0	+	+	--	0	+	--	0	0	--	0	+	--	0	0
• **Fuel**	0	+	+	--	0	+	--	0	0	--	0	+	--	0	0
• **Severance**	0	0	0	+	+	+	-	-	-	+	+	+	+	+	+
Network Balance	0	+	+	--	0	+	--	0	0	--	0	+	--	0	0

Table 1: Package evaluation matrix where the following elements are included (refer Figure 4)

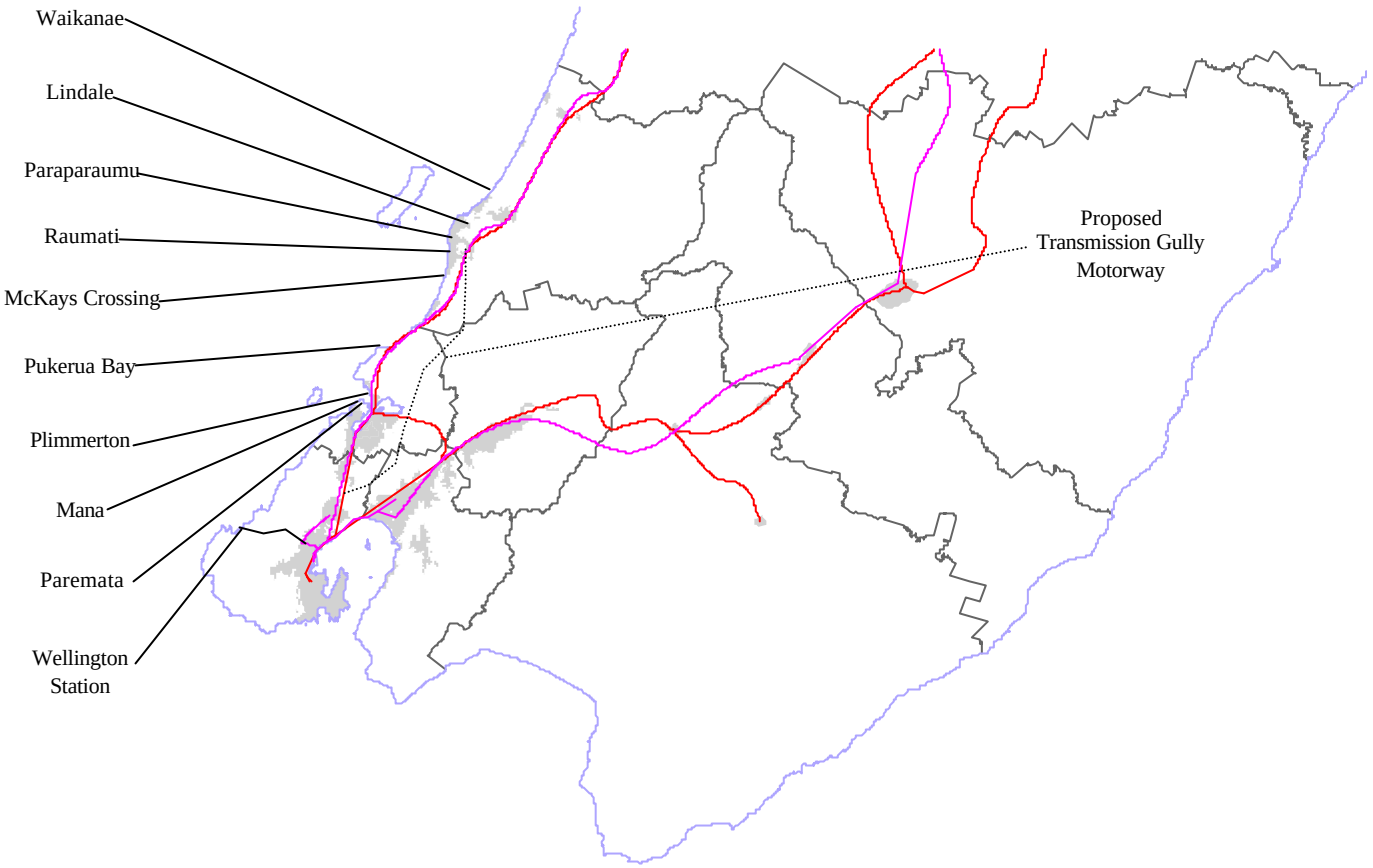

Figure 4 Western Corridor Location Diagram

Passenger transport

Do Minimum PTO – the rail network remains unchanged

PT1
Doubling of peak and off peak frequency in Kapiti, Waikanae electrification, new station at Raumati, refurbished Paraparaumu station, improved interchange at Wellington Station, associated carpark improvements at stations

PT2
All of PT1 plus new station at Lindale, Aotea and Glenside; Porirua East, Plimmerton and Wellington CBD LRTs; refurbishment of remaining station and carpark improvements at stations

Road Improvements

Do Minimum Rd0
Paremata Bridge replacement/duplication, safety improvements, McKays Crossing grade separation. Options that have Transmission Gully early have the old bridge decommissioned when Transmission Gully is opened. Before Transmission Gully is opened both bridges are used to support the clearways options.

The four road options below RdA to RdD all include the projects from the Do Minimum road option (Rd0).

RdA
Northbound PM peak clearway only to Steyne Ave in 2001, no Pukerua Bay bypass, Transmission Gully in 2006 with peak toll of $2 and offpeak toll $1 and 2.6 c/l regional petrol tax. The northbound clearway can be abandoned on the opening of Transmission Gully.

RdB
Full peak clearways option in Mana and Plimmerton in 2001, Pukerua Bay bypass, Transmission Gully in 2016 with peak toll $2 and offpeak toll $1 and 2.6 c/l regional petrol tax

RdC
No improvements in Mana and Plimmerton, no Pukerua Bay bypass, Transmission Gully in 2006 with peak toll $2 and offpeak toll $1 and 2.6 c/l regional petrol tax

RdD
Reduced peak clearways option in Mana and Plimmerton in 2001, no Pukerua Bay bypass, Transmission Gully in 2006 with peak toll of $2 and offpeak toll of $1 and 2.6 c/l regional petrol tax. The reduced clearways option provides an additional lane at peak times which is available to buses, high occupancy vehicles and left turning traffic.

The preferred option from this evaluation is RdD PT1 which brings Transmission Gully early with toll funding, a reduced upgrade to the existing highway and the medium level of rail improvements in the short term future.

The economic evaluation of these options is shown in appendix 1.

The detailed modelling enabled a more precise determination of the traffic flows onto other parts of the network so that the appropriateness of proposals outside the corridor was confirmed.

Hutt corridor and Wellington central corridor

The Hutt and Wellington Central corridor studies had not been completed at the time of writing this paper. Both these corridor studies were able to use as a given the greater definition of to the proposals on the Western Corridor.

Economic development is an important issue for the Hutt Corridor. Both population and employment forecasts suggest that this area has weak prospects. Accordingly, economic development has been emphasised as an issue in this corridor with a particular concern that the flow of goods and information should not be impeded by the transport network.

The Wellington Central corridor is a very important corridor for the region. Wellington Central is a small compact area where over 40% of the regions employment resides. As a consequence the central area is the focal point of the region's road and rail system. However, there still remains a significant volume of travel, that for various reasons wishes to travel through the central area to other destinations. The central area is a small area in which a mix of travel activities occur which at peak times can lead to high volumes competing for space.

In the central area, being a key regional destination, the local council wishes to develop an urban form strategy. It is this dimension that makes this corridor study particularly interesting and it is intended to build urban form issues into the corridor plan.

In the case of the Wellington Central area there has been a lack of any real transport planning in the recent history as the local council does not have the resources and capability for this kind of work. This lack of capability has been an area of concern for some time as it is such an important area for the region and was critical for progressing the implementation of the Regional Land Transport Strategy.

Conclusion

Progression the implementation of a Regional Land Transport Strategy by embarking on a series of discrete but yet interrelated corridor studies appears to have merit.

The multi party approach can achieve buy in, both at the technical and political level, when implementation is the responsibility of several agencies.

The multi party approach can assist when the technical capability of a key agency is not sufficient to undertake the work required. Similarly this approach is able to facilitate progress when serious inertia problems may exist in any one key agency.

The corridor approach enables the detail of individual proposals to be developed in an integrated context. Individual agencies have in the past developed their proposals in isolation as their statutory responsibility are typically single mode. In the case of roads, State Highways are managed separately from local roads.

This approach is likely to have a greater level of integration which will develop better outcomes and efficiencies.

References

Ashley D, Brennand A.W, Houghton D, (1999) Strategic Transport Planning In New Zealand's Two Major Urban Areas: Auckland and Wellington. 23rd Australisian Transport Research Forum. Perth Western Australia.

Appendix 1

Table 2 : Economic Evaluation Based on Annualised AM, Inter and PM Peak Flows

Money Values in $million	**Rd0PT0**	**Rd0PT1**	**Rd0PT2**
NPV Benefits	0	$55.8	$108.7
NPV Costs	0	$60.7	$137.5
NPV tolls + petrol tax	0	0	0
NPV fare revenue	0	$11.7	$26.5
NPV benefits-costs + revenue	0	$6.7	-$2.3
BRC	-	1.11	0.98
	RdAPT0	**RdAPT1**	**RdAPT2**
NPV Benefits	$145.3	$195.0	$245.8
NPV Costs	$162.2	$223.0	$299.0
NPV tolls + petrol tax	$59.9	$62.3	$46.2
NPV fare revenue	-$9.1	0	$30.9
NPV benefits-costs + revenue	$33.9	$34.4	$24.1
BRC	1.21	1.15	1.08
	RdBPT0	**RdBPT1**	**RdBPT2**
NPV Benefits	$84.8	$138.7	$185.8
NPV Costs	$80.4	$142.3	$218.0
NPV tolls + petrol tax	$18.4	$27.3	$24.7
NPV fare revenue	-$2.8	0	$16.5
NPV benefits-costs + revenue	$20.0	$23.7	$9.0
BRC	1.25	1.17	$1.04
	RdCPT0	**RdCPT1**	**RdCPT2**
NPV Benefits	$136.6	$192.0	$243.9
NPV Costs	$159.1	$221.1	$297.4
NPV tolls + petrol tax	$67.6	$67.7	$48.8
NPV fare revenue	-$10.3	0	$32.5
NPV benefits-costs + revenue	$34.8	$38.7	$27.7
BRC	1.22	1.17	1.09
	RdDPT0	**RdDPT1**	**RdDPT2**
NPV Benefits	149.0	200.8	251.6
NPV Costs	167.2	228.0	304.0
NPV tolls + petrol tax	59.9	62.3	30.9
NPV fare revenue	-9.1	0	46.4
NPV benefits-costs + revenue	32.6	35.1	24.9
BRC	1.19	1.15	1.08

Where BRC = $\frac{\text{NPV benefits – costs + revenue}}{\text{NPV costs}}$

Table 3 : AM Peak 2016 Travel Performance

	Forecast 2016 AM Peak SBD Flows (7.00 am – 9.00 am)			Annual Cost of Congestion (millions) 2016	Paraparaumu-Wellington Car travel time (mins) 2016
	Mana Vehicles	TG Vehicles	PT Persons		
Rd0PT0	2621	-	1632	$129	79.3
Rd0PT1	2515	-	1949	$125	75.6
Rd0PT2	2504	-	2010	$116	72.7
RdAPT0	2269	1424	1289	$123	66.5
RdAPT1	2208	1424	1626	$121	64.7
RdAPT2	2137	1246	1700	$112	61.8
RdBPT0	3023	859	1253	$124	69.5
RdBPT1	2860	903	1601	$121	66.8
RdBPT2	2844	698	1660	$113	63.9
RdCPT0	2269	1424	1289	$123	66.5
RdCPT1	2208	1424	1626	$121	64.7
RdCPT2	2137	1246	1700	$112	61.8
RdDPT0	2280	1396	1285	$124	66.3
RdDPT1	2217	1395	1623	$121	64.5
RdDPT2	2148	1235	1698	$112	61.4

Table 4 : PM Peak 2016 Travel Performance

	Forecast 2016 PM Peak NBD Flows (4.00 pm – 6.00 pm)			Annual Cost of Congestion (millions) 2016	Wellington - Paraparaumu Car travel time (mins) 2016
	Mana Vehicles	TG Vehicles	PT Persons		
Rd0PT0	2710	-	1629	$129	68.3
Rd0PT1	2607	-	1949	$125	64.7
Rd0PT2	2602	-	2000	$116	62.1
RdAPT0	2365	1758	1236	$123	57.7
RdAPT1	2285	1708	1621	$121	56.4
RdAPT2	2398	1322	1723	$112	54.7
RdBPT0	3180	1342	1222	$124	60.3
RdBPT1	3034	1307	1564	$121	57.6
RdBPT2	3031	1055	1628	$113	55.1
RdCPT0	2365	1758	1236	$123	57.7
RdCPT1	2285	1708	1621	$121	56.4
RdCPT2	2398	1322	1723	$112	54.4
RdDPT0	2377	1723	1232	$124	57.5
RdDPT1	2296	1674	1618	$121	56.2
RdDPT2	2410	1210	1721	$112	54.3

Table 5 : Sensitivity Analysis

	Growth Rate Increased by 20%		Transmission Gully $200 million	
	NPV (benefits-costs + revenue) (millions)	**BRC**	**NPV (benefits-costs + revenue)**	**BRC**
RdAPT0	$97.1	1.63	$52.5	1.40
RdBPT0	$58.3	1.77	$27.2	1.40
RdBPT1	$103.2	1.72	$30.9	1.24
RdBPT2	$124.3	1.58	$16.2	1.08
RdCPT0	$96.1	1.63	$53.4	1.40
RdDPT0	$89.7	1.54	$55.2	1.38