

# Western Corridor transportation study

## Summary of draft technical report – Stage 1

18 April 2005



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Prepared for

Greater Wellington Regional Council  
and Transit New Zealand

Prepared by

**Maunsell Limited**  
10th Floor, KPMG Centre  
135 Victoria Street  
PO Box 27 277  
Wellington  
New Zealand

Tel +64 4 382 2999  
Fax +64 4 382 2998  
wellington@maunsell.com

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## Summary of draft technical report – Stage 1

### The Western Corridor Transportation Study

Greater Wellington Regional Council and Transit New Zealand are jointly reviewing the transport strategy for the Western Corridor. The Corridor includes the major road and rail transport routes from north of Waikanae to Ngauranga and associated routes to the Hutt Valley. The aim of the Study is to provide safer, more efficient, more reliable and sustainable transportation along the Western Corridor for the benefit of the Wellington region and the nation.

The outcome of the study will be a Western Corridor Plan. This plan will form part of the Wellington Regional Land Transport Strategy 2005-2015 and will include a 20-year costed programme of capital improvements, transport initiatives along with strategies to manage travel demand. The draft Corridor Plan is planned for release in July 2005, followed by public hearings in September 2005 and completion in December 2005.

The Study contributes to a review of the Wellington Regional Land Transport Strategy and has regard to the requirements of the Land Transport Management Act 2003.

### The draft technical report – Stage 1

The draft technical report – Stage 1 details the work to date on the study and provides the technical background for the Stage 2 consultation being held in May 2005 with key stakeholders and the general public. The report makes no specific recommendations. It is a record of the key findings from the technical work to date including assessment of the elements and consideration of five corridor scenarios. A further technical report will be produced in July taking into account the Stage 2 consultation and further technical work.

### Findings of Stage 1 Consultation

The study commenced with public consultation on issues and options based on the release of a Preliminary Discussion Document. In addition to this there has been ongoing dialogue with key stakeholders including iwi. A Consultation Summary Report has been issued. The key concerns arising from the Stage 1 consultation were:

- The need for certainty and commitment to action
- The national strategic importance of the corridor
- The urgency of finding and implementing a solution
- Scepticism about current SH1 improvements
- The effects on freight of poor corridor performance
- Increasing congestion and trip time variability
- The poor safety record along Centennial Highway
- The wider effect on economic development, both regionally and nationally, from transport issues within the corridor
- The vulnerability of the corridor
- The need for a comprehensive upgrade of rail passenger services
- The importance of considering environmental and social impacts.
- The needs of local networks and increasing difficulty for local traffic access.
- The negative economic effects of Travel Demand Management.

## The Wellington Strategic Transport Model (WSTM)

A key technical tool in the study is the Wellington Transport Strategy Model. It is a state of the art, multi-modal strategic transport computer model covering the eight Districts of the Wellington Region and is capable of modelling the effects of possible changes to the regional transport network on car, truck, bus, rail and active (walk, cycle) travel modes. The model includes land use and demographic forecasts for three levels of growth; low, medium and high. The medium forecast provides the expected case, with the low and high cases being appropriate for sensitivity testing.

The level of congestion that would be experienced with the current network in 2016 is illustrated below.

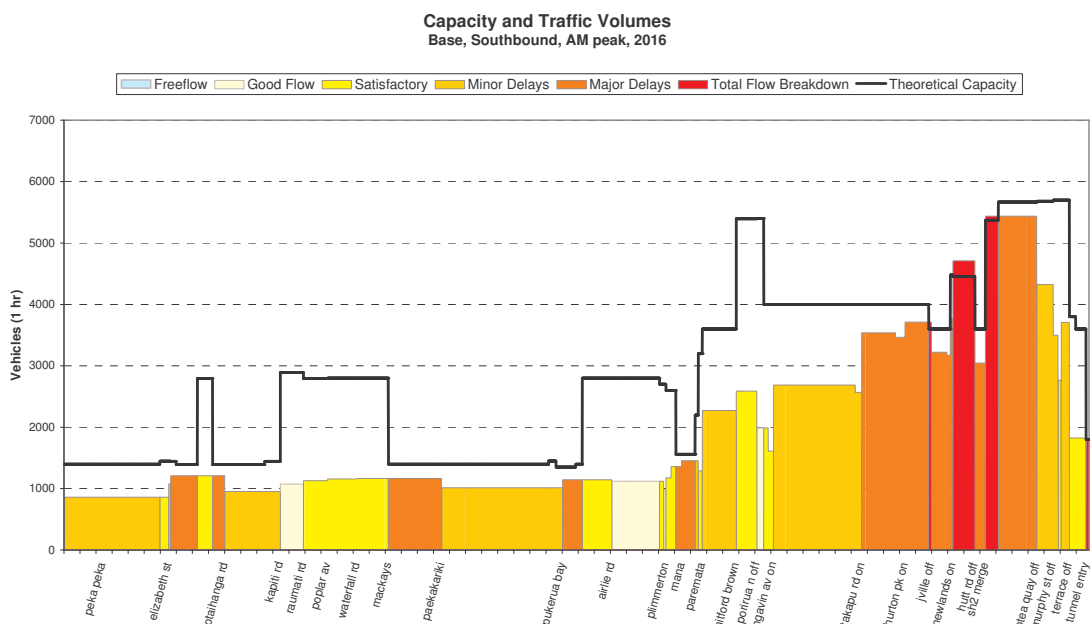


Figure 1: Highway Congestion 2016: AM Peak Hour

## Project Elements

A wide range of elements have been considered within the study including, rail infrastructure improvements, highway improvements and travel demand management measures. A first round of analysis reduced the number of elements to approximately 30 and these are documented in the Western Corridor Transportation Study - Confirmed Elements Report, February 2005. Specialist reports have also been prepared on the rail elements and travel demand management options.

## Evaluation Tools

A number of evaluation tools have been developed and used in the study; these are Planning Balance Sheet evaluation, risk assessment and cost review.

## The Planning Balance Sheet

The Planning Balance Sheet (PBS) provides for the evaluation of options against stated criteria which are based on the objectives of the Land Transport Management Act 2003,

New Zealand Transport Strategy and the Regional Land Transport Strategy. It is a tool to assist in the understanding of the performance of an option and to make explicit the trade offs between different criteria or objectives.

The PBS identifies sub attributes under each objective. The performance of an option against each sub attribute is scored out of ten with 5 being the effect of making no further improvements. Weighting of the different objectives has been established by the Regional Land Transport Committee, and selected key stakeholders have provided alternatives for sensitivity testing. Application of the weightings allows calculation of an overall score.

Planning Balance Sheet Weightings	RLTS Workshop	Land Transport NZ	Transport Action Group	Transport 2000+
Assist economic and regional development	19%	20%	25%	20%
Assist safety and personal security	14%	20%	13%	20%
Improve access, mobility and network reliability	16%	20%	15%	20%
Protect and promote public health	11%	20%	10%	20%
Ensure environmental sustainability	16%	20%	15%	20%
Consider economic efficiency and affordability	24%	Consider separately	22%	-

## Risk Assessment

A second key evaluation tool is Risk Assessment which is a process of quantifying a wide range of possible element risks and identifying the implications of that risk including delays and cost. The Risk Assessment was carried out with the study Technical Steering Group. The Western Corridor Transportation Study – Risk assessment workshop report, April 2005 documents their findings.

## Estimate of Element Costs

The costing of most elements has been undertaken in conjunction with international industry experts, Rob MacDonald and Associates (RM&A). RM&A have previously undertaken the parallel estimate for the proposed Transmission Gully Motorway project in March 2004 which ensures element cost estimates are comparable.

## The Wellington Regional Strategy (WRS)

A number of other studies are informing, and being informed by, the Western Corridor Transportation Study. One of the most significant is the major regional initiative to prepare a Wellington Regional Strategy. This would have a significant influence on future land use policy and is tasked with achieving an environment in which sustainable growth of the region can be achieved. Current medium growth population projections suggest that the population of the region may start to fall after 2026.

A policy of intensification of residential or business activities around passenger transport nodes would benefit the corridor as developments of this nature have been observed to reduce private vehicle usage for commuting movements when the highway network is stressed. This will be considered in conjunction with the Wellington Regional Strategy and as part of the Travel Demand Management Strategy.

## Technical Findings on the Elements

### Rail

The single track section north of Pukerua Bay is the weak point on the existing rail corridor. As with the highway the rail corridor is vulnerable to slips. The current train scheduling of approximately 20 minute frequency from Paraparaumu is at the upper limit of the current track configuration, due to the sections of single track

The rail infrastructure improvements considered would allow increased train frequencies and also provide a higher degree of reliability

Major rail improvements increase morning peak patronage by 500 passengers (10%) but only reduce Ngauranga Gorge vehicle flows by 100 vehicles (1%). Major rail improvements therefore do not solve highway problems; the currently suppressed travel demand takes up much of the relief obtained, unless sustained by Travel Demand Management measures.

**Kapiti Transportation Hub:** Extension of the commuting rail network north of Paraparaumu would provide opportunities for increased park and ride capacity and reduce traffic volumes in the town centre. Extension and a new station at Lindale would provide opportunities for a larger public transport hub attracting patronage from Waikanae and the beach communities.

### Travel Demand Management (TDM)

Non price travel demand management measures implemented overseas have achieved a reduction in peak volumes in the order of 5%. Road pricing would be more effective. TDM should be supplemented by additional passenger transport capacity to cater for the resulting mode shift.

The most suitable non price TDM elements for this corridor are:

- Park and ride
- CBD parking restraints
- Bus/rail interchange
- Bus priority (feeder services)
- Increased public transport service frequency
- Workplace travel plans
- High occupancy vehicle lanes.

### Highway

**Safety:** The injury crash rate is generally uniform along the corridor. However the severity of crashes is worst between Paekakariki and Pukerua Bay and north of

Paraparaumu. Furthermore 40% of all crashes and 20% of all fatalities occur at intersections.

**Corridor Reliability:** Currently corridor journey times have a high degree of unreliability. The route is prone to closure following crashes, provides limited access for emergency vehicles and is vulnerable to landslip and flooding. There are limited alternative routes particularly for freight.

The highway currently has a poor level of service in some areas and requires upgrading. Widening to a multilane highway would solve the current problems related to level of service deficiencies and the provision of a median barrier would improve safety. A multilane road would also provide a more reliable road through providing additional sealed surface allowing for breakdowns and the reduced likelihood of crashes. Consultation has identified that safety and reliability are key factors for such a strategic transport network and is supported by the technical work.

**Potential benefits:** The assessed maximum potential transport benefits available across the corridor are shown below. These do not include benefits from reduced crashes or reduced congestion at intersections and merges.

Section/Option	Annual WTSM benefits (pa)	Length of section
Northern (North of MacKays)	\$10M	19km
Central	\$13M	27km
Southern (South of Linden)	\$5M	11km
Rail	\$8M	58km
Full length	\$27M	58km

Free flow road conditions during the peak hour are predicted to result in a 10% reduction in rail patronage and a 20% increase in highway usage. Benefits in the southern section of the corridor are limited by downstream network constraints.

**Roads - Northern Section – Peka Peka Rd to MacKays Crossing:** The Kapiti Coast Long Term Council Community Plan favours four laning close to the existing alignment through Waikanae and Paraparaumu. An expressway would relieve state highway congestion through Paraparaumu and Waikanae and reduce the severity of crashes in the rural sections. The Western Link Road as a local arterial would provide an alternative route to SH 1 and provide resilience through a second crossing of the Waikanae River.

**Roads Central Section - Transmission Gully or Coastal Expressway:** A key decision from this corridor plan will ultimately be whether to continue to pursue Transmission Gully or whether to upgrade the existing highway corridor along this length. Highway improvements in this section have fewer regional benefits per kilometre than the northern section. Four lanes of expressway standard highway would provide adequate capacity for all long term WRS growth projections. An expressway is a four lane road with a median divided carriageway. A motorway upgrade would provide little tangible benefit over an expressway and would have additional construction costs.

The comparative costs and risks of these two elements are:

	Transmission Gully	Coastal Expressway
<b>Expected cost</b>	\$1,000M	\$610M
<b>Risk profile.</b>	Very high	Extremely high

Note:

1. Based on options with levels of mitigation that has not been tested with the community to any significant extent.
2. There exists a significant cost risk that major social and environmental mitigation, including potentially more substantive options, might be required on the Coastal Expressway in particular for the Mana Bypass and Centennial Highway. This could potentially erode the cost difference between Transmission Gully Motorway and the Coastal Expressway.

The comparative Planning Balance Sheet scores are:

Planning Balance Sheet Assessment	Transmission Gully	Coastal Expressway
Economic & regional development.	5.7	5.9
Safety & personal security	5.8	5.8
Access, mobility & network reliability	7.0	6.7
Public health	6.4	5.4
Environmental sustainability	4.7	3.4
Economic efficiency & affordability	1.8	4.3
Planning balance sheet score – RLTC	4.9	5.2
Planning balance sheet score – LTNZ	5.9	5.4
Planning balance sheet score –TAG	5.0	5.2
Planning balance sheet score - T2000+	5.9	5.2

Note:

1. Planning Balance Sheet scores are influenced by the cost and scope of the elements.

**Roads - South of Linden:** A Petone- Grenada Link provides approximately the same level of benefits as Transmission Gully and is the most economically efficient element assessed. It reduces traffic in the most congested part of the Western and Hutt Corridors and provides an improved freight linkage to Seaview. The Ngauranga Gorge-Aotea Quay section and the Wellington local network limit the benefit of any improvements in the southern part of the corridor. Bus priority and HOV lanes may have benefit in the Ngauranga Gorge.



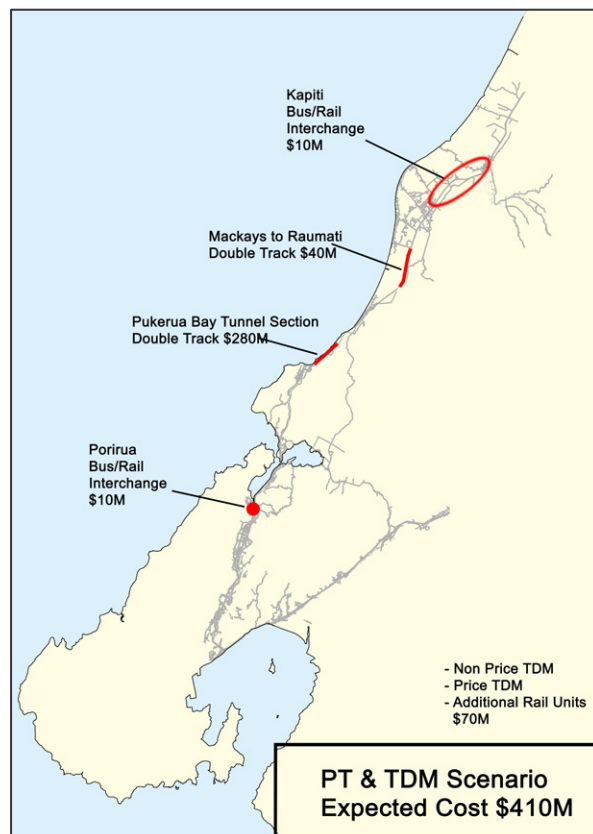
## Initial Scenarios

The initial scenarios are packages of promising elements collected in themed packages to test the envelope of impacts against the study's objectives and to understand the contribution that different approaches might make to the study's objectives. The methodology for identifying these scenarios involved input from the Technical Steering Group. The PBS has been used to analyse the scenarios based on the assessments undertaken for each element.

The scenarios are:

### IP1 Passenger transport and travel demand management scenario

This provides for improved passenger transport and management of the base road network with travel demand management strategies. No highway or local road improvements would be completed in this scenario. Kapiti and Porirua would have 10 and 5 minute train frequencies respectively. Travel demand management strategies should have some form of road pricing to manage traffic volumes. This scenario identifies what can be achieved without road improvements.



Note: Based on options with levels of mitigation that has not been tested with the community to any significant extent.



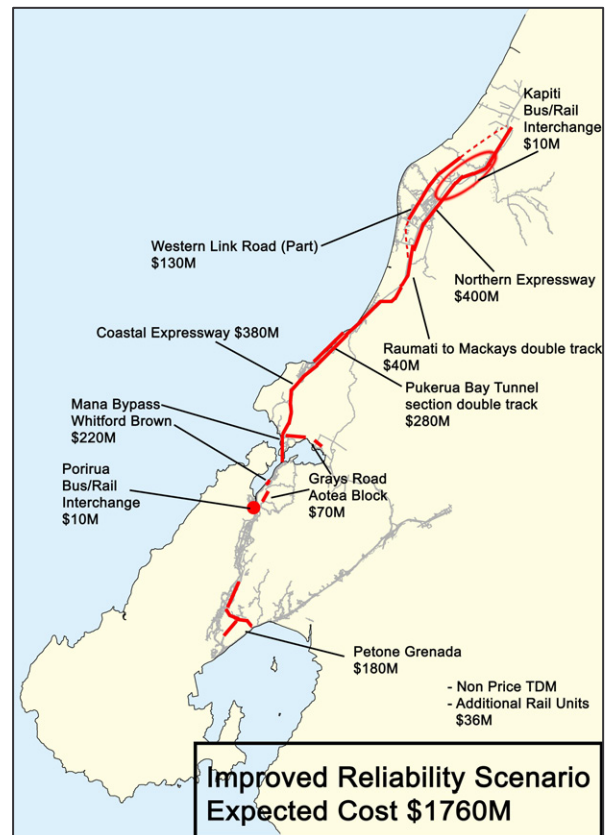
Note: Based on options with levels of mitigation that has not been tested with the community to any significant extent.

## IP2 Roding scenario

This scenario would provide highway and local road improvements without rail improvements or TDM measures. This scenario identifies what can be achieved with road improvements alone. Rail mode share would reduce and highway volumes would increase up to 20%. There would be no road congestion in the corridor although the Ngauranga – Aotea Quay section and Wellington CBD limitations are likely to back up into the corridor.

## IP3 Improved reliability scenario

This scenario would provide a reliable safe facility suitable for corridor demand. Rail improvements and TDM strategies are used to offset the lack of highway capacity south of Tawa. The highway would be a consistent four lane, median divided facility along the corridor with a parallel local road where appropriate for back up use in the event of a closure. Kapiti and Porirua would have 15 and 7 minute train frequencies respectively that could be increased with the addition of further rolling stock. The single sections of track would be duplicated to improve reliability. Congestion in the southern part of the network would be reduced through a balanced investment in road and rail infrastructure along with TDM measures.



Note: Based on options with levels of mitigation that has not been tested with the community to any significant extent.



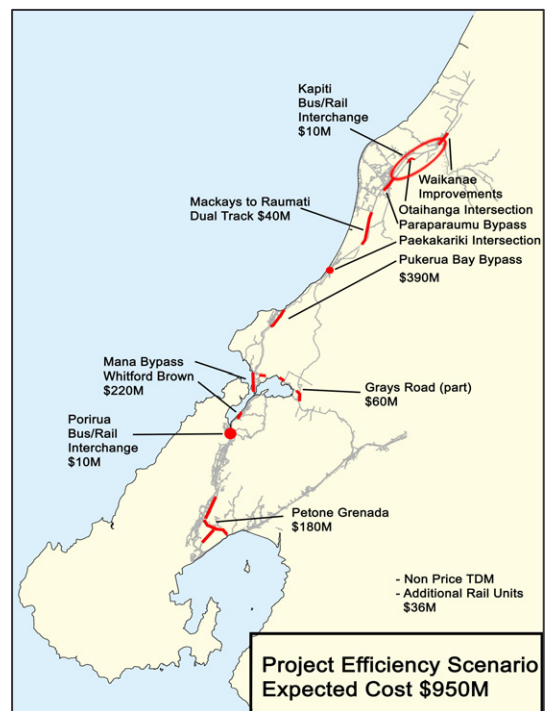
Note: Based on options with levels of mitigation that has not been tested with the community to any significant extent.

#### IP4 Congestion relief scenario

This scenario focuses on elements that relieve current congestion points on the highway and rail network. Rail capacity would be increased with longer trains at the current frequency. Highway improvements would be concentrated in the southern part of the corridor where the congestion is worst. In the northern and central section bottlenecks would be relieved. Freeing up these sections allows traffic growth that places the remaining sections of the network under stress with resulting poor levels of service. The highway would not be of a consistent standard along the corridor and the reliability of the road and rail networks would not be addressed by this scenario.

#### IP5 Project efficiency scenario

This scenario focuses on the elements that provide the maximum economic benefit along the corridor. Highway improvements would be located irregularly along the corridor. Freeing up sections of the corridor allows traffic growth that places the remaining sections of the network under stress with resulting poor levels of service. The best performing rail projects would be included to allow improved 15 minute frequencies to Kapiti. The highway would not be of a consistent standard along the corridor and the reliability of the road network would not be addressed by this scenario. The additional strain placed on the single track rail section between Pukerua Bay and Paekakariki is likely to reduce the reliability of the rail network below current levels.



Note: Based on options with levels of mitigation that has not been tested with the community to any significant extent.

## Assessment of Initial Scenarios

The analysis of the initial scenarios shows the following:

Scenario	Regional Benefits (per annum)	Expected Costs	PBS Score	
			RLTC	LTNZ
PT &TDM	\$6M	\$410M	5.3	5.2
Roading	\$43M	\$2,050M	5.6	6.5
Improved reliability	\$43M	\$1,760M	5.7	6.2
Congestion Relief	\$26M	\$1,070M	5.2	5.1
Project Efficiency	\$26M	\$950M	5.4	5.2

Note:

1. Based on options with levels of mitigation that has not been tested with the community to any significant extent.

The corridor performance for each of the scenarios is summarised in the following table.

Scenario	Safety	Reliability	Congestion and level of service	Mode Share	TDM required
PT &TDM	Neutral	✓	✘✘	62:31:6	15%
Roading	✓✓	✓	✓✓	66:26:7	-
Improved reliability	✓✓	✓✓	neutral	63:29:8	5%
Congestion Relief	✓	Neutral	neutral	66:27:7	5%
Project Efficiency	✓	Neutral	✘	62:30:7	5%

## Sensitivity

Sensitivity testing of the initial scenarios is currently underway using the 2026 high projection. Further sensitivity testing of the Planning Balance Sheet will also be undertaken to consider the effects of significant oil price rises and population distribution changes. Testing of alternative population distributions will be undertaken once the WRS land use scenarios are available. In the interim WRS have advised that their strategies are likely to result in traffic volumes that fall between the medium and high growth projections currently in the model.

The effects of private vehicle running costs increasing by \$0.2 per kilometre have been modelled, this equates to the doubling of running costs. The results showed a mode shift towards passenger transport and a 15% reduction in traffic volumes in Ngauranga Gorge at peak times.

## Affordability and Implementation

There are number of potential funding sources for projects over the next 20 years. In order to provide a framework in which to take this into account in the Planning Balance Sheet a review has been undertaken of all relevant sources. As a result of this analysis \$1.2 billion total cost was adopted as the mid point for assessing affordability of scenarios and scoring them in the PBS. The proportion of overall region-wide funding that might be available for implementing the Western Corridor Strategy is assumed for the mid point estimates as 50% of all Wellington Region highway expenditure.

Toll revenues would not be sufficient to fund the larger elements. Transmission Gully tolls are only likely to net \$10M per year and would not be attractive to private investment.

Large elements, progressed with urgency, are likely to take at least 12 years to implement and those that are not progressed with urgency at least 16 years. Small elements can be completed in as little as two years. Transmission Gully is expected to take at least 9 years from a decision to proceed before it is able to be opened.

## Where To From Here

The study programme from this point includes the following:

**Consultation:** A second round of consultation with the public and stakeholders will commence in May based on the technical findings to date. This will provide feedback on the initial scenarios and the relative importance of the study objectives to communities and groups.

**Technical work:** Further technical work will be undertaken through the consultation period. In some areas there should be further refinement to ensure that decisions can be made on sound information with a satisfactory level of relativity between the options. It is expected that the consultation will generate questions of the existing technical work that will also require further technical information.

**Funding:** Further work is under way to determine the affordability of the scenarios.

## Study outcome

The process will strive to provide a study outcome that achieves:

- A strong regional consensus on the process and the final corridor plan
- Improved corridor performance
- Public acceptance
- Political acceptance
- Certainty for the region
- Affordability within agreed funding.