

GHD CLIENTS/PEOPLE/PERFORMANCE

MORIMORUWA
RITA TRAVIS/COMMUNITY

122 TRANSPORT AGENCY
SARAH ACTON

Determining the Transport Effects of Alternative Land Uses

Laura Skilton


GHD CLIENTS/PEOPLE/PERFORMANCE

Transportation Models

Traditionally used to assess roading projects

Can also be used to assess alternative land use scenarios on a roading network


- Mitigation measures
- Transport sustainability
- Cost to the community



GHD CLIENTS/PEOPLE/PERFORMANCE

Transportation Models

- Computer representation of the road network consisting of:
 - network
 - matrix
 - travel parameters
- Tool to assist decision making



GHD CLIENTS/PEOPLE/PERFORMANCE

Transportation Models - Matrices

Methods of preparing matrices:

- direct survey
- matrix estimation
- gravity model

or combination of the above

TO FROM	1	2	3	4	5	6
1	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00


GHD CLIENTS/PEOPLE/PERFORMANCE

Matrices – Direct Survey

Household Interview Surveys
Roadside Interview Surveys

Large survey cost
Partial matrix
Guesstimate the remaining

How do you predict the future?
Growth each zone based on future growth?



GHD CLIENTS/PEOPLE/PERFORMANCE

Matrices – Matrix Estimation

Prior matrix updated based on vehicle paths and traffic volumes

Good traffic data
Separate, independent set of counts for validation

Trip generations from each zone
Calibrated network

How do you predict the future?
Growth each zone based on future growth?

GHD CLIENTS PEOPLE PERFORMANCE

Matrices – Gravity Models

Trip distribution based on the attractiveness of two zones
 origins and destinations
 cost of travel (time and distance)

Trip generation from each zone based on land use
 households per zone
 employment per zone
 by trip purpose


Different networks have different trip distributions
 Future matrices based on future land use scenarios

GHD CLIENTS PEOPLE PERFORMANCE

Level of Service

Urban network
 Intersection delay
 LOS C = 20-35 seconds delay
 LOS D = 35-55 seconds delay

Rural network
 vehicle volumes
 LOS C = 750 vehicles per hour



GHD CLIENTS PEOPLE PERFORMANCE


MORRISONVILLE DISTRICT COUNCIL

NZ TRANSPORT AGENCY

Wairau Plains Land Use Study

Assess the transport sustainability of potential long-term growth areas and inform the development of a preferred growth strategy
 Identify future demands on the transport network generated by growth scenarios
 Identify deficiencies with the existing transport system in terms of current and future demands

Combined NZTA and MDC project

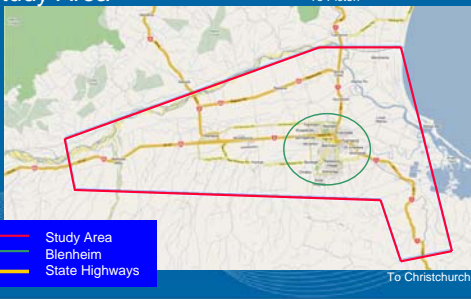


GHD CLIENTS PEOPLE PERFORMANCE

MORRISONVILLE DISTRICT COUNCIL

NZ TRANSPORT AGENCY

Study Area



— Study Area
 — Blenheim
 — State Highways

GHD CLIENTS PEOPLE PERFORMANCE

MORRISONVILLE DISTRICT COUNCIL

NZ TRANSPORT AGENCY

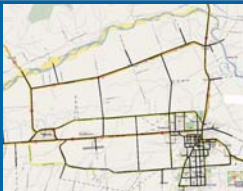
Transport Model

SATURN – variable demand matrix
 similar to a gravity model

Base network
 Base land use data from 2006 Census
 Trip generation
 alternative trip purposes
 modified from other transport models

Validated to observed vehicle volumes and travel times

Future matrices based on future land use scenarios



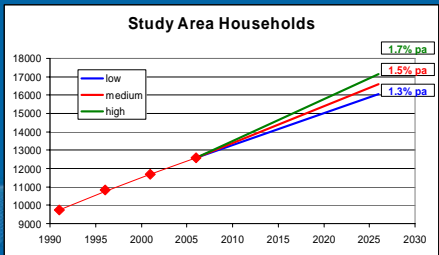
GHD CLIENTS PEOPLE PERFORMANCE

MORRISONVILLE DISTRICT COUNCIL

NZ TRANSPORT AGENCY

Growth Trends

Study Area Households



Year	Low	Medium	High
1990	9000	9000	9000
1995	10000	10000	10000
2000	11000	11000	11000
2005	12000	12000	12000
2010	13000	13000	13000
2015	14000	14000	14000
2020	15000	15000	15000
2025	16000	16000	16000
2030	17000	17000	17000

Medium growth requires 4000 more households

Future Land Use Scenarios

Household distribution:
intensify Blenheim
satellite towns
combination



Employment:
known future developments
existing trends

Future Land Use Scenarios

Alternative household distributions:

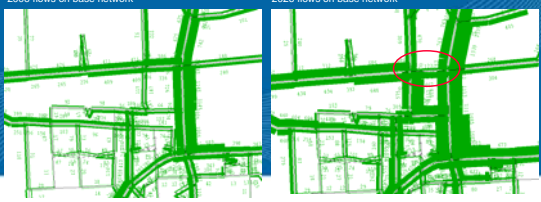
	Intensify	Satellite Towns	Combination
Blenheim	2890	600	1700
Taylor River	700	300	500
Renwick	300	700	500
Grovetown	100	1200	700
Spring Creek	100	50	50
Bankhouse	0	700	350
Marlborough Ridge	0	200	100
Wairau Valley	0	250	100

Do Minimum Network

Includes works where PFR's have been undertaken

Improve intersections that fail in all scenarios
otherwise route choice effected

2006 flows on base network 2026 flows on base network



Comparing Land Use Scenarios


Rural Network
Traffic flows – 4 laning
Intersection delays – additional capacity

Urban Network
Intersection delays – additional capacity

Network Wide Statistics

Rural Network


Links with volumes greater than 750 vph
2006 2026 Satellite Towns

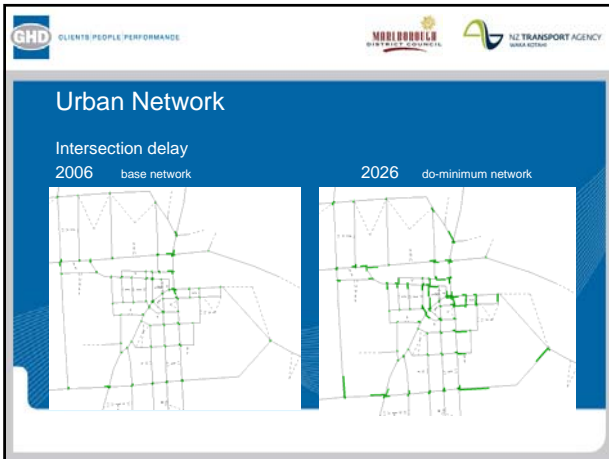


Rural Network

Intersection delays

- Worst with Satellite Town scenario
- Can quantify number of intersection improvements required





Total Network Summaries

Evening peak results

Scenario	2006	2026		2026	
		Intensification		Satellite Town	Combination
Households	12,600	16,600 +32%	16,600 +32%	16,600 +32%	16,600 +32%
Travel Time (hrs)	966	1,651 +71%	2,308 +139%	1,905 +97%	1,905 +97%
Travel Distance (km)	53,049	80,098 +51%	100,048 +89%	89,085 +68%	89,085 +68%
Fuel (litres)	4,156	6,657 +60%	8,512 +105%	7,466 +80%	7,466 +80%
Average Speed	54.9	48.5	43.4	46.6	46.6

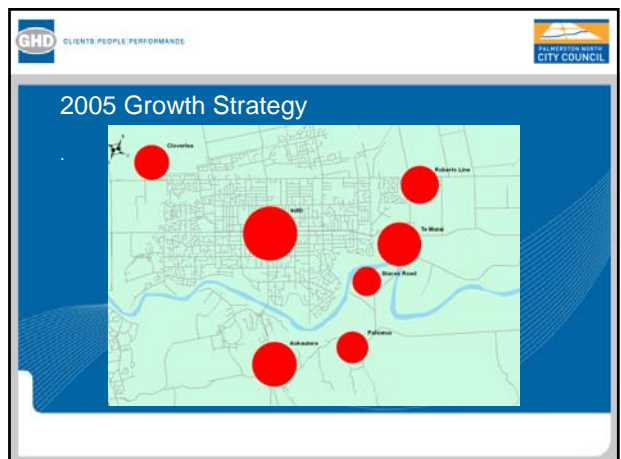
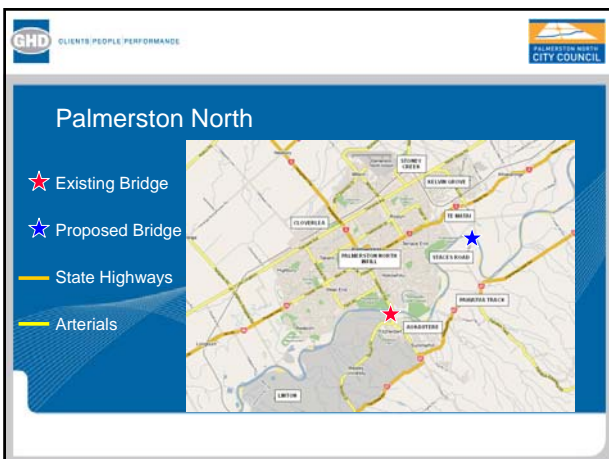
-
- Summary**
- Transport models allows us to:
- Quantify mitigation measures required for alternative land use scenarios
 - Quantify transport costs to community for alternative land use scenarios
 - Assist Planners in reviewing policies and growth strategies
 - Provide data for determining development levies

Another Use For Alternative Land Use Scenarios within a Transport Model

Sensitivity on BCR

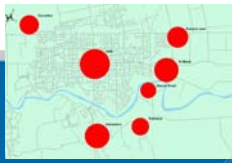
Determine the benefits of a roading project on alternative land use scenarios

Case Study – Palmerston North Second River Crossing



GHD CLIENTS PEOPLE PERFORMANCE

Palmerston North Land Use Scenarios:



High growth rate	- fully uses all available areas
Medium general	- partially uses all available areas
Medium south	- concentrates on growth south of river
Medium north	- concentrates on growth north of river
Medium Linton	- alternative to growth strategy
Medium Stoney Creek	- alternative to growth strategy

GHD CLIENTS PEOPLE PERFORMANCE

Palmerston North CITY COUNCIL

Probability of Land Use Scenario

	Rank
High growth rate	6
Medium general	2
Medium south	1
Medium north	4
Medium Linton	5
Medium Stoney Creek	3

GHD CLIENTS PEOPLE PERFORMANCE

Palmerston North CITY COUNCIL

BCR of Land Use Scenario

	Rank	BCR
High growth rate	6	2.43
Medium general	2	2.17
Medium south	1	2.42
Medium north	4	1.41
Medium Linton	5	2.25
Medium Stoney Creek	3	2.27
Weighted average		2.2

