



**MWH**

**BUILDING A BETTER WORLD**

**STAGE 1 REPORT**

# **Arterial Traffic Study Evaluation of Existing Arterial Traffic Routes**

Prepared for Nelson City Council

APRIL 2010

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## Arterial Traffic Study Evaluation of Existing Arterial Traffic Routes

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## Executive Summary

The objective of the Nelson Arterial Traffic Study is to determine the best transport system configuration between Annesbrook and the QEII/Haven Rd roundabouts that will improve the city as a whole.

This report covers the first stage of the study, that being the evaluation of existing arterial traffic routes. There are currently two main arterial routes between north and south. These are:

- State Highway 6 (often referred to as the Rocks Road route)
- Rutherford Street / Waimea Road.

Both routes are two-lane two-way roads with high levels of residential and commercial land uses fronting the routes. The Rocks Road route traverses the coastline for a significant length, whilst Waimea Road passes two large high schools and the public hospital. SH6 carries around 20,000 vehicles per day and the Waimea Road route carries around 25,000 vpd reducing down to less than 15,000 vpd on Rutherford Street.

Travel times on the two routes show that the average travel time delay in the peak periods is around two to four minutes, with some very high travel times experienced irregularly. Overall, travel time variability is moderate with no significant change over the last five years.

To determine the future characteristics of the transport network, the Nelson-Tasman transport model has been significantly updated to reflect the most recent census data, current land use projections and network improvements. This model has been calibrated, validated and peer reviewed.

Projected population figures show that contrary to recent history, the bulk of the future increase in population is likely to occur in Nelson and Stoke, rather than Richmond and Tasman. Forecast land use changes show that the majority of new jobs are likely to be in Richmond and Tasman rather than Nelson. Those new jobs that are in Nelson are likely to be predominantly in south and west Nelson and Stoke, rather than in the Nelson CBD.

Overall a 26-28% increase in trips over the entire network is forecast from 2006 to 2036. A significant increase in vehicle kilometres travelled is predicted within the model study area; however the average trip length is less in the AM and PM peaks.

In relation to the arterial routes between Nelson CBD and Annesbrook, the screenlines show a significant increase in traffic in the interpeak periods and in the contra-peak direction in the AM and PM peaks. However, little or no increase in vehicles is predicted by the model for peak direction travel along the current arterial routes in Nelson.

Assessments of the economic, noise, social, air quality and water quality impacts of the existing situation have been undertaken, including how these impacts are likely to change in the future should no change to the arterial routes be undertaken. These assessments, along with the transport modelling, will form the basis of the multi-criteria analysis and cost benefit analysis to be undertaken on the proposed options in Stage 3 of the Study.

This report also describes the multi criteria analysis procedure that will be used and the consultation strategy that has been adopted by the project team.

# 1 Introduction

## 1.1 Study Objective

The objective of the Nelson Arterial Traffic Study is to determine the best transport system configuration between Annesbrook and the QEII/Haven Rd roundabouts that will improve the city as a whole.

This includes an assessment, not just of transport related impacts but also of other economic, social, environmental and cultural impacts.

The final deliverable from this study will be a preferred transport system configuration that can be progressed to scheme assessment design and subsequently submitted for statutory approvals, funding approvals and implementation.

## 1.2 Background

In the 1960's the Nelson City Council was involved in an investigation for a route between Richmond and Nelson and the *Southern Arterial*, which included the Southern Link, was selected as the preferred option.

The *Southern Arterial* was developed over time by constructing projects such as the Stoke Bypass. In 1996, the Council decided to progress with the Southern Link section by undertaking an assessment of alternatives and then lodging a Notice of Requirement in 1999. As the new link would become a State highway, Transit New Zealand (now NZ Transport Agency) assumed responsibility for the project in March 2000 and consequently amended the Assessment of Environmental Effects and resubmitted the Notice of Requirement in July 2000.

The Council hearing before Commissioners commenced in November 2000 but then adjourned for a year to allow Council to undertake air quality measurements. In early 2002, the Commissioners recommended to NZ Transport Agency that the designation be withdrawn on the basis of air quality and public health issues.

Transit then undertook further work before taking the Southern Link to the Environment Court in 2003. The Court agreed with the Commissioners in that the Southern Link requirement should be withdrawn. The major concerns of the Court included the proximity to schools, potential effects on pedestrian safety, issues of social coherence and air quality. The Court's decision also stated that there was a lack of evidence given as to the comparative efficiency of the Southern Link with any alternative.

This decision resulted in Nelson City Council, Tasman District Council, and Transit agreeing to undertake a study of transport options within the wider Nelson-Richmond urban area. This study was the North Nelson to Brightwater Strategic Study which, in April 2008, culminated with the recommendation of a long term vision to beyond 2026 in terms of public transport, cycling, traffic management, and travel demand management measures as well as roading improvements.

Due to a number of factors, including the decision by Tasman District Council to pull out of the study, the division in the community with regards to the options and the need to progress the other elements of the strategy, the strategy was completed without a final decision related to the preferred roading option between Nelson and Stoke.

In December 2008 the Regional Transport Committee (RTC) completed the draft Regional Land Transport Strategy (RLTS). The strategy proposed a significant improvement in passenger transport services between Nelson and Richmond and acknowledged that if there is a need for additional roading capacity, the corridor along the railway reserve linking to the Annesbrook Drive roundabout is the logical potential route. The strategy proposed to monitor/review the need for a new road along the "railway reserve" or high occupancy vehicle (HOV) clearways on SH6 and Waimea Rd/Rutherford St routes annually.

In reviewing the draft RLTS, Council identified that, among other issues, the potential benefits to the city of enhancing the waterfront area of Nelson required further consideration. Council subsequently resolved to advise the Regional Transport Committee of its intention to commission an Arterial Traffic Study. Council also gave the RTC an indication of the level of funding it would be providing for passenger transport in the 2009-19 Council Community Plan, which was less than that envisaged by the RLTS.

After further consideration the Regional Transport Committee made some minor amendments to the Strategy. Council adopted the Regional Land Transport Strategy in June 2009.

Subsequently, the NZ Transport Agency, in releasing the 2009 - 2012 National Land Transport Programme, stated that new public transport services and improvements were unlikely to receive funding from Central Government within the next three years as they do not align well with national investment priorities.

This study is the aforementioned Arterial Traffic Study, which has been commissioned to undertake further investigatory work in relation to all possible transport options between Nelson and Stoke and recommend a preferred option.

### **1.3 Project Governance**

This project was commissioned by Nelson City Council, but is being overseen by a Decision Making Panel comprising representatives from Nelson City Council, NZ Transport Agency, Tasman District Council, the MWH New Zealand Ltd project team and Dr Alan Nicholson, an independent academic from the University of Canterbury. The members of the Decision Making Team are provided in Appendix A.

The Decision Making Panel is responsible for ensuring that the study process is robust and that the final study outcomes are based on quality technical analysis. Whilst the Nelson City Councillors are not directly involved throughout the study, they will be kept up to date through periodic Council workshops. NZ Transport Agency, as a key funding partner, are involved to endorse the process at key stages throughout the study.

### **1.4 Project Team**

MWH New Zealand Ltd are leading a team of technical experts from both MWH and specialist consultancies to ensure that all technical facets of the study area and the options are considered and evaluated in an appropriate manner. The members of the project team are shown in Appendix B.

### **1.5 Study Area**

The study area is from the Annesbrook Drive / Whakatu Drive Roundabout in the south to the QE II/Haven Road Roundabout in the north. The study area is shown in Figure 1-1 below:



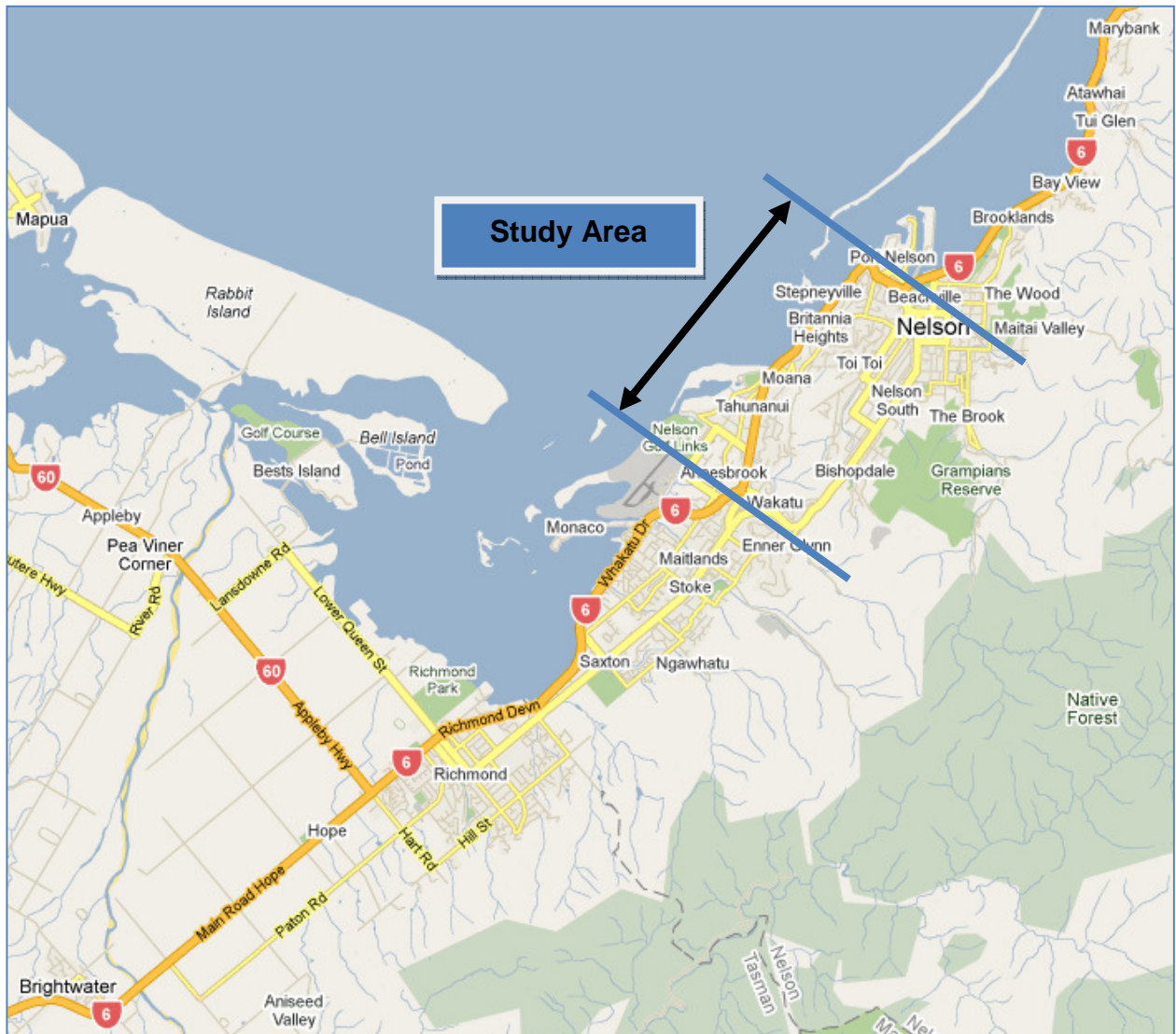


Figure 1-1 : Study area from Annesbrook to QE II Haven Road Roundabouts

## 2 Study Structure

This study methodology is divided into four distinct stages, as follows:

- Stage 1: Evaluation of existing arterial traffic routes: present and future conditions
- Stage 2: Selection of best arterial route options
- Stage 3: Evaluation of best arterial route options
- Stage 4: Determination of preferred arterial transport configuration and comparison with existing arterial traffic routes.

The full study terms of reference, including an outline of what will be considered within each of these stages is included in Appendix C.

## 2.1 Stage 1 Report

This report covers the first stage of the study, that being the evaluation of existing arterial traffic routes. In doing so this document reports on:

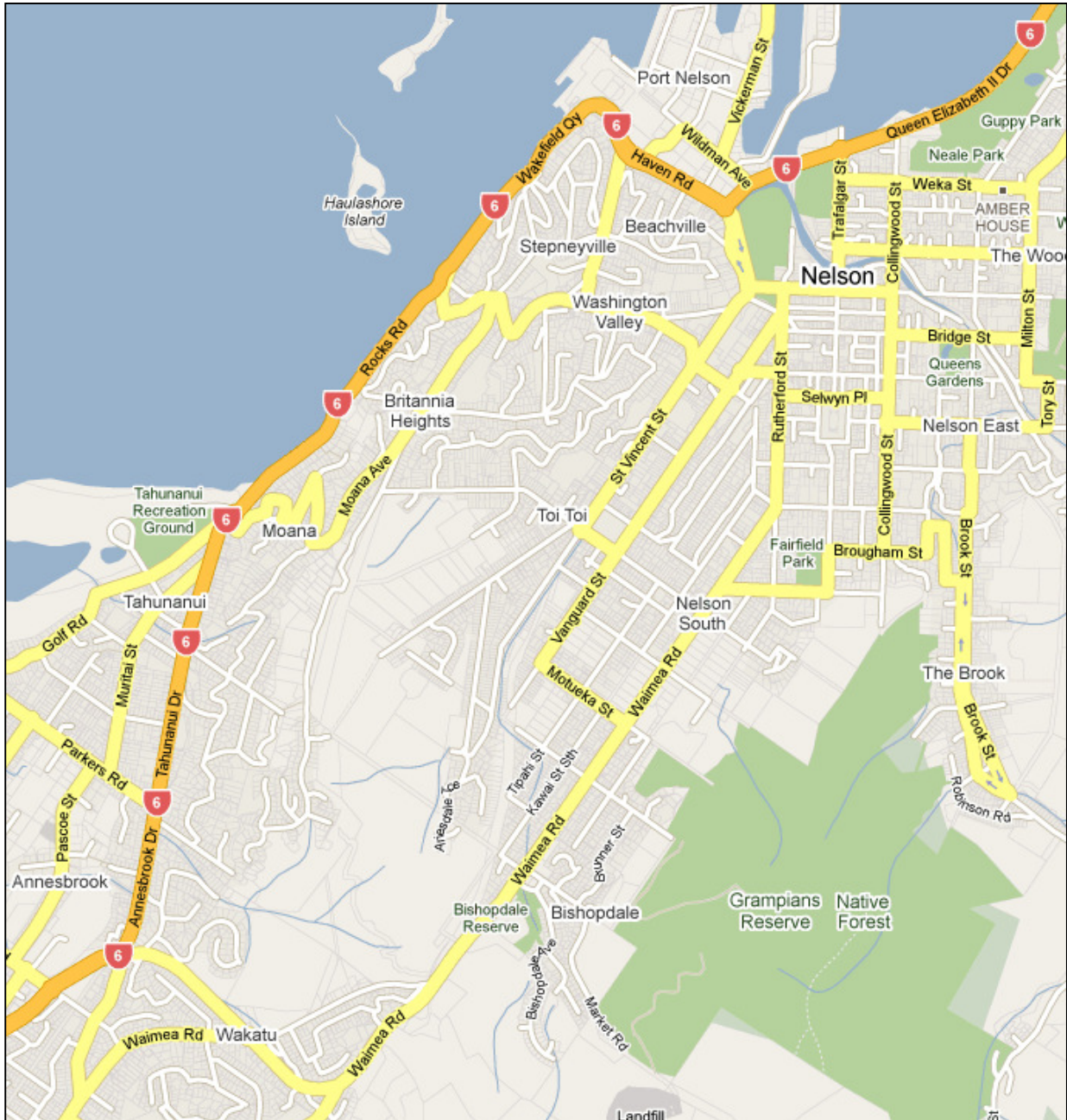
- The study objective (see Section 1)
- The study structure (see Section 2)
- A description of the existing arterial routes (see Section 3)
- Computer-based transport modelling inputs and outputs (see Section 4)
- Assessment of the existing arterial routes (see Section 5)
- The proposed evidence based assessment methodology, including assessment criteria (see Section 6)
- The proposed consultation strategy (see Section 7).

A Stage 1B report is also being produced as an addendum to this report which outlines:

- Differences between the North Nelson to Brightwater transport model and the current model
- The Multi-Criteria Analysis criteria adopted by the Decision Making Team

### 3 Current Arterial Route Characteristics

The study area is from the Annesbrook roundabout in the south to the QE II/Haven Road roundabout in the north. The study area is shown in Figure 3-1 below:



**Figure 3-1 : Study area from Annesbrook to QE II Haven Road Roundabouts**

There are currently two main arterial routes between north and south. These are:

- State Highway 6 (often referred to as the Rocks Road route, and managed by NZ Transport Agency)
- Rutherford Street / Waimea Road.

### 3.1 State Highway 6

The northern end of the study area is the Haven Road / QEII roundabout, which is a three arm roundabout with the SH6 on the western and northern arms. The Auckland Point Primary School is located adjacent to this intersection.

The arterial route initially travels west from this location along Haven Road past Port Nelson to Wakefield Quay. Haven Road comprises a single lane in each direction divided by a wide planted median. Land use adjacent to this section is predominantly commercial and industrial.

Haven Road becomes Wakefield Quay with the left turn bend towards the waterfront. Wakefield Quay again comprises one lane in each direction although the median eventually reduces down to a single centreline. Land use from Haven Road to Poynters Crescent is mostly commercial with some restaurants and apartment buildings also along either side of the road. From Poynters Crescent to Richardson Street the highway is bounded by the seawall on the western side of the road, with no development except the Boat Shed café. On the eastern side of the road, residential properties line the route.

SH6 is named Rocks Road between Richardson Road and Tahunanui, but continues to comprise one lane in each direction. The highway along this stretch again is bounded by the sea on the western side. On the eastern side, steep banks and a small reserve front the highway until residential development again appears towards Tahunanui.

In 2007, traffic signals were installed at the intersection of SH6 with Bisley Ave, Beach Road and access to the beach. At this location SH6 heads back inland slightly along Tahunanui Drive. Tahunanui Drive also comprises one lane in each direction but includes a flush median with right turn bays for the majority of its length. Land use is predominantly retail and commercial, with Tahunanui Primary School also fronting the highway on the western side.

At Parkers Road, the highway becomes Annesbrook Drive which continues the cross section from Tahunanui Drive of a single lane in each direction with a flush median. However, the land use becomes residential all the way to the Annesbrook Roundabout at the southern end of the study area.

This route is approximately 5.6km long. The speed limit is 50km/h for the entire route.

### 3.2 Rutherford Street / Waimea Road

This route initially travels south from the QEII Drive (SH6) roundabout along Haven Road to Halifax Street. Haven Road has two lanes in each direction separated by a wide planted median. A few commercial properties adjacent to the northbound carriageway are the only developed land along this stretch, as a stream runs along the western side.

The route then takes a left at a roundabout into Halifax Street before making a right turn at traffic signals into Rutherford Street. Halifax Street comprises only one lane in each direction but widens to two lanes at the approach to the intersections at either end of the short link. Halifax Street is bounded by Anzac Park to the south with the northern side having playing fields and a couple of commercial properties.

Rutherford Street is a wide retail / commercial street which runs along the western edge of the Nelson central business district, one block to the east of Trafalgar Street, the main retail street in Nelson. Rutherford Street generally comprises one lane in each direction with right turn bays or additional lanes gained on the approach to the many priority and traffic signalled intersections along its length. Rutherford Street forms one side of the CBD Ring Route. It is noted that the Heart of Nelson Study has identifies the expansion of the CBD area through to Vanguard Street, one block to the west.

A slight bend in the road indicates the route diverting onto Waimea Road. The cross section again comprises one lane in each direction with a flush median transforming into right turn bays for the priority intersections that are frequent along this length. Land uses adjacent to Waimea Road include a hospital, schools and kindergartens as well as residential properties with some minor commercial and retail in

pockets. As Waimea Road approaches the Bishopdale reserve, adjacent land use becomes much less developed. The speed limit increases from 50km/h to 70km/h and a short passing lane is provided in each direction. The route passes the seagull intersection of The Ridgeway before arriving at the Beatson Road roundabout. At this location traffic can choose to travel south via Waimea Road and Main Road Stoke, or continue along Whakatu Drive to the Annesbrook Drive roundabout to travel south via SH6 Whakatu Drive.

The route between The Ridgeway and the Annesbrook Roundabout has very few property accesses although it is passing through a residential area.

This route is approximately 6.3km long between Annesbrook and the Haven/QEII roundabouts. The speed limit is 50km/h apart from the stretches of 70km/h between the northern end of Bishopdale reserve and north of the Beatson Road roundabout and south of Beatson Road roundabout to north of Annesbrook Drive roundabout.

### 3.3 Public Transport

The RLTS states that two main passenger transport services operate in Nelson.

- SBL Services (SBL) currently provides a commercial bus service between Richmond and Nelson via the two arterial routes described above. Both travel via Stoke, with one travelling via SH6 Rocks Road and the other via Waimea Road. There are 12 weekday services operating from Richmond to Nelson CBD via SH6, and 13 return services on that route. There are 10 services on weekdays travelling via Waimea Rd to Nelson CBD (and 8 return services). There is a limited service operating on Saturdays and Sundays. The services operate between the hours of 7am and 6pm with headways varying from 30 minutes in the AM peak to two hours in the interpeak. The 2004 Nelson/Tasman public transport study estimated that these services carry between 150,000 and 200,000 passengers annually.
- SBL also operate "The Bus", a publicly subsidised bus service on four routes within Nelson. These routes cover:
  - Atawhai;
  - Hospital/Toi Toi;
  - The Brook/Maitai; and
  - Washington Valley.

These services operate Monday to Saturday, and are essentially 'shopper services' designed for the transport disadvantaged. These services carry 35,000 passengers annually. This equates to 160 passenger trips per day.

In addition to these services there are other commercial and subsidised school bus services that run throughout the region and a 'Late Late Bus' that runs between Nelson and Richmond on Friday and Saturday nights.

### 3.4 Walking and Cycling

Walking and cycling are popular modes of travel within Nelson. A network of off-road and roadside facilities provide for pedestrians and cyclists.

The SH6 route is identified as a cycle route by Nelson City Council. Cycle lanes are provided from Haven Road to Tahunanui (with some sections below recommended minimum widths), and although no specific facilities exist along Tahunanui Drive or Annesbrook Drive, it is a recommended cycle link.

The Waimea Road / Rutherford Street route is not a recommended cycle route. The alternative route is via the Old Railway Reserve, for which a temporary sealed surface was installed in 2009. This route ties into Beatson Road at the southern end (a recommended cycle link) and Vanguard Street at the northern end which has dedicated cycle facilities along most of the length.

Both routes have footpaths on both sides of the road for the majority of their length. The exceptions are where there is limited roadside development, such as Rocks Road or Bishopdale Hill where, typically, a footpath is only provided on one side of the road. The Old Railway Reserve route is also available for pedestrians.

### 3.5 AADTs

The Nelson City Council Annual Average Daily Traffic (AADT) volume on Rocks Road at the Basin Reserve (south of Richardson Street) was 20,200 vehicles per day (vpd) in 2009. Although the traffic volumes have been fluctuating over the last ten years, the traffic growth rate has been calculated to be approximately zero.

The Nelson City Council 2009 AADT volumes were 25,100 vpd on Waimea Road (at Bishopdale Hill) and 14,400 vpd on Rutherford Street (between Nile Street and Waimea Road). The traffic growth at these two locations over the last five years is also approximately zero. Traffic volumes are lower on Rutherford Street than Waimea Road due to a number of reasons, including the fact that there are a lot of trip ends between these two locations including the hospital, a number of schools and some businesses. The other reason is that there are a number of alternative routes available to traffic other than Rutherford Street, which branch out from Waimea Road including St Vincent Street, Vanguard Street, Van Diemen Street and routes through the city centre.

The heavy vehicle route through Nelson is SH6 which connects the Port and Airport with the urban areas of Nelson, Stoke and Richmond and the adjacent districts of Marlborough and Tasman. Heavy vehicles make up around 6% of the traffic stream on SH6 south of the Port, which equates to approximately 1,200 heavy vehicle movements per day. To the north of Nelson (at Hira), the number of heavy vehicles drops to approximately 400 per day, which is 15% of the traffic stream. South of Nelson (at Wairoa Bridge), the number of heavy vehicles increases to over 1,500 per day, which is 19% of the traffic stream.

### 3.6 Peak Hour Traffic Volumes

Peak hour traffic count information has been obtained from Nelson City Council for three locations on the arterial routes in question and these are summarised below. This data was obtained during February 2010.

**Table 3-1 : Peak Hour Volumes**

	<b>Rocks Road</b>	<b>Waimea Road</b>	<b>Rutherford Street</b>
AM Peak Northbound	1234 vph	1505 vph	734 vph
PM Peak Southbound	1074 vph	1684 vph	906 vph

The table above shows that Waimea Road carries significantly more traffic than Rocks Road. The location of the traffic counter, on Bishopdale Hill, is in a 70km/h location with no side friction. It is also located further south than the Rocks Road traffic counter and therefore may pick up additional traffic from the southern suburbs. There are also no intersections on Waimea Road that require through traffic to stop or give way (with the exception of the Hampden Street pedestrian crossing); this is in contrast to the Tahunanui intersection at the southern end of Rocks Road which does impart a capacity restriction.

The peak hour flows on Rutherford Street in comparison to Waimea Road reinforces the discussion above in regards to the other routes able to be used by Waimea Road traffic.

In relation to whether these traffic volumes should result in significant capacity issues, reference is made to the *Austroads Guide to Traffic Management Part 3 Traffic Analysis* which states that one-way mid-block urban traffic capacity is typically 900 vehicles per hour per lane for an undivided road with low side friction.

However, it also states that peak period mid-block traffic volumes may increase to 1200 to 1400 vehicles per lane per hour on any road when the following conditions exist or can be implemented:

- adequate capacity at major upstream intersections;
- uninterrupted flow from the carriageway upstream;
- minimal number of crossing or entering traffic movements at intersections;
- control or absence of parking;
- control or absence of right turns by banning turning at difficult intersections;
- good co-ordination of traffic signals along the route.

The current traffic counts on Waimea Road show higher volumes than theoretically expected by Austroads; however this could be due to the semi-urban 70km/h nature of the route at the location of the count station. This location also has two lanes in the southbound direction which contributes to why the southbound volumes are greater than northbound.

### 3.6.1 School Holiday Variation

Nelson City Council has analysed traffic volumes on Waimea Road to determine how these are affected by school traffic. The analysis showed that there is around a 24% reduction in AM peak traffic volumes (8am to 9pm) during the school holidays. In the PM peak (4pm to 5pm), the reduction is less pronounced, with less than a 5% reduction, although the reduction is around 11% for the 3pm to 4pm period.

### 3.6.2 Heavy Vehicle Traffic

Analysis of the traffic data from the NZTA count station on Rocks Road shows the heavy vehicle traffic as follows:

**Table 3-2 : SH6 Heavy Vehicle Traffic Volumes**

	<b>AM Peak (8am-9am)</b>	<b>Interpeak (12pm-1pm)</b>	<b>PM Peak (4pm-5pm)</b>
Northbound	98	67	52
Southbound	70	70	85

This shows that heavy vehicle traffic comprises approximately 8% of the traffic stream in the AM peak AADT on State Highway 6.

Heavy vehicle information has also been obtained from traffic surveys undertaken in 2006 on Rutherford Street at the intersection of Selwyn Street.

**Table 3-3 : Rutherford Street Hourly Heavy Vehicle Traffic Volumes**

	<b>AM Peak (8am-9am)</b>	<b>Interpeak (12pm-1pm)</b>	<b>PM Peak (4pm-5pm)</b>
Northbound	15	24	7
Southbound	14	29	8

Heavy vehicles only comprise 2% of the traffic stream in the AM Peak on Rutherford Street.

The above data shows that that the vast majority of heavy vehicle traffic currently uses SH6.

### 3.7 Travel Time Data

Nelson City Council has been undertaking travel time surveys on the two arterial routes since 2001, and reported on this data in the Regional Land Transport Strategy. These travel time surveys were undertaken typically six times<sup>1</sup> per annum using the floating car method. Further analysis on this data has been undertaken and the results are shown in the graphs below. Depicted are the average travel times, the minimum and maximum travel times and the 15<sup>th</sup> and 85<sup>th</sup> percentile travel times for each year. This data gives an indication as to the variability of travel times along the routes in the peak periods.

The Rocks Road route is from the Halifax Road Roundabout to the Annesbrook Roundabout. The Waimea Road route is from Selwyn Place to the Annesbrook Roundabout.

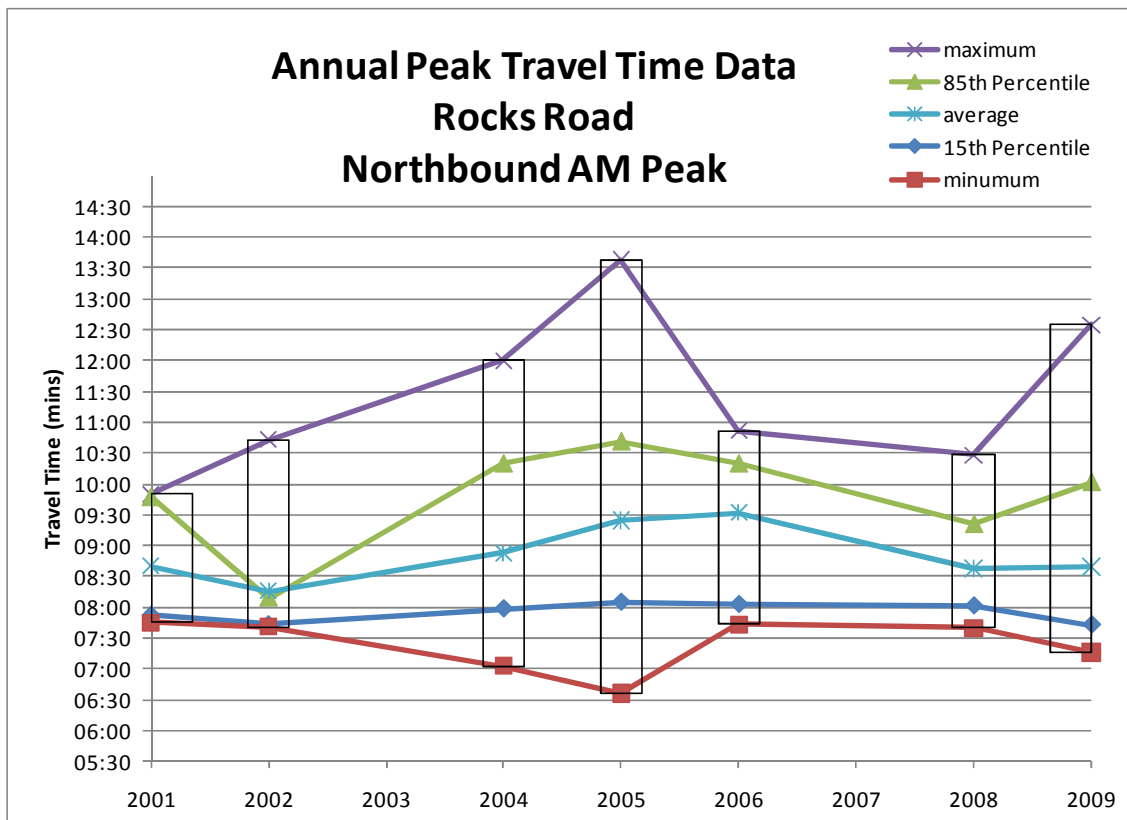
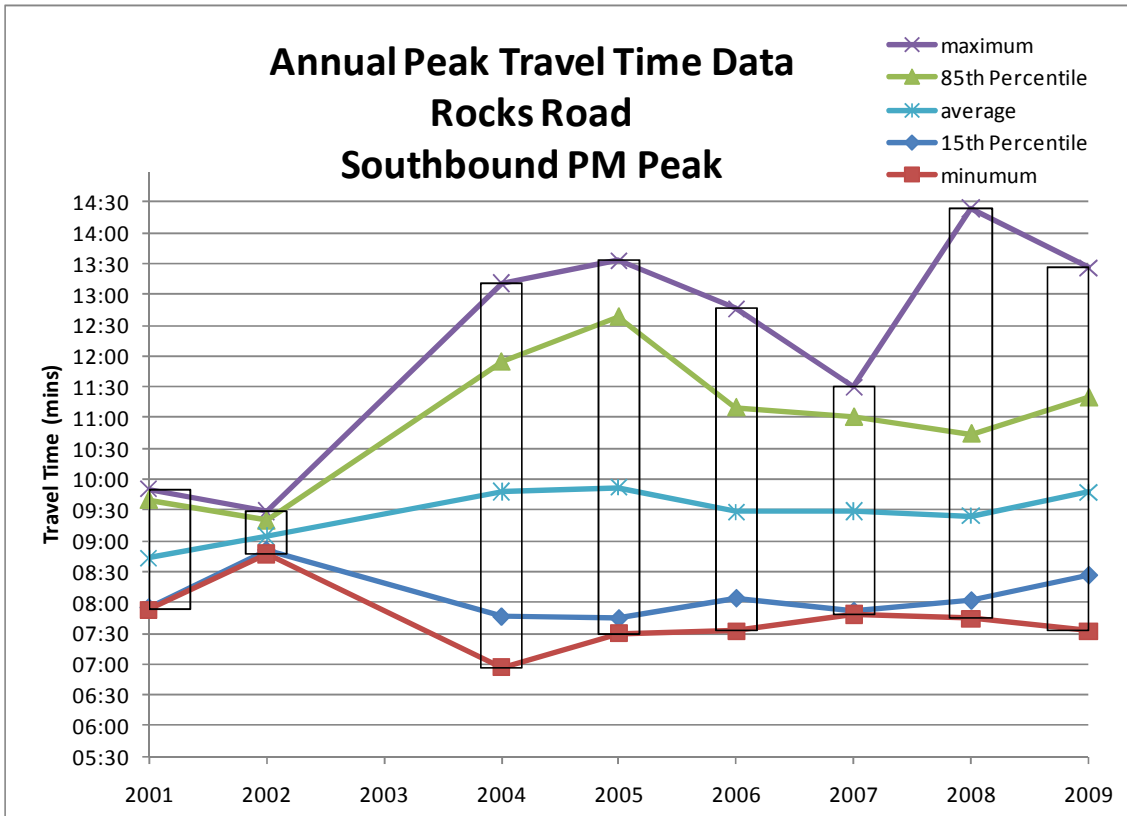


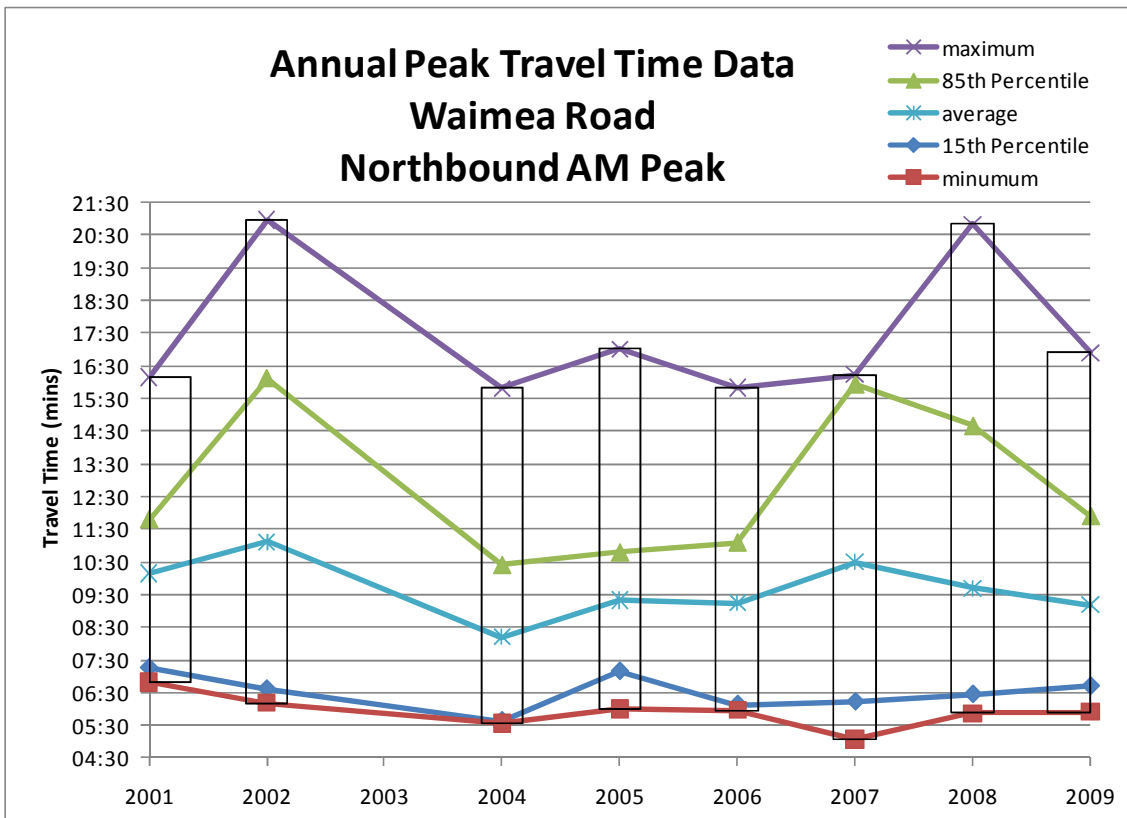
Figure 3-2 : Annual Peak Travel Time Data - Rocks Road – Northbound AM Peak

<sup>1</sup> Although limited information in some years which can result in unusual figures such as the 85<sup>th</sup> percentile travel time being below the mean (See Figure 3-2 for year 2002)

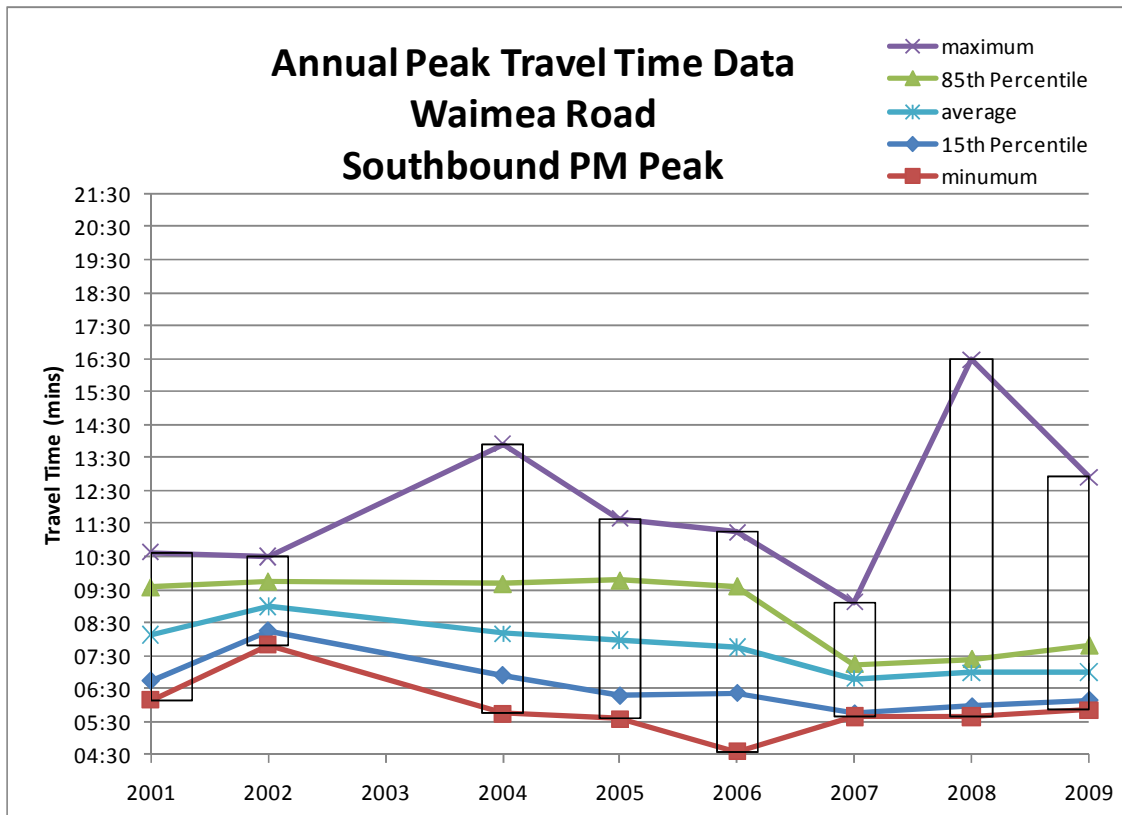




**Figure 3-3 : Annual Peak Travel Time Data - Rocks Road – Southbound PM Peak**



**Figure 3-4 : Annual Peak Travel Time Data - Waimea Road – Northbound AM Peak**



**Figure 3-5 : Annual Peak Travel Time Data - Waimea Road – Southbound PM Peak**

For the Rocks Road route in the AM peak, the average annual travel time increased from 2002 to 2006 to be around 3 minutes greater than the minimum recorded travel time. The average has decreased since 2006, which will be, in part, a result of the Tahunanui intersection improvements. In the PM peak, the average travel time has been relatively consistent over the last six years; around 2-3 minutes more than the minimum recorded travel time.

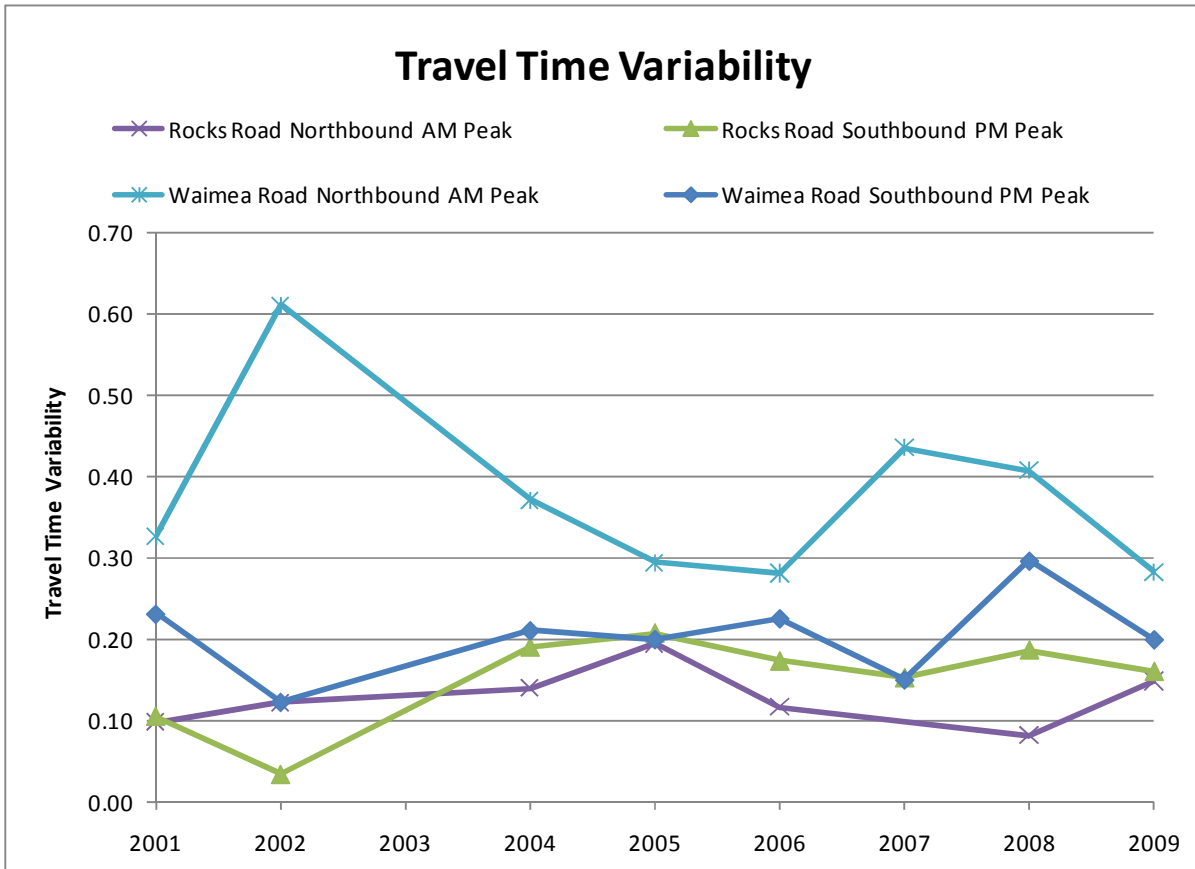
For the Waimea Road route in the AM peak, the average travel time has fluctuated but currently sits around 4 minutes more than the minimum recorded travel time. In the PM peak, the average appears to have decreased over time and there is only around 2 minutes of delay.

The data also shows that there can be very high maximums in travel times. However, , whilst the maximums often strongly influence public perception of congestion and travel time variability, it is important not to let them dictate the perception of travel time variability. Accordingly, further work in regards to travel time variability is outlined below.

### 3.7.1 Travel Time Variability

The travel time variability of the routes has been calculated by dividing the standard deviation of the travel times for a particular time period by the mean of the travel times for that same time period.

Using this formula provides the following information on how travel time variability has changed from 2001 to 2009.



**Figure 3-6 : Travel Time Variability**

The figure above shows that travel time variability is worst for the Waimea Road route northbound in the AM peak, and this has also had significant variation over time. This could be a result of this route having significant number of destinations along the length, including schools, which add to the morning peak traffic volumes.

The remainder of the routes typically do not have the same level of travel time variability and these have also fluctuated less over time. No significant trends can be seen from the data in terms of an improvement or deterioration of travel time variation over the last five years.

### 3.8 Modal Split

No specific information is available in regards to the modes used on the arterial routes. However the modal split for the region is able to be obtained from census data. The table below outlines the model of travel used by the usually resident population when travelling to work. It clearly shows that the preferred mode of travel for Nelson and Richmond residents is the private car.

**Table 3-4 : Modal Split data from 2006 census**

<b>Mode</b>	<b>Nelson (incl Stoke)</b>	<b>Richmond</b>
Drove car/truck	75%	78%
Vehicle passenger	6%	5%
Bus	1%	1%
Motorcycle	1%	1%
Bicycle	7%	6%
Walk	10%	9%

The table above also shows that vehicle occupancy rates across the Nelson and Richmond areas is also very low, with only 5-6% of journeys to work being undertaken as a passenger.

## 4 Transport Modelling

A transport model is essential for assessing the impact of a wide variety of options in a city network, due to the complex interactions occurring within the road network and the interaction between land use and demand for travel. For strategic planning and assessment of medium to long term needs, the use of a regional strategic computer model is appropriate as it enables a large number of different packages of options to be evaluated.

This section summarises the model used for the analysis, the inputs used and the outputs from the model. Further information on the model form and inputs can be found in the Model Building Report (Gabites Porter, September 2009).

### 4.1 Model Form

The study has used the Tasman-Nelson Regional Transport Model, which is based on the TRACKS software and was initially prepared by Gabites Porter Limited for the North Nelson to Brightwater Strategic Study and used regularly since that study. The model was updated by Gabites Porter in 2009 and was peer reviewed by MWH, prior to being appointed consultants for the Arterial Traffic Study. Acceptance by the peer reviewer makes the model suitable for use by Nelson City Council and NZ Transport Agency.

The model has been calibrated to weekday 2006 for morning (AM), interpeak (IP) and afternoon (PM) peak hour periods, based on the land transport network and land use activities for that Census year. The model is based on a typical day rather than account for significant changes such as school holidays or the lead up to Christmas. The PM peak model is a 3-step model only (refer the Model Building Report) and consequently the public transport impacts are only assessed for the AM and IP periods.

Future model runs were undertaken for the 2016 and 2036 Base networks, with and without the planned improvements to public transport by 2013.

As the model stretches from Hira in the north-east to Kawatiri Junction in the south and Riwaka in the north-west, the model also outputs results for a study area which comprises the SH6 corridor from Hira to Brightwater and extending to Pea Viner corner on SH60, which is the same study area as used in previous studies.

### 4.2 Model Inputs

#### 4.2.1 Transport data

Existing transport data was sourced from:

- Nelson City Council. This included weekly directional traffic reports at key locations generated from the council's tube count traffic monitoring programme; travel time survey data; indicative bus patronage data;
- Tasman District Council. This included weekly traffic reports at key locations generated from the council's tube count traffic monitoring programme;
- NZ Transport Agency. This included traffic counts for all NZ Transport Agency monitoring sites from 1996 to 2006; and mode split data from 1997/1998 Travel Survey for Tasman District Council and Nelson City Council. This data was extracted directly from the survey database; and
- Statistics New Zealand. This data included Journey to Work information from the 2006 Census.
- Consultant reports. This included turning counts undertaken for network improvements or resource consent applications

The traffic count data were used to build traffic flow profiles and to calibrate the 2006 model. The journey to work and travel survey data were used to analyse mode choice.

#### 4.2.2 Land use data

The future land use activities were obtained from:

- Nelson 2009-19 Community Plan
- Tasman Growth, Supply-Demand Model

The above sources use the Statistics New Zealand population forecasts as a base and modify these to take into account specific local factors.

Reference was also given to

- Nelson Urban Growth Strategy (NUGS Dec 2006)
- Nelson Resource Management Plan
- Tasman Resource Management Plan

The land use changes are summarised in the table below.

**Table 4-1 : Population Changes from 2006 to 2036**

Area	Persons					
	2006		2036		Increase	% Increase
Nelson north, outskirts and port (zones 479-528)	6687	(8%)	7871	(8%)	1184	18%
Nelson CBD (zones 1-160)	3879	(5%)	7606	(8%)	3727	96%
Nelson south and west (zones 161-304)	17319	(22%)	17437	(18%)	118	1%
Stoke (zones 305-400, 529-540,625-632)	14055	(18%)	20586	(21%)	6531	46%
Richmond (zones 401-478,541-579,633)	14427	(18%)	20752	(21%)	6325	44%
Rest of Tasman (zones 580-624)	23499	(29%)	24627	(25%)	1128	5%
<b>Total</b>	<b>79866</b>		<b>98879</b>		<b>19013</b>	<b>24%</b>

Table 4-1 above shows that the large increases in population are forecasted as being around the Nelson CBD, Stoke and Richmond areas. Almost 75% of the population growth in the region will be occurring south of Annesbrook.

**Table 4-2 : Employment Changes from 2006 to 2036**

Area	Jobs					
	2006		2036		Increase	% Increase
Nelson north, outskirts and port (zones 479-528)	2914	(8%)	2997	(6%)	83	3%
Nelson CBD (zones 1-160)	8162	(24%)	9116	(20%)	954	12%
Nelson south and west (zones 161-304)	5620	(16%)	8424	(18%)	2804	50%
Stoke (zones 305-400, 529-540,625-632)	3972	(11%)	4994	(11%)	1022	26%
Richmond (zones 401-478,541-579,633)	6352	(18%)	11719	(25%)	5367	84%
Rest of Tasman (zones 580-624)	7552	(22%)	9147	(20%)	1595	21%
<b>Total</b>	<b>34572</b>		<b>46397</b>		<b>11825</b>	<b>34%</b>

Table 4-2 above shows that over half the additional jobs forecast in 2036 would be in Tasman, with a significant but smaller amount in south and west Nelson. Over 65% of new jobs in the region would be south of Annesbrook.

The category model used for private trip generation is based on a New Zealand home interview survey which had a sample size of approximately 10000 households. The trip rates were derived by finding the

total number of households in each category and the total number of car driver trips in each category and dividing one by the other.

Productions for both 'home to' and 'to home' trip ends are generated using the category model and are later attracted to the trip destinations. The attractions are scaled to the number of productions such that a balanced number of trip ends can be matched in the trip distribution phase of the planning process. Subsequently, 'to home' trips are later transposed such that the destination of these trips pertains to the household and the origins pertain to other elements in the model.

The model understands the level of trip making potential within each of the 600+ zones within Nelson City and Tasman Region as it knows how many households, persons, vehicles, jobs and student enrolments there are in each area. As the number of any of these variables change, the model picks up this change and modifies the travel demand on the network accordingly.

### 4.2.3 Population demographics

The age distribution of the population within the Nelson and Tasman regions, like the rest of New Zealand, is forecast to change significantly over the coming years. Current forecasts see the percentage of people in Nelson who are over 65 increasing from 13 to 26% from 2006 to 2026 (i.e. 6,400 to 13,000 people), with an even more pronounced increase in the Tasman

Whilst the model cannot specifically model the increase in age of the population, other demographic factors which change along with the aging population are taken into account, such as the number of people per household and number of cars per household.

Nevertheless, the modelling outputs will be viewed under consideration of the possible effects an aging population could have on the traffic figures.

## 4.3 Future Networks

The modelled 2016 roading base network generally comprises projects which have already been completed since 2006, ones that are currently underway or are committed in the next three years, and a few intersection upgrades which are planned for completion by 2016. Some public transport improvements are also planned for implementation before 2016 and the effect of implementing them is investigated in the first stage of this study; further public transport improvements could be considered later as an option alongside roading improvement options.

These changes to the 2016 network compared to the 2006 calibrated network include the following:

1. Minor upgrades to the three roundabouts by the Whakatu Drive link road by way of additional turning bays on the approaches (only one southbound through lane approach at Champion Road)
2. Upgraded roundabout at the Three Brothers corner, SH6/60 intersection in Richmond
3. New signals at the intersections of Salisbury Road / Talbot Street, Gladstone Road / McGlashen Avenue and Gladstone Road / Oxford Street, with upgraded signals at Gladstone Road / Queen Street in Richmond
4. New signals at the Oxford / Queen / Salisbury Streets intersection in Richmond
5. New signals along Waimea Road in Nelson at Market Road/Boundary Road, Motueka Street and The Ridgeway
6. New signals at Haven Road / Halifax Street intersection in Nelson
7. Extension of Bridge Street to a Give Way controlled intersection at Vanguard Street with upgraded signals at Rutherford Street in Nelson
8. Extension of Washbourn Drive to Hill Street in Richmond; extension of Park Drive joining with Angelus Drive in Richmond; extension of Hillview Road to the Princes Drive extension which will connect to Beatson Road; extension of The Ridgeway from a new roundabout at Songer Street to connect with The Ridgeway South in Stoke
9. Decreases in the assumed free speed (speed limit) on Queen Street in the Richmond CBD and along SH60 between SH6 and McShane Road / Pugh Road.

Improvements to public transport are also included in the modelling for 2016 and 2036. This reflects the 'Phase A' improvements in the Regional Land Transport Strategy, namely:

1. Provision of one express bus service and two secondary bus services between Nelson and Richmond operating at least every 30 minutes in the peak, with a lesser frequency outside these times, Monday to Saturday 6:30am to 6:30pm.
2. The existing local access service (branded "The Bus") to retain its existing level of service.

The modelled 2036 roading base network comprises a number of roading improvements that are considered necessary to retain a reasonable level of service for motorists without unacceptable delays. This is also called the "Do-Minimum" network and as the base scenario it needs to exclude any potential projects which are likely for consideration in the option development and assessment stages of the study. In this respect compared to earlier studies, previously envisaged major upgrades to the road network between the Whakatu Drive / Annesbrook Drive intersection (currently a roundabout) and the Nelson CBD are not included, but only minor upgrades of some intersections.

These changes compared to the 2016 base network include the following:

1. Four-laning of SH6 Whakatu Drive (south of Annesbrook Drive) and Richmond Deviation with a flyover at lower Queen Street and termination at SH60
2. Upgrade of the roundabouts at Whakatu Drive / Annesbrook Drive and Whakatu Road / Waimea Road / Beatson Road intersections
3. New signals at the Vanguard Street / Gloucester Street and St Vincent Street / Gloucester Street / Washington Road intersections
4. New signals at Salisbury Road / William Street and Oxford Street / Wensley Road in Richmond
5. Roundabouts at Hill Street / Champion Road / Hill Street North and Champion Road / Park Drive in Richmond

Specifically excluded from the base 2036 network are the Hope Bypass with diamond interchange at the SH60 end of the Richmond Bypass; extension of Hill Street North to connect to Suffolk Road / Saxton Road East; and grade-separation apart from a flyover over lower Queen Street.

## 4.4 Modelling Results

Summary results for the 2006 base calibration network (without Public Transport Phase A) and for the 2016 and 2036 (with Public Transport Phase A) base networks are given in the tables below for the AM, Interpeak and PM peak periods.

It is recognised that, due to the inherent nature of modelling in both trying to replicate an existing situation and trying to predict what will happen in the future, there will be some inaccuracies. Accordingly, any modelling results need to be read with the understanding that there is a degree of uncertainty in the results. These uncertainties are less for overall model results and screenline results compared to traffic volumes on individual links. Accordingly, these wider scale figures have been reported where possible.

The first table shows the number of trips that are occurring over the entire modelled network.



**Table 4-3 : Model Network Statistics**

TRIPS (whole network)	2006 base calibration			2016 with PT Phase A			2036 with PT Phase A		
	AM	IP	PM	AM	IP	PM	AM	IP	PM
<b>Total person trips (2 or 3 hours)</b>									
Car driver	37037	39433		40881	43425		45888	50427	
Car passenger	6836	12775		7236	13873		7805	15999	
PT : Richmond ←→ Nelson	143	72		230	151		256	182	
PT: Other Nelson services	95	84		121	156		127	158	
Walk / cycle	14120	21609		15106	23897		16310	27613	
<b>Private cars trips (1 hour)</b>									
Total driver trips (incl. park)	24638	20823	26713	27253	22862	29581	31024	26645	33970
Increase relative to 2006	-	-	-	10.6%	9.8%	10.7%	25.9%	28.0%	27.2%

The total person trips are for 2 hours except for the Interpeak PT trips which are for 3 hours  
 No data for PM person trips as only the AM and Interpeak models are 4-step models

Table 4-3 above shows that the average increase in private car trips is similar for all three periods, with a 10-11 % increase for 2016 compared to 2006 and 26-28 % for 2036 compared to 2006, which equates to an average annual growth rate of private car trips of about 0.8 % per annum.

The introduction of 'Phase A' public transport improvements does result in an increase in public transport trips, specifically between Richmond and Nelson, however the number of trips is not significant in comparison to the number of car driver trips. This increase is discussed further below.

The next table below outlines the characteristics of trips within the study area.

**Table 4-4 : Model Study Area Statistics**

TRAVEL (study area) 1 hour	2006 base calibration			2016 with PT Phase A			2036 with PT Phase A		
	AM	IP	PM	AM	IP	PM	AM	IP	PM
Vehicle kilometres	109,936	93,581	122,712	122,738	104,945	137,433	144,259	128,349	162,678
Average Trip Length (km)	6.96	6.88	7.28	6.90	6.87	7.13	6.85	7.00	7.03
Average Trip Time (mins)	8.37	8.01	8.88	8.07	8.20	9.48	7.83	8.13	9.26
Mean delay per vehicle delayed (s)	4.54	4.27	4.82	5.12	4.94	5.39	5.49	5.37	6.41
Link mean speed (km/h)	53.6	54.9	53.1	52.8	54.4	52.1	52.9	54.6	52.5
Mean speed (km/h)	45.7	47.3	44.6	44.3	45.8	43.1	44.4	46.0	42.6

Table 4-4 shows that the number of vehicle kilometres increases in future years, which is to be expected. However the average trip length and trip time decreases which indicates that people are accessing services closer to their point of origin. This is likely a result of land use changes.

The increase in trips and the increase in vehicle kilometres travelled transposes to an increase in average delay per delayed vehicle and a decrease in the mean speed both on links and overall.

The final table in this section shows the travel costs incurred by those undertaking the trips on their chosen mode.

**Table 4-5 : Model Study Area Costs**

COSTS (study area) 1 hour	2006 base calibration			2016 with PT Phase A			2036 with PT Phase A		
	AM	IP	PM	AM	IP	PM	AM	IP	PM
Vehicle operating costs	\$43.5k	\$36.8k	\$48.9k	\$48.4k	\$41.0k	\$54.7k	\$56.3k	\$49.5k	\$64.2k
In-vehicle occ. time cost	\$47.8k	\$39.3k	\$54.5k	\$55.0k	\$45.4k	\$63.3k	\$64.5k	\$55.3k	\$75.7k
Added congestion cost	\$1.9k	\$1.3k	\$2.4k	\$2.3k	\$1.7k	\$3.0k	\$2.7k	\$2.1k	\$3.5k
<b>Total road user cost</b>	\$93.1k	\$77.4k	\$105.9k	\$105.7k	\$88.2k	\$121.0k	\$123.5k	\$106.9k	\$143.6k
Increase relative to 2006	-	-	-	13.5%	13.9%	14.2%	32.6%	38.1%	35.5%

Table 4-5 shows that the rate of increase of travel cost is greater than the increase in the number of trips, with a 14 % increase for 2016 compared to 2006 and 33-38 % for 2036 compared to 2006, which equates to an average annual growth rate of travel costs of about 1.1-1.2 % per annum compared to the expected level for 2011.

It must be recognised that this relates to the model study area and there will be a considerable variation in the number of trips in the different districts of north Nelson (including outskirts of Nelson city), Nelson CBD, Nelson south and west suburbs, Stoke, Richmond, and Hope and beyond, due to different growth in residential development and employment activities. A comparison of the current land use values to those used in previous studies is currently being undertaken and will be discussed in a separate report.

## 4.5 Corridor Results Comparison

Summary results for key screenlines for the 2006 base calibrated network and the 2016 and 2036 (with Public Transport Phase A) base networks are given in the tables below for the AM, Interpeak (IP) and PM peak periods.

This data provides information as to how much traffic is travelling north-south on the network across a certain 'screenline'. The screenlines are:

- Wakefield Quay / Rutherford Street at the northern end of the arterial routes
- Rocks Road / Waimea Road at the middle/southern end of the arterial routes

**Table 4-6 : Wakefield Quay / Rutherford Street Screenline**

SCREENLINE VOLUME (vph)				2006 Calibrated			2016 with PT Phase A			2036 with PT Phase A		
No.	Road	Location	Dirn	AM	IP	PM	AM	IP	PM	AM	IP	PM
2.6a	Wakefield Quay	Sth of Haven Rd	n/b	522	403	334	529	537	448	492	552	516
			s/b	225	357	597	269	441	653	360	542	653
2.6b	Russel St & Maori Road	Sth of Haven Rd	n/b	127	111	120	138	151	174	161	213	259
2.6c			s/b	118	112	134	166	153	162	246	222	197
2.6d	St Vincent St	Sth of Haven Rd	n/b	636	416	348	625	286	271	645	414	430
			s/b	296	391	578	225	328	490	305	375	474
2.6e	Vanguard St	Sth of Haven Rd	n/b	166	160	166	116	141	170	96	108	233
			s/b	142	166	163	198	209	196	198	223	246
2.6f	Rutherford St	Sth of Bridge St	n/b	316	327	331	365	384	401	423	443	402
			s/b	300	320	408	263	275	345	408	331	373
Screenline total flow			n/b	1767	1417	1299	1773	1499	1464	1817	1730	1840
			s/b	1081	1346	1880	1121	1406	1846	1517	1693	1943
% increase with respect to 2006			n/b	-	-	-	0.3%	5.8%	12.7%	2.8%	22.1%	41.6%
			s/b	-	-	-	3.7%	4.5%	-1.8%	40.3%	25.8%	3.4%

**Key**

vph: Vehicles per hour  
 PT: Public Transport  
 AM: Morning peak hour  
 IP: Interpeak hour  
 PM: Evening peak hour  
 n/b: northbound  
 s/b: southbound

Red text denotes travel in the peak direction in the peak hour i.e. northbound in the AM peak and southbound in the PM peak.

**Table 4-7 : Rocks Road / Waimea Road Screenline**

SCREENLINE VOLUME (vph)				2006 Calibrated			2016 with PT Phase A			2036 with PT Phase A		
No.	Road	Location	Dirn	AM	IP	PM	AM	IP	PM	AM	IP	PM
2.2a	Rocks Road	North of Bisley	n/b	1128	862	685	1137	915	740	1007	980	902
			s/b	480	784	1162	531	899	1304	694	1001	1263
2.2c	Princes Drive	North of Moana	n/b	207	107	110	206	116	165	197	134	209
2.2d			s/b	64	86	182	107	108	223	142	131	237
2.2b	Waimea Road	North of Beatson	n/b	1585	1114	1068	1639	1164	990	1582	1226	1154
			s/b	682	1072	1765	706	1059	1654	827	1122	1651
Screenline total flow			n/b	2920	2083	1863	2982	2195	1895	2786	2340	2265
			s/b	1226	1942	3109	1344	2066	3181	1663	2254	3151
% increase with respect to 2006			n/b	-	-	-	2.1%	5.4%	1.7%	-4.6%	12.3%	21.6%
			s/b	-	-	-	9.6%	6.4%	2.3%	35.6%	16.1%	1.4%

The above two tables indicate that at the northern (i.e. Wakefield Quay and Rutherford Street) ends of the two arterial routes between central Nelson and Stoke, there is considerable traffic growth in both the interpeak period and for the contra-peak direction in the AM and PM (commuter) peaks. However, there is little or no growth for the peak direction flows (those given in red) in the AM and PM peaks, with a decrease in traffic on Wakefield Quay in the AM peak and Rutherford Street in the PM peak in 2036 compared to 2006.

At the southern (i.e. Rocks Road and Waimea Road) ends, there is modest growth in the interpeak period but considerable growth in the contra-peak direction in the AM and PM peaks. Again there is negative growth for the peak direction on some routes, namely Rocks Road in the AM peak and Waimea Road in the PM peak.

As discussed earlier in the report, the peak hour flows on Waimea Road are likely to be approaching theoretical capacity. This is possibly one of the reasons that the flows along this road do not increase over the study period. However, as flows do not increase on other roads along this screenline it is also likely that the changes in land use over the study period are resulting in more trips locally and therefore a flattening of trips between Nelson and Stoke/Richmond.

Whilst traffic increases typically result in an additional peak hour trips in the peak direction leading to increased congestion, the above data shows that this is unlikely to happen. Instead, the increase will occur in the off peak direction or in the interpeak period. This will result in 'peak hour' volumes being present for more hours throughout the day, which may require different solutions than those that only cater for peak hour traffic congestion. More work on this area will be undertaken in subsequent stages of this study.

When consideration is given to the aging of the Nelson and Tasman populations, this reinforces the model results in regards to a decrease in peak hour travel to and from work, and an increase in trips in the interpeak period.

More analysis of the changes in land use and traffic volumes for the current model specifically in comparison to the model previously used for the North Nelson to Brightwater Strategic Study is presented in the Stage 1B report.

## 4.6 Public Transport Patronage

As shown in Table 4-3 above, public transport is envisaged to rise from 2006 levels to have an additional 60% on the commuter services in the 2016 AM peak (and this is therefore likely in the PM peak as well) and more than 100% in the interpeak. This is due to the introduction of 'Phase A' public transport measures as discussed earlier.

This increase in public transport trips, whilst significant, is not very large due to the car journey time for the trip between Nelson and Richmond not increasing significantly in future models. This results in the attractiveness of car journeys staying relatively high.

Further modelling was undertaken in regards to the change in public transport patronage as a result of implementing the Phase A improvements. The results of this are shown in the table below.

**Table 4-8 : Public Transport Patronage (trips per hour)**

Year	AM Peak		Interpeak	
	Existing PT	Phase A	Existing PT	Phase A
2006	143	197	72	91
2016	136	230	78	151
2036	134	256	82	182

The table shows that Phase A provides an immediate increase in public transport patronage and this patronage continues to increase in future years. This is compared to the existing public transport provision which would result in patronage remaining low and relatively static in the future.

It should be noted that these public transport patronage figures have been developed without modelling the likely impact of significant changes to parking pricing or availability and/or intensive travel demand management measures. Accordingly, higher patronage could be expected should these measures be implemented.

#### **4.7 Impact of fuel prices**

No specific modelling of significant fuel price changes has been undertaken to date. This will be done prior to Stage 3 of the study and will be reported in that stage.

#### **4.8 Overview of Modelling Results**

The key points of note from the modelling are:

- The transport model has been significantly updated to reflect the most recent census data, current land use projections and network improvements. This model has been calibrated and validated by the modeller and peer reviewed by MWH.
- Projected population figures from the Councils show that contrary to recent history, the bulk of the increase in population is likely to occur in Nelson and Stoke, rather than Richmond and Tasman.
- Forecast land use changes show that the majority of new jobs are likely to be in Richmond and Tasman rather than Nelson. Those new jobs that are in Nelson are likely to be predominantly in south and west Nelson and Stoke, rather than in the Nelson CBD.
- Overall a 26-28% increase in trips over the entire network is forecast from 2006 to 2036
- A significant increase in vehicle kilometres travelled is predicted within the model study area; however the average trip length is less in the AM and PM peaks.
- In relation to the arterial routes between Nelson CBD and Annesbrook, the screenlines show a significant increase in traffic in the interpeak periods and in the off peak direction in the AM and PM peaks in future years. However, little or no increase in vehicles is predicted by the model for peak direction travel along the current arterial routes in Nelson.

The reasons for these results have been further investigated by comparing the land use assumptions and current results with the previous model used for the North Nelson to Brightwater Strategic Study and are presented in the Stage 1B report.

## 5 Assessment of Existing Arterial Routes

An assessment of the existing situation was undertaken in regards to five specific areas:

- Economics
- Noise
- Social
- Air Quality
- Water Quality.

### 5.1 Economics

The economic impact report is attached as Appendix D. A summary of the main points in relation to the existing and the future do-minimum scenario is presented below.

#### 5.1.1 Current Situation

The economic impact report states that the Statistics New Zealand estimates give the 2009 population in Nelson City as 45,000 and in Tasman District as 46,800. Tasman's population has grown faster than Nelson's in recent years and it has been the larger of the two since 2003. Since 2006, population in Tasman is estimated to have grown at a rate of 0.7% per annum and in Nelson by 0.5% per annum. This compares to a rate of 1.0% for New Zealand as a whole.

Despite Tasman's population growing faster than Nelson's in recent years, employment growth in Tasman has in fact fallen by 1.6% over the last five years, whereas employment in Nelson has grown by 2.5%. This has occurred because of the contrasting fortunes of various industries within the region.

The region's employment by industry is highlighted by its significant reliance on primary sector industries. For the combined Nelson/Tasman region the number of jobs in this industry group was 5,830 or 14% of the region's workforce. This compares with 6% at the national level.

Manufacturing (4,940), construction (2,830), wholesale trade (1,500) and retail trade (4,770) also have significant levels of employment, although less than the primary sector.

Tourism, which is reflected by employment in the accommodation and food service industries, increased by 40% from 2000 to 2009 to 3,550 jobs. It accounted for only 8% of the workforce, which is slightly more than the 7% for all New Zealand. Whereas the accommodation and food services workforce for Nelson/Tasman region accounts for 2.7% of the national workforce in this industry, the region accounts for 2.1% of the population. Accordingly, whilst tourism is an important industry for the region it is not as significant as for other parts of the country, where the percentages differ by greater amounts.

#### 5.1.2 Future Situation under a Do-Minimum Scenario

The economic assessment highlighted that recent trends suggest faster population growth in south Nelson and Tasman District, but increasing employment in and around the Nelson CBD. Current land use projections (see Section 4 – Transport Modelling) would see an alteration to this trend. However, enhancement of arterial routes may accentuate the current trend.

Although the current modelling states that congestion on the arterial routes is not likely to increase further during the study period, the economic analysis noted likely impacts if congestion was to become problematic. This includes other changes to land use so that the route between Nelson City and Annesbrook is avoided, such as additional residential development north of the city centre which would use less congested routes to the CBD or increased employment in south Nelson or Tasman closer to those residential areas. It may also result in businesses deciding not to locate within the Nelson CBD

and/or affect the competitiveness of the region's primary product exports using Port Nelson which could have an influence on employment.

Greater congestion on the Rocks Road route might also drive some hospitality land uses (e.g. accommodation, restaurants, bars and cafes) into Nelson's Central City area.

In summary, this means that an increase in congestion could ultimately result in lower employment for the Nelson and Tasman regions generally and/or encourage employment growth in Richmond or elsewhere in Tasman at the expense of employment growth within Nelson City.

Transport economics (i.e. travel time and vehicle operating costs) have been determined by the current model and will be used to determine the benefits of the options in Stage 3 of the study.

The economic impact of the closure of Rocks Road in relation to sea level rise and storm surges has been identified as an issue and more investigation will be undertaken into this area later in Stage 3 of the study.

## **5.2 Noise**

The noise impact report is attached as Appendix E. A summary of the main points in relation to the existing and the future do-minimum scenario is presented below.

### **5.2.1 Current Situation**

The noise assessment determined that the two existing arterial routes already have a noise environment characterised by the high traffic flows. The current land uses along the routes would exhibit some sensitivity to increased traffic; however, these land uses have developed over time in the presence of significant amounts of road traffic noise and noise from other sources.

### **5.2.2 Future Situation under a Do-Minimum Scenario**

The report predicts that if traffic volumes increase in accordance with the model outputs, a modest 10% growth in the number of "adversely affected" properties is likely. This is made up of 5% due to increased traffic flow, and 5% due to possible in-fill housing and possible apartment developments within the areas affected by 55dBA or greater from the existing routes.

## **5.3 Social**

The initial social impact report is attached as Appendix F. A summary of the main points in relation to the existing and the future do-minimum scenario is presented below.

### **5.3.1 Current Situation**

The initial report states that the issues most often raised by the community as being the main effects from the existing arterial routes were:

- Severance, especially along Rocks Road, through Tahunanui and on Waimea Road
- Safety, especially for pedestrians and cyclists
- Air pollution, specifically in Tahunanui
- Amenity value of the waterfront
- Travel delays on Waimea Road and at the Tahunanui signals
- Noise through Tahunanui and on Rocks Road

Submissions and interviewees also identified factors that were perceived to contribute to traffic issues. The most commonly raised factors were:

- peak hour congestion, which was considered to be exacerbated by a lack of efficient alternatives to using private vehicles for getting to work, and traffic generated by driving pupils to and from schools and preschools
- poor quality and low uptake of the existing public transport system (bus services)
- inadequate provision of cycling and walking routes which makes these alternatives dangerous and/or unattractive
- a lack of incentives for private motorists to adopt alternate transport measures
- no bypass for the central city
- growth in commuter distances as residential development spreads into rural areas – this was associated with a perception of a lack of coordination/integration in land use planning and transport provision for commuters between Nelson City Council and Tasman District Council
- heavy traffic on Rocks Road creates severance and amenity issues
- lack of an arterial road to support the significant population growth in the region.

### **5.3.2 Future Situation under a Do-Minimum Scenario**

Severance and risks to safety for pedestrians is an issue that is likely to increase on both corridors due to increasing traffic volumes unless more pedestrian crossings are provided. Real or perceived risk for pedestrians is likely to be a factor in the increasing number of parents choosing to drive their children to school. This trend will continue if safe and accessible alternative methods of transport and pedestrian infrastructure are not provided. Additional pedestrian crossings may help reduce the sense of severance and increase safety but these will act to slow traffic flows which some motorists already regard as a problem during peak periods.

Rat running is already occurring as motorists seek to avoid more heavily trafficked areas by diverting through residential streets. This is likely to continue into the future and may increase as traffic volumes increase during the inter-peak period.

Increasing traffic volumes (particularly heavy traffic) on Rocks Road could impact on the potential of this area to be developed for passive recreation and as an area with high aesthetic values. It is possible that measures which separate the walk and cycleway from the road could improve the current situation and enhance the recreational potential of this area but this is likely to be at the expense of historic features which currently add to the amenity of this area. Aspirations for this area and the options available for achieving those are issues that will need to be considered in more depth during the social impact assessment and community consultation processes.

## **5.4 Air Quality**

The initial air quality report is attached as Appendix G. A summary of the main points in relation to the existing and the future do-minimum scenario is presented below.

### **5.4.1 Current Situation**

The air quality assessment analysed the existing situation with respect to PM<sub>10</sub> concentrations (the widely accepted yardstick for urban air quality) and monthly trends in those concentrations for the airsheds around the study area. It determined that existing data is well established and provides a strong and detailed baseline data set against which to assess the air quality impacts of the various options to be considered for the Nelson Arterial Route. Almost two years of PM<sub>2.5</sub> data from the St Vincent St monitoring site have also been compiled and this will be made available to the study members after the finalisation of the monitoring report.

The data clearly shows elevated PM<sub>10</sub> levels in winter months. The maxima and averages in the winter months are 50% higher in Airshed A (which includes Waimea Road) as compared to Airshed B (which includes Tahunanui and Annesbrook Drives).



The reduction in PM<sub>10</sub> concentration maxima in 2009 to almost half of the 2001 levels is most striking in the St Vincent St data and the average PM<sub>10</sub> concentration has also halved.

The yearly data for the composite monitoring sites in Airshed B are more complex. There is a general downward trend in annual maximum concentrations and in the annual average concentrations, although there are obvious contradictions, particularly in the 2005, 2006 and 2007 maxima. The last two years have shown an essentially constant PM<sub>10</sub> concentration in this Airshed.

#### **5.4.2 Future Situation under a Do-Minimum Scenario**

The continuing trend in PM<sub>10</sub> concentrations, as the widely accepted yardstick for urban air quality in Nelson City, is for a gradual reduction. The chief contributors have been changes to the rules concerning domestic fires contained in the Nelson Air Quality Plan, upgrades of industrial discharges (especially coal-fired boilers being replaced by diesel-fired alternatives) and a ban on open burning.

A smaller contributor to the reduction in PM<sub>10</sub> concentrations, and an associated inferred general improvement in general air quality in Nelson City, will be that the total pollutant emissions from vehicular traffic are inevitably trending downwards. This is well established nationally and internationally and is related to various factors, including a generally newer and more efficient vehicle fleet, the associated retiring of older (and more polluting) vehicles, changes to fuel and road surface specifications, and various other factors.

As the population increases there will be an associated increase in vehicle numbers on the City's roads. If the status quo is maintained and no new route is constructed, the existing through-routes along SH6 (Rocks Road and Tahunanui) in Airshed B, and along Waimea Road in Airshed A, will be subjected generally to increased total vehicle exhaust emissions.

Thus, while emissions from the vehicle fleet itself will trend downwards on a per-vehicle basis, the other effects associated with increased total vehicle numbers, overall congestion of through-routes or, more particularly, feeder roads, and decreased traffic speeds with greater emitted pollutant concentrations as a result, will have a nett effect of increasing emissions of (particularly) PM<sub>10</sub> (and finer) particulate in Airsheds A and B through which the two existing routes pass.

It is however not possible, based on existing data and various uncertainties which exist, to quantify the extent of this nett contaminant concentration increase. However, it will be possible, in at least a semi-quantitative manner, to assess and rank the expected air quality impacts of the various options to be considered against the do-minimum in Stage 3 of the study.

### **5.5 Water Quality**

The initial water quality report is attached as Appendix H. A summary of the main points in relation to the existing and the future do-minimum scenario is presented below.

#### **5.5.1 Current Situation**

The water quality assessment identified the inland watercourses which are affected by the two arterial routes. It noted that all of the identified watercourses have been affected to some degree by structures associated with the existing arterial routes and by stormwater runoff from the road surfaces. However it also stated that the cumulative effects of urbanisation of the wider Nelson area have significantly reduced the ecological functions of some water bodies, with the contribution from the existing arterial routes making up only a small proportion of these modifications.

Stormwater runoff from road surfaces typically carries elevated concentrations of copper, zinc and PAHs which are potentially toxic to aquatic organisms. Studies in Nelson and elsewhere in New Zealand (i.e., Waitamata Harbour, Wellington Harbour) highlight the risk of these contaminants accumulating in riverine and marine sediments and eventually reaching concentrations which adversely affect the benthic ecology. The risk is highest where high traffic volumes occur next to a low energy receiving environment (semi

enclosed estuary or sheltered embayment). The modest traffic volumes in Nelson compared with Auckland and Wellington coupled with the moderately exposed characteristics of Tasman Bay would suggest that the risk of toxicity in Tasman Bay is relatively low. However, there is already evidence that contaminants in the lower reaches of the Maitai River and some of Nelsons urban streams are at levels that may adversely affect the benthic biota

### **5.5.2 Future Situation under a Do-Minimum Scenario**

Traffic volumes on the arterial routes through Nelson are projected to increase by up to 23% over the next 30 years indicating a potentially increasing rate of contaminant input to these watercourses in the medium term. This is not expected to have a major impact on the receiving environment but will still be compared to the other options that will be assessed as part of Stage 3 of the study,

## 6 Proposed Assessment Methodology

### 6.1 Multi-Criteria Analysis

A multi-criteria approach will be used in the assessment of alternative scheme options. Multi-Criteria Analysis (MCA) provides a traceable and justifiable means of exploring preferences amongst different options.

Using this method, selection of a preferred scheme option on this project will be guided by assigning scores to each of the short-listed options over a set of chosen criteria which cover all issues of concern. Criteria can cover both tangible (e.g. economic) factors and intangible (e.g. environmental and cultural) factors. It can also take into account short, medium and long-term considerations. The overall preferred scheme option will then be identified by forming a weighted sum of the option scores. The criteria and weights will be derived at one or two of the Decision Making Team workshops prior to the short listed options being selected. The final scores for each option against each criterion will be determined by the Decision Making Team after gaining all information from the technical experts and the consultation process.

In the MCA process, the scores may be seen as surrogates for measures of value for the criteria, allowing the effects of diverse criteria, with different units, to be combined. The weights represent beliefs about what is important in a particular situation or to a particular group of decision makers.

The scoring and weighting methodology is further described in Figure 6-1 below.

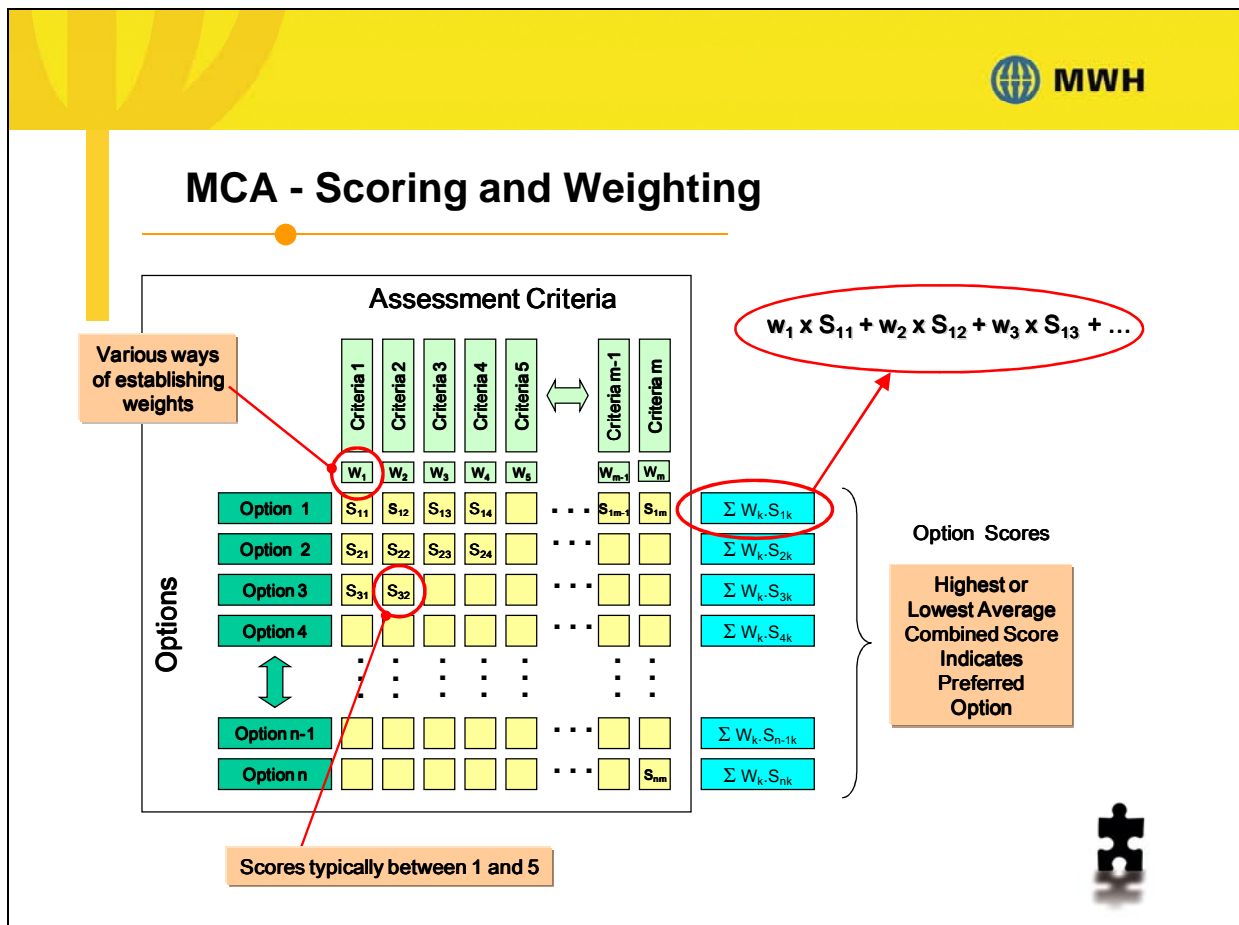


Figure 6-1 : Scoring and Weighting Methodology

## 6.2 Assessment Criteria

The assessment criteria should be scoped to reflect matters that are important within the Resource Management Act, Land Transport Management Act and Local Government Act, taking into account the decision criteria that will eventually be brought to bear through the Environment Court and funding agencies. They should be able to be categorised across all of the "four well-being" considerations - social, environmental, cultural and economic, which are foundation considerations in the Local Government Act.

To satisfy NZ Transport Agency funding requirements, the options will need to be assessed by determining the following:

- Strategic Fit of the problem, issue or opportunity which is being addressed. Guidance on this is given in the NZ Transport Agency Planning Programming and Funding Manual; however, this will be the same for all options.
- Effectiveness of the option. This considers how the option contributes to the purpose of the Land Transport Management Act and the Government Policy Statement on Land Transport Funding objectives.
- Economic efficiency of the option. This is primarily the benefit cost ratio, calculated in accordance with the NZ Transport Agency Economic Evaluation Manual.

In regards to the effectiveness of the option, the Land Transport Management Act, New Zealand Transport Strategy and the Government Policy Statement on Land Transport Funding all refer to the following five objectives:

- Economic Development
- Safety and Personal Security
- Access and Mobility
- Public Health
- Environmental Sustainability

In addition, Nelson City Council has also requested that the options be assessed against a "Community Wellbeing" assessment factor. This would determine how well the options contribute to the outcomes presented in the Community Plan. These are:

- Healthy Land, Sea Air And Water
- People-Friendly Places
- A Strong Economy
- Kind, Healthy People
- A Fun, Creative Culture
- Good Leadership

However, ideally, there should be approximately ten criteria for the Multi-Criteria and no more than twelve. Accordingly, a suggested first cut is as follows:

- Impacts on cultural/heritage values - tangata whenua and heritage (Cult)
- Impacts on natural qualities/values in affected areas (Env)
- Co-benefits (Env/Soc)
- Urban form, long term community development impacts (Soc)
- Impacts on present communities – physical; including road safety, air quality and noise (Soc)
- Impacts on present communities – social (Soc)
- Impacts on present communities – economic development and growth, freight routes and business accessibility (Econ/Soc)
- Adaptability/scalability in medium/long term (Soc/Econ)
- Capacity (Econ)

- Cost / Affordability (Econ)
- Economic Efficiency / BCR (Econ)

Each of the above incorporates a multitude of factors, and will be carefully defining following a group discussion with the Decision Making Team. Such a discussion may, of course, throw up other important criteria, and/or remove some of the above. After this discussion the project team will refine and define the list with a mind to have the Decision Making Team sign off on a final list of criteria in April.

## 7 Consultation Strategy

### 7.1 Overall Purpose

The brief for the Arterial Traffic Study places great importance on consultation with one of the three essential aspects of the study being:

*“that Community engagement is of a high standard and the Community is presented with the information necessary to enable it to clearly understand the decisions made”.*

### 7.2 Community Interest

The project already has wide public interest around the Nelson and Tasman regions. The last time the public were consulted on this subject as part of the North Nelson to Brightwater Strategic Study, over 5,600 submissions were received. In addition, the project was discussed in local newspapers throughout the consultation period and this has continued on a sporadic basis over the last couple of years with a recent increase in media coverage in January and February 2010.

### 7.3 Consultation and Communication Methods

Specific consultation activities are planned for the various stages of this study, as follows:

#### 7.3.1 Stage 1

The Nelson public have already been subject to a number of ‘scoping’ consultations. There will therefore be little point in again widely consulting on current issues and problems. To this end, we will only undertake targeted consultation with key stakeholders and community groups in Stage 1 of the study and this will be reported through the Social Impact Assessment.

#### 7.3.2 Stage 2

No specific community consultation will be undertaken during Stage 2

#### 7.3.3 Stage 3

The second part of the consultation will be undertaken during Stage 3 of the study where analysis of the final options is being undertaken. Targeted consultation will be undertaken with stakeholders and community groups as part of the social and economic impact assessment processes. In addition, we will also undertake deliberative decision making workshops where representatives of a wide range of stakeholder groups will be invited to participate in helping the Decision Making Team identify the preferred option. These workshops will be undertaken instead of open days or public meetings to prevent information being misconstrued and to ensure participants have the information necessary to fully understand the issues and deliberate on the merits of the various options. The workshop will also enable the decision-makers to gain an improved understanding of the views, interests and values of the various groups represented. A preliminary list of stakeholders is provided later in this section; this list only includes those organisations seen to have a constituency. Others may be added as a result of the consultations undertaken during the social and economic impact assessment process.

#### 7.3.4 Stage 4

Advising the public on the results of the study will be undertaken by Nelson City Council at the end of the project.

### **7.3.5 Ongoing public liaison**

For the general public, we propose to keep them informed throughout the study by having a webpage on the Nelson City Council website and through articles in Live Nelson. In addition to this, it is suggested that Nelson City Council prepare an information poster outlining the study process and providing reference to the webpage. This poster will be distributed to venues frequented by the general public including the public libraries in Nelson and Tasman, CAB offices, and other venues recommended by the City Council's Community Policy and Planning Advisor.

Updated information will be presented to the public regularly, at least at the end of each of the study phases, to ensure that accurate, relevant and up-to-date information is provided. The webpage will allow the general public and interest groups to provide feedback to the study team and will also incorporate a "Frequently Asked Questions" section.

## **7.4 Public Contact**

With the exception of the one-to-one meetings being undertaken as part of the social and economic impact assessment work streams and the deliberative decision making workshops, all contact with the public will be undertaken through the Nelson City Council project manager, Andrew James. Queries about the consultation process will be forwarded to the MWH project team for a response.

For each piece of correspondence, Andrew will decide whether or not to respond directly to the person or place the question with an appropriate answer on the Council's Arterial Traffic Study webpage. The MWH project team will assist Andrew in responding as appropriate.

## **7.5 Who Should be Consulted?**

### **7.5.1 Decision Making Team**

The following stakeholders are present on the Decision Making Team:

- Nelson City Council
- Tasman District Council
- NZ Transport Agency
- Nelson Marlborough District Health Board (for the purpose of undertaking a Health Impact Assessment).

### **7.5.2 Social Impact Assessment**

A list of stakeholders who were approached for feedback as part of the scoping stage of the social impact assessment is given below. No attempt was made to contact all interests groups or affected parties, just a cross section of those parties. The purpose of this phase was to identify, and to some extent quantify, the potential social effects of the various options, people's reasons for particular preferences and the range of views on traffic and transport issues held by different groups in the city.

- Bicycle Nelson Bays
- Community and Health Centre
- Enner Glynn School
- Heritage Advisory Group
- Nelson City Council Community Policy and Planning
- Nelson City Council Transport and Safety Co-ordinator
- Nelson Cycle Trails Trust
- Nelson Intermediate School

- Victory Kindergarten
- Nelson South Kindergarten
- Nelson Residents Association
- Nelson-Tasman Living Streets
- Nelsust
- Save Nelsons Waterfront and Rocks Road Association
- SBL Group
- Sustainable Transport Futures
- Tahunanui Primary
- Victory Primary School
- Waimea Road Business and Residents Association
- Y Kids

As part of Stage 3 of the Study some of these groups will be contacted again in regards to the options that are being considered as well others shown below whose interests are also likely to be affected by the outcomes of the study.

- Boathouse Society
- Friends of Nelson Haven
- Grey Power
- National Council for Women
- Nellie Nightingale Library
- Nelson Multi-Cultural Centre
- Nelson Tasman Civil Defence Emergency Management Group
- Nelson Youth Council
- Port Nelson
- Positive Aging Forum
- Tahunanui Business Association
- Tahunanui Community Centre
- Tasman Regional Sports Trust
- Victory Community and Health Centre
- Victory Residents Association
- Walk Nelson Tasman
- Waterfront Association
- Waterfront Redevelopment 2000 Trust
- Yacht Club

### **7.5.3 Economic Impact Assessment**

A number of groups with economic and business interests will also be approached during Stage 3 of the study. This will include:

- Latitude Nelson
- Motel Association
- Nelson Airport
- Nelson Forests Ltd.
- Nelson Tasman Chamber of Commerce
- Nelson Regional Economic Development Agency
- Port Nelson
- Road Transport Forum
- SBL Group
- Tahunanui Business Association
- Waimea Road Business and Residents Association



#### 7.5.4 Deliberative Decision Making Workshops

A preliminary list of those parties which are likely to be invited to the deliberative decision making (DDM) workshops is provided below. This list is based on the invitees to the Transport Forum workshops which were undertaken at the end of the North Nelson to Brightwater Study. It is important that the attendees represent the wide range of interests and parties affected by the various options and for that reason the list is likely to be expanded in response to the findings of the social and economic impact assessments. The final list will be approved by the Decision Making Team before Stage 3 of the study, although parties may be added or removed at the discretion of Nelson City Council.

- Automobile Association
- Bicycle Nelson Bays
- Greypower
- Nelson City Council
- Nelson Marlborough District Health Board
- Nelson Regional Economic Development Agency
- Nelson Residents Association
- Nelson Tasman Chamber of Commerce
- Nelson Youth Council
- Nelsust
- NZ Transport Agency
- Road Transport Forum
- Sustainable Transport Futures
- Tahunanui Business Association
- Tahunanui Community Centre
- Tasman District Council
- Victory Community and Health Centre
- Victory Residents Association
- Waimea Road Business and Residents Association
- Walk Nelson Tasman
- Waterfront Association

It is important to note that individual residents and businesses will not be invited to the workshops; their interests should be conveyed by an overarching organisation.

Two workshops are proposed for the DDM process. The workshops will:

- provide a brief outline of the work undertaken on the study to date including the reasons for undertaking the study, the short-listing process and the Stage 3 effects assessments. The workshops will aim to get agreement on the source and extent of the problem that the arterial study is seeking to address.
- discuss the positive and negative aspects of the options being investigated and aim to gain a strong degree of consensus around those effects.
- obtain agreement on the mitigation measures that would be required for each of the options.
- depending on the extent of goodwill generated by the workshops and the willingness of parties to continue engaging, the workshops will aim to gain a strong degree of consensus on the best solution to Nelson's traffic issues.

It is intended that the workshops will be run at least one week apart to allow sufficient time for the parties to 'process' the information and views from the first workshop and for the project team to work out the answers to questions put to the project team from the participants that were not able to be answered in the workshop.

## 7.6 Iwi Consultation

We will be undertaking initial consultation with iwi early in the project, to identify what concerns and suggestions they have about the transport system configuration between Annesbrook and QEII/Haven Road roundabouts. Discussions will include early identification of cultural or waahi tapu sites.

We will prepare information and supply to Tiakina te Taiao (iwi liaison group which includes four of the iwi affiliated to the Whakatū Marae – Ngāti Rārua, Ngāti Koata, Ngāti Tama and Te Ātiawa), prior to a meeting. The information will also be posted to the two local iwi, Ngāti Kuia and Ngāti Toa, which are not part of Tiakina. This will be followed up by a phone call or meeting.

Early consultation will allow suggestions or issues to be considered at an early stage of the project. Once a short list of options is confirmed these can be presented to iwi, either at a Tiakina meeting or by post, followed by a discussion. The liaison group will also be invited to participate in the deliberative decision-making workshops should they feel that to be appropriate.

## 7.7 Timeframe

The following timeline is envisaged:

- |  |                 |
|--|-----------------|
| • Stage 1 social impact assessment consultation              | February 2010   |
| • Stage 3 social and economic impact assessment consultation | April-July 2010 |
| • Stage 3 DDM workshops                                      | August 2010     |

## 8 References

- Southern Link Decision C35 /2004
- North Nelson to Brightwater Final Technical Report
- Nelson Tasman Transportation Model Building Report September 2009
- North Nelson to Brightwater Model Building Report
- Nelson 2009-19 Community Plan
- Tasman Growth, Supply-Demand Model
- Nelson Urban Growth Strategy (NUGS Dec 2006)
- Nelson Resource Management Plan
- Tasman Resource Management Plan